# *Appendix C*
# *Wildlife Corridor Plan*

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# Irvine Wildlife Corridor Plan

Prepared For:

**City of Irvine**
**Orange County Great Park Corporation**
**Heritage Fields El Toro, LLC**

In Consultation With:

**U.S. Fish and Wildlife Service**
**California Department of Fish and Wildlife**
**Laguna Greenbelt, Inc.**
**Conservation Biology Institute**
**Natural Resources Defense Council**
**Endangered Habitats League**
**Friends of Harbors, Beaches and Parks**

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# I. INTRODUCTION

Heritage Fields El Toro, LLC ("Heritage Fields") and the Orange County Great Park Corporation ("OCGPC") are redeveloping the former MCAS El Toro base property ("Property"). When complete, the Property will include a mixture of urban uses, being developed by Heritage Fields, and a regional park known as the Orange County Great Park ("OCGP"), being developed by OCGPC. The Property will also include a wildlife corridor feature to facilitate the connection of the Limestone-Whiting Wilderness Park in the north to the Laguna Coast Wilderness Park and Crystal Cove State Park to the south ("Irvine Wildlife Corridor Feature" or "WLCF").

This Wildlife Corridor Plan ("WLC Plan") was developed in consultation with Laguna Greenbelt, Inc., the Natural Resources Defense Council, the Endangered Habitats League and the Friends of Rivers, Harbors and Parks ("Conservation Groups"), with the benefit of peer review by wildlife corridor experts ("Peer Reviewers") as described in Appendix D. The WLCP takes into consideration concerns expressed in comments by the Conservation Groups and the United States Fish and Wildlife Service and the California Department of Fish and Wildlife on the Second Supplemental EIR and the views and recommendations of the Peer Reviewers.

Prior planning exercises designated five segments of the WLCF. Segments 2, 3, and 4 were located within the Property. Segments 1 and 5 were located off the Property. One of these early planning exercises, the Irvine Wildlife Corridor Master Plan (Preliminary Draft) dated October 2001 ("2001 Corridor Plan"), located Segment 2 of the WLCF along the eastern edge of PA 51 between Irvine Boulevard and the Southern California Regional Rail Authority railway ("Railroad") and diverted flows from Borrego Canyon Channel downstream of Irvine Boulevard into the WLCF as shown on Figure 1. The 2003 OCGP EIR included a revised conceptual plan for the WLCF that diverted flows from Borrego Canyon Channel through Segment 1 via an undercrossing of Irvine Boulevard at Magazine Road and routed the corridor around then-existing golf courses that are no longer in use or required to be operational as part of the Heritage Fields development. Figure 2 depicts the location of the corridor as proposed in 2003. This concept considered the adjacent golf courses as buffer areas. Further refinements of the WLCF were discussed in *The Irvine Wildlife Corridor Plan* (Cotton/Bridges/Associates 2004) ("2004 Corridor Plan"). The 2004 Corridor Plan identified four target species for the corridor: coyote (*Canis latrans*, "Coyote"), bobcat (*Lynx rufus*, "Bobcat"), coastal California gnatcatcher (*Polioptila californica californica*, "Gnatcatcher"), and least Bell's vireo (*Vireo bellii pusillus*, "Vireo"). The 2003/2004 plans also revised elements of Segments 3 and 4 and outlined other design criteria and special requirements for all segments.

Final plans for Segment 1 were approved by the Army Corps of Engineers, the California Department of Fish and Wildlife (formerly the Department of Fish and Game) and the United States Fish and Wildlife Service in 2011 as part of the County of Orange's ("County") Alton Parkway mitigation project in the Alton Parkway Habitat Mitigation and Monitoring Plan (2011) ("Alton HMMP"), which is incorporated in this WLC Plan by reference. The Alton HMMP reduced previously planned, conceptual diversions of water in the ultimate condition from Borrego Channel into Segments 1 and 2. The County commenced construction of Segment 1 pursuant to the Alton HMMP in 2011 and completed construction in 2012.

In light of the change in the status of the golf courses, updated technical information including reductions to drainage flows from Segment 1 made as part of the Alton HMMP, as well as entitlements proposed by Heritage Fields, this WLC Plan presents refined design criteria and components for Segments 2 to 4. Figure 3 depicts the location of the corridor for the WLC Plan. While providing for the implementation of a corridor partially in a new location, the WLCF is consistent with the 2003 OCGP EIR (and subsequent eight Addenda, Supplemental EIR and Second Supplemental EIR) wildlife corridor planning goals of prior corridor plans, and with the goals, target species, and design concepts in the 2004 Corridor Plan.

As with the concept presented in the 2003 OCGP EIR and the subsequent Corridor Plans, Segments 2 and 3 of the WLCF consist of 132 acres to be owned by the City of Irvine and are depicted on Figure 4 (plan view) and Figures 5a & b (cross-sections). This WLC Plan restores the location of Segment 2 to the conceptual alignment adjacent to Borrego Canyon Channel shown in the 2001 Corridor Plan. Since no drainage feature currently exists below Irvine Boulevard, Segment 2, including the downstream connection to Borrego Channel, needs to be constructed before final modifications can be made to the Magazine Road undercrossing that conveys flows to Segment 2 in accordance with the Alton HMMP.

The objective of this WLC Plan is to establish a wildlife corridor that provides opportunity for movement from Irvine Boulevard to I-5 through the length of the Property for target species in a manner that allows demographic and genetic exchange between populations or subpopulations. Based on comments by the Peer Reviewers, the difficulty of wildlife crossing under the I-5 connection will likely prevent free flow of Bobcats and Coyotes from Segment 4 to the other side of I-5. Instead, more limited gene movement has been recognized as a more realistic target by the Peer Reviewers. This means enough dispersers each generation to transfer genes from one subregion to another: one Coyote about every 2-4 years, one Bobcat about every 3 years, and one Gnatcatcher every 2 years. Vireo gene flow will not be promoted by the corridor since the vireo is migratory and widely distributed in the vicinity. However, the corridor will provide live-in habitat for the Vireo and Gnatcatcher, contributing to their recovery within the subregion as well as range-wide, and the corridor may also provide intermittent live-in habitat for the Coyote and Bobcat.

The WLC Plan addresses Segments 2 and 3 as follows:

- Retains the previously planned upstream and downstream connections to Segments 1 and 3 South;
- Retains the previously identified target species;
- Provides site-appropriate vegetation for the target species;
- Allows for incorporation, in a natural low flow channel, of flows from the Magazine Road undercrossing at Irvine Boulevard consistent with the Alton HMMP;
- Minimizes light and noise intrusion from existing and proposed adjacent development through berms, screening vegetation, and other features;
- Retains road and/or trail crossings at Irvine Boulevard and Astor and provides for the opportunity for one other road/trail crossing location between Astor and the Southern California Regional Rail Authority railway ("Railroad") with appropriate wildlife movement undercrossings at the additional potential location;

- Provides for a wildlife impermeable fence along the interface with existing and proposed adjacent development;
- Changes an underground crossing at the Railroad to an at-grade crossing as suggested by the Peer Reviewers in light of design constraints;
- Provides dual covered wildlife crossings at Borrego Channel; and
- Allows for "permeable" fencing between development areas and the WLCF for Coyote and Bobcat movement should future monitoring determine that such fencing would be beneficial and safe.

Segments 3 South and 4 are depicted on Figure 6 in the same location as in the 2004 Corridor Plan. They will be vegetated with a similar plant palette as Segments 2 and 3, which is designed for the same target species. Segment 3 South (Figure 5a) incorporates the existing Serrano Creek Channel along its easterly edge with a berm along the western edge and will include an access ramp for wildlife into Serrano Creek. The remaining width of the WLCF in this segment will be vegetated with upland plants. A berm along the western edge will help minimize light and noise intrusion from adjacent development. No berm or screening vegetation is required on the eastern edge, as the existing grade separation will minimize light and noise intrusion. Screening vegetation will be used within Segments 3 South and 4 at the Alton/Barranca intersection only. Segment 4 (Figure 7a) includes an existing jurisdictional feature (Serrano Creek Channel) that will be reconstructed to serve as a storm drain and flood control facility in accordance with the *Amendment to the PA 51 and PA 30 Watershed Flood Control Master Plan* ("Master Plan of Drainage") and will also be designed to incorporate an area of the channel planted with native vegetation. Segment 4 will not incorporate berms, but grade separation between the channel and adjacent development on the east and west sides is planned and will protect the WLCF from light and noise intrusion.

Segment 4 will also include one vehicular crossing (Marine Way) and allow for a potential pedestrian crossing between the Alton/Barranca intersection and Interstate 5. The Marine Way undercrossing is anticipated to be a double-arch culvert (each 12 feet high and 32 feet wide). See Figure 11b. A potential pedestrian crossing with an appropriate wildlife undercrossing may also be located within Segment 4. The restored Serrano Creek Channel between Alton and Interstate 5 will require flowline stabilization (or bank stabilization similar to downstream reaches of Serrano Creek); however, this reach will have a soft bottom outside of stabilization areas. Regional storm water quality treatment facilities will be located within Segment 4, which would be planted with native vegetation consistent with the expected hydrological regime of the facilities and will be maintained in a manner that would be consistent with WLC Plan functions. Vegetation within the regional storm water quality treatment facilities would be site appropriate and would be conducive to the target species. Light and noise intrusion within this portion of the WLCF will be minimized through design features of the proposed adjacent development and grade separation between the corridor and adjacent development substantially as shown on Figures 7a and 7b. A wildlife impermeable fence along the interface with proposed adjacent development will be provided along the westerly side of Segment 3 South and along both sides of Segment 4. Figure 5c, 7a, and 7b depict the typical location of the fencing that will be incorporated into the design of the WLCF.

Once adopted, amendments to this WLC Plan must be approved by the City Council. The City Council will delegate to the Director of Community Development the authority to make non-material, technical amendments without City Council approval. Prior to actual construction, improvement plans, grading plans, and conceptual or precise fuel management plans will be submitted to, approved and permitted by the City.

## II. HISTORY OF THE WILDLIFE CORRIDOR FEATURE

The WLCF has been the subject of several planning exercises.

In December of 2000, the Laguna Canyon Foundation developed a concept plan for the wildlife corridor connecting the two NCCP reserve areas, Limestone-Whiting Wilderness Park in the north and the Laguna Coast Wilderness Park and Crystal Cove State Park to the south, acknowledging the reuse of the Property as an opportunity to provide a critical corridor link.

Following Laguna Canyon Foundation's concept plan, the City of Irvine authorized preparation of the Irvine Wildlife Corridor Master Plan. A preliminary draft plan prepared by CBA, Inc., the 2001 Corridor Plan, located the portion of the wildlife corridor that runs through the Property adjacent to the Borrego Channel.

The 2003 OCGP EIR concluded that "no evidence of a wildlife corridor was found during the biological survey of PAs 51 and 30" (p. 5.9-17). The 2003 OCGP EIR went on to state that there were "no Existing Use Areas or Special Linkage Areas within the project area," that no significant impacts would result and that no mitigation measures were necessary. Even so, the 2003 OCGP EIR also noted that "a wildlife corridor is desired by several public agencies including the City of Irvine, County of Orange, U.S. Army Corps of Engineers, USFWS, and CDFG." As such, it was agreed that a wildlife corridor feature would be included as part of the project. A feature is a part of the proposed project which creates benefits or positive environmental effects which would not otherwise be available. The 2003 OCGP EIR identified a different alignment for OCGP segments of the corridor. Consistent with the planning concepts at that time, the 2003 OCGP EIR located the portion of the proposed wildlife corridor through the Property between a proposed new golf course with residential overlay over the existing runways and an existing golf course adjacent to Borrego Channel. This corridor realignment facilitated keeping the existing golf courses open. Even though there were no impacts to wildlife movement associated with redevelopment of the Property, the 2003 OCGP EIR included a mitigation measure (BIO-3) for the City to work with the state and federal agencies regarding the wildlife corridor feature.

Following the certification of the 2003 OCGP EIR, the City of Irvine developed the 2004 Corridor Plan that showed the same alignment for the wildlife corridor as the 2003 OCGP Program EIR. For planning purposes, it divided the Wildlife Corridor into five segments. Segment 1 was offsite, north of Irvine Boulevard. Segments 2, 3, and 4 were within the Property.[1] Segment 5 was also outside of the OCGP south of Interstate 5. The plan graphically

[1] In the 2004 Corridor Plan, Segment 3 was bisected by the Railroad. In this WLC Plan, the portion of Segment 3 north of the Railroad has been realigned, while the alignment and configuration of the portion south of the

depicted a connection in Segment 2 to the proposed Agua Chinon restoration at its southerly end, but did not consider the grade changes and roadways planned for this area, the lack of hydrological connection between Agua Chinon and the proposed WLCF due to the fact that Agua Chinon drains into an Orange County Flood Control box culvert, or the lack of a northerly connection to open space areas under prior drafts of the plan or Heritage Field's project entitlements, all of which rendered the assumed connection of questionable biological value. The 2004 Corridor Plan identified four target species for the corridor (Bobcat, Coyote, Gnatcatcher, and Vireo), and designated four zones within the proposed corridor: a Core Zone that included a created channel for drainage conveyance which was to be the primary wildlife movement area; a Conservation Zone that was to buffer light and noise through screening vegetation; an Activity Zone that would allow for open space and recreational uses; and an Encroachment Zone that abutted the wildlife corridor and in which lighting and noise restrictions were deemed to be needed. The 2004 Corridor Plan also identified special development requirements ("SDRs") and a monitoring program.

As part of the ongoing OCGP master planning process, Fuscoe Engineering, in collaboration with Ecosystem Restoration Associates, produced the 2006 Wildlife Corridor Design Concept Plan ("2006 Concept Plan") for the OCGP. The 2006 Concept Plan used characteristics of the 2004 Corridor Plan and provided greater detail on design of the wildlife corridor feature. It was thought that sections of the existing Borrego Channel were inadequate for flood control purposes, and a diversion of up to 1,200 cfs was proposed. To accommodate these flows, the 2006 Concept Plan included a series of drop structures (up to 26) and flowline stabilization features. The 2006 Concept Plan incorporated the SDRs of the 2004 Irvine Wildlife Corridor Plan and advanced many of the physical design features necessary to complete the wildlife corridor feature. As the design of the WLCF becomes increasingly detailed, such detail could potentially render certain of the SDRs less important or superseded. On page 21 of the 2006 Concept Plan, this issue is specifically noted:

> *It should be noted that when the detailed design is done for the Wildlife Corridor, some of the SDRs may become less relevant or be supplanted by the final design. It is important to judge the final design against the purpose of the Wildlife Corridor and the intent of the SDRs.*

In 2011, the OCGP prepared the Wildlife Corridor 2011 Design Concept Update ("2011 Design Concept Update"). The purpose of the report was to present design criteria and components for the proposed wildlife corridor, taking into account the prior planning efforts, new information, and studies, including changes to the entitlement that were approved by the City in 2009 and 2011 and changes in hydrology from the approval of the Alton HMMP covering Segment 1 that eliminated the need for grade control structures by substantially reducing the flows that would be diverted from Borrego Channel. (The 2011 Design Concept Update noted that further updates were anticipated.)

The Peer Reviewers reviewed all aspects of the WLC Plan including its location, width, plantings, internal crossings and features, fire control measures, edge effects and in-corridor

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Railroad is unchanged. To distinguish between the different sections of Segment 3, this WLC Plan refers to the portion north of the Railroad as Segment 3 and the portion south of the Railroad as Segment 3 South.

maintenance of vegetation, channels, and storm water treatment facilities and concluded that the Plan would likely accommodate movement of all four focal species (Coyote, Bobcat, Gnatcatcher, and Vireo) from inland habitats southward through the entire length of the Property to the edge of I-5 and it is a biologically effective corridor between Irvine Boulevard and I-5. Two of the focal species (Coyotes and Bobcats) might be able to move beyond the project area (i.e., cross under I-5 to coastal natural areas) often enough (e.g., one Coyote every 2-4 years) to transfer genes from one region to another on either end of the corridor. The gnatcatcher could have passage over I-5 once every two years. The panel identified ongoing challenges for the long term success of the inland-to-coastal corridor (e.g., the I-5 crossing), but felt these challenges might be overcome with careful monitoring, innovation, and political will to find solutions by the various stakeholders.

In addition to serving the movement needs of specific target species, the Peer Reviewers identified numerous other biological values for the proposed corridor system. For example, native habitats restored within the corridor would serve as live-in habitat for native plants and animals, such as the Gnatcatcher, Vireo and coastal cactus wren and a suite of more common native avifauna, reptiles and small mammals. This could be a valuable environmental amenity and an educational opportunity for people in the City of Irvine.

The Peer Reviewers also emphasized the need for flexibility in addressing issues that may arise during and after implementation, which would depend on an effective corridor monitoring program. Monitoring use of the corridor by wildlife could be performed in part by local schools e.g., colleges and universities, citizen action groups, and local residents, thus presenting an educational opportunity and potentially imbuing the local community with a feeling of investment and ownership in this unique urban amenity. The proposed wildlife corridor plan could very well serve as a model for providing wildlife connectivity in a heavily urbanized landscape that will be emulated throughout California and elsewhere.

## III. DESIGN CRITERIA AND BIOLOGICAL FUNCTION OF THE WLCF

In general, wildlife corridors provide a variety of functions: 1) corridors provide linkages where connectivity is desired; 2) corridors provide opportunities for animals to move through the linkage without excessive risk, including risk of movement into "mortality sinks" (i.e., unsuitable areas with high mortality risk) and facilitate such movement; and 3) corridors allow demographic and genetic exchange between populations or subpopulations (Lyren et al., 2008)[2]. The Peer Reviewers, three of whom were authors of the above-referenced article, have determined that planning and conceptual design of the WLCF provides these corridor functions, while considering the surrounding existing and planned conditions.

[2] Lisa Lyren, R.S. Alonso, Kevin Crooks, and Erin Boydston. 2008. Evaluation of Functional Connectivity for Bobcats and Coyotes across the Former El Toro Marine Base, Orange County, California. Administrative Report, 179 pp. For additional information, contact: Center Director, Western Ecological Research Center, U.S. Geological Survey, 3020 State University Drive East, Modoc Hall, Room 3006, Sacramento, CA 95819.

## A. Segments 2 & 3

The following interrelated components of Segments 2 and 3 of the WLCF are addressed in this Plan.

- General Description and Location;
- Wildlife Crossings;
- Fencing
- Hydrology;
- Target Species;
- Vegetation; and
- Edge Effects.

### 1. General Description and Location

Figures 3 and 4 depict the location of Segments 2 and 3 of the WLCF. Segment 2 starts at the Irvine Boulevard undercrossing at Magazine Road and continues south along the eastern side of the former MCAS El Toro, adjacent to Borrego Channel. Segment 3 starts where WLCF crosses over Borrego Channel and continues south until it reaches the Railroad. Segments 2 and 3 of the WLCF range in width from approximately 485 feet to over 1,100 feet, with an average width of more than 600 feet. While not part of the WLCF, the existing Borrego Canyon Channel along the east side of the WLCF provides an additional buffer of approximately 60 to 80 feet.

This alignment has the same upstream (Segment 1) and downstream (Segment 3 South) connections as in the 2004 Corridor Plan and provides for a shorter length between the two connection points.

To ensure that relocation of the WLCF closer to the Borrego Canyon Channel and the adjacent existing development would not diminish the functions for the target species, studies were conducted to evaluate potential light spillage and potential noise impacts into the WLCF from sources to the east of the Borrego Canyon Channel. See Appendices A and B. Other measures are proposed to minimize light and noise effects within the corridor from future proposed development along the western side, as detailed below under Section III.A.7 (Edge Effects). There is expected to be no measurable impact on the target species due to light spillage or ambient noise levels from existing and proposed development.

### 2. Wildlife Crossings

Segment 1 is located north of Irvine Boulevard. It will connect to Segment 2 through a wildlife undercrossing at Magazine Road designed in accordance with the Alton HMMP. Segment 2 will have a wildlife undercrossing at Astor Street and an additional crossing may also be located between Astor Boulevard and the Railroad. Movement from Segment 3 to Segment 3 South will be facilitated by the installation of wildlife permeable fencing along both sides of the railroad tracks to allow for passage of Bobcats and Coyotes using an at-grade crossing for the reasons recommended by Peer Reviewers, which are discussed below. The crossing is subject to OCTA/Metrolink approval.

### a. Magazine Road (Segment 1 to Segment 2)

The existing undercrossing that allows vehicular traffic on the former Property to pass under Irvine Boulevard will be slightly reconfigured to maximize use by wildlife. The current undercrossing is depicted on Figure 8, Photographs 1 and 2. The current undercrossing has the following dimensions: approximately 128 feet long, 24 feet wide at the invert, and between 15 and 20 feet high. As depicted on the photograph, Coyotes and Bobcats would have unrestricted line of sight through the undercrossing making this feature ideal for Coyote and Bobcat movement. Following modification of Segment 1 in accordance with the Alton HMMP, native vegetation will be planted at the opening of the culvert at each end.

### b. Astor Road (Within Segment 2)

An undercrossing at Astor will be constructed with the grading of the wildlife corridor feature as there is no undercrossing currently at this location. Astor is planned to be a local road for development within the Property and will be designed according to City standards. The total length of the undercrossing is estimated to be approximately 140 feet. The undercrossing is proposed to be constructed as an arch culvert approximately 24 feet wide by 8 feet high with a dry shoulder within the crossing to facilitate movement when the channel is flowing. This was done at the suggestion of the Peer Reviewers. A center portion of the culvert (approximately 8 feet wide) would remain hardened to adequately convey storm water flows and resist erosion, but would also be textured to convey a natural feel. The remaining areas along the center section can remain as a soft bottom and will be raised above the flow path. Native vegetation would be planted at the opening of the culvert at each end. The proposed crossing is depicted in Figure 9.

### c. Potential Future Road/Trail Crossing (Within Segments 2 or 3)

Segments 2 or 3 may have an additional road/trail crossing between Astor and the Railroad, which will be designed to accommodate wildlife movement in a manner generally consistent with the design for Astor Road as depicted in Figure 9. The specific design of the wildlife movement elements of the road/trail crossing (height to width ratio, substrate and proximity to other crossings) will be reviewed by the City and Peer Reviewers.

### d. Vegetated Cover over Borrego Canyon Channel (Segment 2 to Segment 3)

In order to provide for a crossing over the Borrego Canyon Channel, which is an existing concrete channel along the length of Segment 2 of the Wildlife Corridor Feature, two approximately 50-foot wide covers will be installed over the Borrego Canyon Channel. Soil will be placed on the cover to blend into the adjacent grades and will be planted with shallow rooted native grasses and shrubs from the coastal sage scrub plant palette listed below. Funnel fencing will be provided to direct movement into the covered areas. The proposed crossings are depicted in Figure 11a. These crossings will require coordination and approval from OCFCD. The dual crossings were added at the request of the Peer Reviewers to better use the land on the southeastern side of the Borrego Channel and to enhance connectivity

through redundancy. Artificial dens as shown on Figure 4 may be provided in Segment 2 to provide escape habitat for Coyotes and Bobcats at limited locations.

#### e. Railroad (Segment 3 to Segment 3 South)

A wildlife permeable fence would be installed along both sides of the Railroad tracks within the limits of the wildlife corridor feature that would allow passage of Bobcats and Coyotes while precluding human access. The proposed fencing is depicted in Figure 10. The specialized fencing will require coordination and approval from OCTA/Metrolink. A dirt path will be constructed through the scrub vegetation on either side of the Railroad to funnel Bobcats and Coyotes to the crossing areas. The at-grade Railroad crossing was added at the suggestion of the Peer Reviewers, who explained that Bobcats and Coyotes are both known to cross such features, that mortality risk was low, and that an at-ground crossing was preferable to a tunnel under the Railroad because it was more likely to be used.

### 3. Fencing

With the exception of the permeable fencing at the Railroad crossing noted above, a wildlife impermeable fence will be installed along the property line boundary between the development and the corridor to prevent Bobcats and Coyotes from entering adjacent residential areas or areas of the park, where they could be subject to vehicle collisions or other sources of harm. Existing fencing along Borrego Channel is expected to keep wildlife from entering the existing developed areas east of Segments 2 and 3. The fencing will also serve to restrict unauthorized public access and to prevent domestic animals from entering the corridor, where they could harm native avifauna, small mammals, amphibians, or reptiles. Wildlife impermeable fencing will be a minimum of 6 feet above ground and will extend a minimum of 18 inches below the surface. Because such wildlife impermeable fencing would also prevent Bobcats and/or Coyotes from entering the WLCF from development areas in the unlikely event that Bobcats and Coyotes would reach developed areas, it could be determined at a future date, based on biological monitoring, that focused areas of permeable fencing are desirable. The determination that wildlife permeable fencing be installed for the benefit of Bobcats and/or Coyotes, would be weighed against the potential adverse effects associated with allowing domestic cats into the corridor, which could have a substantial impact on native avifauna, small mammals, amphibians, or reptiles, and other urban/wildlife interface issues.

### 4. Hydrology

The hydrology for the Wildlife Corridor Feature will be consistent with the Master Plan of Drainage and the Alton HMMP approved by the United States Army Corps of Engineers, the California Department of Fish and Wildlife and the United States Fish and Wildlife Service. The Alton HMMP requires the County to construct a low-flow splitter in Borrego Canyon Channel that diverts to Segment 1 approximately 53 to 96 cfs in 10-year storm events and up to 112 cfs during a 100-year storm event. Before Segment 2 of the WLCF is constructed and ready to accept flows, the diverted flows in Segment 1 are being captured and returned to Borrego Canyon Channel.

When Segment 2 is constructed and ready to accept flows, the Alton HMMP describes the reconfiguration of Segment 1 into its ultimate condition. In the ultimate condition, Segment 1 is

to be reconfigured to deliver low flows under Irvine Boulevard via the Magazine Road underpass using a weir, open channel or piping. Additional runoff for the corridor is anticipated to come from rainfall within the corridor footprint itself and maybe further supplemented by treated stormwater from adjacent development.

The constructed low-flow drainage area within Segment 2 will be approximately 30-60 feet wide within an overall channel width of 150-200 feet. The width of the low flow drainage area is planned to be adequate to accommodate flows without the need for flow-line stabilization or armoring. See Figure 7a. The channel depicted in the WLC Plan supports native riparian habitat, described below, that is typically used by Vireo for foraging and breeding and is also used by the Gnatcatcher for foraging, particularly during the summer and fall, when the coastal sage scrub is in dormancy. See Figures 4 and 4a. Flows will be returned to the Borrego Canyon Channel near the wildlife crossing of the flood control channel in the lower portion of Segment 2.

The design has the flexibility to allow, at the option of the developer, discharge of treated storm water to Segments 2 and 3 of the WLCF. The additional water could benefit riparian vegetation. No water quality treatment facilities will be located in Segments 2 and 3 of the WLCF.

### 5. Target Species

The 2004 Corridor Plan identified four target species for the corridor: Bobcat, Coyote, Gnatcatcher, and Vireo. The planting scheme for Segments 2 and 3 of the WLCF provides vegetation for the target species. As set forth below, Segment 2 of the WLCF includes riparian vegetation associated with the low-flow channel, then Segment 2 transitions to upland vegetation such as coastal sage scrub and southern cactus scrub. Segment 2 also includes screening vegetation along the eastern boundary. Segment 3 will include a limited area of riparian vegetation, in a small constructed channel as depicted on Figures 4 and 4a.

### 6. Vegetation

The following vegetation associations will be used for Segments 2 and 3 of the WLCF. A description of each association is provided below including discussion of how each vegetation association supports the target species. A 25-foot wide unplanted area for various purposes (i.e., fire, maintenance) will be located adjacent to the property line along the Borrego Canyon Channel, as shown in Figures 5a and 5b. The access area will be inside the impermeable fencing and will be gated and locked to prevent public access. Except as provided below, fire safety issues in this WLC Plan are being addressed within the WLCF. Adjacent development will have a fuel management area and a set-back zone to mitigate for wildland interface fire hazards, as shown in Figure 12. Within the WLCF, fuel management, thinning and physical barriers in the 30-foot-wide Special Maintenance Area shown in Figure 12 will provide appropriate protections for adjacent areas that interface with the WLCF.

#### a. Riparian Vegetation

Mulefat scrub and southern willow scrub, combined, will comprise the riparian vegetation that makes up the central component of Segment 2 between Irvine Boulevard and the

Borrego Canyon Channel and will provide suitable vegetation for Vireo breeding as well as areas for movement and foraging for the Bobcat, Coyote and Gnatcatcher. See Figure 4.

The reach of Segment 2 extending from Irvine Boulevard to the Borrego Canyon Channel crossing will include a low-flow channel of approximately 30-60 feet within a 150- to 200-foot-wide channel that will carry flows originating within the watershed for Segment 2 as well as flows coming from north of Irvine Boulevard that are discharged through the Alton Parkway segment of the WLCF. Figure 5a is a typical cross-section. During peak events, the water surface is estimated to be approximately six inches deep across the 150- to 200-foot-wide channel. The wetter portions of the channel will be vegetated with two riparian types: mulefat scrub and southern willow scrub, ranging from about 30- to 60-foot in width as depicted on Figure 4. Segment 3 will include a limited area of riparian vegetation as depicted on Figure 4. The riparian vegetation would be used by all four of the target species. No defined channel would be included in Segment 3. Figure 5b is a typical cross-section.

The southern willow scrub is a slightly "wetter" association than the mulefat scrub; however, it is expected that the two associations will intergrade and as such, there are many species common to both. The proposed plant palettes are provided below in Tables 1 and 2. Vegetation maintenance would be limited to chaparral species that would be maintained at less than five-percent cover as discussed in Section III.A.9.[3] Note, blue elderberry would not be subject to maintenance within the mulefat scrub as it is one of the target riparian species.

[3] Chaparral or large native shrubs that would be removed should they volunteer in the WLCF include, but are not limited to, laurel sumac (*Malosma laurina*), chamise (*Adenostoma fasciculata*), ceanothus (*Ceanothus* spp.), scrub oak (*Quercus berberidifolia*), mountain mahogany (*Cercocarpus betuloides*), manzanita (*Arctostaphylos* spp.), and the chaparral species listed in Table 6.

| Table 1: Southern Willow Scrub | | | | | |
|---|---|---|---|---|---|
| **Botanic Name** | **Common Name** | **Stock Type** | **Plant Spacing** | **No. per Acre** | **Percent** |
| **CANOPY** | | | | | |
| *Salix gooddingii* | Black willow | 1 gal | 20' o.c. | 50 | 14.3% |
| *Salix lasiolepis* | Arroyo willow | 1 gal | 10' o.c. | 100 | 28.6% |
| *Salix exigua* | Sandbar willow | 1 gal | 10' o.c. | 100 | 28.6% |
| *Baccharis salicifolia* | Mulefat | 1 gal | 10' o.c. | 100 | 28.6% |
| **Subtotal** | | | | 350 | 100% |
| | | | | | |
| **UNDERSTORY** | | | | | |
| *Juncus patens* | Spreading rush | Liner | Clumped. | 200 | 20% |
| *Rubus ursinus* | California blackberry | 1 gal | 8 o.c. | 100 | 10% |
| *Juncus textilis* | Basket rush | 1 gal | Clumped | 150 | 15% |
| *Leymus triticoides* | Creeping wild rye | Liner | 3' o.c. | 200 | 20% |
| *Rosa californica* | California wild rose | 1 gal. | 8' o.c. | 100 | 10% |
| *Muhlenbergia rigens* | Deergrass | 1 gal | 8 o.c. | 100 | 10% |
| *Artemisia douglasiana* | Mugwort | 1 gal | Clumped | 150 | 15% |
| **Subtotal** | | | | 1000 | 100% |
| **Total Container Stock** | | | | **1350** | |

| Table 2: Mulefat Scrub | | | | | |
|---|---|---|---|---|---|
| **Botanic Name** | **Common Name** | **Stock Type** | **Plant Spacing** | **No. per Acre** | **Percent** |
| **CANOPY** | | | | | |
| *Sambucus nigra* | Blue elderberry | 1 gal | 20' o.c. | 50 | 14.3% |
| *Baccharis salicifolia* | Mulefat | 1 gal | 10' o.c. | 100 | 28.6% |
| *Salix exigua* | Sandbar willow | 1 gal | 10' o.c. | 100 | 28.6% |
| *Baccharis emoryi* | Emoryi's baccharis | 1 gal | 10' o.c. | 100 | 28.6% |
| **Subtotal** | | | | 350 | 100% |
| | | | | | |
| **UNDERSTORY** | | | | | |
| *Baccharis pilularis* | Coyote Brush | 1 gal | 8' o.c.. | 200 | 20% |
| *Lepidospartum squamatum* | Scalebroom | 1 gal | 8 o.c. | 150 | 15% |
| *Juncus patens* | Spreading rush | liners | Clumped | 250 | 25% |
| *Leymus triticoides* | Creeping wild rye | Liner | 3' o.c. | 150 | 15% |
| *Muhlenbergia rigens* | Deergrass | 1 gal | 8 o.c. | 100 | 10% |
| *Artemisia douglasiana* | Mugwort | 1 gal | Clumped | 150 | 15% |
| **Subtotal** | | | | 1000 | 100% |
| **Total Container Stock** | | | | **1350** | |

### b. Coastal Sage Scrub and Southern Cactus Scrub

Upland vegetation types include coastal sage scrub and southern cactus scrub. These are included in Tables 3-4.

**Table 3: Coastal Sage Scrub**

| Botanic Name | Common Name | Stock Type | Plant Spacing | No. per Acre | Percent |
|---|---|---|---|---|---|
| **SHRUB LAYER** | | | | | |
| *Encelia californica* | California encelia | 1 gal | 8' o.c. | 200 | 20% |
| *Isocoma menziesii* | Coast goldenbush | 1 gal | 8' o.c. | 150 | 15% |
| *Baccharis pilularis* | Coyote bush | 1 gal | 8' o.c | 150 | 15% |
| *Artemisia californica* | California sagebrush | 1 gal | 6' o.c | 300 | 30% |
| *Eriogonum fasciculatum* | California buckwheat | 1-gal | 8' o.c. | 100 | 10% |
| *Salvia apiana* | White sage | 1-gal | 8' o.c. | 100 | 10% |
| **Subtotal** | | | | 1,000 | 100% |
| **NATIVE GRASSES** | | | | | |
| *Stipa pulchra* | Purple needlegrass | 1 gal | Clumped | 200 | 67% |
| *Melica imperfecta* | Coast range melic | 1 gal | 10' o.c. | 100 | 33% |
| **Subtotal** | | | | 300 | 100% |
| **Total Container Stock** | | | | **1300** | |
| *Encelia californica* | California encelia | Seed | Scattered | 2 lbs | 10% |
| *Artemisia californica* | California sagebrush | Seed | Scattered | 3lbs | 15% |
| *Isocoma menziesii* | Coast goldenbush | Seed | Scattered | 2 lbs | 10% |
| *Lotus scoparius* | Deerweed | Seed | Scattered | 1 lbs | 5% |
| *Phacelia circutaria* | Caterpillar phacelia | Seed | Scattered | 1 lbs | 5% |
| *Vulpia microstachys* | Small Fescue | Seed | Scattered | 1 lbs | 5% |
| *Lasthenia californica* | California goldfields | Seed | Scattered | 2 lbs | 10% |
| *Lupinus bicolor* | Miniature lupine | Seed | Scattered | 2 lbs | 10% |
| *Cryptantha intermedia* | Intermediate cryptantha | Seed | Scattered | 2 lbs | 10% |
| *Plantago erecta* | California plantain | Seed | Scattered | 2 lbs | 10% |
| *Deinandra fasciculata* | Fascicled tarplant | Seed | Scattered | 2 lbs | 10% |
| **Total Seed Stock** | | | | **20 LBS** | **100%** |

| Table 4: Southern Cactus Scrub | | | | | |
|---|---|---|---|---|---|
| **Botanic Name** | **Common Name** | **Stock Type** | **Plant Spacing** | **No. per Acre** | **Percent** |
| **SHRUB LAYER** | | | | | |
| | | | | | |
| *Peritoma arborea* | Bladderpod | 1 gal | 8' o.c. | 100 | 10% |
| *Artemisia californica* | California sagebrush | 1 gal | 8' o.c. | 100 | 10% |
| *Encelia californica* | California encelia | 1 gal | 6' o.c. | 200 | 20% |
| *Baccharis pilularis* | Coyote bush | 1 gal | 6' o.c | 100 | 10% |
| *Sambucus nigra* | Blue elderberry | 1 gal | 20' o.c. | 50 | 5% |
| *Opuntia littoralis* | Prickly Pear | Pads | Clumped | 250 | 25% |
| *Cylindropuntia prolifera* | Coastal cholla | Padsl | Clumped | 200 | 20% |
| **Subtotal** | | | | 1,000 | 100% |
| **NATIVE GRASSES** | | | | | |
| *Stipa pulchra* | Purple needlegrass | 1 gal | Clumped | 300 | 75% |
| *Melica imperfecta* | Coast range melic | 1 gal | 10' o.c. | 100 | 25% |
| **Subtotal** | | | | 400 | 100% |
| **Total Container Stock** | | | | **1400** | |
| *Encelia californica* | California encelia | Seed | Scattered | 2 lbs | 10% |
| *Artemisia californica* | California sagebrush | Seed | Scattered | 2 lbs | 10% |
| *Isocoma menziesii* | Coast goldenbush | Seed | Scattered | 2 lbs | 10% |
| *Eriogonum fasciculatum* | Coast buckwheat | Seed | Scattered | 1 lb | 5% |
| *Acmispon glaber* | Deerweed | Seed | Scattered | 1 lb | 5% |
| *Phacelia circutaria* | Caterpillar phacelia | Seed | Scattered | 1 lb | 5% |
| *Vulpia microstachys* | Small Fescue | Seed | Scattered | 1 lb | 5% |
| *Lasthenia californica* | California goldfields | Seed | Scattered | 2 lbs | 10% |
| *Lupinus bicolor* | Miniature lupine | Seed | Scattered | 2 lbs | 10% |
| *Cryptantha intermedia* | Intermediate cryptantha | Seed | Scattered | 2 lbs | 10% |
| *Plantago erecta* | California plantain | Seed | Scattered | 2 lbs | 10% |
| *Deinandra fasciculata* | Fascicled tarplant | Seed | Scattered | 2 lbs | 10% |
| **Total Seed Stock** | | | | **20 LBS** | **100%** |

The coastal sage scrub described in Table 3 will provide breeding vegetation for the Gnatcatcher and will also be planted in areas within the WLCF (along with the southern cactus scrub) that will also provide stepping stones for Gnatcatchers dispersing through Segments 2 and 3. See Figures 4 and 4a. The southern cactus scrub described in Table 4 will provide suitable vegetation for the coastal cactus wren as well as the Gnatcatcher. Species such as the blue elderberry and bladderpod, will add additional structure to the habitat due to the larger size of these shrubs which will be scattered within this community. Both vegetation types will provide cover and foraging areas for the Bobcat and Coyote and areas immediately adjacent to the areas of riparian vegetation will provide foraging areas for the Vireo.

### c. Open Southern Cactus Scrub Mosaic

The open southern cactus scrub mosaic described in Table 5 will be planted in a mosaic with the southern cactus scrub on areas of former Navy landfill areas that occupy portions of Segment 2 immediately south of Irvine Boulevard. See Figure 4. The former landfill areas

have a 5-foot thick cap and can accommodate shallow-rooted plants such as the native grasses and cactus. Planting these areas in a mosaic will accomplish three goals in addition to provision of breeding areas for the coastal cactus wren and movement areas for the Bobcat, Coyote and Gnatcatcher: it will: 1) provide a lower fuel source that would inhibit north to south moving fires (typical of strong Santa Ana wind conditions) as well as low fuel source in proximity to future development expected along the western boundary of the WLCF;[4] 2) provide open areas for raptor foraging; and 3) provide sufficient cover by native shrubs and cactus to provide suitable foraging and breeding areas for the Gnatcatcher. Cactus will be planted to facilitate Bobcat movement (see, e.g. Figure 10, showing conceptual movement paths that will not be planted with cactus). While not included in the plant palette, colonization by native scrub components such as California sagebrush and California buckwheat accounting for up to 10-percent absolute cover (combined) would be acceptable in these areas based upon fire modeling for these areas (maintenance would be required to limit cover by these species to no more than 10-percent of the total open cactus scrub). The locations of the open southern cactus scrub mosaic are depicted on Figures 4 and 4a.

**Table 5: Open Southern Cactus Scrub Mosaic**

| Botanic Name | Common Name | Stock Type | Plant Spacing | No. per Acre | Percent |
|---|---|---|---|---|---|
| **NATIVE GRASSES** | | | | | |
| *Stipa pulchra* | Purple needlegrass | 1 gal | 8' o.c. | 300 | 30% |
| *Melica imperfecta* | Coast range melic | 1 gal | 8' o.c. | 300 | 30% |
| *Bothriochloa barbinodis* | Beardgrass | 1 gal | 8' o.c | 100 | 10% |
| *Stipa lepida* | Foothill needlegrass | 1 gal | 8' o.c | 300 | 30% |
| **Subtotal** | | | | 1,000 | 100% |
| **NATIVE SHRUBS** | | | | | |
| *Opuntia littoralis* | Prickly Pear | Pads | Clumped | 200 | 20% |
| *Cylindropuntia prolifera* | Coastal cholla | Padsl | Clumped | 200 | 20% |
| *Baccharis pilularis* | Coyote bush | 1 gal | 8' o.c. | 200 | 20% |
| *Peritoma arborea* | Bladderpod | 1 gal | 8' o.c. | 100 | 10% |
| *Encelia californica* | California encelia | 1 gal | 8' o.c. | 150 | 15% |
| *Ericameria pachylepis* | Grassland goldenbush | 1 gal | Clumped | 100 | 10% |
| *Sambucus nigra* | Blue elderberry | 1 gal | 20' o.c. | 50 | 5% |
| **Subtotal** | | | | 1,000 | 100% |
| **Total Container Stock** | | | | **2,000** | |
| **SEED MIX** | | | | | |
| *Lasthenia californica* | California goldfields | Seed | Scattered | 4 lbs | 26.7% |
| *Cryptantha intermedia* | Intermediate cryptantha | Seed | Scattered | 2 lbs | 13.3% |
| *Salvia columbarae* | Chia | Seed | Scattered | 3 lbs | 20% |
| *Lupinus bicolor* | Miniature lupine | Seed | Scattered | 2 lbs | 13.3% |
| *Sisyrinchium bellum* | Blue-eyed grass | Seed | Scattered | 2 lbs | 13.3% |
| *Dichelostemma capitatum* | Wild hyacinth | Seed | Scattered | 2 lbs | 13.3% |
| **Total Seed Stock** | | | | **15 LBS** | **100%** |

[4] This was determined by fire models to be particularly important for the southerly portion of Segment 2 and Segment 3, where northwesterly winds pose the highest risk to adjacent development, thus the large area of open cactus scrub along the westerly boundary.

### d. Screening Plantings

The screening planting will be located along the eastern edge of Segment 2, as shown on Figures 4 and 4a. The shrubs to be used vary in height from approximately 12 to 15 feet at maturity and have a canopy span of approximately 15 to 20 feet. With plantings at approximately 15 to 20-foot intervals, the trees will form an effective screen to reduce potential light spillage and potential effects from noise (see below for more details on light and noise impacts). Screening vegetation will be limited to an approximately 20-foot width, except, as shown in Figure 4, where additional vegetation is needed to screen adjacent development from the line of sight at the center of the WLCF. Additional plants can be added based on field inspection to fill in gaps within the areas of screening planting as needed to screen line of sight from the centerline of the WLCF. Screening vegetation will be consistent with the Irvine Wildlife Corridor - Preliminary Fuel Management Plan in Appendix E. Plantings will supplement other actions to reduce light and noise, which include berms, grade separation and setbacks. In order to prevent Bobcats from scaling the wildlife impermeable fence, screening plantings will be planted such that at maturity, the canopy of each species will be at least five feet from the fence.

**Table 6: Screening Plantings**

| Botanic Name | Common Name | Stock Type | Plant Spacing | No. per Acre | Percent |
|---|---|---|---|---|---|
| **CANOPY** | | | | | |
| *Sambucus nigra* | Blue elderberry | 1 gal | 20' o.c. | TDB | 25% |
| *Rhus ovata* | Suger bush | 1 gal | 20' o.c. | TDB | 25% |
| *Rhus integrifolia* | Lemonade berry | 1 gal | 20' o.c. | TDB | 25% |
| *Heteromeles arbutifola* | Toyon | 1 gal | 20 ' o.c. | TBD | 25% |
| **Subtotal** | | | | TBD | 100% |
| **UNDERSTORY** | | | | | |
| *Baccharis pilularis* | Coyote Brush | 1 gal | 8' o.c.. | TDB | 25% |
| *Peritoma arborea* | Bladderpod | 1 gal | 8' o.c. | TBD | 25% |
| *Opuntia littoralis* | Prickly Pear | Pads | Clumped | TBD | 25% |
| *Cylindropuntia prolifera* | Coastal cholla | Padsl | Clumped | TBD | 25% |
| **Subtotal** | | | | TBD | 100% |
| **Total Container Stock** | | | | **TBD** | |

### e. Vegetation Establishment And Monitoring

Subject to seed and container stock availability, planting may occur in multiple growing seasons to achieve the densities set forth above. The Storm Water Pollution Prevention Plan (SWPPP) will provide for use of appropriate native vegetation for stabilization until establishment. A goal of this WLC Plan is to establish suitable vegetation within the WLCF and establish use of the corridor by the target species. Container stock and seed will be locally sourced (generally from 15-mile radius) wherever possible. The target is for riparian scrub plantings to attain a minimum of 50-percent native shrub/tree cover after three years and 70-percent native shrub/tree cover after five years with less than ten -percent cover by non-native species and zero-percent cover by giant reed (*Arundo* donax), saltcedar (*Tamarix* ramosissima), and pampas grass (*Cortedaria*

spp.). The target for coastal sage scrub and cactus scrub plantings is to attain 40-percent native shrub cover after three years, and 60-percent native shrub cover after five years, with less than ten percent cover by non-native species (except annual grasses), less than five percent cover by chaparral species and 30-foot spacing between chaparral canopy species in Table 6 and Note 3 above (see discussion below under Section III.A.9.a for rationale for this requirement), and zero percent cover by non-native invasive species. The target for the open southern cactus scrub is 40-percent cover by native cactus, scrub/shrub and grassland species within three years and 60-percent cover of the same at five years. As for the other habitats, non-native cover would be maintained at ten percent or less with no invasive species. All values provided for percent cover, including those for target native species cover, non-native species thresholds, or maintenance thresholds, represent absolute cover and not relative cover.

Once the corridor, or any reach of it, is completely installed and mature native vegetation dominates the segment, periodic monitoring will be conducted to document wildlife use of the corridor.

### 7. Edge Effects

The WLCF in this WLC Plan utilizes a variety of design measures to minimize potential edge effects from adjacent development such as light and noise intrusion, human intrusion into the wildlife corridor, and fuel management. Except for limited thinning as described below, fuel management will occur within the Special Maintenance Areas identified in Figure 4.

#### a. Lighting

Lighting studies conducted by The Planning Center (2012, see Appendix A) at eight locations along the eastern limits of the WLCF concluded that at the eastern limits of the WLCF, existing maximum light spillage ranges from 0.03 to 0.14 foot candles at the locations evaluated. Construction of Segment 2 of the WLCF includes creation of a berm along most of the length of both sides of Segment 2, which will reduce light spillage from existing and proposed development into the WLCF, as will the lowering of the riparian corridor relative to existing grades. It is expected there will be a minimum difference of approximately 10 feet in elevation between the bottom of the drainage channel and top of berm. As discussed above under "Screening Plantings," screening plantings will be located along the eastern edge of the WLCF (on the berm), as shown in Figures 4 and 4a, providing additional light shielding. Using a combination of the berm, added screening vegetation, and lowering the corridor relative to the elevation of adjacent existing and proposed development areas, light spillage is expected to be reduced to less than 0.10 foot candle along the entire length of Segment 2 when measured at the bottom of the riparian channel.

The configuration of Segment 3 as shown in Figure 5b also includes grade change between the corridor and the adjacent development on the eastern side of the corridor. This configuration limits light intrusion. In addition, berms will be incorporated into the design for the west side of Segment 3 as necessary to further reduce light spillage from future development on the western side of the corridor to less than 0.10 foot candle within Segment 3 when measured at base of center of the corridor.

Although a land development plan has not been developed for the area adjacent to the western side of the WLCF, project lighting will be designed and shielded to prevent spillage of light into adjacent preserved open space areas at levels that could affect wildlife movement. For the western edge of Segments 2 and 3, the following standard will be applied and achieved through a combination of shielding of lights near the western boundary of the WLCF, berming, and screening plantings.

> PDF Lighting 1: The project lighting for new development adjacent to the western edge of Segments 2, 3, 3 South and 4 and the eastern edge of Segment 4 of the WLCF will be designed and shielded so that the nighttime lighting of the WLCF shall be no greater than 0.10 foot candles when measured at the centerline of the riparian channel for Segments 2 and 4 and the centerline of the corridor for Segments 3 and 3 South.

In order to confirm that lighting goals are achieved, the Project Biologist and City will review proposed project lighting for development directly adjacent to the WLCF.

**b. Noise**

Urban Crossroads conducted noise studies (2012, see Appendix B) at three locations determined to represent the areas of highest potential noise production from existing development at the proposed eastern edge of the WLCF. The findings of the noise study are summarized below:

- Observer Location L1 is located approximately 70 feet west of the property line fence opposite the FedEx Freight center located at 56 Fairbanks. The noise level meter recorded the ambient noise levels over 48 hours. Based on the noise level measurement results provided in Table 1, the average hourly noise levels range from 49.3 dBA Leq during the noise sensitive night time hours to 53.4 dBA Leq during the daytime hours. This results in an overall 24-hour CNEL noise level of 57.5 dBA CNEL.

- At Observer Location L2, the noise meter was placed approximately 54 feet west of the property line fence opposite the Albertsons distribution center employee parking lot. The noise level meter recorded the ambient noise levels over 48 hours. The average hourly Leq noise levels at Observer Location L2 ranged from 49.5 during the daytime hours and 51.7 during the nighttime hours. Due to the 10 dBA noise penalty for the noise sensitive nighttime hours, the higher nighttime noise levels results in a 24-hour CNEL of 58.8 dBA.

- For Observer Location L3, the noise meter was placed at the property line fence opposite the Albertsons distribution center loading dock area. A full 24-hour noise level measurement was collected at Observer Location L3. The measured hourly Leq noise levels ranged from 50.3 dBA during the daytime hours to 51.5 dBA during the evening hours. The measured CNEL at the Observer Location L3 was calculated at 57.4 dBA CNEL.

The noise study shows that potential noise effects from existing development on the target wildlife species associated with relocation of the Segment 2 would not be adverse. The addition of berms, screening vegetation, and the vertical offset from the flow line (approximately 10 feet) planned for Segments 2 and 3 would be expected to further reduce noise effects within the corridor.

Although a land development plan has not been developed for the area adjacent to the western side of the WLCF, residential uses along the western edge of the WLCF would produce minimal levels of noise. The construction of a berm along the western edge and the vertical offset will further minimize noise effects. To reduce noise spillage to levels consistent with the goals of achieving a biologically effective wildlife corridor in the post-development condition along the western edge of Segments 2 and 3, the 2012 Modified Project will include the following PDF (with limited exceptions for roadways):

> PDF Noise 1: Berms, other vertical offsets, or, in Segment 4, walls will reduce potential noise effects to less than a 24-hour CNEL of 60 dBA at the western boundary of Segments 2, 3, and 3 South of the WLCF when measured at the base of the interior berm and on the eastern and western boundaries of Segment 4 when measured at the base of the interior berms or walls.

In order to confirm that noise goals are achieved, the Project Biologist and City will review plans for proposed development directly adjacent to the WLCF.

### 8. Human Intrusion

To minimize effects to wildlife from human intrusion and reduce conflicts between wildlife and development, the boundaries of the WLCF will be fenced with a wildlife-impermeable fence as shown as a typical section in Figures 5 and 5b. Where existing fencing is already in place on the eastern side of the corridor, new fencing does not need to be installed.

The existing FAA site next to Astor will be adjacent to, but not within, the WLCF and is not included in the 132-acre total for the WLCF. The site is fenced and will not be accessible through any portion of the WLCF. Access to the FAA site is not expected to have any adverse effect on wildlife or wildlife movement.

Segment 2 of the WLCF will also contain a closed former Navy landfill. Upon construction of Segment 2, the fence surrounding this area will be removed. The Navy will continue non-invasive monitoring of vapor and groundwater wells and will inspect the integrity of the landfill cap. Monitoring will occur quarterly, but is expected to decrease in frequency over time. The monitoring activity is not anticipated to have any adverse effect on wildlife or wildlife movement.

### 9. Vegetation Management

The WLCF has been effectively designed topographically to support a plant palette that limits fuels in proximity to future development while still providing beneficial habitat for target species and to maintain the desired species through vegetation management ("Vegetation

Management"). The plant palette for the interior of the corridor is designed with native plant materials such that combustible fuel loads within the WLCF are kept to a minimum and centralized to the middle of the corridor. The WLCF is divided into different zones for management purposes: Special Maintenance Areas 1 and 2 and the Interior Corridor Habitat Management Area. As shown in Figure 4, Special Maintenance Areas are located in adjacent to the edges of the WLCF, while the remainder of the WLCF falls within the Interior Corridor Habitat Management Area. Maintenance requirements in each area are described below. Unless otherwise provided in this Plan, volunteer growth other than the species listed in Table 6 and Note 3 will not be removed as part of maintenance within the WLCF. Vegetation outside the WLCF on the westerly side of the berm slope will be irrigated landscape with non-invasive plant material from the OCFA Approved Plant List.[5]

Vegetation Management will be done a) with hand held tools consistent with best management practices; b) outside of the avian nesting season, or if during the nesting season, only after a biological monitor confirms that there will be no effects to nesting birds; c) in a manner that will not reduce or eliminate any plants that are planned for the area; and d) in a manner that minimizes effects to either the target species (Gnatcatcher or Vireo) and to more common species that are protected under the Migratory Bird Treaty Act (MBTA). All removed plant species will be disposed of outside of the WLCF. See Irvine Wildlife Corridor Plan Preliminary Fuel Management Plan (Firesafe Planning Solutions 2013) included in Appendix E. In order to ensure both effective and cost-efficient maintenance for chaparral and undesirable coastal sage scrub species, as described below, the following additional measures are recommended: 1) a landscape specialist will review the appropriate areas each season prior to maintenance to identify and flag for removal (as necessary) chaparral species that exceed the 5-percent maximum within the riparian habitats, coastal sage/cactus scrub and open cactus scrub as well as flag undesirable coastal sage scrub species such as California sagebrush and California buckwheat that exceed 10-percent absolute cover in the open cactus scrub; 2) the landscape specialist should prepare a booklet showing photographs of the non-native invasive species, non-native undesirable species, undesirable native species to be maintained at 10-percent cover in the open cactus scrub and chaparral species to be limited to 5-percent cover; 3) utilize landscape crews experienced in native habitat restoration and maintenance; and 4) the landscape specialist will review the appropriate areas to confirm that the maintenance has been adequately performed.

### a. Special Maintenance Areas

Within the WLCF, vegetation management for fuel management purposes will be limited to the 30-foot wide Special Maintenance Areas as shown on Figure 12 and described and depicted in the Irvine Wildlife Corridor Plan Preliminary Fuel Management Plan (Firesafe Planning Solutions 2013) included in Appendix E. Native habitat plantings within the Special Maintenance Areas will include dense areas of native cactus, as summarized in Tables 8 and 9 below, interspersed with lower growing grasses, forbs, and shrubs acceptable to OCFA (e.g., bladderpod, California encelia, baccharis, coast goldenbush). Rock may also be added to these areas to maintain open areas, which also provide habitat for reptiles.

[5] OCFA Approved Plant List *available at* www.ocfa.org/_uploads/pdf/guidec06.pdf.

Maintenance in the Special Maintenance Areas will consist of removing undesirable species set forth in Table 7, removing chaparral species specified in Table 6 and Note 3 to maintain absolute cover of less the 5-percent with a minimum 30-foot spacing between chaparral individuals, and removing invasives. Such maintenance would be limited to up to twice per year, requiring a few days by small crews using only hand held tools, and using the protocols described above.

**Table 7: Plant Removal List Within Special Maintenance Areas**

| Botanic Name | Common Name |
|---|---|
| *Cynara Cardunculus* | Artichoke Thistle |
| *Ricinus Communis* | Castor Bean Plant |
| *Cirsium Vulgare* | Wild Artichoke |
| *Brassica Nigra* | Black Mustard |
| *Silybum Marianum* | Milk Thistle |
| *Sacsola Austails* | Russian Thistle/Tumblewood |
| *Nicotiana Bigelevil* | Indian Tobacco |
| *Nicotiana Glauca* | Tree Tobacco |
| *Lactuca Serriola* | Prickly Lettuce |
| *Conyza Canadensis* | Horseweed |
| *Heterothaca Grandiflora* | Telegraph Plant |
| *Anthemix Cotula* | Mayweed |
| *Urtica Urens* | Burning Nettle |
| *Cardaria Draba* | Noary Cress, Perennial Peppergrass |
| *Brassica Rapa* | Wild Turnip, Yellow Mustard, Field Mustard |
| *Adenostoma Fasciculatum* | Chamise |
| *Adenostoma Sparsifolium* | Red Shanks |
| *Cortaderia Selloana* | Pampas Grass |
| *Artemisia Californica* | California Sagebrush |
| *Eriogonum Fasciculatum* | Common Buckwheat |
| *Salvia Mellifera* | Black Sage |
| | |
| **Ornamental:** | |
| *Cortaderia* | Pampas Grass |
| *Cupressus sp* | Cypress |
| *Eucalyptus sp* | Eucalyptus |
| *Juniperus sp* | Juniper |
| *Pinus sp* | Pine |

Along the interior edges of the corridor (Special Maintenance Area 1 as shown in Figure 4), the vegetation will be from the OCFA Approved Plant List and will be mostly comprised of cactus, totaling 50-percent of the vegetative cover, OCFA-Approved coastal sage scrub, and native grassland components as set forth in Table 8 below. Any changes to the plant palette would require approval by OCFA and Heritage Fields. At the end five years, the cactus is expected to account for a minimum 50-percent relative cover and in the long-term as it matures, will account for 50-percent absolute cover.

| Table 8: Open Southern Cactus Scrub Mosaic Within Special Maintenance Area 1 | | | | | |
|---|---|---|---|---|---|
| **Botanic Name** | **Common Name** | **Stock Type** | **Plant Spacing** | **No. per Acre** | **Percent** |
| **NATIVE GRASSES** | | | | | |
| *Stipa pulchra* | Purple needlegrass | 1 gal | Clumped. | 100 | 10% |
| *Stipa lepida* | Foothill needlegrass | 1 gal | Clumped | 100 | 10% |
| **NATIVE SHRUBS** | | | | | |
| *Opuntia littoralis* | Prickly Pear | Pads | Clumped | 350 | 35% |
| *Cylindropuntia prolifera* | Coastal cholla | Padsl | Clumped | 350 | 35% |
| *Peritoma arborea* | Bladderpod | 1 gal | 8' o.c. | 50 | 5% |
| *Isocoma menziesii* | Coast goldenbush | 1 gal | 8' o.c. | 50 | 5% |
| **Total Container Stock** | | | | **1,000** | **100%** |
| **SEED MIX** | | | | | |
| *Lasthenia californica* | California goldfields | Seed | Scattered | 4 lbs | 26.7% |
| *Cryptantha intermedia* | Intermediate cryptantha | Seed | Scattered | 2 lbs | 13.3% |
| *Salvia columbarae* | Chia | Seed | Scattered | 3 lbs | 20% |
| *Lupinus bicolor* | Miniature lupine | Seed | Scattered | 2 lbs | 13.3% |
| *Sisyrinchium bellum* | Blue-eyed grass | Seed | Scattered | 2 lbs | 13.3% |
| *Dichelostemma capitatum* | Wild hyacinth | Seed | Scattered | 2 lbs | 13.3% |
| **Total Seed Stock** | | | | **15 LBS** | **100%** |

In limited areas, designated as Special Maintenance Area 2 in Figure 4, the vegetation will be mostly comprised of cactus, totaling 70-percent of the vegetative cover, OCFA-Approved coastal sage scrub, and native grassland components as set forth in Table 9 below. Any changes to the plant palette would require approval by OCFA and Heritage Fields. At the end of five-years, the cactus is expected to account for a minimum 70-percent relative cover and in the long-term as it matures, will account for approximately 70-percent of the absolute cover or 50-percent cactus and 20-percent rock. For Special Maintenance Areas 1 and 2, OCFA-approved coastal sage scrub species will not be removed except when overall shrub cover exceeds 50-percent absolute cover.

| Table 9: Open Southern Cactus Scrub Mosaic Within Special Maintenance Area 2 | | | | | |
|---|---|---|---|---|---|
| **Botanic Name** | **Common Name** | **Stock Type** | **Plant Spacing** | **No. per Acre** | **Percent** |
| **NATIVE GRASSES** | | | | | |
| *Stipa pulchra* | Purple needlegrass | 1 gal | Clumped. | 100 | 10% |
| *Stipa lepida* | Foothill needlegrass | 1 gal | Clumped | 100 | 10% |
| **NATIVE SHRUBS** | | | | | |
| *Opuntia littoralis* | Prickly Pear | Pads | Clumped | 250 | 25% |
| *Cylindropuntia prolifera* | Coastal cholla | Padsl | Clumped | 250 | 25% |
| *Peritoma arborea* | Bladderpod | 1 gal | 8' o.c. | 100 | 10% |
| *Isocoma menziesii* | Coast goldenbush | 1 gal | 8' o.c. | 100 | 10% |
| *Encelia californica* | California encelia | 1 gal | 8' o.c. | 100 | 10% |
| **Total Container Stock** | | | | **1,000** | **100%** |
| **SEED MIX** | | | | | |
| *Lasthenia californica* | California goldfields | Seed | Scattered | 4 lbs | 26.7% |
| *Cryptantha intermedia* | Intermediate cryptantha | Seed | Scattered | 2 lbs | 13.3% |
| *Salvia columbarae* | Chia | Seed | Scattered | 3 lbs | 20% |
| *Lupinus bicolor* | Miniature lupine | Seed | Scattered | 2 lbs | 13.3% |
| *Sisyrinchium bellum* | Blue-eyed grass | Seed | Scattered | 2 lbs | 13.3% |
| *Dichelostemma capitatum* | Wild hyacinth | Seed | Scattered | 2 lbs | 13.3% |
| **Total Seed Stock** | | | | **15 LBS** | **100%** |

Based on the grading plan, plant palette, and weather patterns, a detailed fire modeling was conducted, as summarized in the Irvine Wildlife Corridor Feature Fire Related Program (Firesafe Planning Solutions 2013) attached as Appendix C, and reviewed and approved by the OCFA. Special Maintenance Areas on and adjacent to the berm along the westerly boundary of the WLCF are shown on Figure 4 and in the Irvine Wildlife Corridor Plan Preliminary Fuel Management Plan included in Appendix E.

### b. Interior Corridor Habitat Management Area

Within the Interior Corridor Habitat Management Area, Vegetation Management will be even more limited than in the Special Management Areas, consisting of removal of invasives, removal of chaparral species, and limited removal of certain coastal sage scrub species within open southern cactus scrub areas.

In addition to the removing invasives within Interior Corridor Habitat Management Area, chaparral species listed in Table 6 and Note 3 will be removed to maintain absolute cover at less than 5 percent with a minimum of 30-foot spacing between chaparral individuals, from areas of riparian habitat, coastal sage scrub and cactus scrub. Such removal is important because the Gnatcatcher is an identified target species (blue elderberry will not be removed from areas of mulefat scrub as it is a habitat component of the mulefat scrub). Specifically, the Gnatcatcher is a coastal sage scrub/cactus scrub "obligate" species, and conversion from these preferred habitat types to chaparral would be detrimental to one of the four target species and would be inconsistent with the goals of the WLC. As such, it will be important to maintain the target

vegetation as summarized in Tables 1 – 5 above to ensure that the target species have optimal habitat conditions within the WLCF. Any removal would be conducted using the protocols described above. Any changes to the plant palette would require approval by OCFA and Heritage Fields. Maintaining optimal habitat for the Gnatcatcher by preventing conversion of areas of coastal sage scrub and cactus scrub to chaparral also minimizes fire risks.

Finally, while not included in the plant palette for areas of Open Southern Cactus Scrub Mosaic, other coastal sage scrub species such as California sagebrush and California buckwheat are likely to colonize these areas over time. Based on fire modeling, such species can, combined, reach 10-percent total cover within the open cactus scrub. Where it exceeds 10-percent cover, maintenance would be performed to maintain it at 10-percent cover or less. The need for this maintenance would be infrequent.

## 10. Analysis of Effect of Vegetation Management on Target Species

Vegetation Management will have minimal effects on target species as described below.

### a. Least Bell's Vireo

The Vireo is a neotropical migrant that breeds in southern California and winters in southern Mexico and Central America. As such, it migrates long distances in spring and fall, returning to southern California from southern Mexico or Central America in late March or early April, traveling many hundreds of miles. Given that the Vireo is capable of long distance migration, Segments 2 and 3 of the WLCF will serve primarily as either a "stopover" for resting or foraging Vireos during migration or as an area for breeding. It will not be important in providing connectivity between the Central and Coastal portions of Orange County. The riparian habitat within Segments 2 and 3 will average approximately 100 feet in width, providing suitable habitat for Vireo during migration as well as potential breeding habitat. Vegetation Management will not affect the riparian corridor, will be conducted outside of the avian breeding season and would not measurably affect potential Vireo breeding or foraging areas outside of the riparian corridor.

### b. California Gnatcatcher

Unlike Vireo, the Gnatcatcher is a resident species that spends its entire life near its natal territory. Gnatcatchers typically disperse short distances from their natal territories (typically no more than a few kilometers). Dispersal abilities are summarized on the Partner's in Flight Website:

> *California Gnatcatcher is non-migratory. Post-breeding dispersal by fledglings occurs during late summer and fall. Natal dispersal distance typically documented at less than 3 km. Longest documented dispersal distance by juvenile is 16 km (Braden 1992). Dispersal across highly man-modified landscapes, including major highways and residential development, occurs often (Bailey and Mock 1998, Gavin 1998, Lovio 1996, Haas and Campbell 2003, Atwood unpublished data). Many examples of occupied habitat patches isolated by extensive development (e.g., Dana Point Headlands, Oceanside; Bailey and Mock 1998). Extensive movements by breeding adults are relatively rare (Bailey and*

*Mock 1998). Longest documented dispersal distance by an adult is 9 km (Atwood and Bontrager 2001). Types of habitat used during dispersal are highly variable (Campbell et al. 1998).*[6]

Given Gnatcatcher dispersal abilities, and habitat requirements, Segments 2 and 3 will provide high quality live-in habitat for breeding Gnatcatchers as well as a dispersal corridor for Gnatcatchers moving between Central and Coastal areas of Orange County. Specifically, the combination of coastal sage scrub, southern cactus scrub and riparian scrub will provide an optimal habitat mosaic for both breeding and dispersing Gnatcatchers. It is important to note, that riparian corridors are often used by dispersing Gnatcatchers as well as providing important resources (insects) during the dry summer months when coastal sage scrub enters summer dormancy. The Special Management Area will be limited to the western edge of the WLCF, extending no more than 30 feet from the top of the berm into the WLCF. Within these areas, native cactus and scrub habitat would occur in sufficient densities (between 30 and 50-percent cover) which is optimal cover for the Gnatcatcher. Similarly, the potential need for removal of occasional volunteers of chaparral species would benefit the Gnatcatcher by preventing chaparral species from crowding out Gnatcatcher habitat and would be conducted outside the Gnatcatcher breeding season. Figure 4a depicts the size and distribution of eight potential gnatcatcher breeding territories and use areas within the WLCF based on the typical range for breeding territory size as well as non-breeding season use areas which can be twice the size of breeding territories.

#### c. Coyote

Coyotes are highly adapted to human landscapes and regularly move through urban areas. As such, Segments 2 and 3 will provide optimal conditions for Coyotes moving through the Wildlife Corridor. Segments 2 and 3 will provide foraging, resting, and movement opportunities and given the adaptability of Coyotes, there would be no constraints to Coyote movement and/or use of the segment. Vegetation Management would have no measurable affect either due to occasional human occupation or due to slightly reduced cover, on the Coyote.

#### d. Bobcat

While Bobcats exhibit fairly high levels of adaptability to human altered landscapes, they are less adaptable than Coyotes and are more likely to restrict movements (especially longer distance movements) to areas of natural habitat or areas with moderately dense vegetation. Segments 2 and 3 will provide more than sufficient space, optimal cover, and optimal habitat types for movement by Bobcats through this segment. As noted above for the Coyote, Vegetation Management would have no measurable affect either due to occasional human occupation or due to slightly reduced cover, on the Bobcat.

### B. Segments 3 South & 4

Planning and conceptual design of Segments 3 South and 4 have also taken into account prior corridor plans and studies. Segments 3 South and 4 are substantially similar in terms of

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[6] *Available at* www.prbo.org/calpif/htmldocs/species/scrub/california_gnatcatcher.html.

functionality and have the same location as described in the 2003 OCGP EIR, 2004 Corridor Plan and the 2011 Design Update. They are included herein to provide a unified conceptual plan for the WLCF. The following interrelated components of Segments 3 South and 4 of the WLCF and the resulting biological functions of the corridor provided are addressed in this Plan:

- General Description, Location, and Fencing;
- Wildlife Crossings;
- Hydrology;
- Target Species;
- Vegetation;
- Edge Effects;
- Human Intrusion;
- Vegetation Management; and
- Analysis of Effect of Vegetation Management on Target Species.

### 1. General Description, Location, and Fencing

Figure 6 depicts the proposed location of Segments 3 South and 4 of the WLCF, which are in the same alignment, location and configuration as in the 2003 OCGP EIR and 2004 Corridor Plan.

Segment 3 South will connect to Segment 3 with an at-grade crossing of the Railroad tracks, as described above. Segment 3 South extends southerly to the intersection of Barranca Parkway and Alton Parkway, and is proposed to include a ramp into Serrano Creek subject to OCFCD coordination and approval. Segment 3 South connects to Segment 4 through an existing undercrossing under the Barranca/Alton intersection. Segment 4 extends south to Interstate 5 and surrounds the existing Serrano Creek. See description of the Serrano Creek Channel and Marine Way undercrossings in Hydrology, Section 2, below. It will be crossed by Marine Way. IRWD currently owns and maintains an existing 21-inch sewer line in Segment 4. Per the IRWD Sub-Area Master Plan, IRWD anticipates relocating this line out of Segment 4. Segment 4 will include regional water quality facilities at the downstream end just before Interstate 5. Facilities will be maintained in accordance with procedures to avoid impacts to nesting species and with IRWD's maintenance schedule. The maintenance will not hinder Bobcat or Coyote movement. The regional water quality facilities may be located on either side of Serrano Creek.

Subject to future development planning, Segment 4 may also include a pedestrian crossing to facilitate trail and pedestrian movement in the area at a location to be determined between the Barranca/Alton Intersection and I-5.

Segment 3 South will be bordered by Serrano Creek Channel and the embankment of Alton Parkway on the east side and a minimum 10-foot high berm along the west side. These features and the implementation of PDF Lighting 1 and PDF Noise 1 are expected to minimize potential light and noise effects within Segment 3 South. Wildlife impermeable fencing will be installed along the western boundary of the WLCF. Existing fencing along the Serrano Creek Channel will keep wildlife within the corridor. See Figure 5c.

Segment 4 will not have berms, but will have a wildlife impermeable fence on both sides and the depth of the channel provides separation from future proposed adjacent development. Land uses adjacent to the Segment 4 are to be developed in accordance with the noise and light limitations in PDF Lighting 1 and PDF Noise 1. Parking and building lighting should not be directly aimed toward the WLCF. Further, reflectors are to be placed on lights limiting the amount of artificial light entering the WLCF.

Segments 3 South and 4 range in width from approximately 440 to 790 feet (with the exception of the undercrossing between Segments 3 South and 4), with an average width of approximately 530 feet.

### 2. Wildlife Crossings

Segments 3 South and 4 will use the existing undercrossing at the Barranca/Alton intersection.

Segment 4 will have a new crossing to be constructed at future Marine Way. The crossing of future Marine Way will be a double arch culvert (each 12-feet high x 32-feet wide). See Figure 11b. The bottom of the arch system will be hardened to adequately convey storm water flows and resist erosion, but will be textured to provide a natural feel.

In addition, a potential pedestrian crossing will be constructed in Segment 4 at future location between The Barranca/Alton intersection and I-5. The pedestrian crossing will be grade-separated from the corridor at least ten feet above the channel bottom. The wildlife undercrossing will be at least 18 feet wide to provide for wildlife movement. Lighting, if any, will be directed away from the corridor. The specific design of the wildlife movement elements of the pedestrian crossing (height to width ratio, substrate and proximity to other crossings) will be reviewed by the City and Peer Reviewers.

### 3. Hydrology

In 2011, the County and the City of Irvine approved the Master Plan of Drainage. Based upon this analysis, Segment 3 South will only collect runoff from the Segment 3 South footprint. Segment 3 South will be graded to capture these flows in a natural swale feature, and localized flows will be conveyed from an appropriate collection point within Segment 3 South to Serrano Creek, which is consistent with current drainage patterns.

The drainage area within Segment 4 average width will be approximately 140 - 220 feet based on hydrological analysis. Since this portion of Serrano Creek Channel's watershed is approximately 4,200 acres and is mostly developed, channel flows are significant. Due to upstream development, this segment of the WLCF will receive flows during the dry weather season. This segment of the WLCF will be designed to safely convey peak storm events and reduce degradation of the Serrano Creek Channel in accordance with the Master Plan of Drainage and the WLC Plan. The channel between Alton and Interstate 5 will require flowline stabilization or bank stabilization similar to downstream reaches of Serrano Creek. The drainage area of Segment 4 from Alton Parkway to Marine Way is anticipated to be approximately 140 - 220 feet in width based on hydrological analysis. This segment will be soft bottom with a series of Gabion Drop Structures (1.5-foot step height) and natural vegetation subject to Orange County

Public Works and City of Irvine design criteria, as shown in Figure 6. The crossing of future Marine Way will be a double arch culvert (each 12-feet high x 32-feet wide). See Figure 11b. The bottom of the arch system will be hardened to adequately convey storm water flows and resist erosion, but will be textured to provide a natural feel. For the portion of Segment 4 from Marine Way to the connection to the I-5 culvert, the drainage area will be an approximate bottom width of 60 feet with stabilized side walls. This is similar to portions of Serrano Creek downstream of the project site. Maintenance of the channel and related flood control facilities would be consistent with WLC Plan functions.

Although a land plan has not been developed for the areas adjacent Segment 4 of the WLCF, treated storm water will be discharged to Segment 4 of the WLCF from regional water quality facilities located within Segment 4 of the WLCF. The regional storm water quality facilities would be planted with native riparian understory species that would be fully consistent with the goals of the WLCF. Effectively, the regional water quality facilities would function as open meadow areas within the larger area of riparian vegetation; creating greater diversity within the vegetation structure associated with Segment 4. Maintenance of the regional water quality treatment facilities would be consistent with WLC Plan functions.

### 4. Target Species

The 2004 Corridor Plan identified four target species for the corridor: Bobcat, Coyote, Gnatcatcher, and Vireo. The proposed planting scheme for Segments 3 South and 4 as shown on Figure 6 of the WLCF provides vegetation for the target species.

### 5. Vegetation

The same vegetation associations that are to be used in Segments 2 and 3 are proposed for Segments 3 South and 4 of the WLCF, as shown in Figure 6. Subject to availability, planting may occur in multiple growing seasons to achieve the specified densities.

Within Segment 4, design features will be incorporated into Serrano Creek Channel to allow for conveyance of storm flows, as well as establishment of areas of mulefat scrub and southern willow scrub described in Tables 1 and 2 above to provide suitable vegetation for foraging and occupation by Vireo, as well as areas cover for movement of other target species.

The open southern cactus scrub mosaic described in Table 5 above will also be incorporated into Segments 3 South and 4. The grass species will be planted in a mosaic with the southern cactus scrub. Planting these areas in an open southern cactus scrub mosaic will provide breeding areas for the coastal cactus wren and Gnatcatcher (see Figure 4a); cover and movement areas for the Bobcat, and Coyote; and open areas for raptor foraging, while limiting flame lengths and protecting adjacent development areas from fire at the wildland interface. Except as provided below, fire safety issues in this WLC Plan are being addressed by design of the WLCF, considering channels, grade separation, and vegetation. As shown on Figure 13, adjacent development will have a 30-foot fuel management area and a 20-foot set-back zone to mitigate for wildland interface fire hazards. As an option, the 30-foot fuel management area with adjacent development can be replaced with a 6 foot high radiant heat fence. Vegetation will be thinned for fire management purposes only within the 30-foot Special Maintenance Area shown

on Figure 13. Within the remainder of the WLCF, only chaparral and non-CSS species would be removed for the benefit of the Gnatcatcher, as described in Section III.A.9.b (Interior Corridor Habitat Management Area). These actions will provide appropriate protections for adjacent areas that interface with the WLCF.

Screening vegetation will be used in Segment 3 South and 4 north and south of the Alton/Barranca intersection, as shown in Figure 6. Screening planting will be done in accordance with the criteria set forth in Section III.A.6.d (Screening Plantings). Additional plants can be added based on field inspection within the areas of screening planting as needed to screen line of sight from the centerline of the WLCF. Screening vegetation will be consistent with the Irvine Willdife Corridor - Preliminary Fuel Management Plan in Appendix E.

Segment 4 will also include riparian vegetation consisting of mulefat scrub and southern willow scrub, as summarized in Tables 1 and 2 above, within the Serrano Channel and on adjacent slopes and terraces as depicted on Figure 6, ultimately transitioning to open cactus scrub along the margins as summarized in Table 6. Regional water quality features will also be included within the envelope of areas with open cactus scrub and riparian habitat that will be planted with riparian understory components with the adjacent mulefat scrub and southern willow scrub that will be fully consistent with goals of the WLCF. The regional water quality and flood control facilities will be maintained from an unpaved access area in a manner that would be consistent with WLC Plan functions. The plant palette for the regional water quality facilities is provided in Table 10.

**Table 10: Regional Water Quality Facilities Plant Palette**

| Botanic Name | Common Name | Stock Type | Plant Spacing | No. per Acre | Percent |
|---|---|---|---|---|---|
| *Juncus patens* | Spreading rush | Liner | Clumped. | 200 | 20% |
| *Carex praegracilis* | Clustered field sedge | 1 gal | 8 o.c. | 200 | 20% |
| *Juncus textilis* | Basket rush | 1 gal | Clumped | 100 | 10% |
| *Leymus triticoides* | Creeping wild rye | Liner | 3' o.c. | 100 | 10% |
| *Distichlis spicata* | Saltgrass | Liner. | Clumped | 200 | 20% |
| *Muhlenbergia rigens* | Deergrass | 1 gal | 8 o.c. | 100 | 10% |
| *Artemisia douglasiana* | Mugwort | 1 gal | Clumped | 100 | 10% |
| **Subtotal** | | | | 1000 | 100% |

Finally, while not included in the plant palette for areas of Open Southern Cactus Scrub Mosaic, other coastal sage scrub species such as California sagebrush and California buckwheat are likely to colonize these areas over time. Based on fire modeling, such species can, combined, reach 10-percent total cover within the open cactus scrub. Where it exceeds 10-percent cover, maintenance would be performed to maintain it at 10-percent cover or less. The need for this maintenance would be infrequent.

### 6. Edge Effects

Edge effects in Segments 3 South and 4 will be addressed with the same PDFs that applied to Segments 2 and 3.

### a. Lighting

See discussion for Segments 2 and 3. Similar site specific light and noise measures will be implemented for these segments as described for Segments 2 and 3.

> PDF Lighting 1: The project lighting for new development adjacent to the western edge of Segments 2, 3, 3 South and 4 and the eastern edge of Segment 4 of the WLCF will be designed and shielded so that the nighttime lighting of the WLCF shall be no greater than 0.10 foot candles when measured at the centerline of the riparian channel for Segments 2 and 4 and the centerline of the corridor for Segments 3 and 3 South.

In order to confirm that lighting goals are achieved, the Project Biologist and City will review proposed project lighting for development directly adjacent to the WLCF.

### b. Noise

To reduce noise spillage to levels consistent with the goals of achieving a biologically effective wildlife corridor in the post-development condition along the edges of Segments 3 South and 4, the following PDF (with limited exceptions for roadways and crossings such as Marine Way) will apply:

> PDF Noise 1: Berms, other vertical offsets, or, in Segment 4, walls will reduce potential noise effects to less than a 24-hour CNEL of 60 dBA at the western boundary of Segments 2, 3, and 3 South of the WLCF when measured at the base of the interior berm and on the eastern and western boundaries of Segment 4 when measured at the base of the interior berms or walls.

In order to confirm that noise goals are achieved, the Project Biologist and City will review plans for proposed development directly adjacent to the WLCF.

## 7. Human Intrusion

To reduce effects to wildlife from human intrusion and reduce conflicts between wildlife and development, the boundaries of the WLCF will be fenced with wildlife impermeable fence in the locations shown in Figures 5c, 7a, and 7b.

## 8. Vegetation Management

Vegetation Management within Segments 3 South and 4 will be conducted in the same manner as Segments 2 and 3. A 30-foot wide Special Maintenance Area 1 is planned for Segments 3 South and 4, in the locations depicted on Figures 6 and 13. . The remainder of Segments 3 South and 4 will be managed as Interior Corridor Habitat Management Areas as described above for Segments 2 and 3.

## 9. Analysis of Effect of Vegetation Management on Target Species

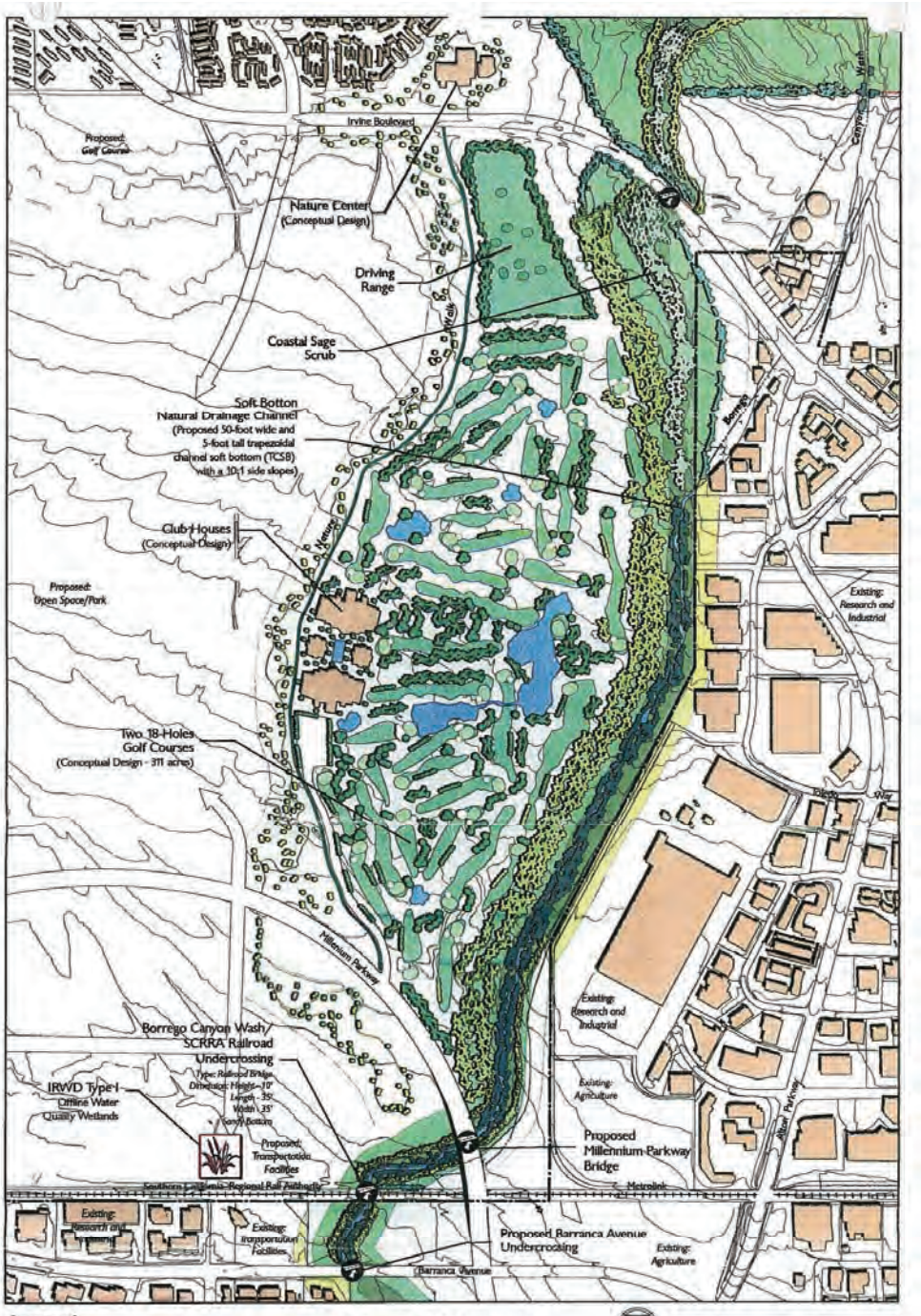
The effects of Vegetation Management in Segments 3 South and 4 will be similar to those described in detail for Segments 2 and 3 and are expected to have minimal effects on target species.

## IV. CONCLUSIONS

The WLC Plan provides for development of a biologically effective corridor between Irvine Boulevard and I-5. The WLC Plan will accommodate movement of all four target species (Coyote, Bobcat, Gnatcatcher, and Vireo) from inland habitats southward through the entire WLCF. Two of the target species (Coyotes and Bobcats) might be able to move beyond the project area (i.e., cross under I-5 to coastal natural areas) often enough (e.g., one Coyote/Bobcat every 2-4 years) to transfer genes from one region to another on either end of the corridor. The Gnatcatcher could be expected to cross I-5 approximately once every two years. The Vireo is a migratory bird and I-5 is not expected to present any significant movement barrier for the speices.

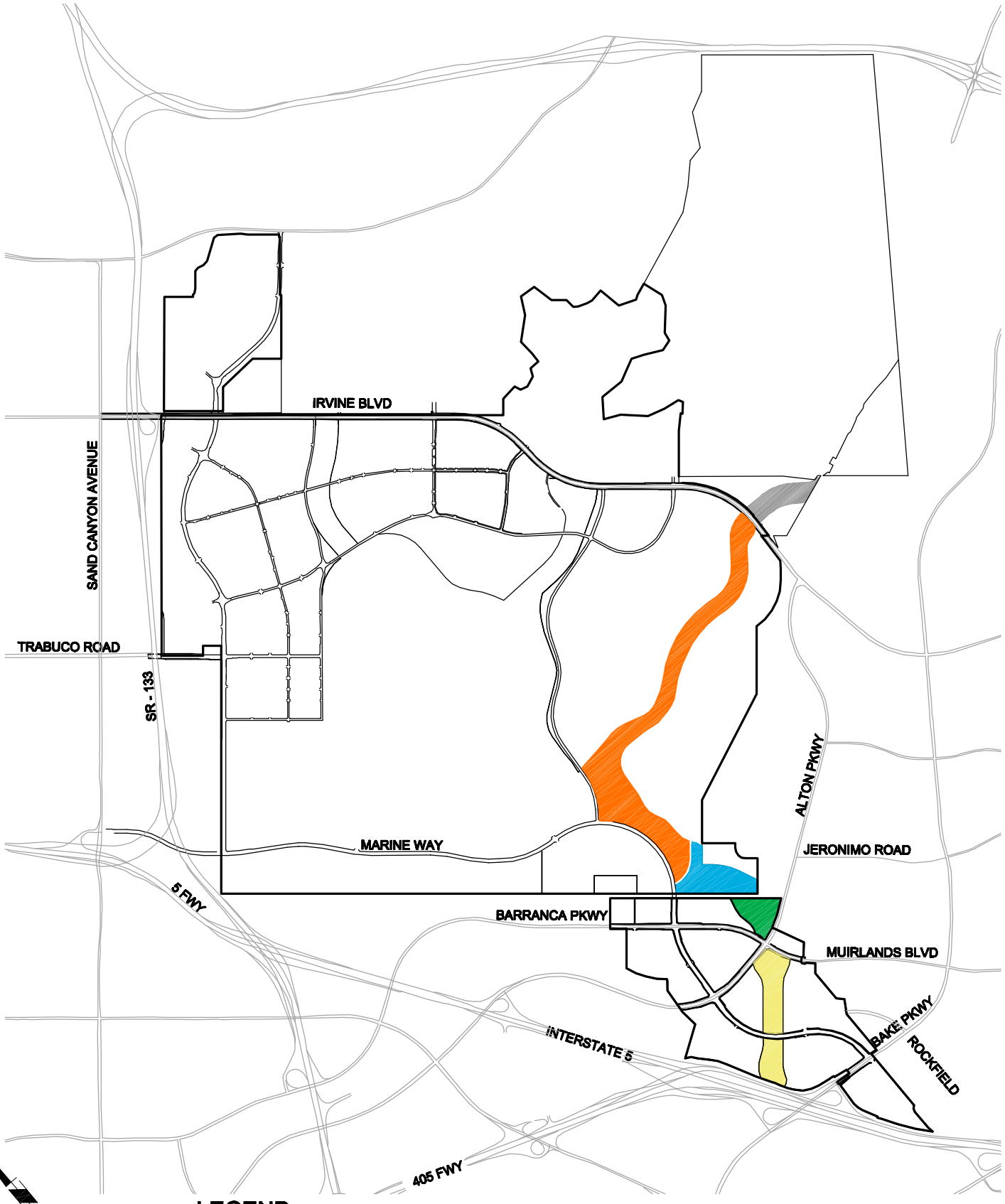
In addition to serving the movement needs of specific target species, the WLCF will provide numerous other biological values. Native habitats restored within the corridor would serve as live-in habitat for native plants and animals, such as the Gnatcatcher, the Vireo and coastal cactus wren. This will be a valuable environmental amenity and an educational opportunity for people in the City of Irvine.

The WLC Plan allows for flexibility in addressing issues that may arise during and after implementation, including the development of a corridor monitoring program. Monitoring use of the corridor by wildlife could be performed in part by local schools, citizen action groups, and local residents, thus presenting an educational opportunity and potentially imbuing the local community with a feeling of investment and ownership in this unique urban amenity. The proposed wildlife corridor plan could very well serve as a model for providing wildlife connectivity in an urbanized landscape that will be emulated throughout California and elsewhere.




# Irvine Wildlife Corridor Concept Plan Planning Unit 2

**FIGURE 1**



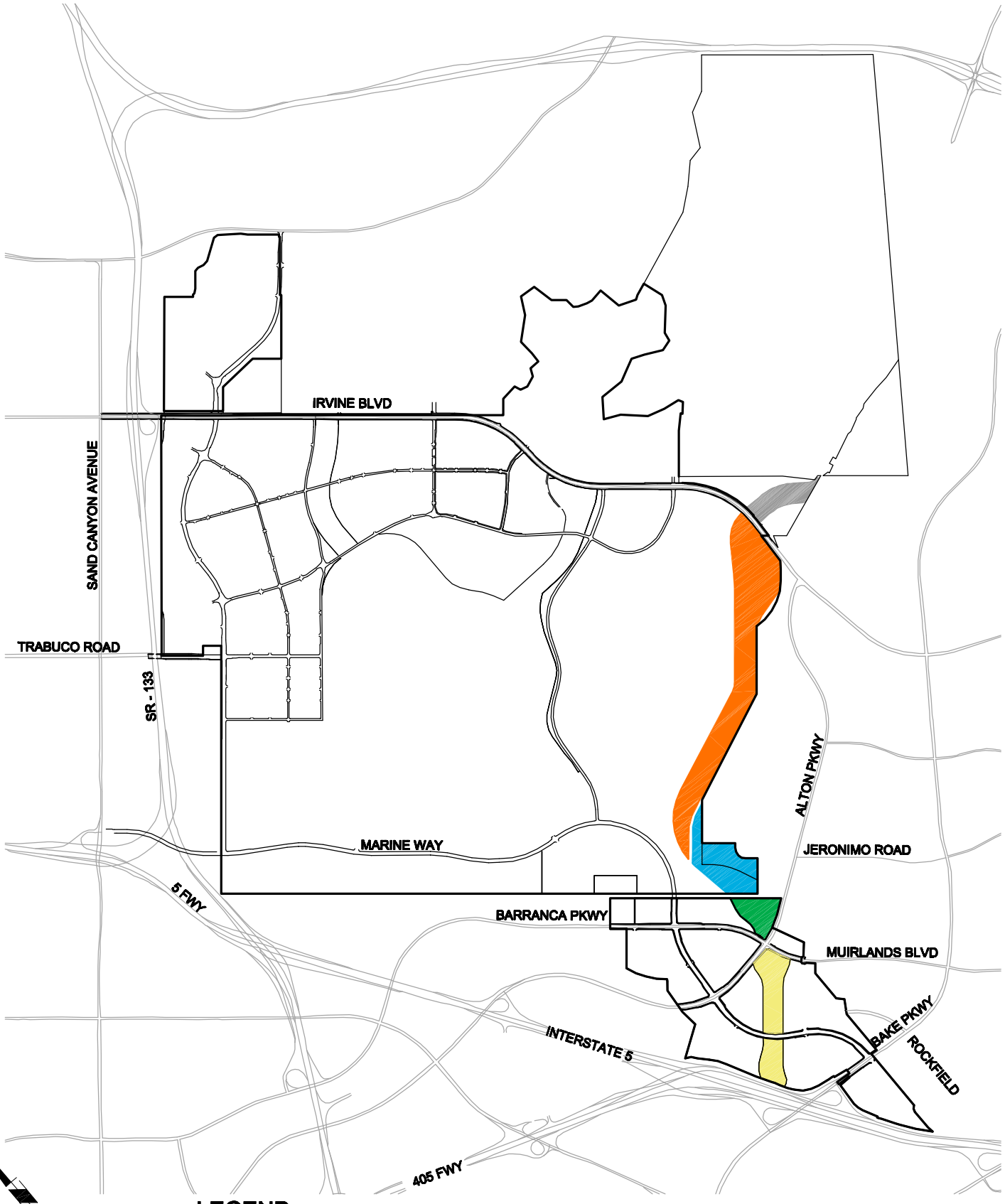

## LEGEND

- Portion of Segment 1 (Constructed, Not a Part)
- Segment 2
- Segment 3
- Segment 3 South
- Segment 4

# FIGURE 2
## 2003 Wildlife Corridor Segment and Vicinity Map

August 14, 2013

H:\PDATA\10105001\ADMIN\REPORTS\SSEIR_2012\FIGURE 2_EX_WLC.DWG JLEONARD 8/14/13 1:23 pm



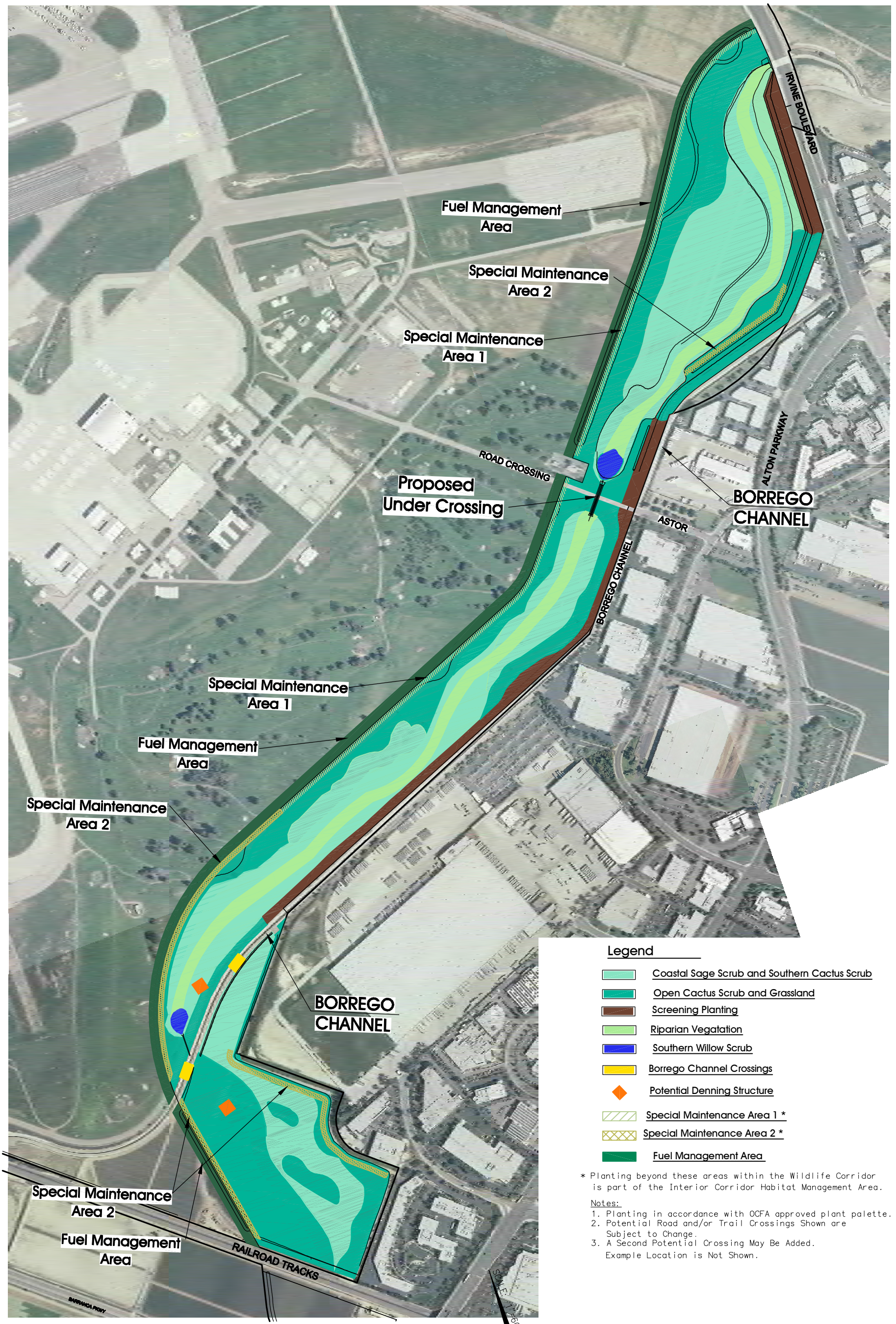

## LEGEND

- Portion of Segment 1 (Constructed, Not a Part)
- Segment 2
- Segment 3
- Segment 3 South
- Segment 4

**FIGURE 3**
**Irvine Wildlife Corridor Plan**
**Segment and Vicinty Map**

August 14, 2013

H:\PDATA\10105001\ADMIN\REPORTS\SSEIR_2012\FIGURE 3_WLC.DWG JLEONARD 8/14/13 1:25 pm




Legend

- Coastal Sage Scrub and Southern Cactus Scrub
- Open Cactus Scrub and Grassland
- Screening Planting
- Riparian Vegatation
- Southern Willow Scrub
- Borrego Channel Crossings
- Potential Denning Structure
- Special Maintenance Area 1 *
- Special Maintenance Area 2 *
- Fuel Management Area

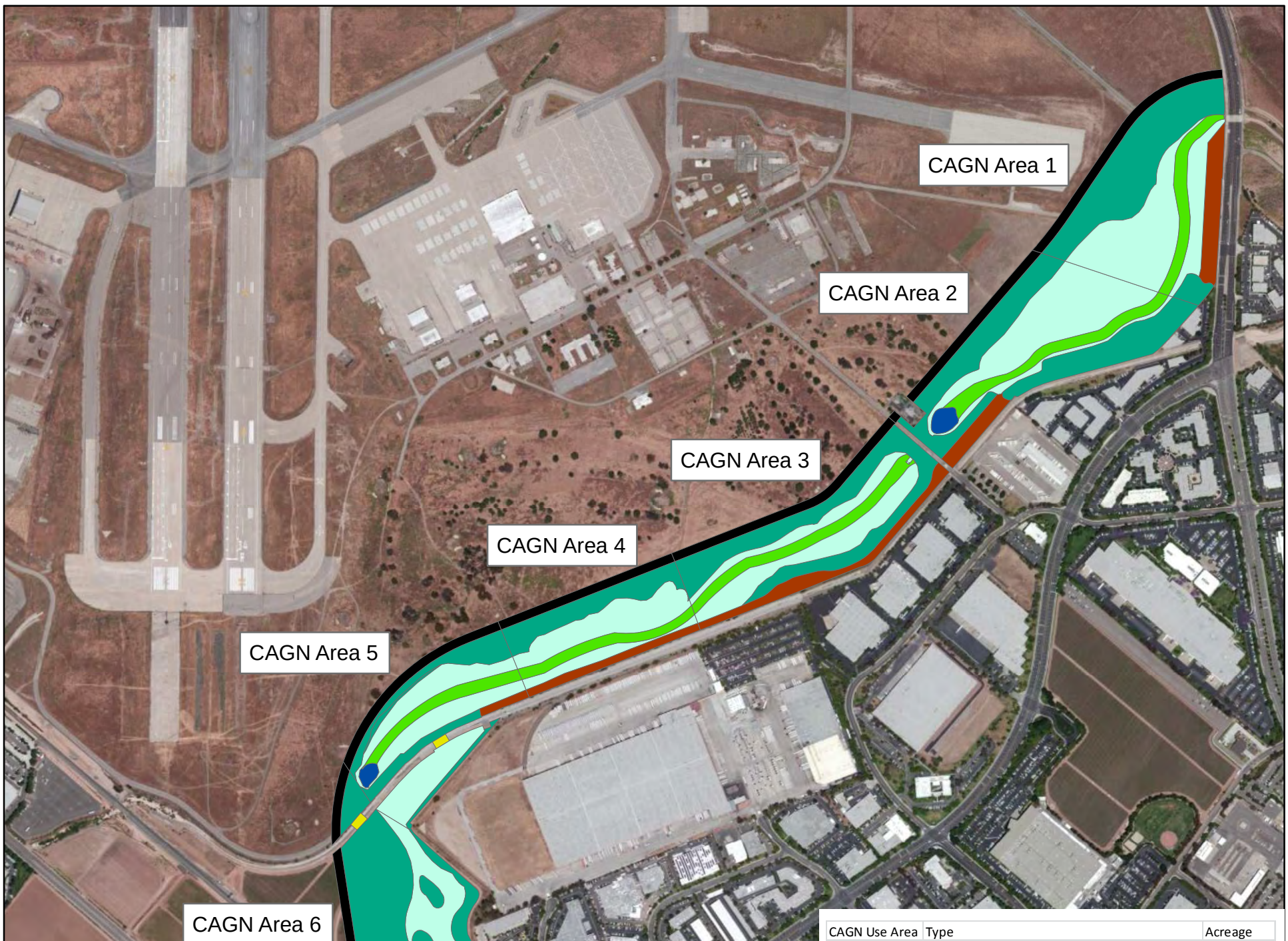
* Planting beyond these areas within the Wildlife Corridor is part of the Interior Corridor Habitat Management Area.

Notes:
1. Planting in accordance with OCFA approved plant palette.
2. Potential Road and/or Trail Crossings Shown are Subject to Change.
3. A Second Potential Crossing May Be Added. Example Location is Not Shown.

# FIGURE 4
## Irvine Wildlife Corridor Plan Segment 2 and 3 Concept Design and Planting

September 30, 2013

H:\PDATA\10105001\ADMIN\REPORTS\SSEIR_2012\FIGURE_4_WLC_SEGMENT2_3-REV-8-9-13.DWG JLEONARD 10/14/13 9:08 am




| CAGN Use Area | Type | Acreage |
|---|---|---|
| 1 | Coastal Sage Scrub and Southern Cactus Scrub | 10.14 |
| | Open Cactus Scrub and Grassland | 10.38 |
| | Riparian Vegetation | 2.22 |
| | Screening Planting | 2.49 |
| | | |
| 2 | Coastal Sage Scrub and Southern Cactus Scrub | 10.32 |
| | Open Cactus Scrub and Grassland | 10.87 |
| | Riparian Vegetation | 2.66 |
| | Screening Planting | 1.28 |
| | Southern Willow Scrub | 0.56 |
| | | |
| 3 | Coastal Sage Scrub and Southern Cactus Scrub | 7.16 |
| | Open Cactus Scrub and Grassland | 8.32 |
| | Riparian Vegetation | 2.91 |
| | Screening Planting | 2.68 |
| | | |
| 4 | Coastal Sage Scrub and Southern Cactus Scrub | 6.49 |
| | Open Cactus Scrub and Grassland | 3.87 |
| | Riparian Vegetation | 1.86 |
| | Screening Planting | 1.48 |
| | | |
| 5 | Coastal Sage Scrub and Southern Cactus Scrub | 9.16 |
| | Open Cactus Scrub and Grassland | 4.47 |
| | Riparian Vegetation | 1.95 |
| | Screening Planting | 0.40 |
| | Southern Willow Scrub | 0.34 |
| | | |
| 6 | Coastal Sage Scrub and Southern Cactus Scrub | 7.08 |
| | Open Cactus Scrub and Grassland | 18.77 |
| | | |
| 7 | Coastal Sage Scrub and Southern Cactus Scrub | 3.78 |
| | Open Cactus Scrub and Grassland | 7.07 |
| | Screening Planting | 0.37 |
| | | |
| 8 | Coastal Sage Scrub and Southern Cactus Scrub | 1.35 |
| | Open Cactus Scrub and Grassland | 14.51 |
| | Riparian Vegetation | 11.88 |
| | Screening Planting | 2.35 |

- Access Ramp to Serrano Creek Channel - 0.03 ac.
- Borrego Channel Crossings - 0.26 ac.
- Coastal Sage Scrub and Southern Cactus Scrub - 55.48 ac.
- Drainage Course/Riparian Vegetation - 11.88 ac.
- Special Maintenance Area - 12.49 ac.
- Open Cactus Scrub and Grassland - 78.26 ac.
- Riparian Vegetation - 11.60 ac.
- Screening Planting - 11.05 ac.
- Southern Willow Scrub - 0.90 ac.
- Regional Water Quality Facilities - TBD

N

0 425 850 1,700

Feet

# IRVINE WILDLIFE CORRIDOR

Potential Gnatcatcher Use Areas

GLENN LUKOS ASSOCIATES

Exhibit 4A

X:\00 - 0362 ONLY\0257-45HF\257-45_GIS\WildlifeCorridorGIS\REV1\257-45WLC REV1.mxd

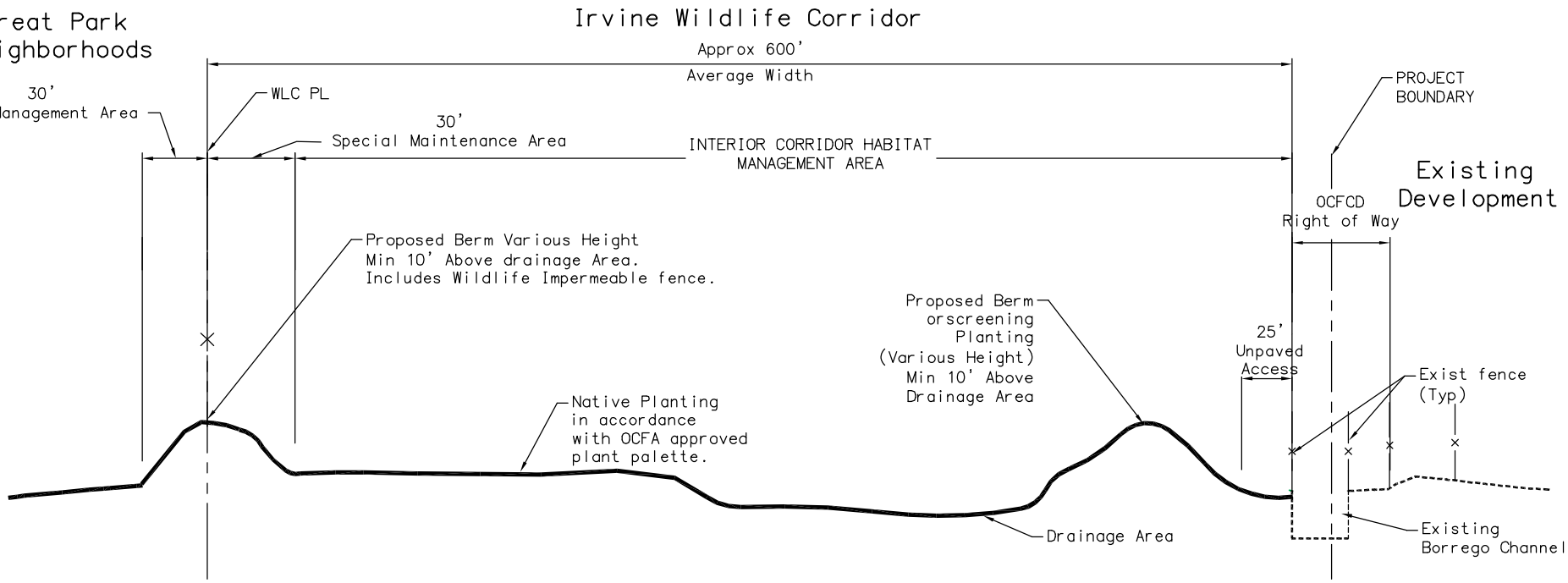



**FIGURE 5a**
**Irvine Wildlife Corridor Plan**
**Segment 2 Cross Section (Typical)**

September 27, 2013

H:\PDATA\10105001\ADMIN\REPORTS\SSEIR_2012\FIGURE 5-TYP CROSS SECTION.DWG JLEONARD 9/27/13 3:53 pm

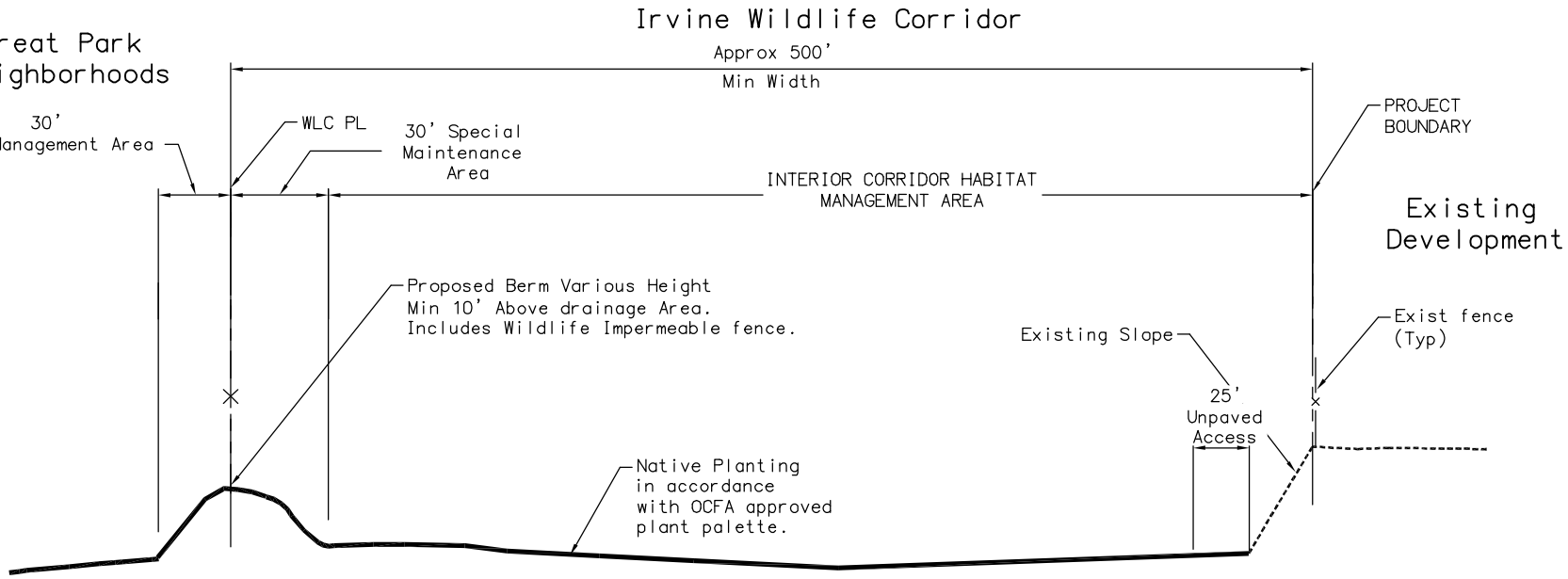



**FIGURE 5b**
**Irvine Wildlife Corridor Plan**
**Segment 3 Cross Section (Typical)**

Spetember 27, 2013

H:\PDATA\10105001\ADMIN\REPORTS\SSEIR_2012\FIGURE 5B-SEG3_TYP CROSS SECTION.DWG JLEONARD 9/30/13 11:36 am

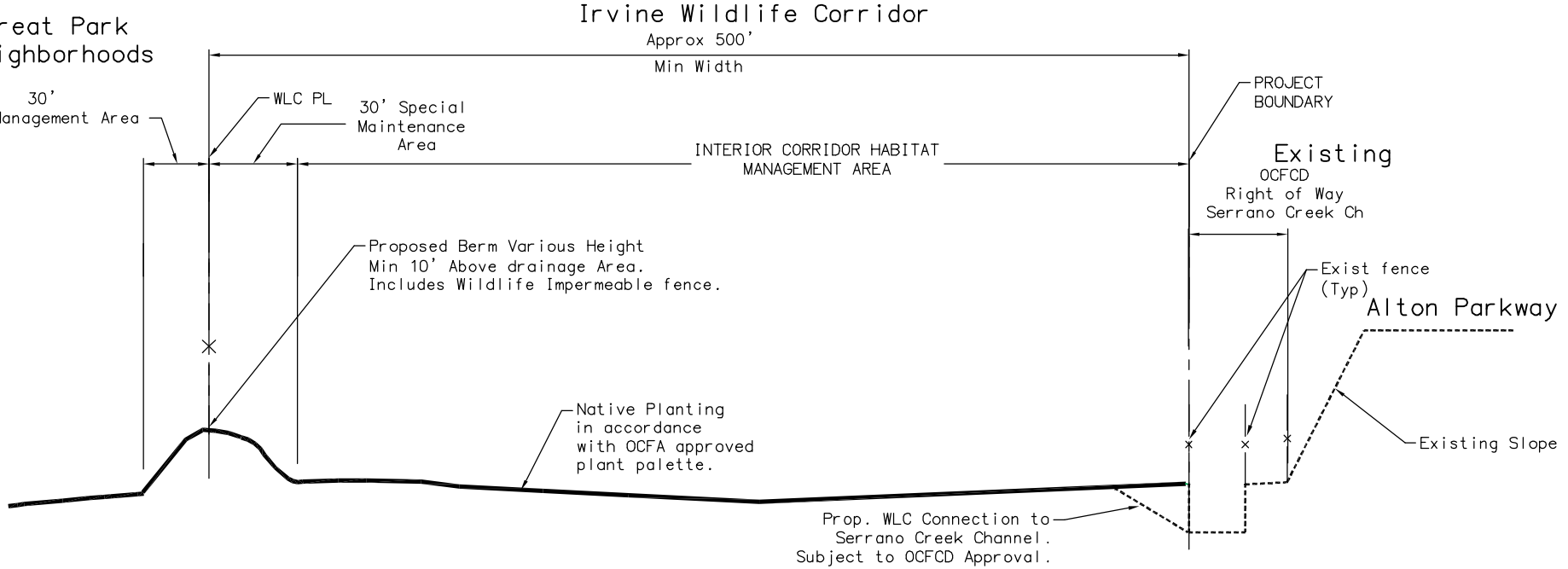
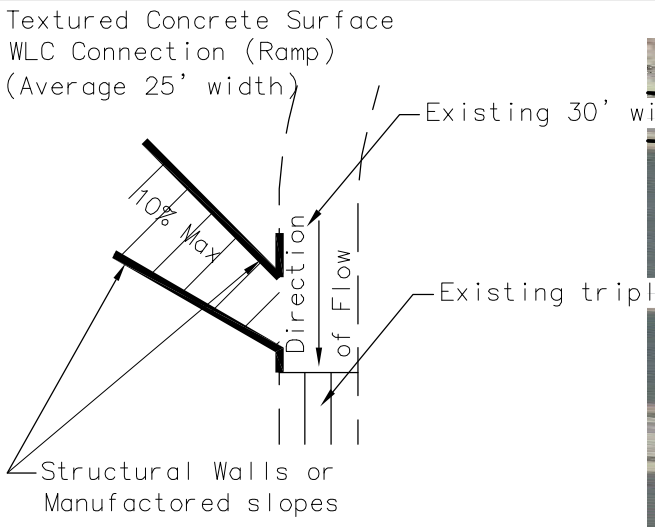



**FIGURE 5c**
**Irvine Wildlife Corridor Plan**
**Segment 3 South Cross Section (Typical)**

September 27, 2013

H:\PDATA\10105001\ADMIN\REPORTS\SSEIR_2012\FIGURE 5C-SEG3S_TYP CROSS SECTION.DWG JLEONARD 9/27/13 4:11 pm




**Prop. WLC Connection to Serrano Creek Ch.**

1. Connection Shown Hereon is Subject to OCFCD Approval.

RAILROAD TRACKS
SERRANO CHANNEL
Special Maintenance Area 1
Fuel Management Area
BARRANCA PARKWAY
Proposed Connection
Existing Under Crossing
Muirlands
ALTON PARKWAY
Drop Structure (flowline stabilization)
Special Maintenance Area 1
Marine Way Crossing
Proposed Under Crossing
Regional Water Quality Facility (Location either side of channel)
I-5 FREEWAY
BAKE PARKWAY
RESEARCH DR.
SCALE: 1"=400'
400 200 0 400 800 1200
SCALE: 1"=400'

Notes:

## Legend

1. Planting Shown in accordance to OCFA approved plant palette.
2. Potential Road and/or Trail Crossing Shown are Subject to Change.
3. A Second Potential Pedestrian Crossing May Be Added. Example Location is Not Shown.

- Coastal Sage Scrub and Southern Cactus Scrub
- Open Cactus Scrub and Grassland
- Screening Planting
- Special Maintenance Area 1 *
- Fuel Management Area

* Planting beyond these areas within the Wildlife Corridor is part of the Interior Corridor Management Area.

- Drainage Course / Riparian Vegatation *
  *- Riparian Vegetation north of Marine Way
- Regional Water Quality Facilities **
  **- Either side of Seranno Creek
- Access Ramp to Serrano Creek Channel
  ( See Detail Hereon)

# FIGURE 6
# Irvine Wildlife Corridor Plan Segment 3 South and 4 Concept Design and Planting

September 30, 2013

H:\PDATA\10105001\ADMIN\REPORTS\SSEIR_2012\FIGURE_6_WLC_SEGEMENT_3S_4.DWG JLEONARD 9/30/13 1:19 pm

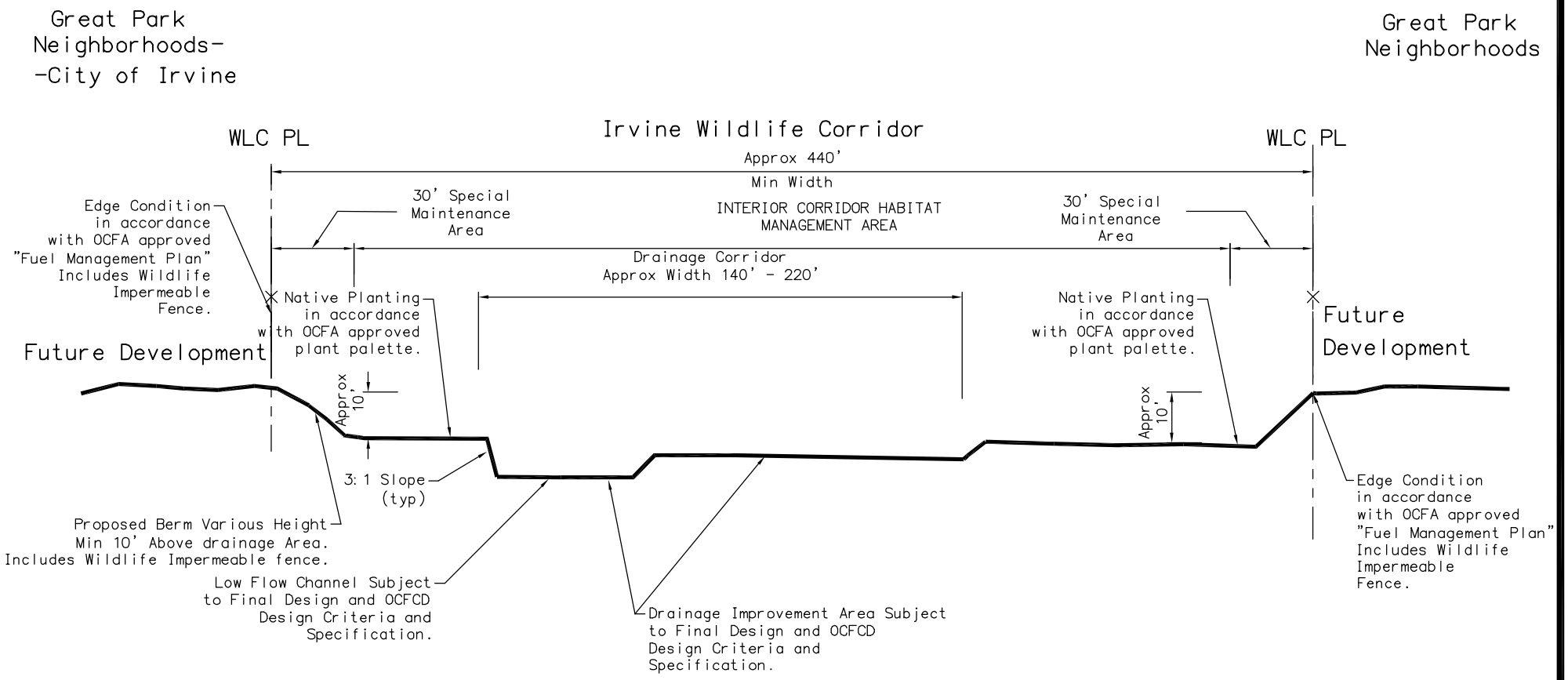



**FIGURE 7a**
**Irvine Wildlife Corridor Plan**
**Segment 4 Cross Section (Typical)**
**(from Barranca Pkwy to Marine Way)**

September 30, 2013

H:\PDATA\1010501\ADMIN\REPORTS\SSEIR_2012\FIGURE 7A-TYP CROSS SECTION.DWG JLEONARD 9/30/13 1:08 pm

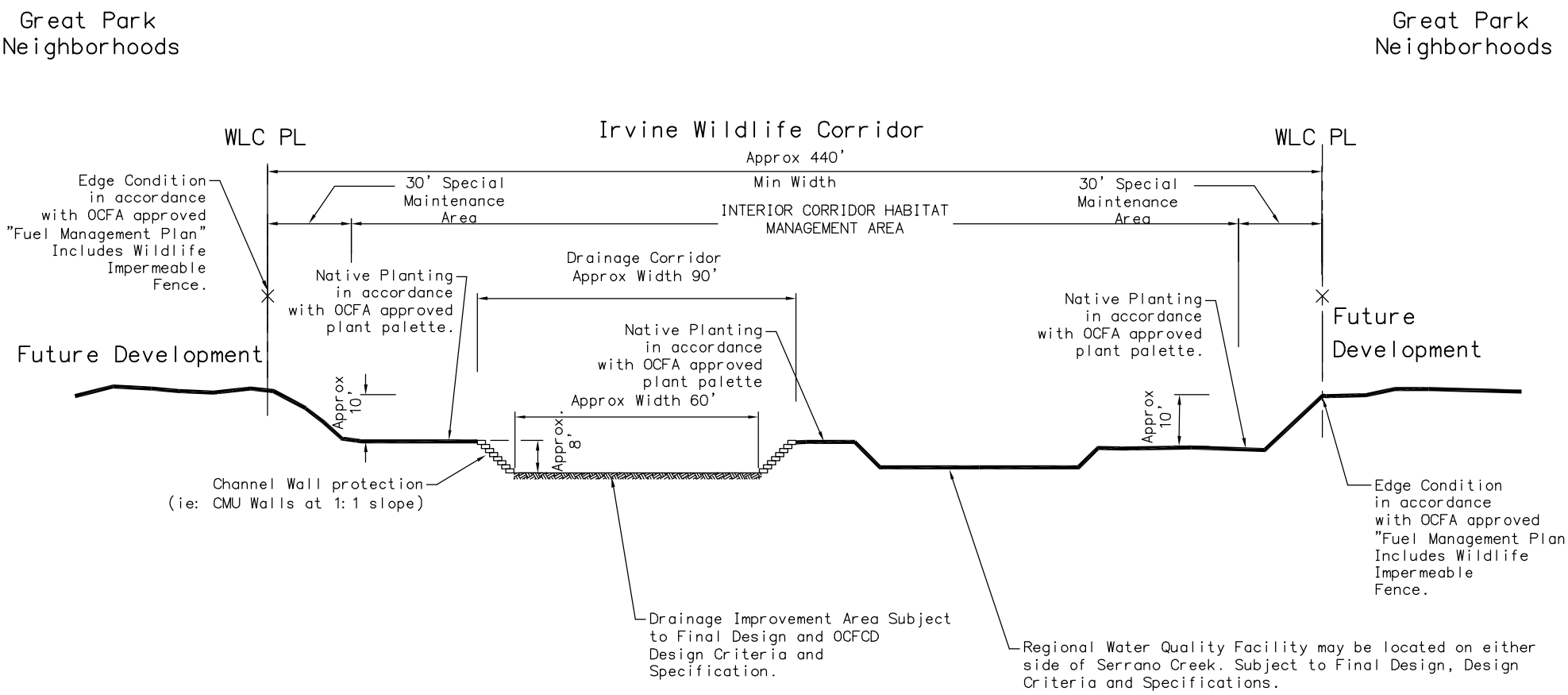



**FIGURE 7b**
**Irvine Wildlife Corridor Plan**
**Segment 4 Cross Section (Typical)**
**(from Marine Way to I-5)**

September 30, 2013

H:\PDATA\10105001\ADMIN\REPORTS\SSEIR_2012\FIGURE 7B-TYP CROSS SECTION.DWG JLEONARD 9/30/13 1:10 pm

Photograph 1: Magazine Road undercrossing looking south toward segment 2 of the WLCF.

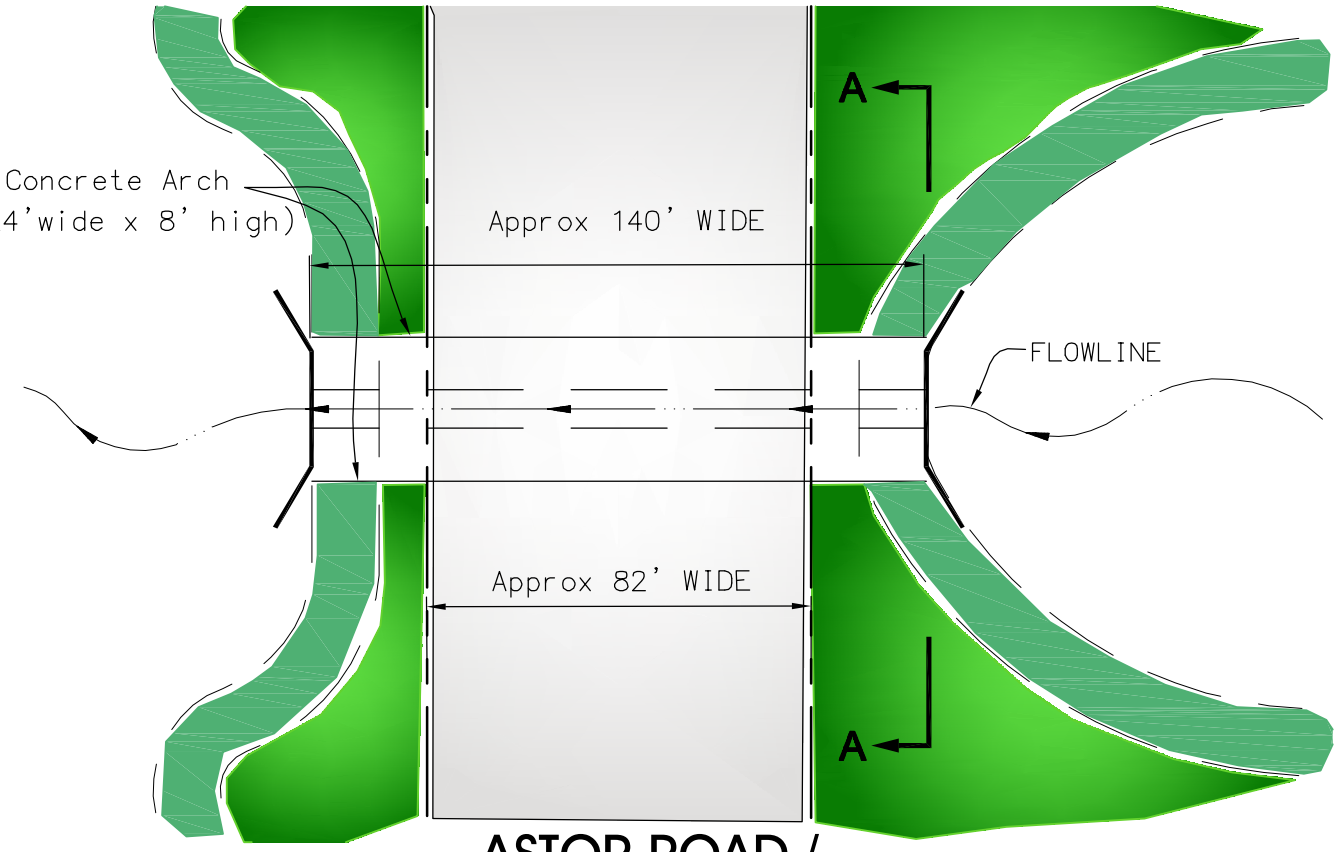
Photograph 2: Magazine Road undercrossing looking north toward segment 1 of the WLCF.

GLENN LUKOS ASSOCIATES

Figure 8

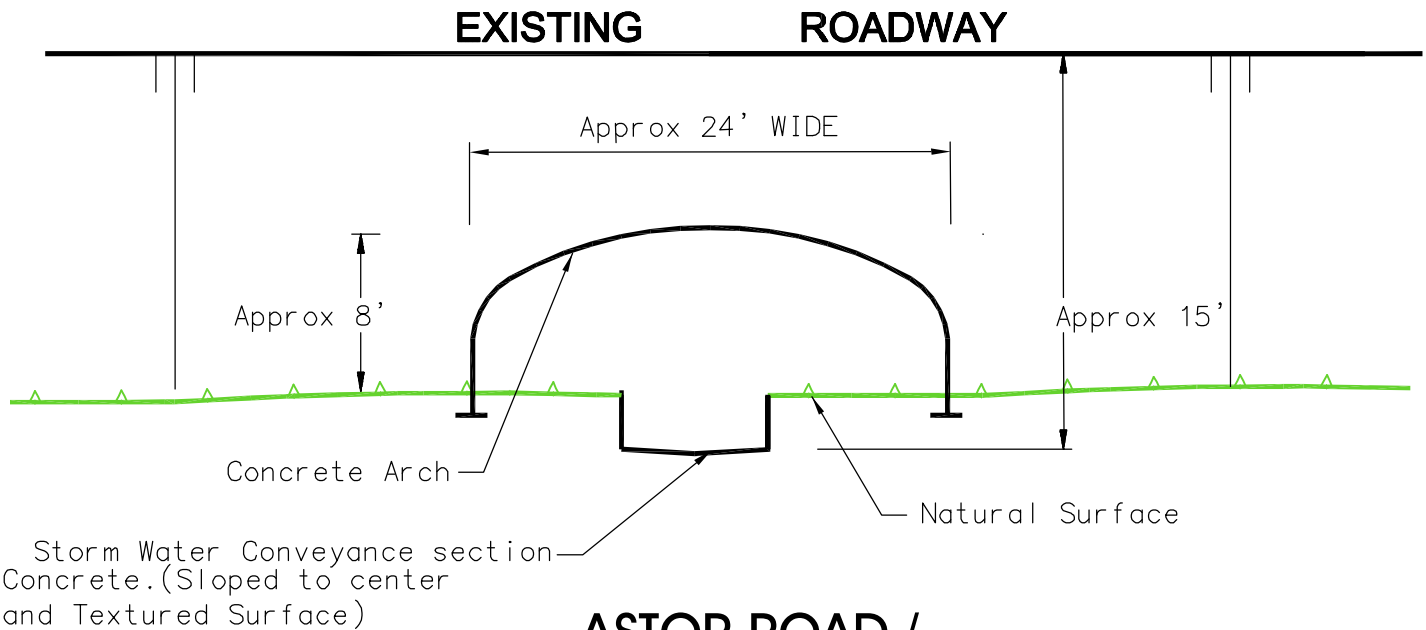
**HERITAGE FIELDS/GREAT PARK**

Site Photographs




# ASTOR ROAD / WILDLIFE CORRIDOR UNDERCROSSING

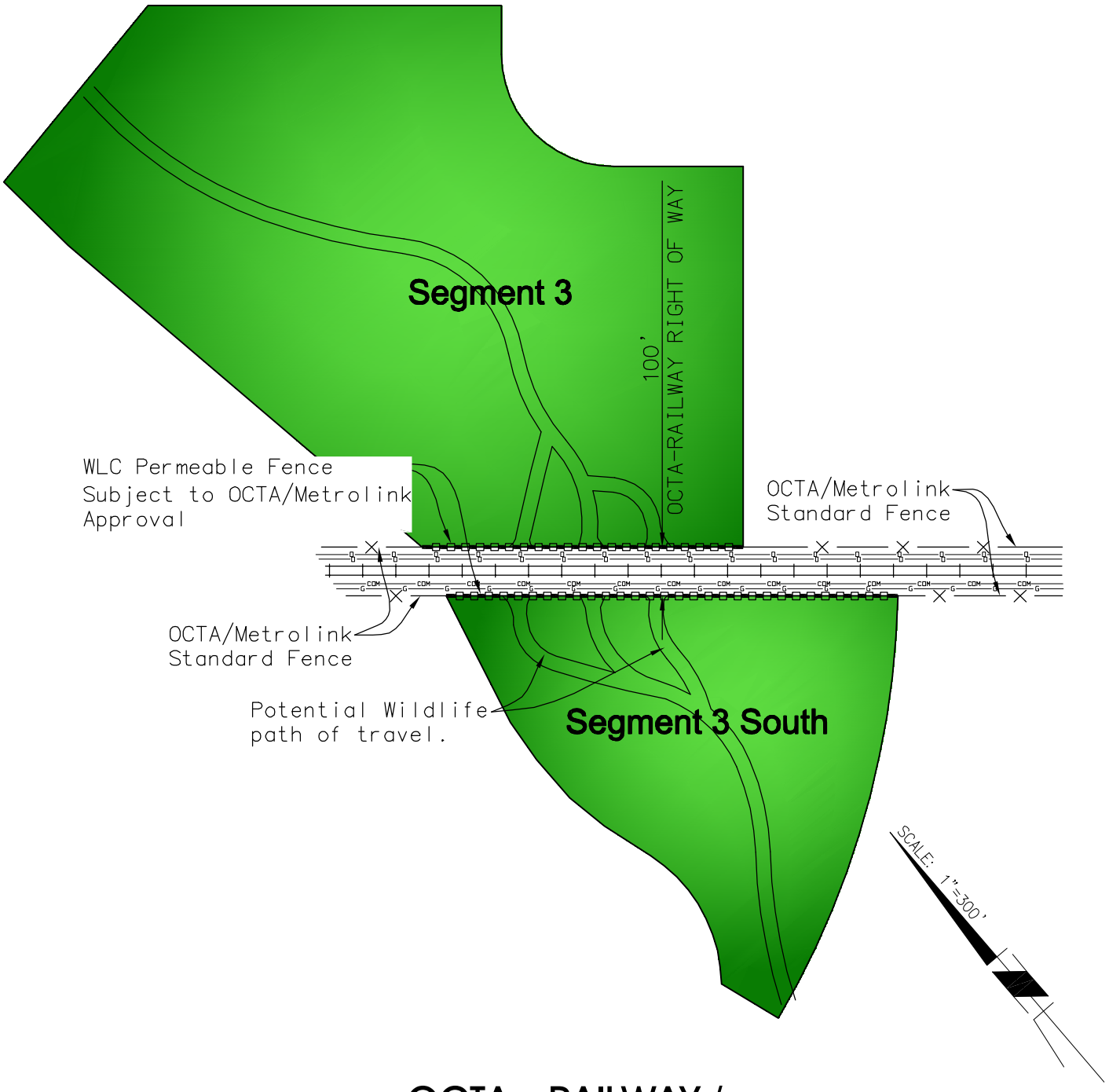
SCALE: 1"=40'




# ASTOR ROAD / WILDLIFE CORRIDOR UNDERCROSSING SECTION A-A

Figure 9
October 3, 2013

H:\PDATA\10105001\ADMIN\REPORTS\SSEIR_2012\FIGURE_9_ASTOR RD_WLC UNDERCROSSING.DWG JLEONARD 10/3/13 12:09 pm

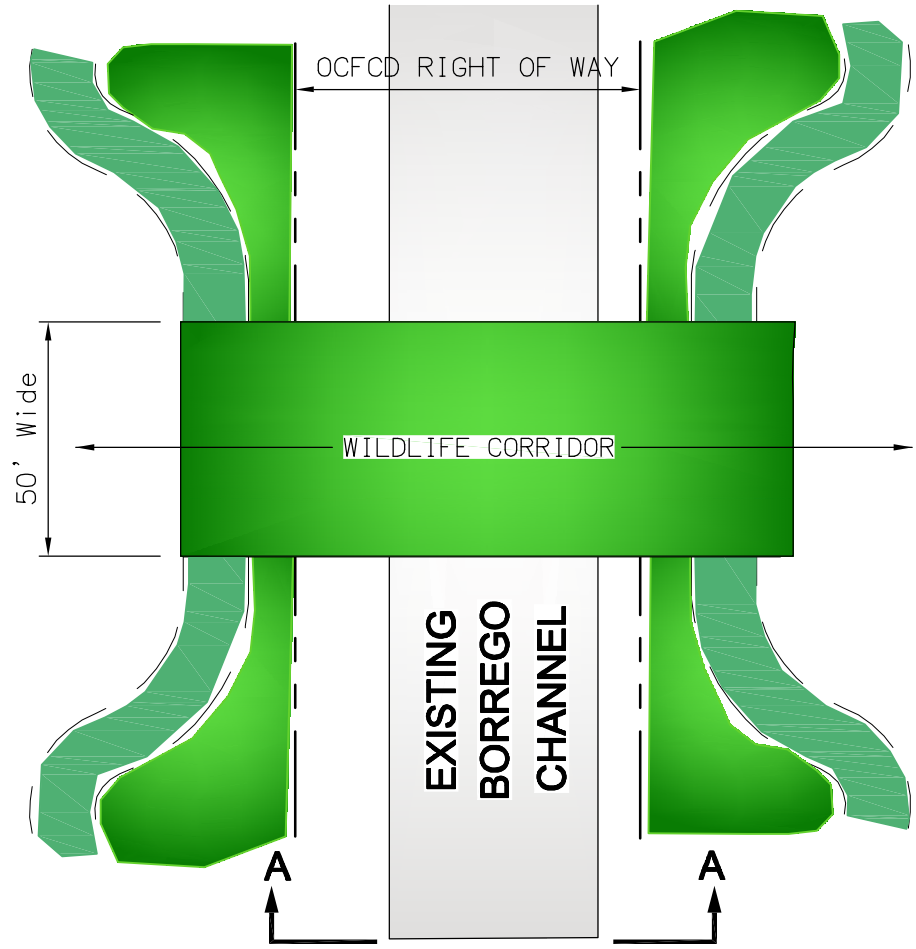


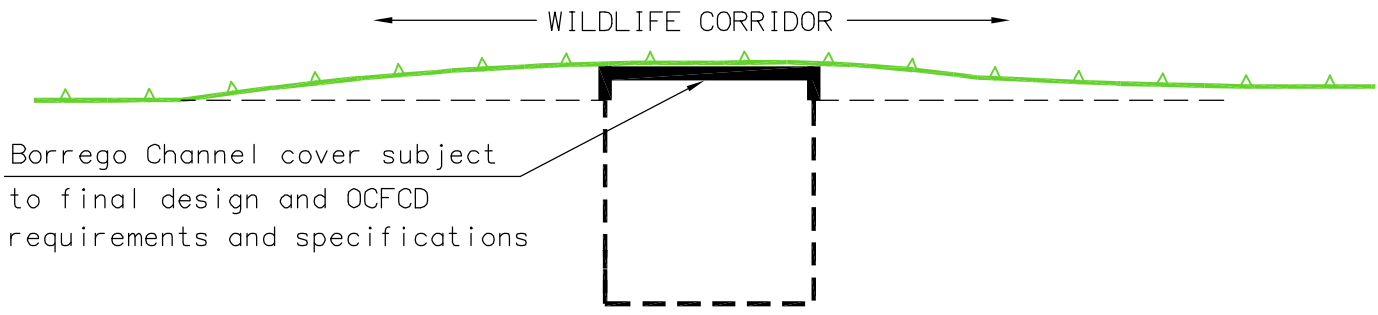

# OCTA - RAILWAY / WILDLIFE CORRIDOR CROSSING

0 150 300
SCALE: 1"=300'

**FIGURE 10**
**September 10, 2013**

H:\PDATA\10105001\ADMIN\REPORTS\SSEIR_2012\FIGURE_10_OCTA-RR_WLC UNDERCROSSING.DWG JLEONARD 9/10/13 3:07 pm



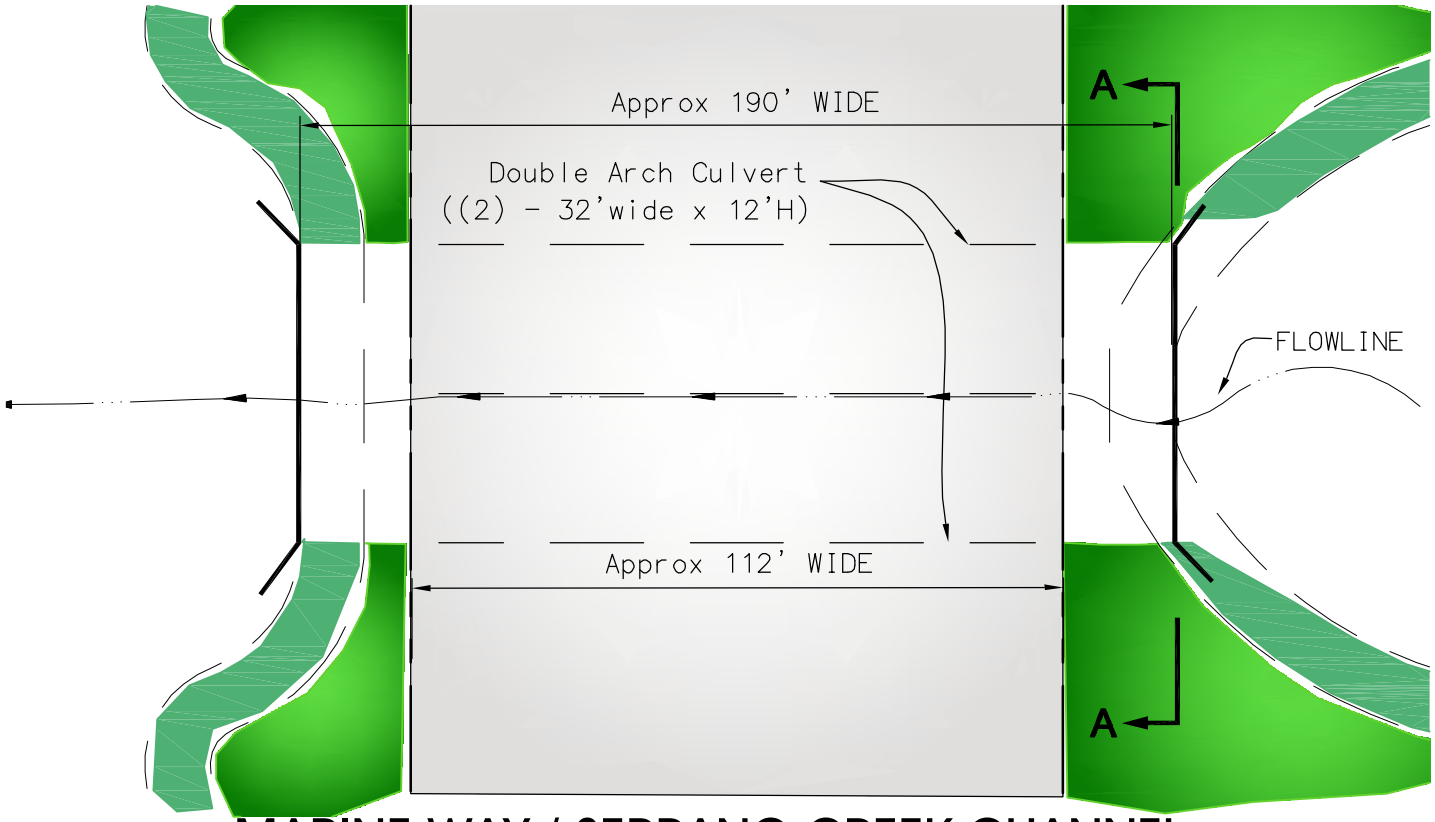




## SECTION A-A

# BORREGO CHANNEL COVER / WILDLIFE CORRIDOR CROSSING

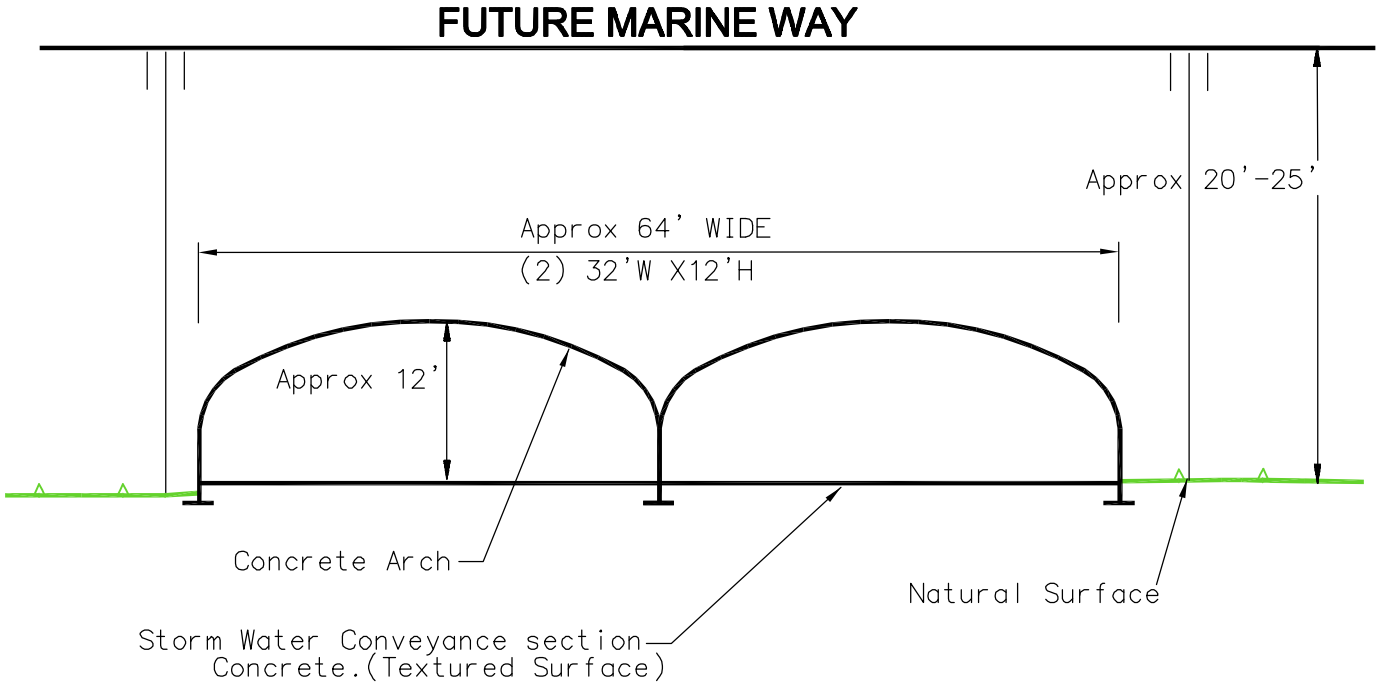
Figure 11a
August 14, 2013

H:\PDATA\10105001\ADMIN\REPORTS\SSEIR_2012\FIGURE_11_BORREGO_OVERCROSSING.DWG JLEONARD 8/14/13 3:03 pm




# MARINE WAY / SERRANO CREEK CHANNEL UNDERCROSSING

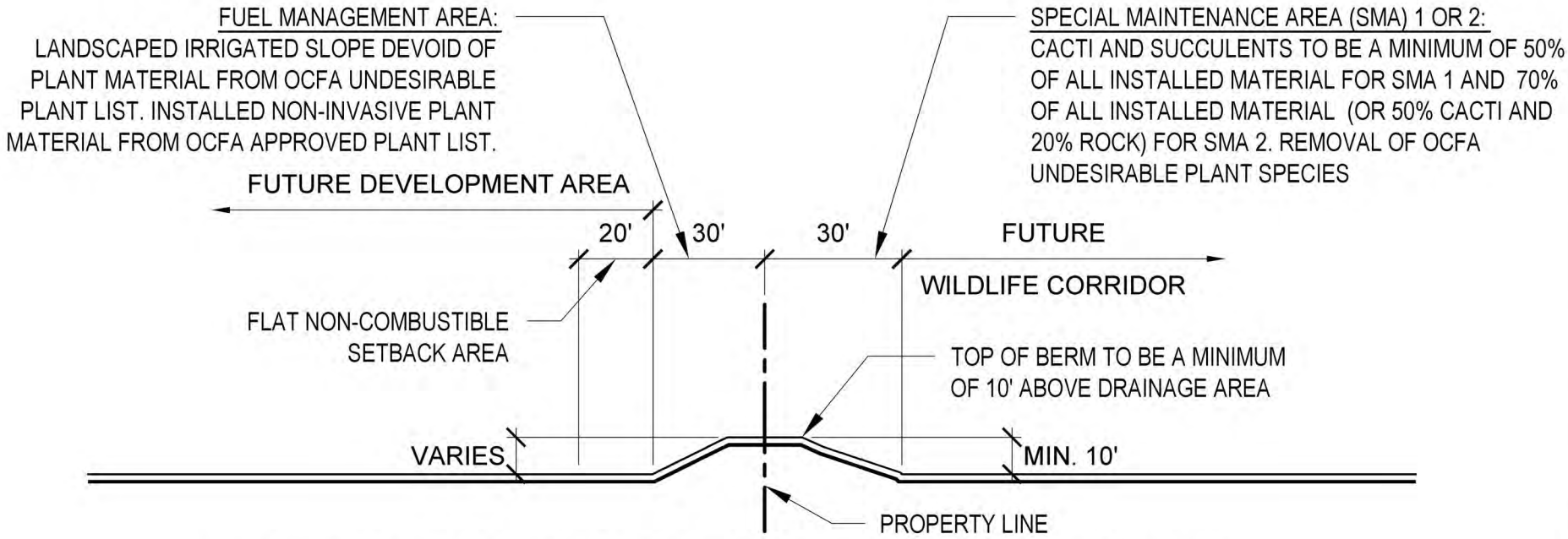
SCALE: 1"=40'




# MARINE WAY / SERRANO CREEK CHANNEL UNDERCROSSING SECTION A-A

Figure 11b
September 13, 2013

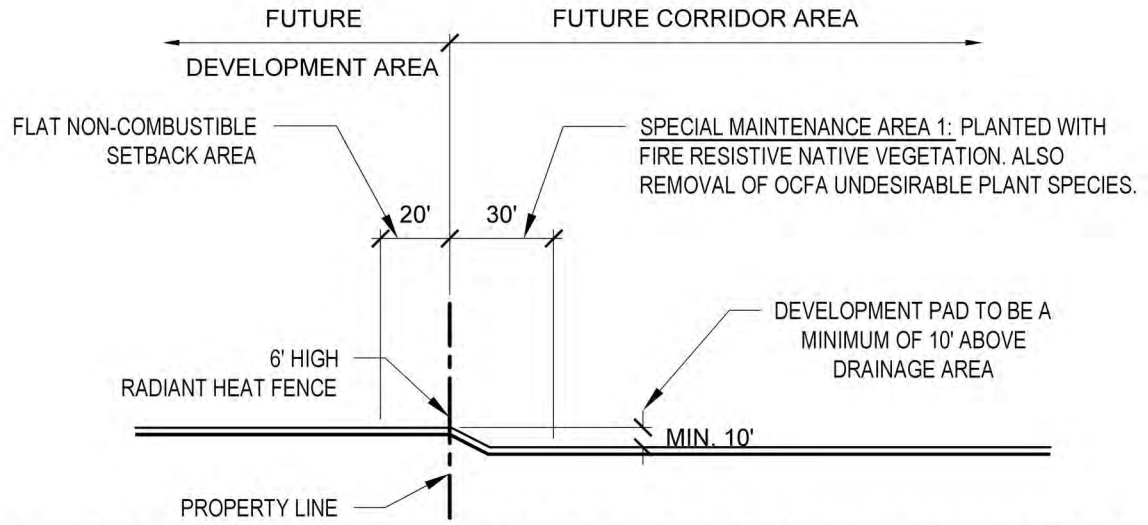
H:\PDATA\10105001\ADMIN\REPORTS\SSEIR_2012\FIGURE 11B_MARINE WAY_UNDERCROSSING.DWG JLEONARD 9/13/13 1:21 pm



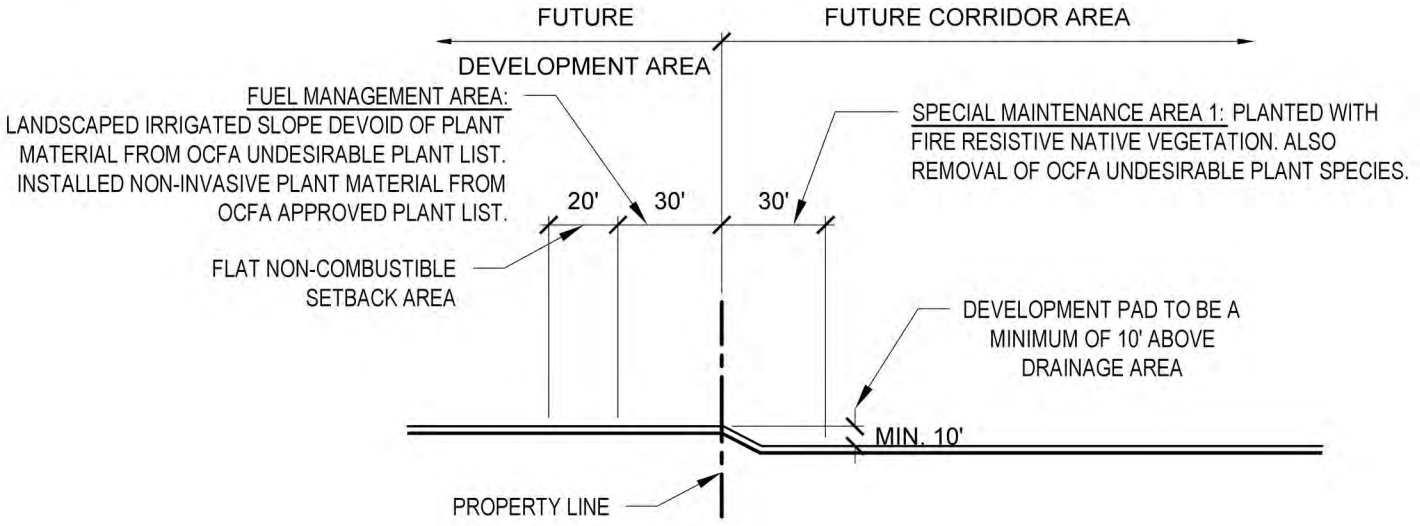

# INTERFACE MANAGEMENT FOR SEGMENTS 2 AND 3 PER THE IRVINE WILDLIFE CORRIDOR FEATURE FIRE RELATED PROGRAM

FIGURE 12

October 04, 2013




INTERFACE MANAGEMENT OPTION 1 FOR SEGMENTS 3 SOUTH AND 4
PER THE IRVINE WILDLIFE CORRIDOR FEATURE FIRE RELATED PROGRAM




INTERFACE MANAGEMENT OPTION 2 FOR SEGMENTS 3 SOUTH AND 4
PER THE IRVINE WILDLIFE CORRIDOR FEATURE FIRE RELATED PROGRAM

FIGURE 13

October 04, 2013

# Appendix A

Lighting Study (The Planning Center 2012)

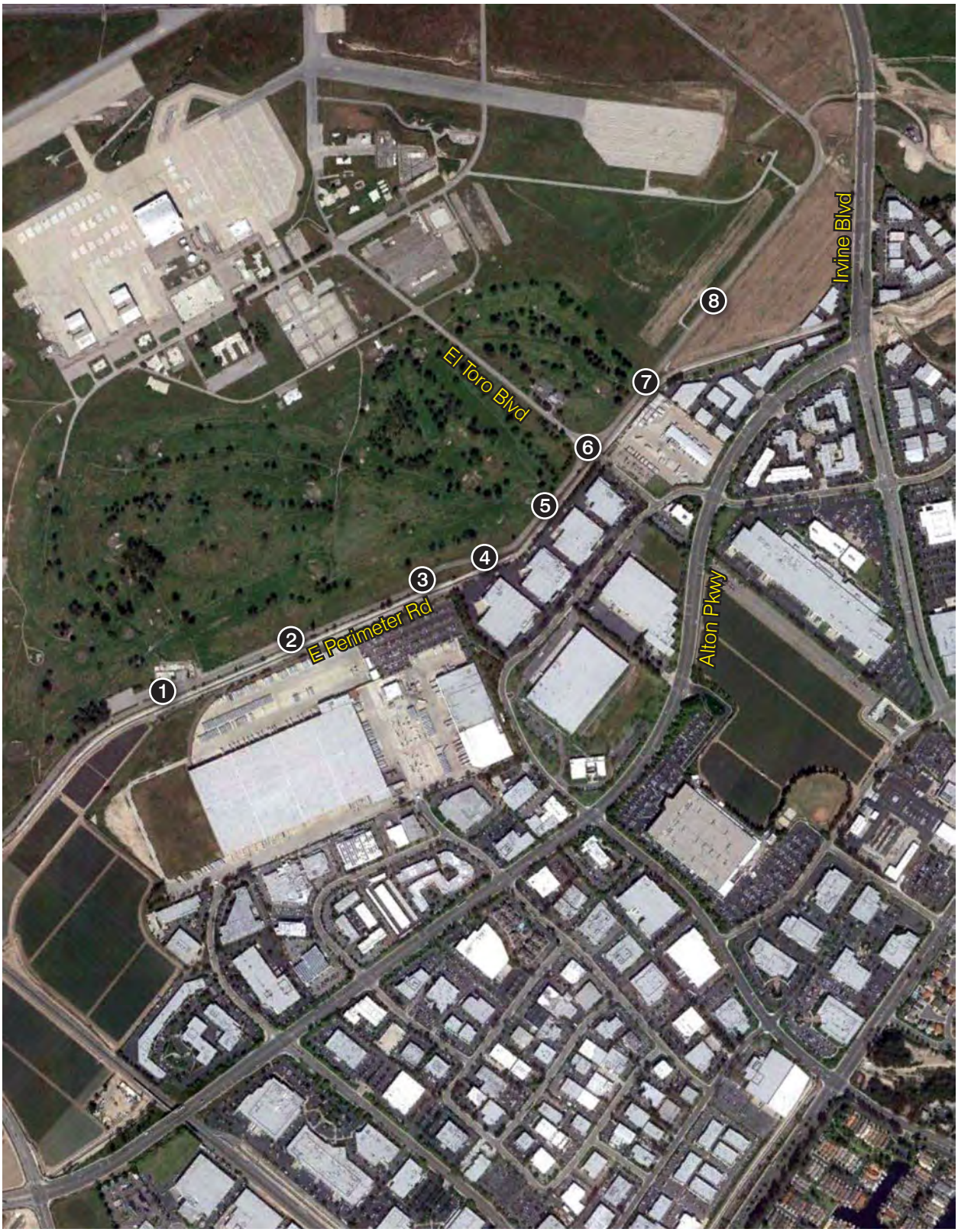
Light Measurements Heritage Fields Site East Perimeter Road May 17, 2012 Michael Milroy

Meter reading before 1st measurement with sensor cover on: 0.00 Meter range: 20.00 ft.-cd Meter source: Normal (tung.)

First measurement time: 8:20 pm Visible moon: none Sky condition: cloudy

Last measurement time: 9:15 pm Visible moon: none Sky condition: cloudy

| **Location** | **Approximate distance and direction from intersection of El Toro Blvd. and East Perimeter Road** | **Measurement (foot-candles)** | | **Visible lights** | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **Meter aimed at light** | **Meter aimed straight up** | **Building lights** | | **Parking lot lights** | **Street lights** | **Vehicle lights** |
| | | | | **Exterior** | **Interior** | | | |
| 1 | 3,360 feet southwest | 0.04 | 0.04 | X | | X | X | |
| 2 | 2,480 feet southwest | 0.04 | 0.04 | X | | X | | |
| 3 | 1,480 feet southwest | 0.03 | 0.04 | X | | X | | |
| 4 | 1,040 feet southwest | 0.12 | 0.05 | X | | X | | |
| 5 | 470 feet southwest | 0.14 | 0.05 | X | | | | |
| 6 | At intersection | 0.14 | 0.05 | X | | X | X | X (few) |
| 7 | 540 feet northeast | 0.10 | 0.06 | X | | X | X (distant) | |
| 8 | 1,440 feet northeast | 0.06 | 0.04 | X | | | X (distant) | X (distant) |




1 Light Measurement Locations

0 1,000
Scale (Feet)

# Appendix B

Noise Study (Urban Crossroads 2012)

URBAN CROSSROADS

41 Corporate Park | Suite 300 | Irvine, CA 92606 | (949) 660-1994
www.urbanXroads.com

May 21, 2012

Ms. Jennifer Bohen
Heritage Fields El Toro, LLC
25 Enterprise, Suite 400
Aliso Viejo, CA 92656

**Subject: Heritage Fields Project 2012 Wildlife Corridor Ambient Noise Conditions**

Dear Ms. Bohen:

Urban Crossroads, Inc. is pleased to submit this review of the ambient noise conditions associated with the proposed Heritage Fields Project 2012 Wildlife Corridor. To evaluate the existing noise level environment near the proposed wildlife corridor, three (3) long-term noise level measurements were taken near the eastern project boundary. Exhibit 1-A shows the Project boundaries and the noise level measurement locations. The long-term 24-hour noise level measurements were positioned at the fence or at distances ranging from 54 feet to 70 feet west of the existing concrete channel. The noise level measurements were recorded during typical weekday conditions by Urban Crossroads, Inc. on Wednesday, May 9th, 2012 and Thursday May 10th, 2012. Appendix 1.1 includes a photo index of the project study area.

1.1 Measurement Procedure and Criteria

The long-term noise level measurements were recorded using a Quest DL Pro data logging Type 2 noise dosimeter. All noise meters were programmed in "fast" mode to record noise levels in "A" weighted form. The Quest DL noise dosimeters were calibrated using a Quest QC-10 calibrator. All noise level measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (Standard S1.4-1983).

1.2 Noise Measurement Locations and Results

To assess the existing ambient noise level conditions opposite the warehouse and distributions center located east of the project site, long-term ambient noise level measurements were collected. The noise level measurements represent the typical weekday noise conditions with full operation of the neighboring FedEx Freight and Albertson's distribution centers. Currently, noise barriers do not exist between the project site and the neighboring distribution centers. Therefore, the following long-term ambient noise measurements reflect the unmitigated exterior noise conditions. The results for each measurement location are provided in Table 1. Noise measurements data printouts are presented in Appendix 1.2. A detailed description for each noise level measurement location is provided below:

- Observer Location L1 is located approximately 70 feet west of the property line fence opposite the FedEx Freight center located at 56 Fairbanks. The noise level meter recorded the ambient noise levels over 48 hours. Based on the noise level measurement results provided in Table 1, the average hourly noise levels range from

49.3 dBA Leq during the noise sensitive night time hours to 53.4 dBA Leq during the daytime hours. This results in an overall 24-hour CNEL noise level of 57.5 dBA CNEL.

- At Observer Location L2, the noise meter was placed approximately 54 feet west of the property line fence opposite the Albertsons distribution center employee parking lot. The noise level meter recorded the ambient noise levels over 48 hours. The average hourly Leq noise levels at Observer Location L2 ranged from 49.5 during the daytime hours and 51.7 during the nighttime hours. Due to the 10 dBA noise penalty for the noise sensitive nighttime hours, the higher nighttime noise levels results in a 24-hour CNEL of 58.8 dBA.

- For Observer Location L3, the noise meter was placed at the property line fence opposite the Albertsons distribution center loading dock area. A full 24-hour noise level measurement was collected at Observer Location L3. The measured hourly Leq noise levels ranged from 50.3 dBA during the daytime hours to 51.5 dBA during the evening hours. The measured CNEL at the Observer Location L3 was calculated at 57.4 dBA CNEL.

If you have any questions, please contact me directly at (949) 660-1994 ext. 203.

Respectfully submitted,

URBAN CROSSROADS, INC.

Bill Lawson, P.E., INCE
Principal

JN: 08141-06 Measurements.docx

EXHIBIT 1-A

# NOISE MEASUREMENT LOCATIONS

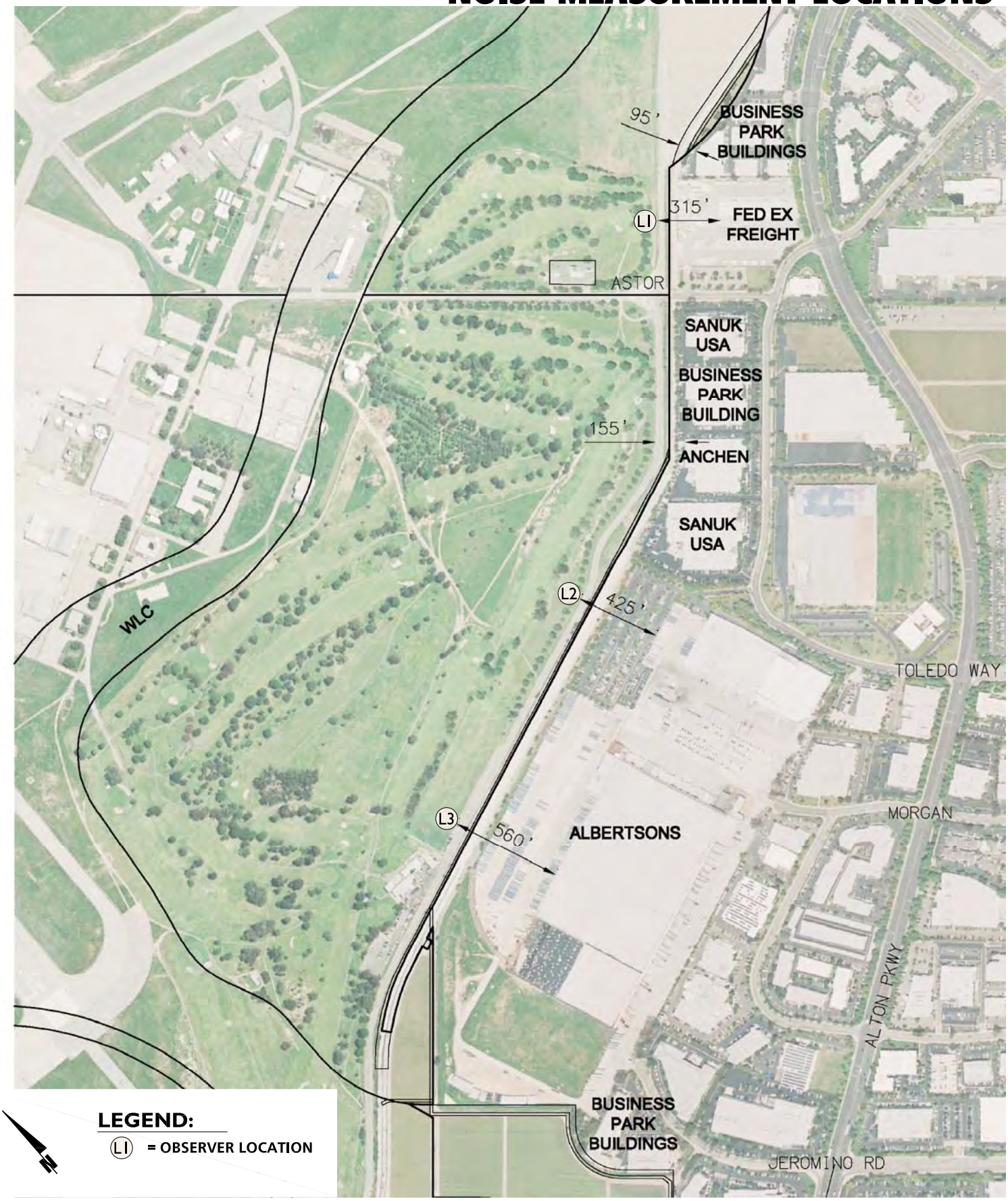


**Table 1**

**Long-Term (Ambient) Noise Level Measurements**

| Observer Location[1] | Dates | Description | Hourly Noise Level (Leq dBA)[2] | | | CNEL |
|---|---|---|---|---|---|---|
| | | | Daytime (7am to 7pm) | Evening (7pm to 10pm) | Nighttime (10pm to 7am) | |
| L1 | 5/9/2012<br>5/10/2012 | Noise meter was placed approximately 70 feet west of the property line fence opposite the FedEx Freight center located at 56 Fairbanks. | 53.4 | 52.9 | 49.3 | 57.5 |
| L2 | 5/9/2012<br>5/10/2012 | Noise meter was placed approximately 54 feet west of the property line fence opposite the Albertsons distribution center employee parking lot. | 49.5 | 50.7 | 51.7 | 58.8 |
| L3 | 5/9/2012 | Noise meter was placed at the property line fence opposite the Albertsons distribution center loading dock area. | 50.3 | 51.5 | 50.4 | 57.4 |

[1] See Exhibit 1-A for the location of the monitoring sites, and Appendix 1.1 for Study Area Photos.

[2] Average hourly noise levels. The long-term noise level measurements printouts are included in Appendix 1.2.

# APPENDIX 1.1

## Study Area Photos

# JN:08141 Heritage Fields 2012

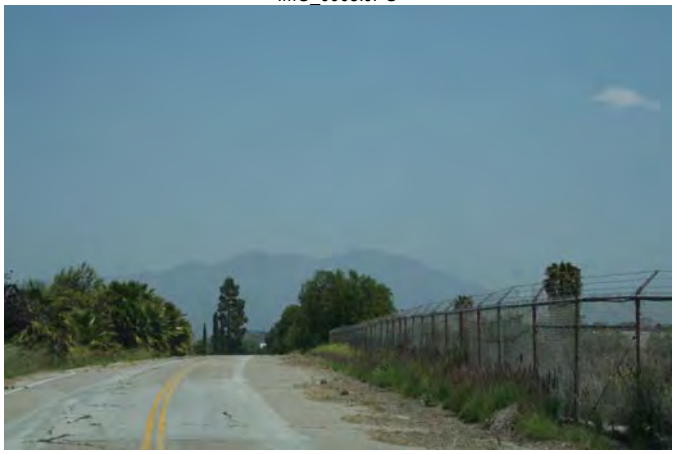
IMG_0002.JPG

IMG_0003.JPG

IMG_0004.JPG

IMG_0005.JPG

IMG_0006.JPG



IMG_0007.JPG

IMG_0008.JPG

IMG_0009.JPG

# JN:08141 Heritage Fields 2012

IMG_0010.JPG

IMG_0011.JPG

IMG_0013.JPG

IMG_0014.JPG

IMG_0015.JPG

IMG_0016.JPG

IMG_0017.JPG


IMG_0018.JPG

# JN:08141 Heritage Fields 2012

IMG_9974.JPG

IMG_9975.JPG

IMG_9976.JPG

IMG_9977.JPG

IMG_9978.JPG

IMG_9979.JPG

IMG_9980.JPG

IMG_9981.JPG

# JN:08141 Heritage Fields 2012

IMG_9982.JPG

IMG_9983.JPG

IMG_9984.JPG

IMG_9985.JPG

IMG_9986.JPG

IMG_9987.JPG

IMG_9988.JPG

IMG_9989.JPG

# JN:08141 Heritage Fields 2012

IMG_9990.JPG

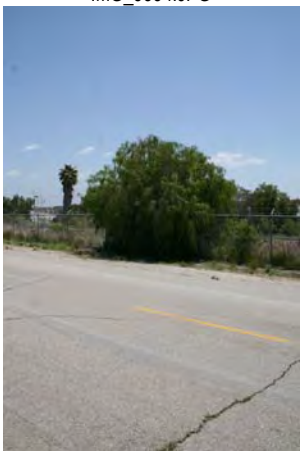
IMG_9991.JPG

IMG_9992.JPG

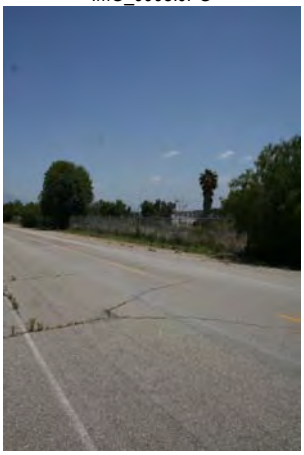
IMG_9993.JPG

IMG_9994.JPG

IMG_9995.JPG



IMG_9996.JPG



IMG_9997.JPG

# JN:08141 Heritage Fields 2012

IMG_9998.JPG

IMG_9999.JPG

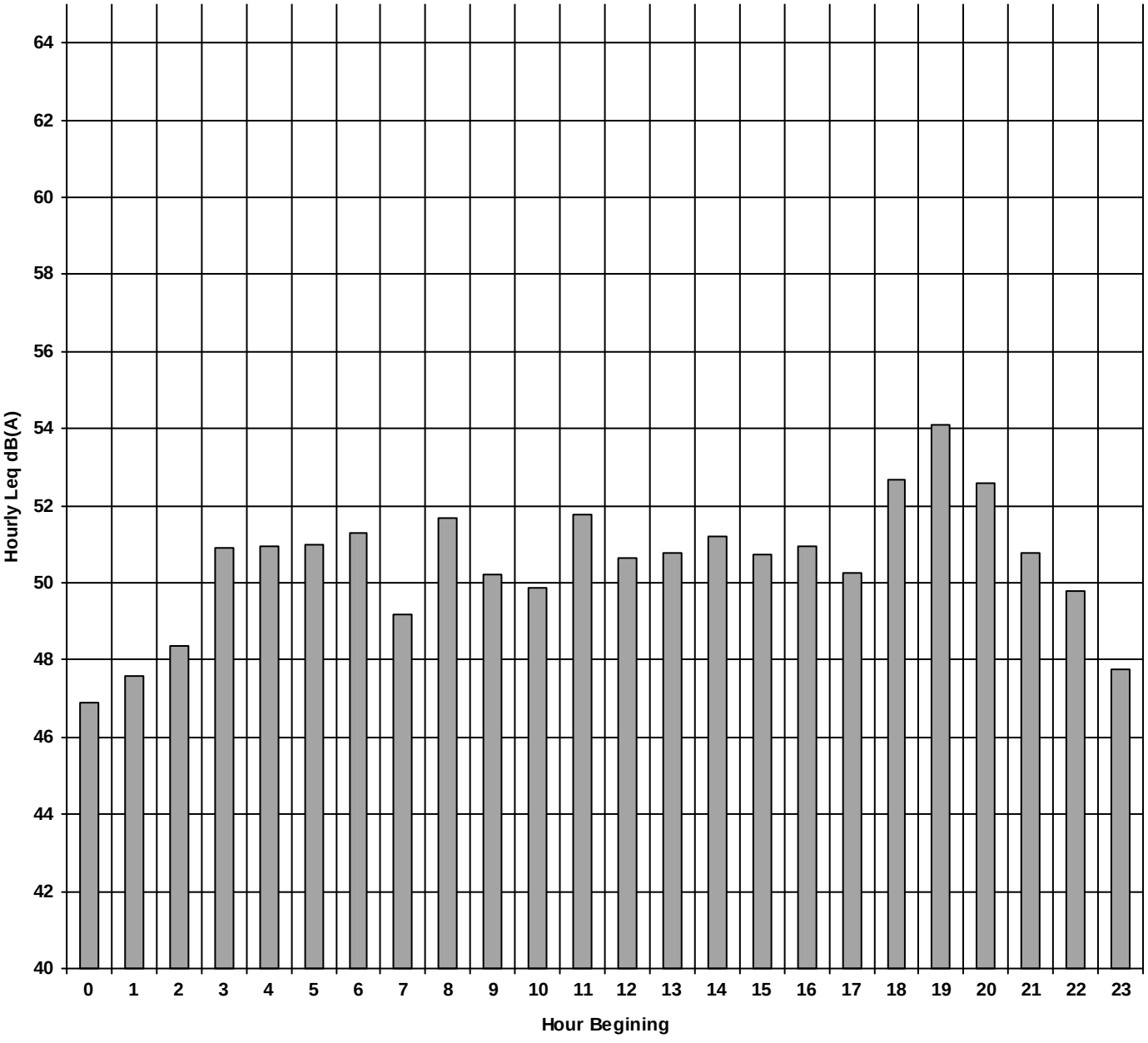
# APPENDIX 1.2

## Noise Monitoring Data Printouts

## 24-Hour Noise Level Measurement Summary

*Project Name:* Heritage Fields Project 2012
*Job Number:* 08141
*Location #:* L1
*Analyst:* B. Lawson
*Description:* 70' west of the fence opposite FedEx Freight
*Start Date:* Wednesday, May 09, 2012

Hourly Leq dB(A) Readings (unadjusted)




***Measured Peak Noise Hour: 19***

***Measured Peak Hour dBA Leq: 54.1***

## 24-Hour Noise Level Measurement Summary

*Project Name:* Heritage Fields Project 2012
*Job Number:* 08141
*Location #:* L1
*Analyst:* B. Lawson
*Description:* 70' west of the fence opposite FedEx Freight
*Start Date:* Wednesday, May 09, 2012

Leq To CNEL Noise Calculations

| *Noise Hour* | *Hourly Leq* | *CNEL Penalty* | *Adjusted Hourly Leq* |
|---|---|---|---|
| 0 | 46.9 | 10 | 56.9 |
| 1 | 47.6 | 10 | 57.6 |
| 2 | 48.3 | 10 | 58.3 |
| 3 | 50.9 | 10 | 60.9 |
| 4 | 51.0 | 10 | 61.0 |
| 5 | 51.0 | 10 | 61.0 |
| 6 | 51.3 | 10 | 61.3 |
| 7 | 49.2 | 0 | 49.2 |
| 8 | 51.7 | 0 | 51.7 |
| 9 | 50.2 | 0 | 50.2 |
| 10 | 49.9 | 0 | 49.9 |
| 11 | 51.8 | 0 | 51.8 |
| 12 | 50.7 | 0 | 50.7 |
| 13 | 50.8 | 0 | 50.8 |
| 14 | 51.2 | 0 | 51.2 |
| 15 | 50.7 | 0 | 50.7 |
| 16 | 51.0 | 0 | 51.0 |
| 17 | 50.3 | 0 | 50.3 |
| 18 | 52.7 | 0 | 52.7 |
| 19 | 54.1 | 5 | 59.1 |
| 20 | 52.6 | 5 | 57.6 |
| 21 | 50.8 | 5 | 55.8 |
| 22 | 49.8 | 10 | 59.8 |
| 23 | 47.7 | 10 | 57.7 |

***Calculated CNEL: 56.9***

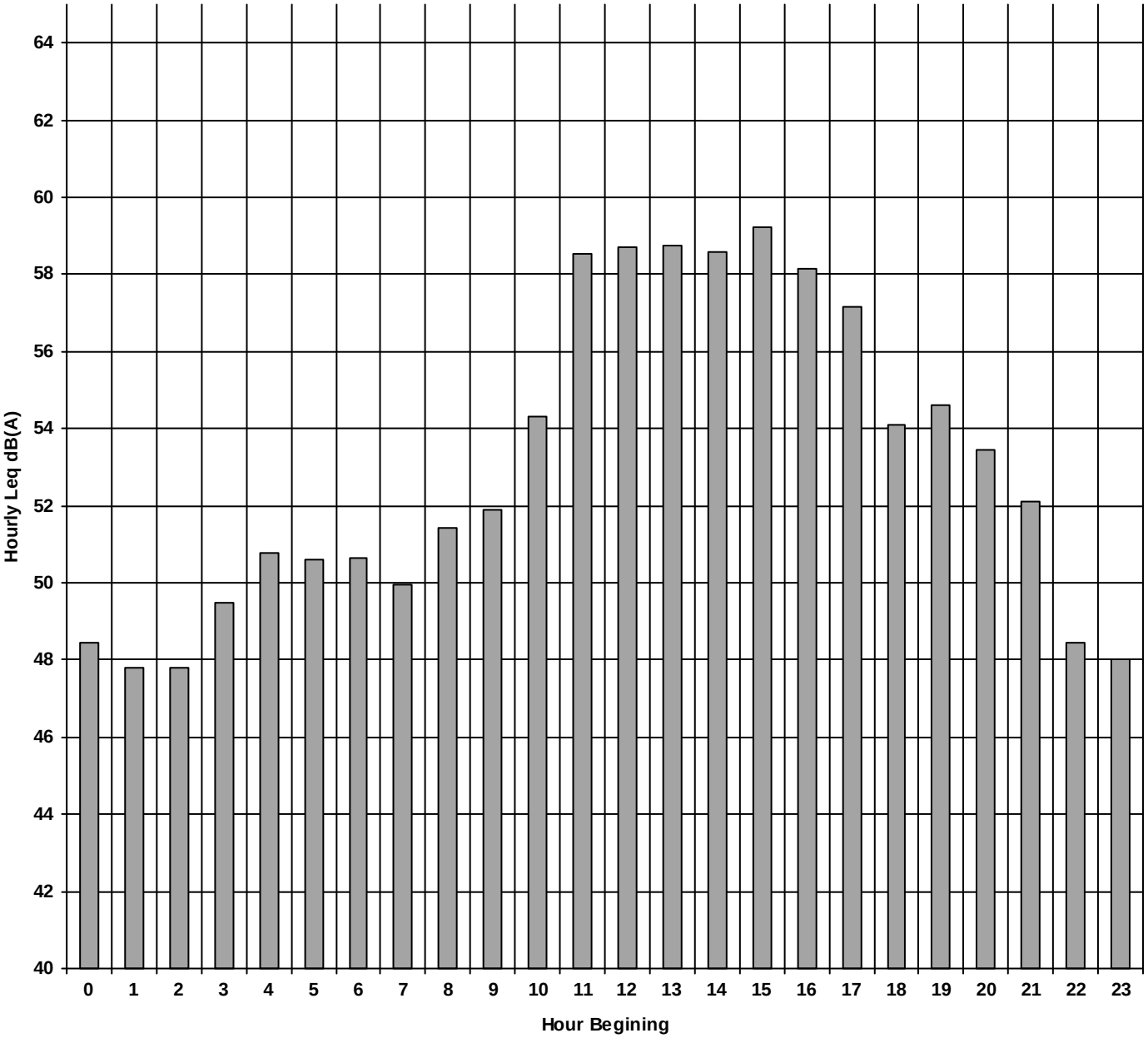
***Evening Hours***

***Nighttime Hours***

## 24-Hour Noise Level Measurement Summary

*Project Name:* Heritage Fields Project 2012
*Job Number:* 08141
*Location #:* L1
*Analyst:* B. Lawson
*Description:* 70' west of the fence opposite FedEx Freight
*Start Date:* Thursday, May 10, 2012

Hourly Leq dB(A) Readings (unadjusted)




***Measured Peak Noise Hour: 15***

***Measured Peak Hour dBA Leq: 59.2***

## 24-Hour Noise Level Measurement Summary

*Project Name:* Heritage Fields Project 2012
*Job Number:* 08141
*Location #:* L1
*Analyst:* B. Lawson
*Description:* 70' west of the fence opposite FedEx Freight
*Start Date:* Thursday, May 10, 2012

Leq To CNEL Noise Calculations

| *Noise Hour* | *Hourly Leq* | *CNEL Penalty* | *Adjusted Hourly Leq* |
|---|---|---|---|
| 0 | 48.4 | 10 | 58.4 |
| 1 | 47.8 | 10 | 57.8 |
| 2 | 47.8 | 10 | 57.8 |
| 3 | 49.5 | 10 | 59.5 |
| 4 | 50.8 | 10 | 60.8 |
| 5 | 50.6 | 10 | 60.6 |
| 6 | 50.7 | 10 | 60.7 |
| 7 | 50.0 | 0 | 50.0 |
| 8 | 51.4 | 0 | 51.4 |
| 9 | 51.9 | 0 | 51.9 |
| 10 | 54.3 | 0 | 54.3 |
| 11 | 58.6 | 0 | 58.6 |
| 12 | 58.7 | 0 | 58.7 |
| 13 | 58.7 | 0 | 58.7 |
| 14 | 58.6 | 0 | 58.6 |
| 15 | 59.2 | 0 | 59.2 |
| 16 | 58.1 | 0 | 58.1 |
| 17 | 57.2 | 0 | 57.2 |
| 18 | 54.1 | 0 | 54.1 |
| 19 | 54.6 | 5 | 59.6 |
| 20 | 53.5 | 5 | 58.5 |
| 21 | 52.1 | 5 | 57.1 |
| 22 | 48.4 | 10 | 58.4 |
| 23 | 48.0 | 10 | 58.0 |

***Calculated CNEL: 58.1***

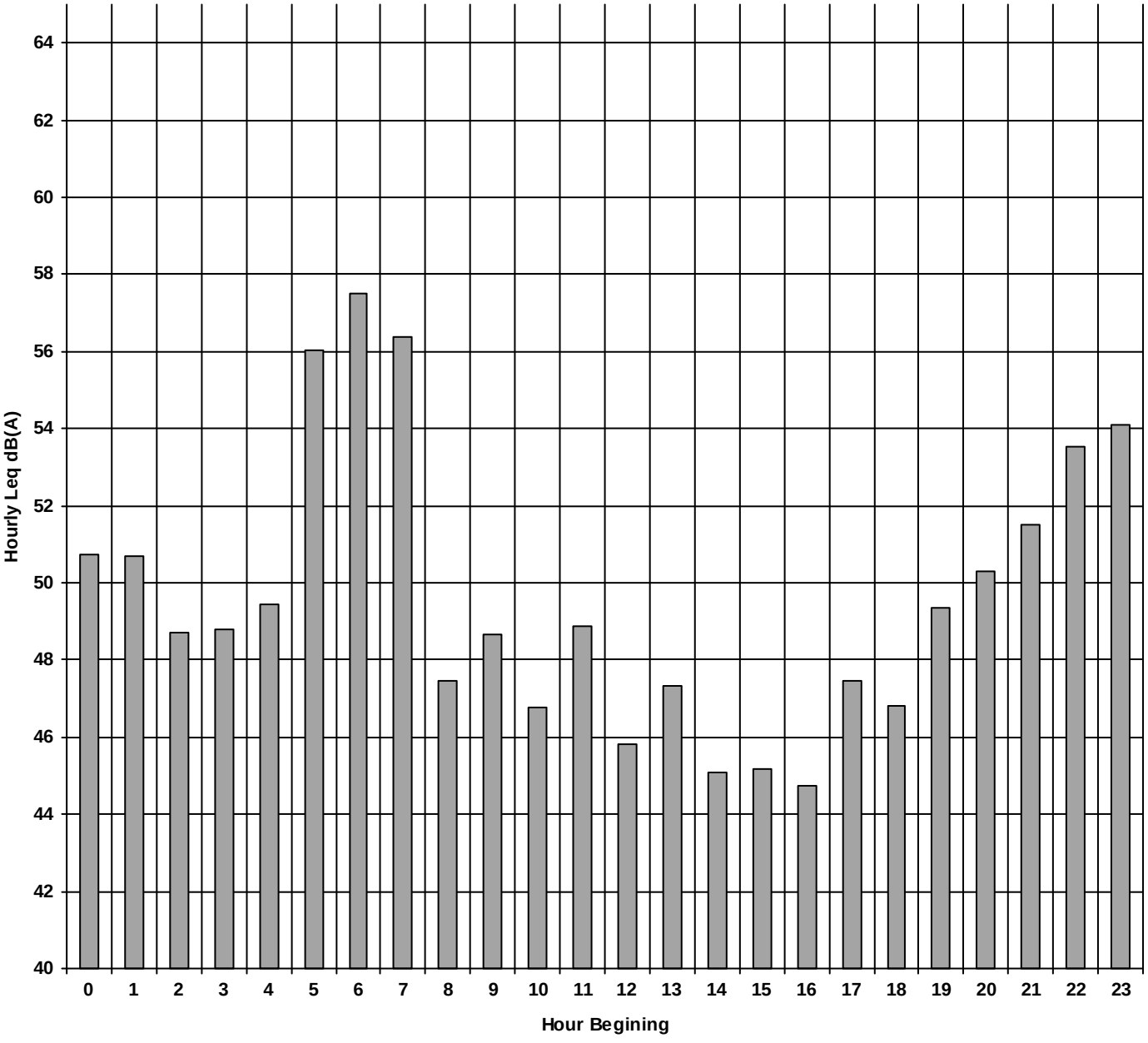
***Evening Hours***

***Nighttime Hours***

## 24-Hour Noise Level Measurement Summary

*Project Name:* Heritage Fields Project 2012 *Job Number:* 08141
*Location #:* L2 *Analyst:* B. Lawson
*Description:* 54' west of the fence opposite the Albertsons Distribution Center
*Start Date:* Wednesday, May 09, 2012

Hourly Leq dB(A) Readings (unadjusted)




***Measured Peak Noise Hour: 6***

***Measured Peak Hour dBA Leq: 57.5***

## 24-Hour Noise Level Measurement Summary

*Project Name:* Heritage Fields Project 2012 *Job Number:* 08141
*Location #:* L2 *Analyst:* B. Lawson
*Description:* 54' west of the fence opposite the Albertsons Distribution Center
*Start Date:* Wednesday, May 09, 2012

Leq To CNEL Noise Calculations

| *Noise Hour* | *Hourly Leq* | *CNEL Penalty* | *Adjusted Hourly Leq* |
|---|---|---|---|
| 0 | 50.7 | 10 | 60.7 |
| 1 | 50.7 | 10 | 60.7 |
| 2 | 48.7 | 10 | 58.7 |
| 3 | 48.8 | 10 | 58.8 |
| 4 | 49.5 | 10 | 59.5 |
| 5 | 56.0 | 10 | 66.0 |
| 6 | 57.5 | 10 | 67.5 |
| 7 | 56.4 | 0 | 56.4 |
| 8 | 47.5 | 0 | 47.5 |
| 9 | 48.7 | 0 | 48.7 |
| 10 | 46.8 | 0 | 46.8 |
| 11 | 48.9 | 0 | 48.9 |
| 12 | 45.8 | 0 | 45.8 |
| 13 | 47.3 | 0 | 47.3 |
| 14 | 45.1 | 0 | 45.1 |
| 15 | 45.2 | 0 | 45.2 |
| 16 | 44.7 | 0 | 44.7 |
| 17 | 47.5 | 0 | 47.5 |
| 18 | 46.8 | 0 | 46.8 |
| 19 | 49.4 | 5 | 54.4 |
| 20 | 50.3 | 5 | 55.3 |
| 21 | 51.5 | 5 | 56.5 |
| 22 | 53.5 | 10 | 63.5 |
| 23 | 54.1 | 10 | 64.1 |

***Calculated CNEL: 59.5***

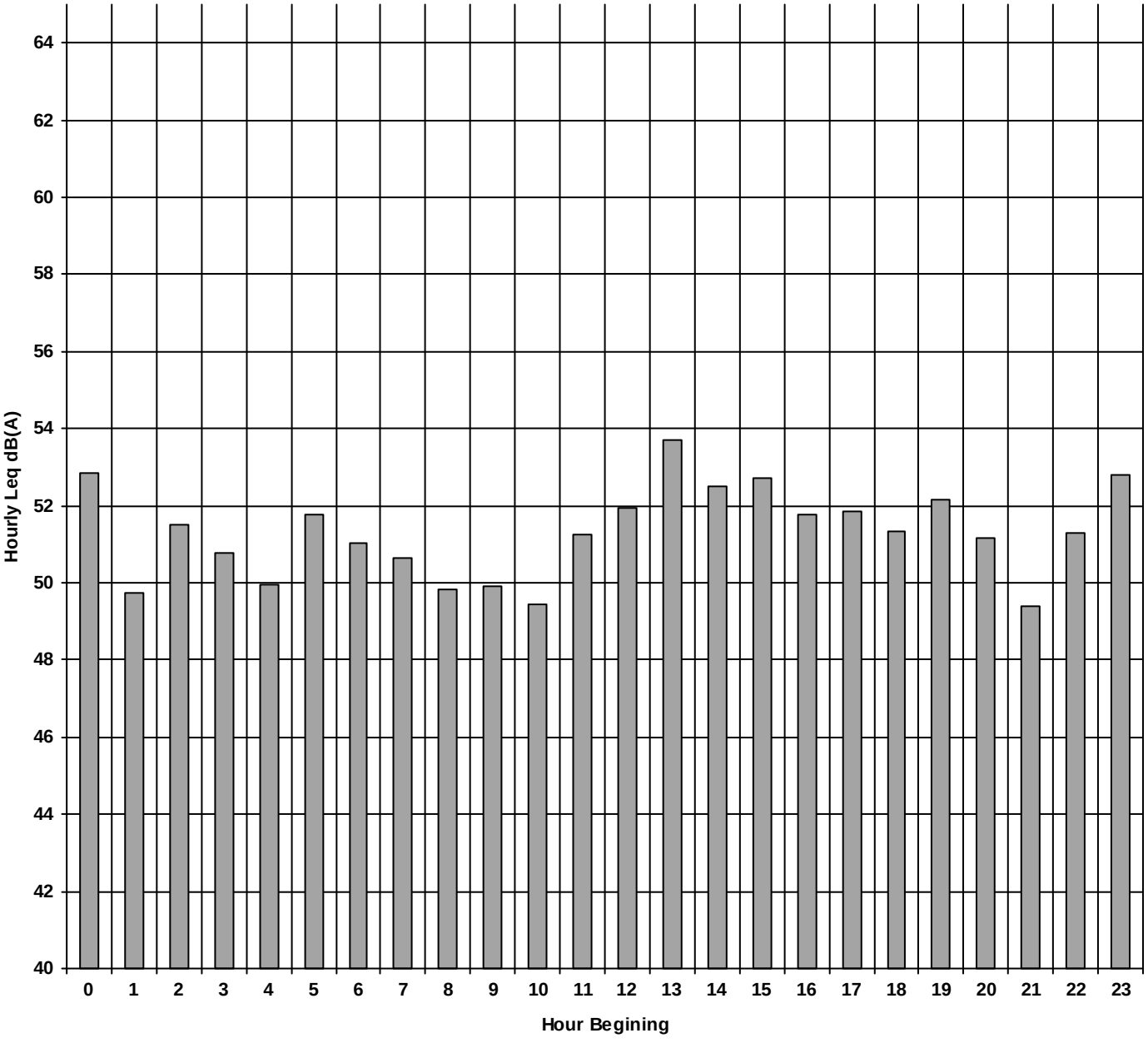
***Evening Hours***

***Nighttime Hours***

## 24-Hour Noise Level Measurement Summary

*Project Name:* Heritage Fields Project 2012 *Job Number:* 08141
*Location #:* L2 *Analyst:* B. Lawson
*Description:* 54' west of the fence opposite the Albertsons Distribution Center
*Start Date:* Thursday, May 10, 2012

Hourly Leq dB(A) Readings (unadjusted)




***Measured Peak Noise Hour: 13***

***Measured Peak Hour dBA Leq: 53.7***

## 24-Hour Noise Level Measurement Summary

*Project Name:* Heritage Fields Project 2012 *Job Number:* 08141
*Location #:* L2 *Analyst:* B. Lawson
*Description:* 54' west of the fence opposite the Albertsons Distribution Center
*Start Date:* Thursday, May 10, 2012

Leq To CNEL Noise Calculations

| *Noise Hour* | *Hourly Leq* | *CNEL Penalty* | *Adjusted Hourly Leq* |
|---|---|---|---|
| 0 | 52.8 | 10 | 62.8 |
| 1 | 49.7 | 10 | 59.7 |
| 2 | 51.5 | 10 | 61.5 |
| 3 | 50.8 | 10 | 60.8 |
| 4 | 49.9 | 10 | 59.9 |
| 5 | 51.8 | 10 | 61.8 |
| 6 | 51.0 | 10 | 61.0 |
| 7 | 50.6 | 0 | 50.6 |
| 8 | 49.8 | 0 | 49.8 |
| 9 | 49.9 | 0 | 49.9 |
| 10 | 49.4 | 0 | 49.4 |
| 11 | 51.3 | 0 | 51.3 |
| 12 | 51.9 | 0 | 51.9 |
| 13 | 53.7 | 0 | 53.7 |
| 14 | 52.5 | 0 | 52.5 |
| 15 | 52.7 | 0 | 52.7 |
| 16 | 51.8 | 0 | 51.8 |
| 17 | 51.9 | 0 | 51.9 |
| 18 | 51.3 | 0 | 51.3 |
| 19 | 52.2 | 5 | 57.2 |
| 20 | 51.2 | 5 | 56.2 |
| 21 | 49.4 | 5 | 54.4 |
| 22 | 51.3 | 10 | 61.3 |
| 23 | 52.8 | 10 | 62.8 |

***Calculated CNEL: 58.1***

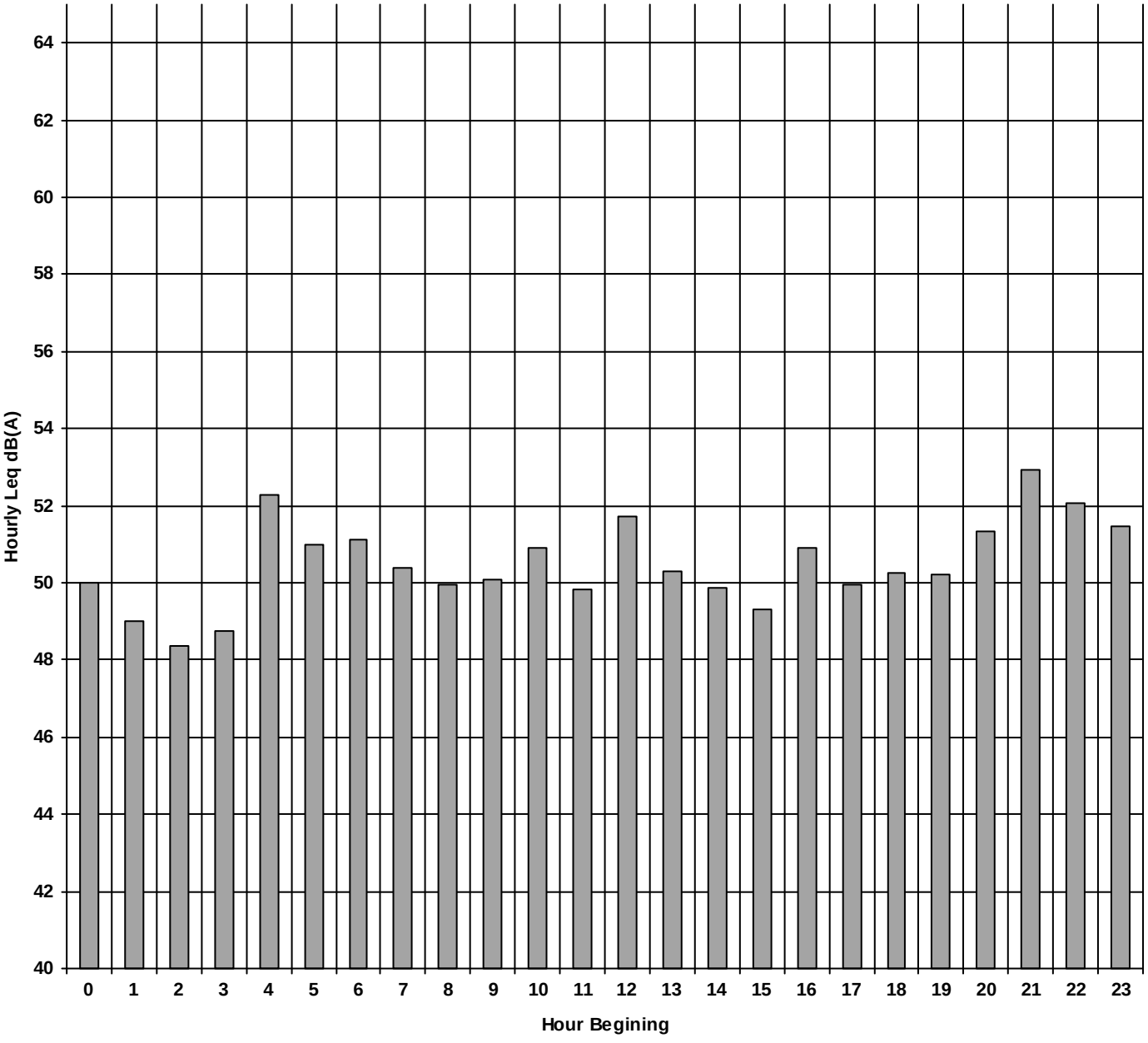
***Evening Hours***

***Nighttime Hours***

## 24-Hour Noise Level Measurement Summary

*Project Name:* Heritage Fields Project 2012 *Job Number:* 08141
*Location #:* L3 *Analyst:* B. Lawson
*Description:* At the property line fence opposite the Albertsons Distribution Center
*Start Date:* Wednesday, May 09, 2012

Hourly Leq dB(A) Readings (unadjusted)




***Measured Peak Noise Hour: 21***

***Measured Peak Hour dBA Leq: 52.9***

## 24-Hour Noise Level Measurement Summary

*Project Name:* Heritage Fields Project 2012 *Job Number:* 08141
*Location #:* L3 *Analyst:* B. Lawson
*Description:* At the property line fence opposite the Albertsons Distribution Center
*Start Date:* Wednesday, May 09, 2012

Leq To CNEL Noise Calculations

| *Noise Hour* | *Hourly Leq* | *CNEL Penalty* | *Adjusted Hourly Leq* |
|---|---|---|---|
| 0 | 50.0 | 10 | 60.0 |
| 1 | 49.0 | 10 | 59.0 |
| 2 | 48.3 | 10 | 58.3 |
| 3 | 48.7 | 10 | 58.7 |
| 4 | 52.3 | 10 | 62.3 |
| 5 | 51.0 | 10 | 61.0 |
| 6 | 51.1 | 10 | 61.1 |
| 7 | 50.4 | 0 | 50.4 |
| 8 | 50.0 | 0 | 50.0 |
| 9 | 50.1 | 0 | 50.1 |
| 10 | 50.9 | 0 | 50.9 |
| 11 | 49.8 | 0 | 49.8 |
| 12 | 51.7 | 0 | 51.7 |
| 13 | 50.3 | 0 | 50.3 |
| 14 | 49.9 | 0 | 49.9 |
| 15 | 49.3 | 0 | 49.3 |
| 16 | 50.9 | 0 | 50.9 |
| 17 | 50.0 | 0 | 50.0 |
| 18 | 50.3 | 0 | 50.3 |
| 19 | 50.2 | 5 | 55.2 |
| 20 | 51.3 | 5 | 56.3 |
| 21 | 52.9 | 5 | 57.9 |
| 22 | 52.1 | 10 | 62.1 |
| 23 | 51.4 | 10 | 61.4 |

***Calculated CNEL: 57.4***

***Evening Hours***

***Nighttime Hours***

# Appendix C

Irvine Wildlife Corridor Feature Fire Related Program (Firesafe Planning Solutions 2013)

# Irvine Wildlife Corridor Feature
# Fire Related Program

Developer:
**Heritage Fields El Toro, LLC**
**Great Park Neighborhoods**
**25 Enterprise, Suite 400**
**Aliso Viejo, CA 92656**

Prepared for:
**Orange County Fire Authority**
Fire Prevention Bureau
OCFA Service Request No. 176729

**Prepared By:**

firesafe
::PLANNING SOLUTIONS

Revised: October 4, 2013

## Table of Contents

## Wildlife Corridor – Specific Future and Existing Development Areas

Provided below is an aerial of the proposed Irvine Wildlife Corridor (light green areas). The portion of the Corridor within the project is separated into 4 Segments (Segments 2-4). Segment 1 was approved in 2011 as part of the County of Orange's Alton Parkway mitigation project.

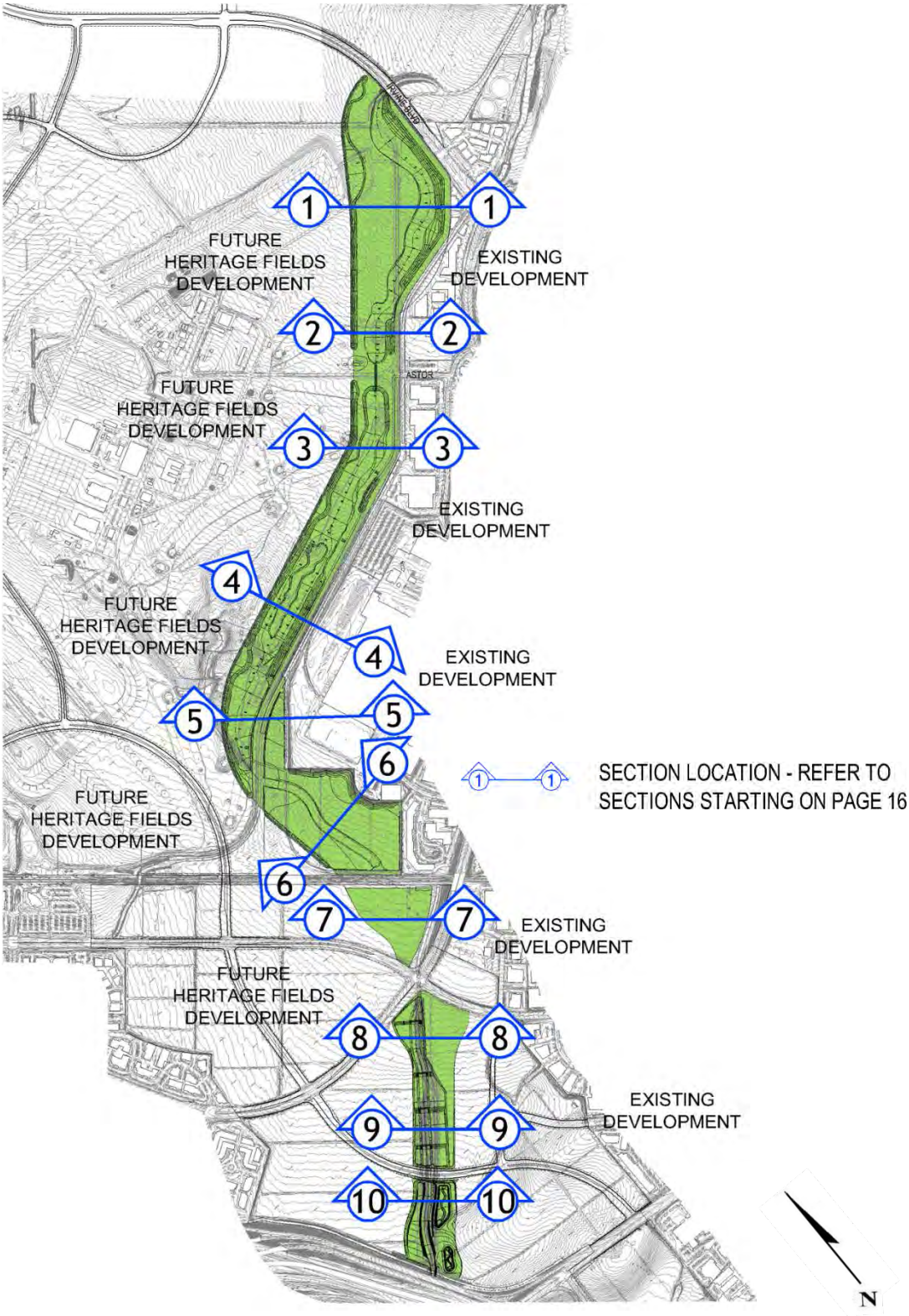

**Segment 1**

**Segments 2 & 3**

**Segment 3 South**

**Segment 4**

The Great Park and Heritage Fields interface will be varied and complex. We have examined features within and along the immediate edge of the Wildlife Corridor to protect future and existing structures. Numbered section locations are provided below.



## *Basis for Modeling*

Fire modeling is based on **topography, fuel and weather.** Modeling was completed for this project using BehavePlus 5.0.5. BehavePlus fire modeling system is a computer program based on mathematical models that describe wildland fire behavior and effects and the fire environment. It is a flexible system that produces tables, graphs, and simple diagrams. It can be used for a host of fire management applications including projecting the behavior of an ongoing fire, planning prescribed fire, fuel hazard assessment, and training. The BehavePlus program automatically creates a worksheet that requests the required input variables based on the modules, output variables, and options selected by the user.

The overall **topography** for this interface is relatively flat in and adjacent to the wildlife corridor. With little to no difference in elevation, slope is nearly nonexistent for the overall interface; however an earthen berm a minimum of 10' high above the drainage area will be placed between the wildlife corridor and the future development areas which will help slow an impending wildfire and provide a buffer to the interface.

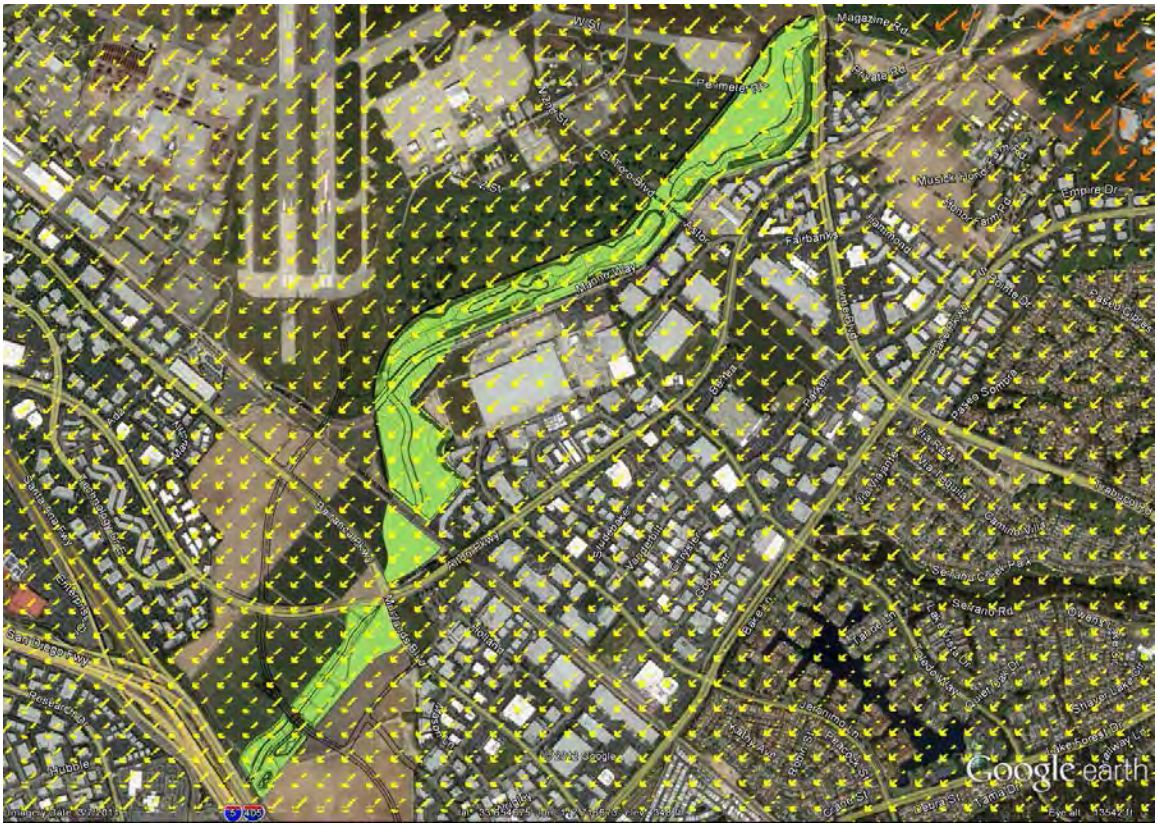
**Fuels** are light to medium and will be discussed specifically for each of the ten interface areas. Overall, four fuels have been modeled for all areas. Two of these are dynamic fuels (gr4 and gs2) and two (model sh7 and SCAL18) are not (See Appendix A for discussion on Dynamic Fuels). Dynamic fuel models would shift fuel load from the live to the dead component depending on the fuel moisture within the plants. Models used are as follows:

| Fuel Model | |
|---|---|
| gr4 | Moderate load, dry climate grass (D) (104) |
| gs2 | Moderate load, dry climate grass-shrub (D) (122) |
| sh7 | Very high load, dry climate shrub (S) (147) |
| SCAL18 | Sage / Buckwheat |

The final variables for the discussion of fuels are the configuration, continuity and arrangement of the fuels. In the case of the Wildlife Corridor, the fuels are aligned with the prevailing and extreme (Foehn) winds. Since the length of the corridor aligns with the wind, wind driven (extreme) fire would necessarily travel the length of the corridor rather than crossing it. Further discussion of this will follow within this program. The amount of fuel and its relationship to the development areas will play an important role in the performance based fire defense system that has been designed into this interface.

**Weather** can be identified by several key inputs: wind, temperature, relative humidity and cloud cover. Two wind events are normal in the interface between the Irvine Wildlife Corridor and the future Great Park Neighborhoods. First is an onshore (SW wind) which is created by heating in the inland areas which causes low pressure. Air from over the ocean which is cooler flows in to fill the low pressure areas. This onshore flow is predominant most of the time. The second wind event is the Santa Ana wind event which is a North to Northeast wind caused by high pressure systems. High pressure builds over the Great Basin (e.g., Nevada) and the cold air there begins to sink.

However, this air is forced downslope which compresses and warms it at a rate of about 29 degrees Fahrenheit per mile of descent. As its temperature rises, the relative humidity drops; the air starts out dry and winds up at sea level (Orange County) much drier still.




The onshore flow (SW) is normally light but can be brisk, especially when transitioning from an offshore/ Santa Ana event. For analysis purposes, a 30 mile per hour onshore wind was used for the Wildlife Corridor/Great Park Neighborhoods interface. The Santa Ana event is much stronger. Modeling for the Santa Ana (NE) was completed with a 60 mile per hour wind. All areas where considered to be unsheltered and eye level winds computed at 50% of the 20 foot winds.

For the analysis of this interface, temperatures were considered to be in the high 90's and relative humidity was in the 5% to 9% for the most extreme conditions. Fine dead fuels are impacted by relative humidity more than any others. One hour fuels have been assumed to be 4% fine dead fuel moisture; ten hour and hundred hour fuels at 5% and 6% respectively. All calculations assume un-shaded fuel beds (no clouds).

## *Fire Behavior*

Using the factors established for the modeling (shown below), the modeling outputs are simplified into four basic factors. First is the **Flame Length**, a very good indication of fire behavior as it is influenced by all of the relevant factors of extreme fire behavior (fuel moisture, winds, HR, slope, aspect and available fuel surface ratios). Second is the **rate of spread**. The speed at which a fire travels is import in both the timing of when a fire will impact a particular area and in the intensity of the flame front with faster moving fires having more energy than slower moving ones. The third aspect is **fireline intensity** or how hot the fire is burning and finally is the **residence time** or how long the fire will burn at any one location in the flaming front of the fire.

| Inputs: SURFACE | | |
|---|---|---|
| Description | | Eastern Corridor NE Wind at 60 mph |
| **Fuel/Vegetation, Surface/Understory** | | |
| Fuel Model | | gr4, gs2, sh7, SCAL18 |
| **Fuel Moisture** | | |
| 1-h Moisture | % | 4 |
| 10-h Moisture | % | 5 |
| 100-h Moisture | % | 6 |
| Live Herbaceous Moisture | % | 30 |
| Live Woody Moisture | % | 60 |
| **Weather** | | |
| Midflame Wind Speed | mi/h | 30 |
| Wind Direction (from north) | deg | 45 |
| **Terrain** | | |
| Slope Steepness | % | 0 |
| Aspect | deg | 0 |
| **Fire** | | |
| Spread Direction (from north) | deg | 15, 30, 45, 60, 75, 90, 105, 120, |

**Flame lengths** for the "worst case" fire scenario are extreme at the head of the fire but relatively small on the flanks and heal of the fire, mostly due to the wind. The tip of the

Eastern Corridor No Wind

Flame Length (ft)

but only fifteen degrees out of
t 50% (now 10 to 20 feet) and
s.

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 2.4 | 1.6 | 4.0 | 4.7 |
| 30 | 2.4 | 1.6 | 4.0 | 4.7 |
| 45 | 2.4 | 1.6 | 4.0 | 4.7 |
| 60 | 2.4 | 1.6 | 4.0 | 4.7 |
| 75 | 2.4 | 1.6 | 4.0 | 4.7 |
| 90 | 2.4 | 1.6 | 4.0 | 4.7 |

It should be noted that without wind the flame lengths would be under five feet in all directions. (shown to the left)

ogram

Below are the flame lengths for the four fuels that have been used for the analysis. It should be noted that the sh7 and SCAL18 are very extreme scenarios. These fuel models require fuel bed depth of 6 feet which is a very unlikely event within the wildlife corridor except in a few isolated areas. There will be no large continuous shrub fuel beds in the corridor.

## Eastern Corridor NE Wind at 60 mph

### Flame Length (ft)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 2.8 | 1.7 | 3.3 | 3.1 |
| 30 | 2.7 | 1.7 | 3.2 | 3.1 |
| 45 | 2.7 | 1.6 | 3.2 | 3.1 |
| 60 | 2.7 | 1.7 | 3.2 | 3.1 |
| 75 | 2.8 | 1.7 | 3.3 | 3.1 |
| 90 | 2.9 | 1.8 | 3.4 | 3.3 |
| 105 | 3.1 | 1.9 | 3.6 | 3.5 |
| 120 | 3.3 | 2.0 | 3.9 | 3.8 |
| 135 | 3.7 | 2.3 | 4.3 | 4.2 |
| 150 | 4.2 | 2.6 | 5.0 | 4.8 |
| 165 | 5.1 | 3.1 | 5.9 | 5.7 |
| 180 | 6.4 | 3.9 | 7.6 | 7.3 |
| 195 | 9.1 | 5.6 | 10.7 | 10.4 |
| 210 | 15.4 | 9.6 | 18.9 | 18.3 |
| 225 | 29.1 | 19.7 | 42.6 | 41.2 |
| 240 | 15.4 | 9.6 | 18.9 | 18.3 |
| 255 | 9.1 | 5.6 | 10.7 | 10.4 |
| 270 | 6.4 | 3.9 | 7.6 | 7.3 |
| 285 | 5.1 | 3.1 | 5.9 | 5.7 |
| 300 | 4.2 | 2.6 | 5.0 | 4.8 |
| 315 | 3.7 | 2.3 | 4.3 | 4.2 |
| 330 | 3.3 | 2.0 | 3.9 | 3.8 |
| 345 | 3.1 | 1.9 | 3.6 | 3.5 |
| 360 | 2.9 | 1.8 | 3.4 | 3.3 |

The **rate of spread** shows the same pattern with extreme head fire that diminishes rapidly only a few degrees off of the full alignment with the wind. The maximum rate of spread without wind is under 5 ch/hr. (a chain is 66 feet). The rate of spread within the gr4 (moderate grass/dry climate) is approximately 12.64 mph (1,112 ft/min or 18 ft/sec). There is simply not enough fuel within the corridor to achieve this level of fire spread.

Eastern Corridor NE Wind at 60 mph

Surface Rate of Spread (ch/h)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 6.2 | 1.9 | 1.7 | 1.0 |
| 30 | 5.9 | 1.8 | 1.6 | 0.9 |
| 45 | 5.8 | 1.7 | 1.6 | 0.9 |
| 60 | 5.9 | 1.8 | 1.6 | 0.9 |
| 75 | 6.2 | 1.9 | 1.7 | 1.0 |
| 90 | 6.8 | 2.0 | 1.8 | 1.1 |
| 105 | 7.7 | 2.3 | 2.1 | 1.2 |
| 120 | 9.2 | 2.8 | 2.5 | 1.4 |
| 135 | 11.5 | 3.5 | 3.1 | 1.8 |
| 150 | 15.5 | 4.6 | 4.2 | 2.4 |
| 165 | 22.8 | 6.8 | 6.1 | 3.6 |
| 180 | 38.2 | 11.5 | 10.4 | 6.1 |
| 195 | 80.0 | 24.4 | 22.1 | 12.9 |
| 210 | 255.4 | 80.6 | 75.9 | 44.5 |
| 225 | 1011.5 | 380.2 | 445.7 | 261.0 |
| 240 | 255.4 | 80.6 | 75.9 | 44.5 |
| 255 | 80.0 | 24.4 | 22.1 | 12.9 |
| 270 | 38.2 | 11.5 | 10.4 | 6.1 |
| 285 | 22.8 | 6.8 | 6.1 | 3.6 |
| 300 | 15.5 | 4.6 | 4.2 | 2.4 |
| 315 | 11.5 | 3.5 | 3.1 | 1.8 |
| 330 | 9.2 | 2.8 | 2.5 | 1.4 |
| 345 | 7.7 | 2.3 | 2.1 | 1.2 |
| 360 | 6.8 | 2.0 | 1.8 | 1.1 |

It should also be noted that the rate drops by a factor of 4 (25% of the head fire value) with fifteen degrees of offset from the wind and drops another third (now 8% of the head fire value) at thirty degrees.

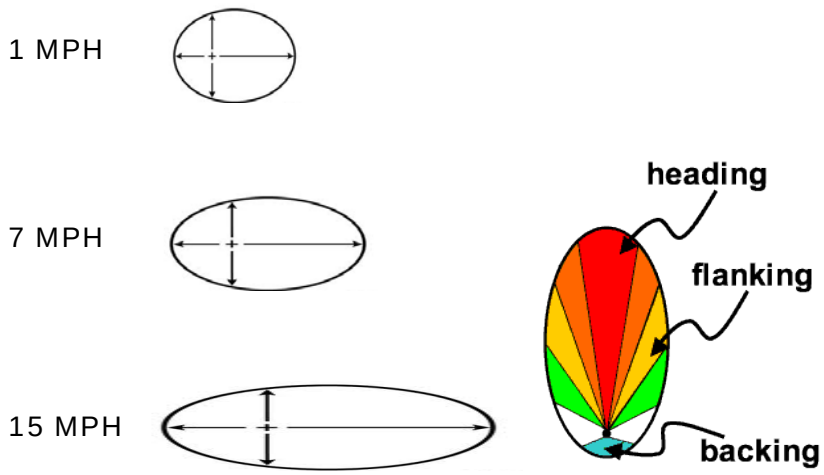
**Fireline intensity** shows the same relationship and characteristics but now the woody shrub fuels are the highest rather than the light flashy grass fuels.

Eastern Corridor NE Wind at 60 mph

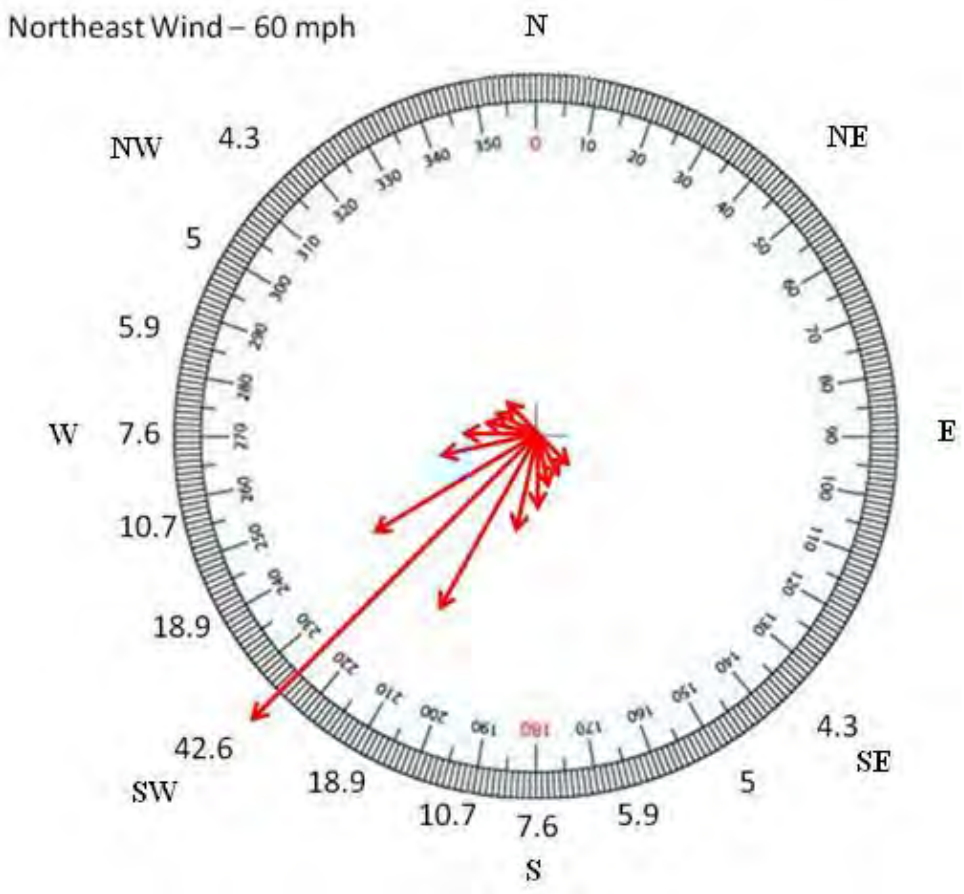
Fireline Intensity (Btu/ft/s)

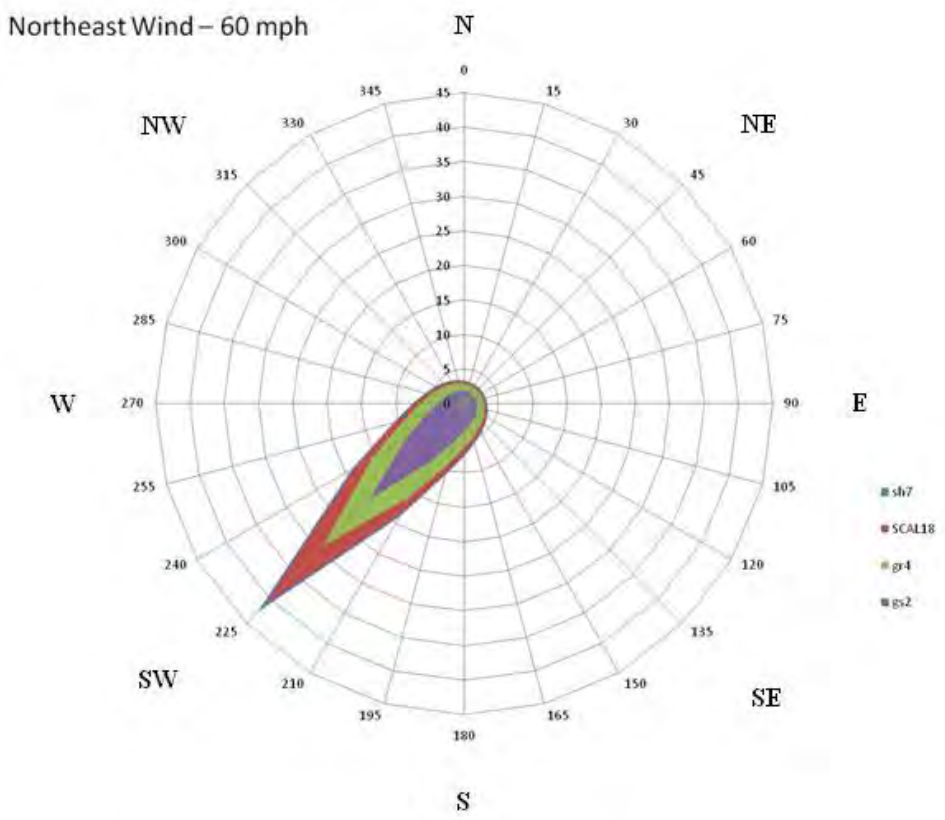
| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 53 | 18 | 74 | 69 |
| 30 | 50 | 17 | 70 | 65 |
| 45 | 49 | 17 | 69 | 64 |
| 60 | 50 | 17 | 70 | 65 |
| 75 | 53 | 18 | 74 | 69 |
| 90 | 58 | 20 | 81 | 75 |
| 105 | 66 | 22 | 92 | 85 |
| 120 | 78 | 27 | 109 | 102 |
| 135 | 98 | 33 | 137 | 128 |
| 150 | 132 | 45 | 185 | 172 |
| 165 | 194 | 66 | 272 | 254 |
| 180 | 326 | 112 | 460 | 429 |
| 195 | 682 | 236 | 980 | 913 |
| 210 | 2176 | 782 | 3363 | 3133 |
| 225 | 8617 | 3685 | 19747 | 18399 |
| 240 | 2176 | 782 | 3363 | 3133 |
| 255 | 682 | 236 | 980 | 913 |
| 270 | 326 | 112 | 460 | 429 |
| 285 | 194 | 66 | 272 | 254 |
| 300 | 132 | 45 | 185 | 172 |
| 315 | 98 | 33 | 137 | 128 |
| 330 | 78 | 27 | 109 | 102 |
| 345 | 66 | 22 | 92 | 85 |
| 360 | 58 | 20 | 81 | 75 |

As the wind speed increases, the fire becomes longer and narrower. With wind speeds of 15 mph plus, the fire perimeter would look like the ellipse on the bottom of the graphic below, area of impact will be small and isolated.




Shown another way, the actual flame lengths for this project have been plotted on the following two graphics to show the relationship of the flame lengths to the wind. Wind in cover from the NE (45 degrees)






As can be seen in the graphics, the fire spread is primarily in a single direction with nearly all of the intensity and rate of spread focused on a single point. This is important to this project especially because of the alignment of the corridor and winds. The fire will, for the most part, stay within the wildlife corridor if one occurs.

The final factor, flame residence time is also important. The fire will not last very long. The residence time for these fuels is all less than a minute. The grass fuels are less than13 seconds and the more woody fuels a little over twice that. These are shown on the next page.

One additional factor that needs to be addressed is fire acceleration. The outputs from the fire models are for fire which has reached equilibrium in a self sustaining state. This takes from 6 to 20 minutes depending on the fuel configuration and the surface to area ratios. In this area, all fire would start out as point source fires. They would grow and extend but would not have the fuelbed configuration or arrangements to have a “line of fire” enter the next fuel compartment. The longest run within the corridor without a roadway or noncombustible surface to inhibit the firefront is less than a half a mile in full alignment and three quarters of mile out of alignment (longest run total). It is important to view all of the results of the modeling with this in mind. Appendix B has more information on fire acceleration.

## Eastern Corridor NE Wind at 60 mph

### Flame Residence Time (s)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 12.62 | 12.61 | 18.69 | 29.35 |
| 30 | 12.62 | 12.61 | 18.69 | 29.35 |
| 45 | 12.62 | 12.61 | 18.69 | 29.35 |
| 60 | 12.62 | 12.61 | 18.69 | 29.35 |
| 75 | 12.62 | 12.61 | 18.69 | 29.35 |
| 90 | 12.62 | 12.61 | 18.69 | 29.35 |
| 105 | 12.62 | 12.61 | 18.69 | 29.35 |
| 120 | 12.62 | 12.61 | 18.69 | 29.35 |
| 135 | 12.62 | 12.61 | 18.69 | 29.35 |
| 150 | 12.62 | 12.61 | 18.69 | 29.35 |
| 165 | 12.62 | 12.61 | 18.69 | 29.35 |
| 180 | 12.62 | 12.61 | 18.69 | 29.35 |
| 195 | 12.62 | 12.61 | 18.69 | 29.35 |
| 210 | 12.62 | 12.61 | 18.69 | 29.35 |
| 225 | 12.62 | 12.61 | 18.69 | 29.35 |
| 240 | 12.62 | 12.61 | 18.69 | 29.35 |
| 255 | 12.62 | 12.61 | 18.69 | 29.35 |
| 270 | 12.62 | 12.61 | 18.69 | 29.35 |
| 285 | 12.62 | 12.61 | 18.69 | 29.35 |
| 300 | 12.62 | 12.61 | 18.69 | 29.35 |
| 315 | 12.62 | 12.61 | 18.69 | 29.35 |
| 330 | 12.62 | 12.61 | 18.69 | 29.35 |
| 345 | 12.62 | 12.61 | 18.69 | 29.35 |
| 360 | 12.62 | 12.61 | 18.69 | 29.35 |

The second wind scenario is a SW wind (onshore) that occurs at the transition of the NE wind event. The dry air that has been pushed out over the ocean is drawn back onto the land for a few hours before more moist air replaced it in the normal onshore flow. In this case the wind speed is about half of the NE wind event. The physics behind this flow are related to the head inland which creates a low pressure due to the rising air mass. The low pressure is filled from the higher pressure over the ocean creating an onshore flow. The fire model has assumed that the first few hours of this flow will have the hot dry air that was pushed out by the NE wind event and the fuel moisture that would be in place at the end of the NE wind event. For this reason, the flame lengths are reduced but not as much as might be found once the fuel moistures recover from the NE wind event. Below

is the output for flame length on the SW onshore wind event. The flame length run from 13 to 30 feet at the head and drop off in a similar manner as the NE wind event as the fire gets out of alignment with the wind. Full fire modeling outputs are provided in Appendix D.

## Eastern Corridor SW Wind at 30

### Flame Length (ft)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 9.1 | 5.7 | 12.1 | 12.7 |
| 30 | 14.6 | 9.0 | 19.3 | 20.3 |
| 45 | 22.1 | 13.7 | 29.3 | 30.8 |
| 60 | 14.6 | 9.0 | 19.3 | 20.3 |
| 75 | 9.1 | 5.7 | 12.1 | 12.7 |
| 90 | 6.6 | 4.1 | 8.8 | 9.2 |
| 105 | 5.3 | 3.3 | 7.0 | 7.3 |
| 120 | 4.4 | 2.7 | 5.8 | 6.1 |
| 135 | 3.9 | 2.4 | 5.1 | 5.4 |
| 150 | 3.5 | 2.2 | 4.6 | 4.8 |
| 165 | 3.2 | 2.0 | 4.3 | 4.5 |
| 180 | 3.0 | 1.9 | 4.0 | 4.2 |
| 195 | 2.9 | 1.8 | 3.9 | 4.0 |
| 210 | 2.8 | 1.8 | 3.8 | 4.0 |
| 225 | 2.8 | 1.7 | 3.7 | 3.9 |
| 240 | 2.8 | 1.8 | 3.8 | 4.0 |
| 255 | 2.9 | 1.8 | 3.9 | 4.0 |
| 270 | 3.0 | 1.9 | 4.0 | 4.2 |
| 285 | 3.2 | 2.0 | 4.3 | 4.5 |
| 300 | 3.5 | 2.2 | 4.6 | 4.8 |
| 315 | 3.9 | 2.4 | 5.1 | 5.4 |
| 330 | 4.4 | 2.7 | 5.8 | 6.1 |
| 345 | 5.3 | 3.3 | 7.0 | 7.3 |
| 360 | 6.6 | 4.1 | 8.8 | 9.2 |

Fire Behavior Summary

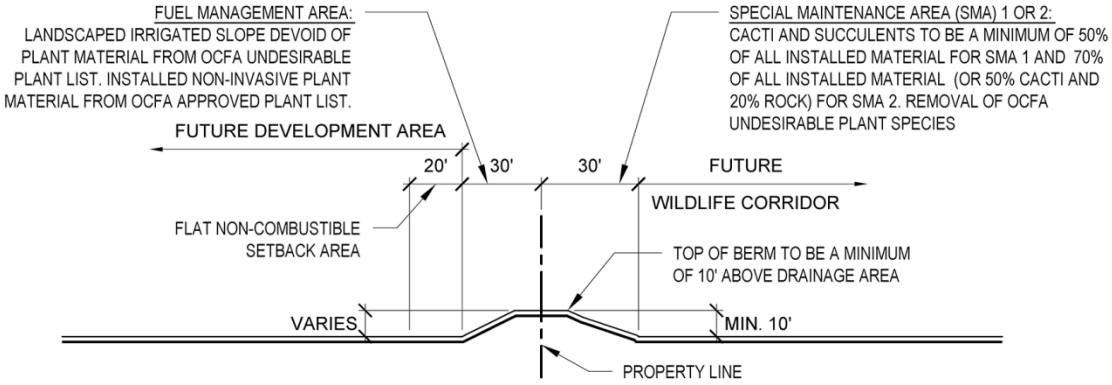
From a modeling standpoint for the lack fuel continuity, position of the fuelbeds, lack of slope and position relative to future development shows that a fire within the wildlife corridor is expected to have little to no impact on adjacent areas with a few minor protection features which are described later in this report. Fire cannot travel from one compartment to the next by simply burning the fuels. It must spot over the noncombustible areas and into new receptive fuel beds. This means that fire within the new compartment would be a point source fire as opposed to a line of fire. The second factor is the diminished role that radiant and convected heat would play in the role of fire propagation. These sites are relatively flat; topography would not play a role in the fire progression. Heat rises and would move up and away from fuel beds on open flat land. Fuel breaks of this size (30+ feet) would significantly reduce if not eliminate any possible preheating of fuels ahead of the flame front.

Worst case for this interface would be for tall grass or a grass shrub mix with a moderate load. Maximum flame length at the head of the fire would be just under 30 feet from the Santa Ana wind and about 22 feet from the onshore wind. Both of these would be from a fuel model gr4 which is very unlikely in this area. As grass/shrub mix would have smaller flame lengths (19 feet and 13 feet respectively) and fireline intensities of less than ½ of the gr4 model. Keep in mind that this is only at the head of the fire and that this fire would be very narrow and long. If you look at the spread rates to the flanks, you see that they diminish rapidly as did the flame lengths and fireline intensity.

The wildlife corridor will have large fuel beds and have a greater potential for maximum fire behavior in a few areas but these areas are not in alignment with the wind where it would carry fire to the development areas. Again the fire would still be narrow and only the head fire would have these flame lengths but they should be anticipated and appropriate mitigations have been taken. It should also be noted that sh7 which is represented by the heaviest loading chaparral fuels 6' in depth is extremely unlikely to become naturally sustaining at this elevation, annual rainfall amount and in this soil type. "A California Flora" by Phillip Munz lists Redberry, Toyon, Elderberry and Mountain mahogany as thriving between 3000-6000' above sea level. Environmental conditions in the Great Park are not conducive to the establishment of these "hard chaparral" species. This is also true for the SCAL18 model but they have been provided for the small areas near the center of the corridor where some of these fuel beds may be able to establish themselves and grow in small segments.

## *Maintenance Requirements*

As will be demonstrated below within the Specific Interface Sections there are established areas with maintenance and planting requirements that would help protect future developments areas from an impending wildfire. Below is a typical section of the western interface of the future corridor and future development areas along Segments 2 and 3 of the corridor:




As illustrated in the typical section above there would be a flat Non-Combustible Construction Area adjoining the berm, followed by a Fuel Management Area on the Heritage Fields side of the berm then a Special Maintenance Area 1 or 2 immediately into the corridor. Within the middle corridor limited maintenance will be performed to ensure that any chaparral species do not overtake the coastal sage scrub and cactus scrub species for the Gnatcatcher habitation. Refer to Appendix C for Plant Spacing Exhibits. An excerpt from the Irvine Wildlife Corridor Plan (2013) is provided below describing the maintenance allowed within the central portion of the corridor:

> *6. Vegetation*
>
> *e. Vegetation Establishment and Monitoring*
>
> *Subject to seed and container stock availability, planting may occur in multiple growing seasons to achieve the densities set forth above. The Storm Water Pollution Prevention Plan (SWPPP) will provide for use of appropriate native vegetation for stabilization until establishment. A goal of this WLC Plan is to establish suitable vegetation within the WLCF and establish use of the corridor by the target species. Container stock and seed will be locally sourced (generally from 15-mile radius) wherever possible. The target is for riparian scrub plantings to attain a minimum of 50-percent native shrub/tree cover after 3 years and 70-percent native shrub/tree cover after 5 years with less than ten -percent cover by non-native species and zero-percent cover by giant reed (Arundo donax), saltcedar (Tamarix ramosissima), and pampas grass (Cortedaria spp.). The target for coastal sage scrub and cactus scrub plantings is to attain 40-percent native shrub cover after three years, and 60-percent native shrub cover after 5 years, with less than ten percent cover by non-native species (except annual grasses), less than five percent cover by chaparral species and 30-foot spacing between chaparral canopy species in Table 6*

*and Note 3 above (see discussion below under Section III.A.9.a for rationale for this requirement), and zero percent cover by non-native invasive species. The target for the open southern cactus scrub is 40-percent cover by native cactus, scrub/shrub and grassland species within three years and 60-percent cover of the same at five years. As for the other habitats, non-native cover would be maintained at ten percent or less with no invasive species. All values provided for percent cover, including those for target native species cover, non-native species thresholds, or maintenance thresholds, represent absolute cover and not relative cover.*

*Once the corridor, or any reach of it, is completely installed and mature native vegetation dominates the segment, periodic monitoring will be conducted to document wildlife use of the corridor.*

Vegetation management will be limited to Special Maintenance Areas 1 and 2 within the WLCF, and have been effectively designed topographically to support a plant palette that limits fuels in proximity to future development while still providing beneficial habitat for target species. Specifically, the use of berms for screening and noise reduction reduces fire risk, thereby limiting the distance from structures to areas where special maintenance would be required. Vegetation outside the WLCF on the westerly side of the berm slope will be irrigated landscape with non-invasive plant material from the OCFA Approved Plant List. The plant palette for the interior of the corridor is designed with native plant materials such that combustible fuel loads within the WLCF are kept to a minimum and centralized to the middle of the corridor. Along the edges of the corridor, the vegetation will be from the OCFA Approved Plant List and will be mostly comprised of cacti, succulents or non-combustible coastal sage scrub and native grassland components.

Beyond, and within, the Special Maintenance Areas 1 and 2, there will be the Interior Corridor Habitat Management Area with removal of chaparral species should such species volunteer within areas of coastal sage scrub and cactus scrub, for the purpose of maintaining habitat suitable for the California gnatcatcher. Native habitat plantings within areas that could be affected by vegetation management will include dense areas of native cactus interspersed with lower growing grasses, forbs, and shrubs acceptable to OCFA (e.g., bladderpod, California encelia, coast goldenbush, etc.). With such plantings, maintenance would be limited to removal of non-native invasive species that volunteer and occasionally "undesirable" species such as California sagebrush or chaparral including laurel sumac (*Malosma laurina*), chamise (*Adenostoma fasciculata*), ceanothus (*Ceanothus* spp.), mountain mahogany (*Cercocarpus betuloides*), manzanita (*Arctostaphylos* spp.), and Scrub Oadk (*Quercus berberidifolia).* Note Blue Elderberry (*Sambucus* nigra) is a component of the Mulefat Scrub and shall not be treated as the other Chaparral species. Such maintenance would be limited to twice per year, requiring a few days by small crews using only hand held tools. Vegetation management will be done (a) with hand held tools consistent with best management practices; b) outside of the avian nesting season, or if during the nesting season, only after a biological monitor confirms that there will be no effects to nesting birds; c) in a manner that will not reduce

or eliminate any plants that are planned for the area; and d) in a manner that minimizes effects to either the target species (California gnatcatcher or least Bell's vireo) and to more common species that are protected under the Migratory Bird Treaty Act (MBTA). The removal of chaparral species, to maintain absolute cover at less than 5 percent with a minimum of 30-foot spacing between chaparral individuals, from areas of riparian habitat, coastal sage scrub and cactus scrub is important because the California gnatcatcher is an identified target species. Specifically, the coastal California gnatcatcher is a coastal sage scrub/cactus scrub "obligate" species, and conversion from these preferred habitat types to chaparral would be detrimental to one of the four target species and would be inconsistent with the goals of the WLC. As such, it will be important to maintain the target vegetation as summarized in Tables 1 – 5 above to ensure that the target species have optimal habitat conditions within the WLCF. Any changes to the plant palette would require approval by OCFA. As a secondary benefit of this maintenance, the fire modeling set forth in Appendix C is based on the suites of species provided in Tables 1 – 5. Maintaining optimal habitat for the gnatcatcher by preventing conversion of areas of coastal sage scrub and cactus scrub to chaparral would also eliminate potentially dangerous conditions.

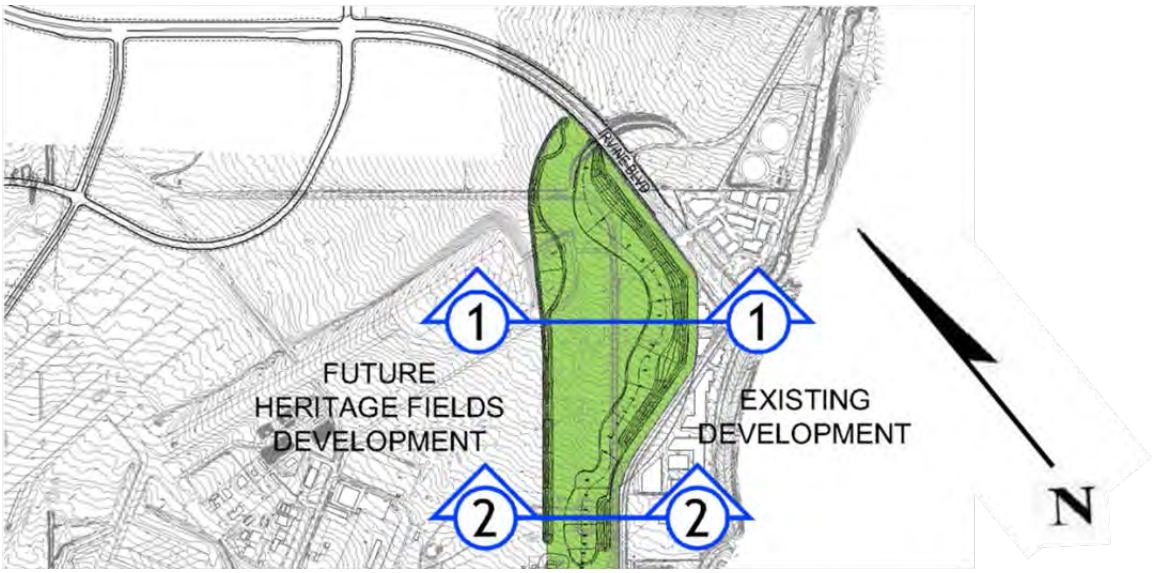
Additionally, within the Interior Corridor Habitat Management Area, while not included in the plant palette for areas of Open Southern Cactus Scrub Mosaic, other coastal sage scrub species such as California sagebrush and California buckwheat are likely to colonize these areas over time. Such species can, combined, reach 10-percent total cover within the open cactus scrub. Where it exceeds 10-percent cover, maintenance would be performed to maintain it at 10-percent cover or less, however, the need for this maintenance would be infrequent.

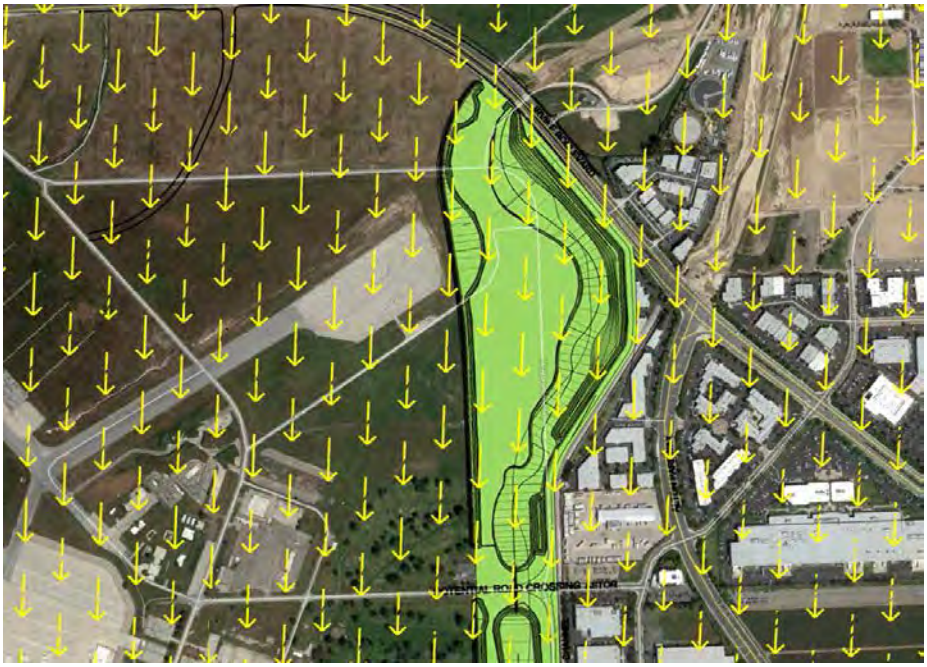
The Fuel Management Area on the western portion of the berm will be irrigated and planted with non-invasive plant material from the OCFA Approved Plant Palette. This area will be maintained on a regular basis as a landscaped area which includes removal of OCFA Undesirable Plant Species as well as dead and dying plant material. From there as shown in the typical section for Segments 2 and 3 above there will be a twenty foot flat Non-Combustible Construction Area. From the Non-Combustible Construction Area there would also be a Radiant Heat Construction Zone, requiring all proposed inhabitable structures within 100' of the Non-Combustible Construction Area to comply with all portions of the 2010 California Building Code Chapter 7A or 2010 California Residential Code Section R327 except for windows and doors. What follows are specific section locations within the corridor.

## *Specific Interface Sections*

### Interface Sections 1 and 2

Within Segments 2 and 3 are six specific sections that have been analyzed and modeled for the fire defense system. Section 1is located just south of the intersection of the wildlife corridor and Irvine Blvd and Section 2 is located approximately 0.25 miles southwest, as shown below and on page 4.



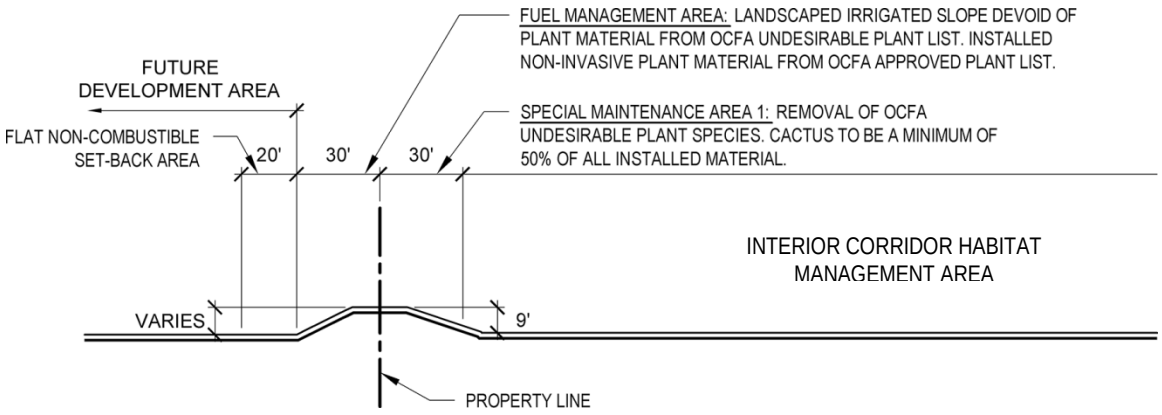
Section 1 is one of the wider areas for the corridor. As shown above, the wind does not run in the same direction as the wind area but rather across it. Fire in this area would

impact the roadway below section 2 (Astor Crossing) but not the adjacent existing structures or the future development areas.

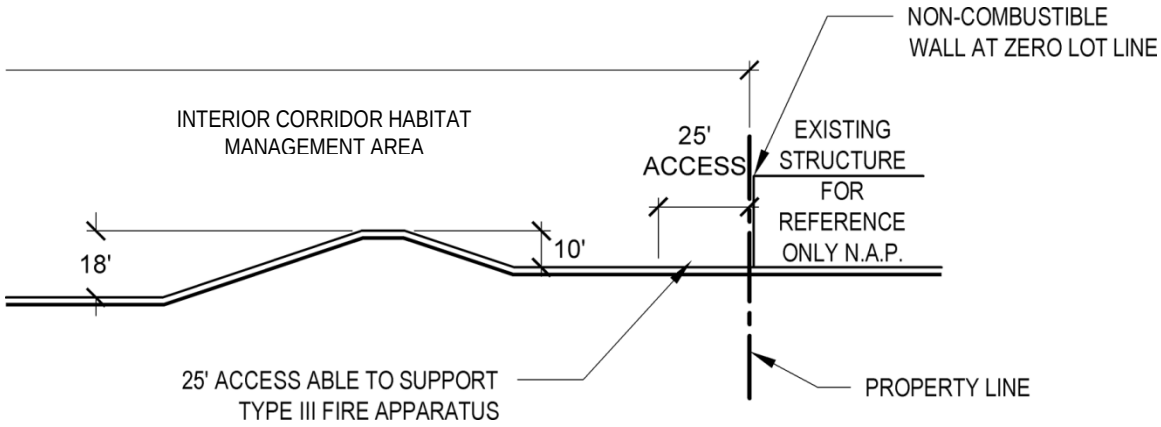
As can be seen on the section below (shown for reference here and larger in Appendix D), an earthen berm will be placed on each side of the wildlife corridor and would increase the effectiveness of the interface protection.

Section 1:1


This berm will vary but for the most part it will be approximately ten feet in height and will be planted with fire resistive vegetation in the 30' Special Maintenance Area 1 on the corridor side which will be devoid of plant material from the Attachment 7 OCFA Undesirable Plant List, additional Chaparral species will be removed to maintain absolute cover of less the 5-percent with a minimum 30-foot spacing between chaparral individuals maintenance. This would be limited to removal of non-native invasive species that volunteer and occasionally "undesirable" species such as California sagebrush or chaparral including laurel sumac (Malosma laurina), chamise (Adenostoma fasciculata), ceanothus (Ceanothus spp.), mountain mahogany (Cercocarpus betuloides), and manzanita (*Arctostaphylos* spp.), and Scrub Oadk (*Quercus berberidifolia)*. Note Blue Elderberry (*Sambucus* nigra) is a component of the Mulefat Scrub and shall not be treated as the other Chaparral species. On the development side of the berm there will be an irrigated Fuel Management Area (adjoining the future development) with non-invasive plants from the OCFA approved plant palette. See Appendix C for details.



The east side of Section 1:1 has additional protection for the interface with the distance from the berm to the property line having a 25’ access between the berm and the existing structures which will provide another noncombustible break. The existing structures on the east side of this interface have been constructed with non-combustible walls as they are built directly on the property line.



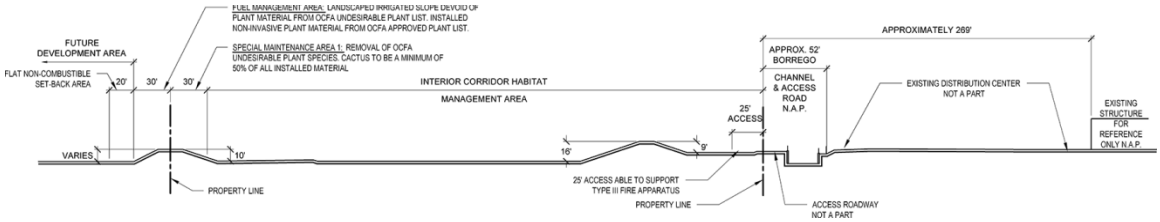

The graphic above illustrates site image locations provided in this program.

This image was taken from Location ‘A’ as shown on the graphic on page 18 along Irvine Blvd facing southwest. As can be seen in this image the future corridor location is a mowed flat area with existing structures. An enlargement of the structures on the left of this image above is provided below.

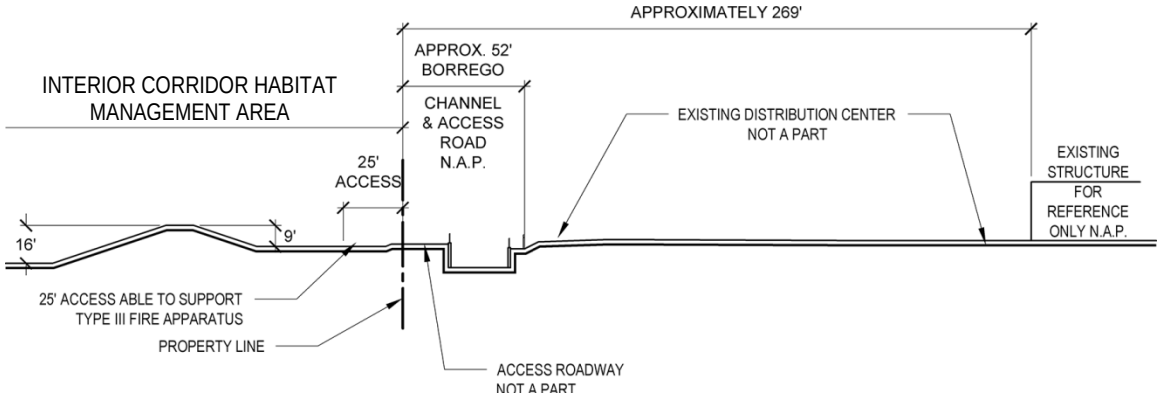
This image was taken from Location ‘B’ as shown on the graphic on page 18 adjoining the eastern property line facing southwest towards the existing structures. As can be seen in this mage the existing structures in this area are directly adjoining the property line.

Section 2:2 as located on page 4 is in a less wide portion of the corridor. The section is shown below for reference.

Section 2:2




The west side will have the same berm as Section 1:1 but the east side will also have the Borrego Channel for protection. In addition to the berm and access roadway, a concrete box channel and maintenance road exists between the corridor and the developed areas to the east as shown below.



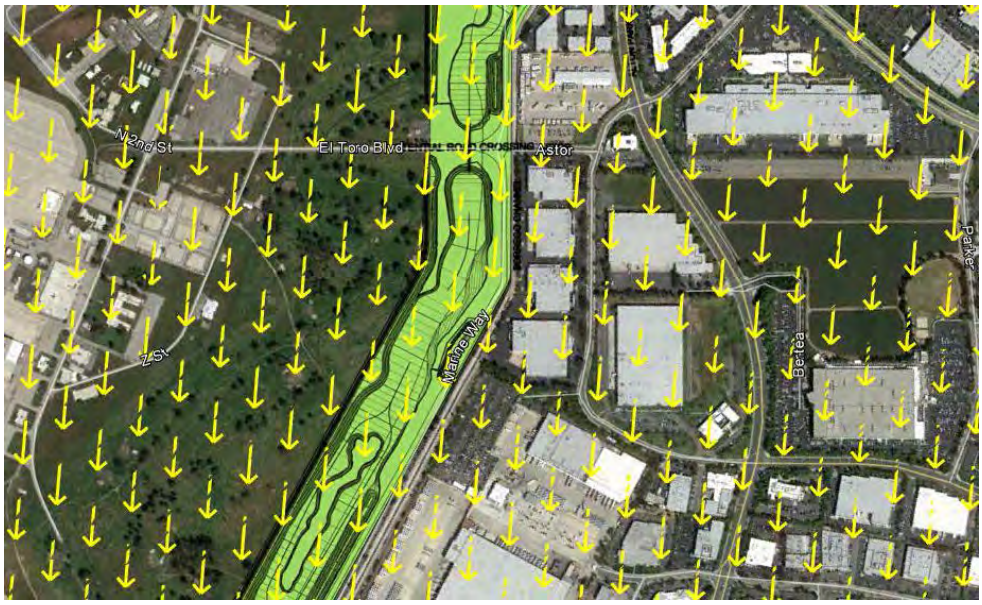

The combination of the berm, access roadway, and maintenance roadway and box channel provide over 100 feet of interface protection in a areas that would not see flame length over 10 feet. Existing development to the east is roughly over 260 feet from the corridor property line.

The image above and below were taken from Location ‘C’ as shown on the graphic on page 18 on Astor road facing north along the existing Borrego Channel. As can be seen in this image there is a maintenance access road directly adjoining the Borrego Channel which would act as a fire break outside of the future corridor for the existing structures.

The image above was taken from Location ‘C’ as shown on the graphic on page 18 Astor Road facing south along the eastern project boundary. This image captures the existing Borrego Channel and maintenance road that would act as a fire break for the existing structures in the event of a wildfire.

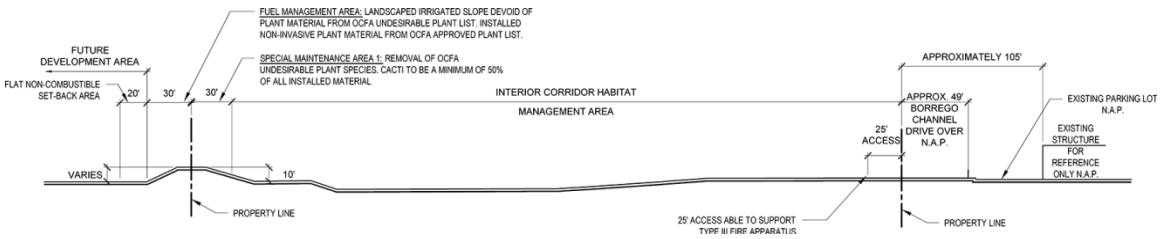
## Interface Section 3

Section 3 is southwest from section 2 by about a quarter of a mile. This section is similar to section 2:2 in its orientation to the wind.

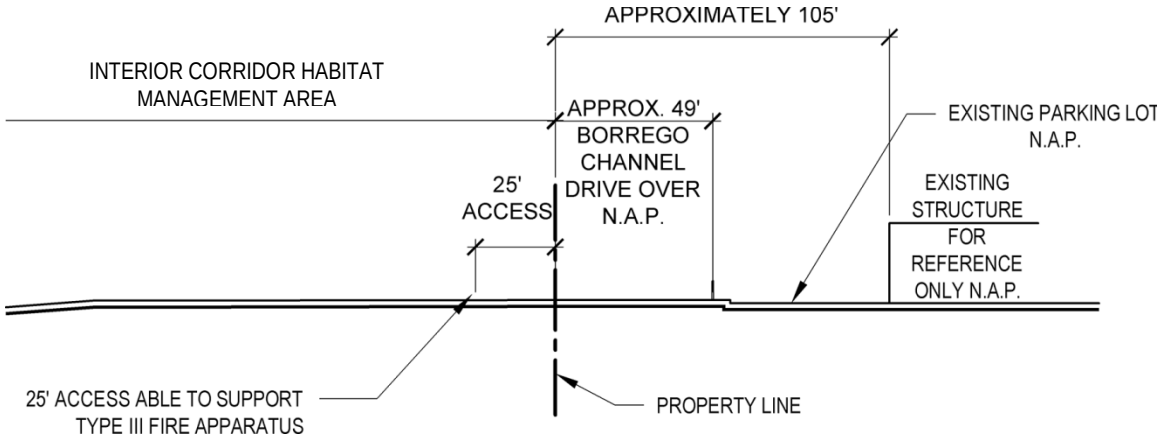




At section 3, the berm on the west side is still 10’ above the drainage area.

Section 3:3

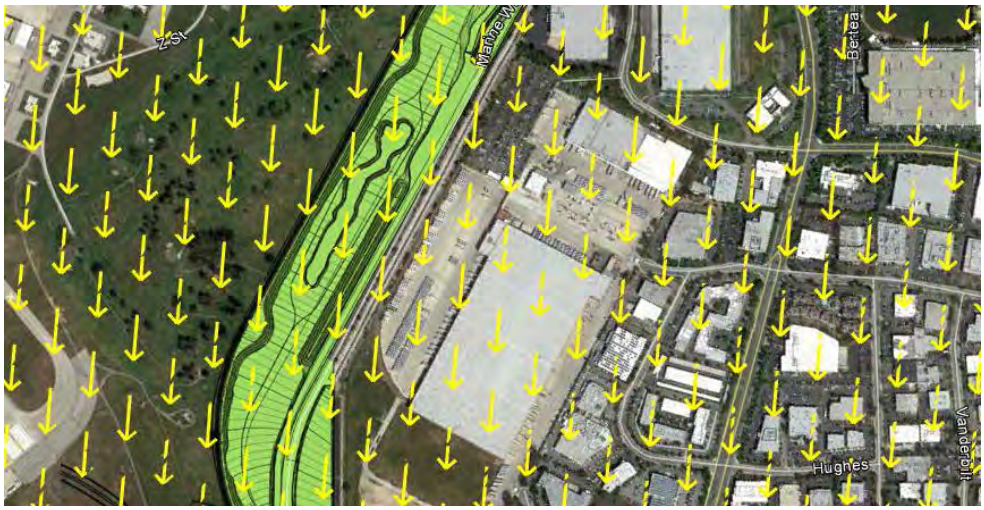


An enlargement of the east interface exactly at Section 3 facing north shows approximately 74’ of non-combustible surface and an additional approximately 56 foot setback on the development side.



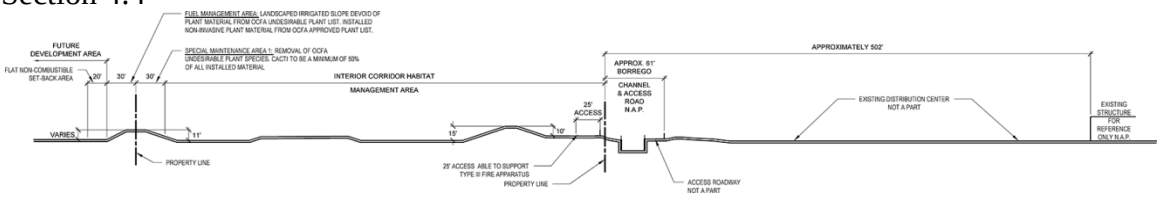
## Interface Sections 4 and 5

Interface Section 4 is another third of mile southwest from section 3. This section of the corridor is not in alignment with the NE wind for an extended area.

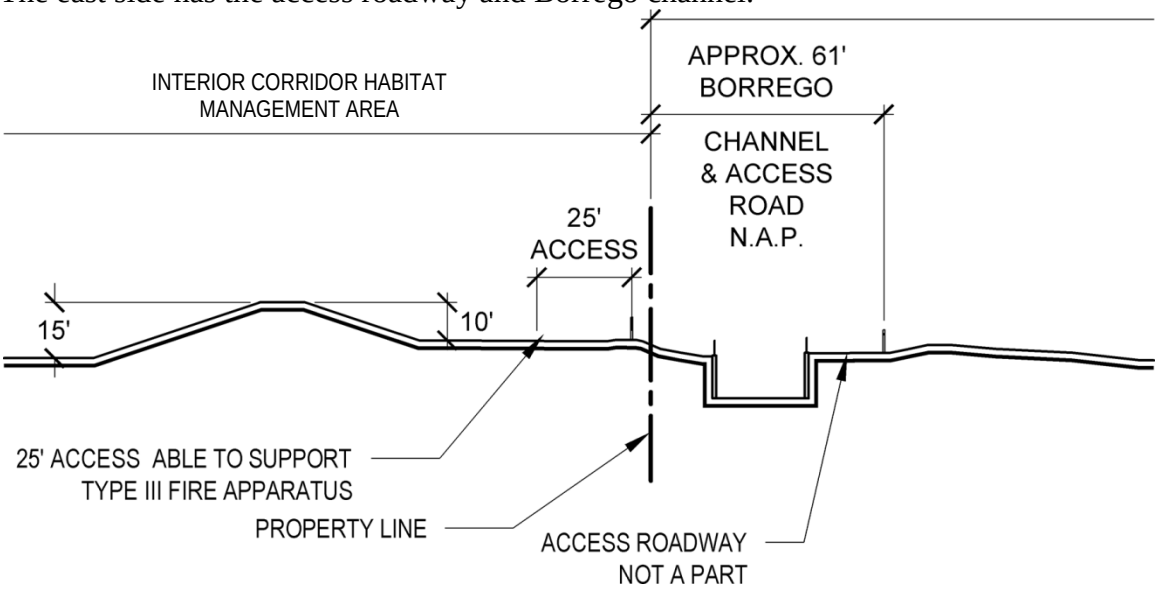




Site 4 is similar to the sections 1 and 2. Berms have been provided at both west and east interfaces.

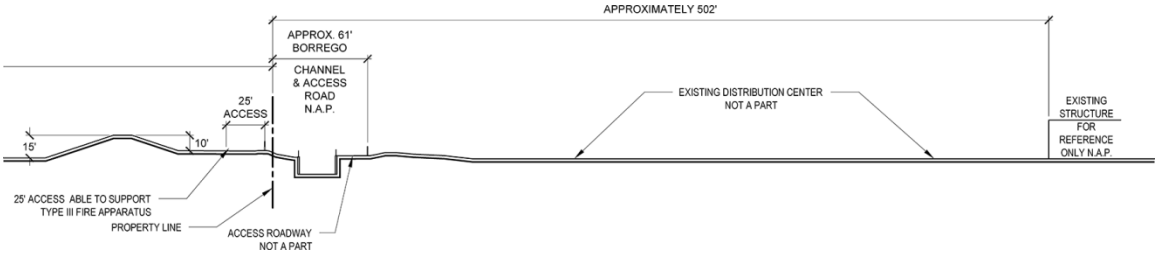
Section 4:4



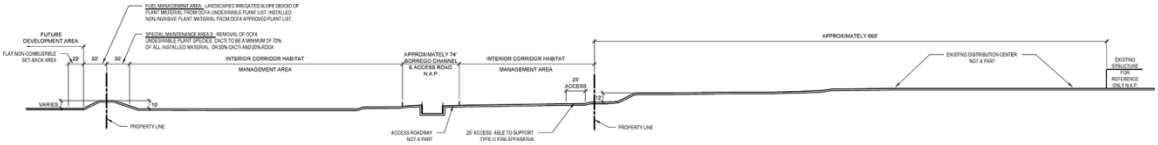
The east side has the access roadway and Borrego channel.



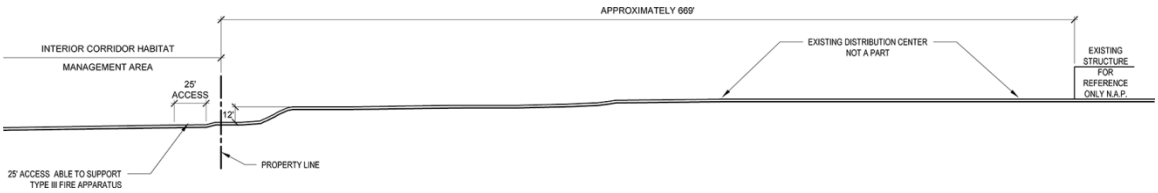

Additionally, the adjacent property has an approximately 500 foot plus set back to the nearest structure.




Section 5:5



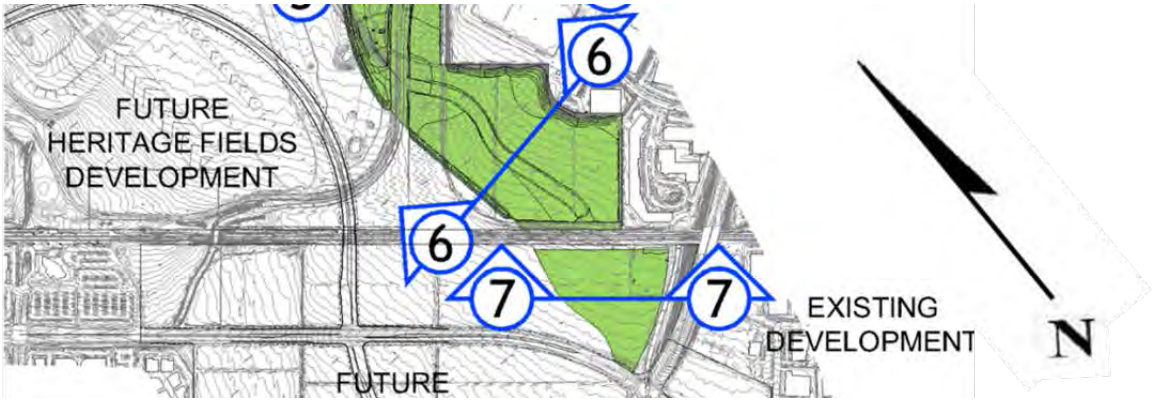
The future development area at Section 5 has more of a perpendicular alignment with the wind, especially the development area to the south of section 5.




Section 5 like Section 4 has a very large setback on the existing development side (east) with over 660 feet between the property line and the first structures.

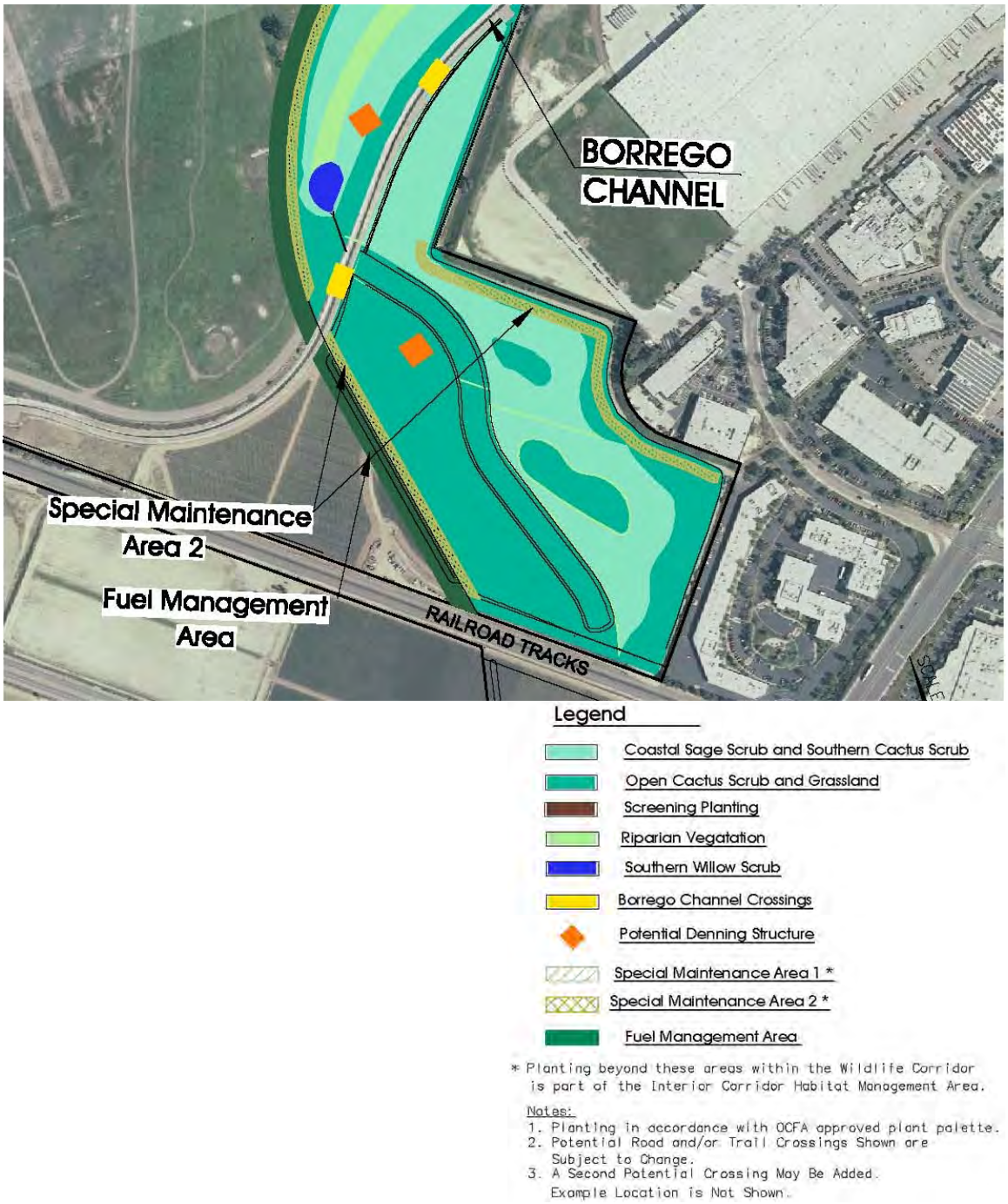
## Interface Sections 6 and 7

Section 6 has several factors which need to be addressed. Section 6 will have a larger fuelbed. This section is the largest undivided fuelbed in the corridor. The alignment of the corridor with the wind is such that fire would run across this segment rather than its length. This orientation would reduce the available fuels. A NE wind would take fire away from the existing development but onto the future Great Park and SW wind would do the opposite. Section 7 is similar but smaller and is located on page 36.



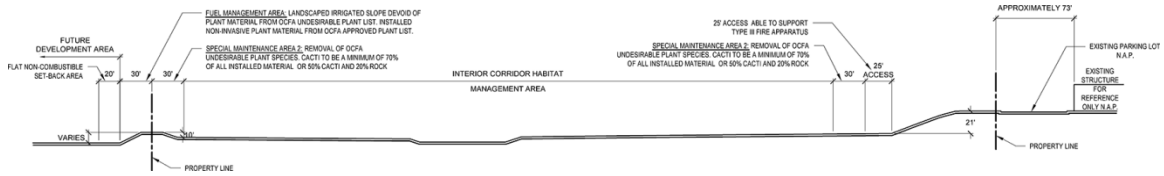


Section 6 will have development with head fire impacts, having a development edge that lie perpendicular to the wind alignment. The NE wind will take fire directly at the future development areas. For this reason, the entire area between the channel bottom and the future development areas to the south will be planted with a cactus grassland mix to reduce flame heights.



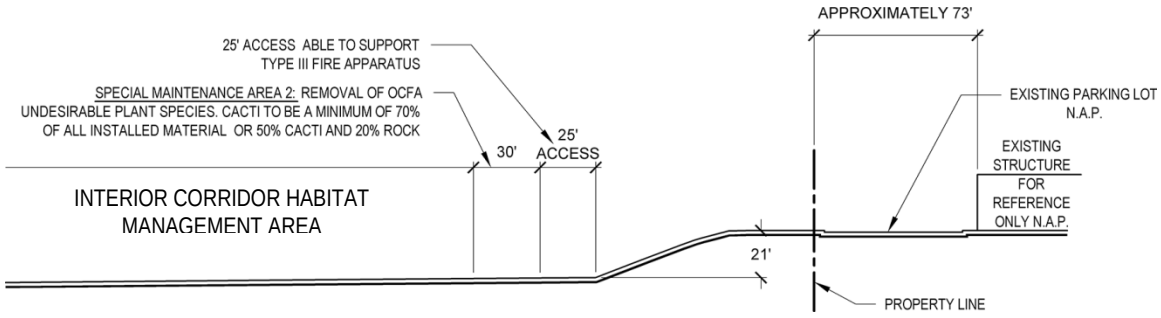

Additionally, as shown below, the corridor will have a berm on the west side and an existing manufactured slope on the eastern edge of the corridor. As on previous sections, the berm on the western side of the corridor will have the slope within the interior of the corridor planted with native habitat, mostly cacti, succulents or comprised of mostly non-combustible material to reduce the fuel load within this area on a continuing basis. The slope along the western berm facing the future development will be fully irrigated landscape with non-invasive plant material from the OCFA Approved Plant List.

Section 6:6




The NE exposure (in a SW wind) will have the access roadway at the bottom and the slope will be covered with 50% cactus, 20% rock and 30% would be native grasses. This would reduce the fuel model to a gr1 or worst case a gr2. As is shown on the following page, the gr2 would achieve its maximum rate of spread and flame length with less than the 30 mph SW wind. The flame lengths would remain at 10 feet or less under all conditions as this is the point at which 100% of the fuel is being consumed. Current conditions without the rock or cactus show a low volume fuel bed.

This image was taken from Location 'E' as shown on the graphic on page 18 facing east along the existing manufactured slope with a southwest exposure. This image captures the existing vegetation on the manufactured slope which demonstrates the low grass shrub mix that would exist if it was not maintained.




The access road (shown above in its current condition) will remain at the toe of the slope and would provide a fire break or control line from a fire coming out of the channel bottom. Fire on the slope would be point source fire from spotting if it crossed the roadway at all. A point source fire on this slope would not reach equilibrium due to lack of fuel.

## Eastern Corridor SW Wind at 30

### Flame Length (ft)

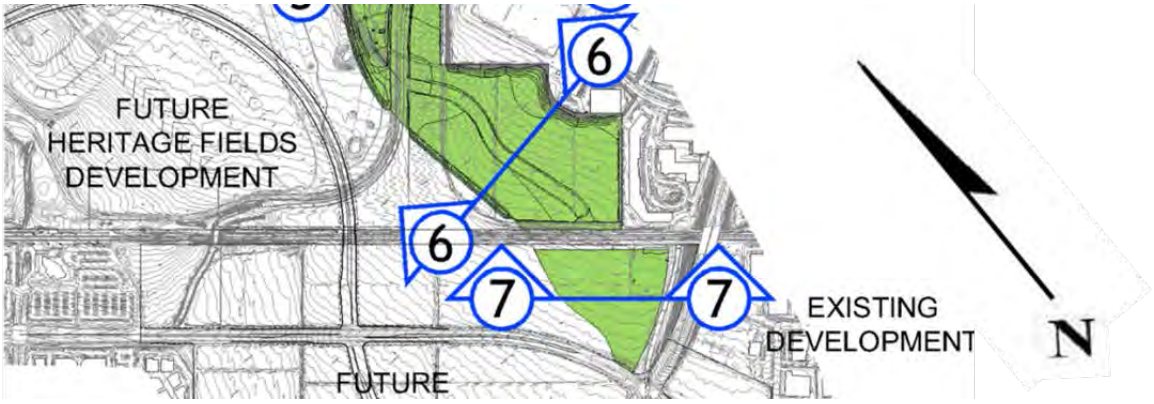
| Spread Dir | Fuel Model | | |
|---|---|---|---|
| deg | gr1 | gr2 | gr4 |
| 15 | 1.6 | 4.8 | 9.1 |
| 30 | 2.0 | 7.3 | 14.7 |
| 45 | 2.2 | 10.0 | 22.9 |
| 60 | 2.0 | 7.3 | 14.7 |
| 75 | 1.6 | 4.8 | 9.1 |
| 90 | 1.3 | 3.5 | 6.6 |
| 105 | 1.1 | 2.8 | 5.2 |
| 120 | 0.9 | 2.4 | 4.4 |
| 135 | 0.8 | 2.1 | 3.8 |
| 150 | 0.8 | 1.9 | 3.5 |
| 165 | 0.7 | 1.7 | 3.2 |
| 180 | 0.7 | 1.6 | 3.0 |
| 195 | 0.6 | 1.6 | 2.9 |
| 210 | 0.6 | 1.5 | 2.8 |
| 225 | 0.6 | 1.5 | 2.8 |
| 240 | 0.6 | 1.5 | 2.8 |
| 255 | 0.6 | 1.6 | 2.9 |
| 270 | 0.7 | 1.6 | 3.0 |
| 285 | 0.7 | 1.7 | 3.2 |
| 300 | 0.8 | 1.9 | 3.5 |
| 315 | 0.8 | 2.1 | 3.8 |
| 330 | 0.9 | 2.4 | 4.4 |
| 345 | 1.1 | 2.8 | 5.2 |
| 360 | 1.3 | 3.5 | 6.6 |

## Eastern Corridor gr2 Wind Analysis

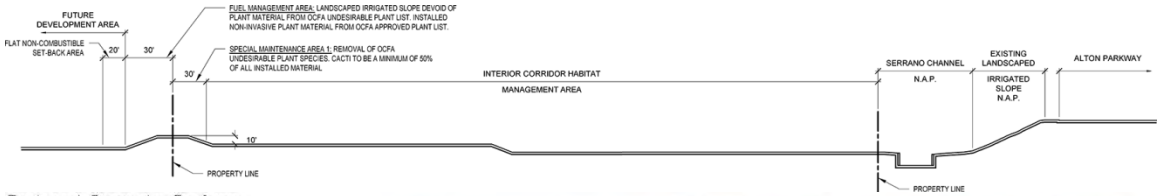
### Flame Length (ft)

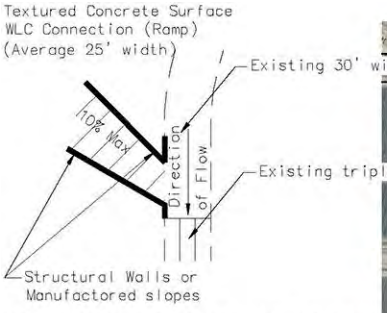
| Spread Dir | Midflame Wind Speed mi/h | | | | |
|---|---|---|---|---|---|
| deg | 0.0 | 5.0 | 7.5 | 15.0 | 30.0 |
| 15 | 3.1 | 4.3 | 4.6 | 4.8 | 4.8 |
| 30 | 3.6 | 5.7 | 6.5 | 7.3 | 7.3 |
| 45 | 3.8 | 6.6 | 8.2 | 10.0 | 10.0 |
| 60 | 3.6 | 5.7 | 6.5 | 7.3 | 7.3 |
| 75 | 3.1 | 4.3 | 4.6 | 4.8 | 4.8 |
| 90 | 2.7 | 3.4 | 3.5 | 3.5 | 3.5 |
| 105 | 2.3 | 2.8 | 2.8 | 2.8 | 2.8 |
| 120 | 2.0 | 2.3 | 2.4 | 2.4 | 2.4 |
| 135 | 1.8 | 2.1 | 2.1 | 2.1 | 2.1 |
| 150 | 1.7 | 1.9 | 1.9 | 1.9 | 1.9 |
| 165 | 1.6 | 1.7 | 1.8 | 1.7 | 1.7 |
| 180 | 1.5 | 1.6 | 1.7 | 1.6 | 1.6 |
| 195 | 1.4 | 1.6 | 1.6 | 1.6 | 1.6 |
| 210 | 1.4 | 1.5 | 1.6 | 1.5 | 1.5 |
| 225 | 1.4 | 1.5 | 1.5 | 1.5 | 1.5 |
| 240 | 1.4 | 1.5 | 1.6 | 1.5 | 1.5 |
| 255 | 1.4 | 1.6 | 1.6 | 1.6 | 1.6 |
| 270 | 1.5 | 1.6 | 1.7 | 1.6 | 1.6 |
| 285 | 1.6 | 1.7 | 1.8 | 1.7 | 1.7 |
| 300 | 1.7 | 1.9 | 1.9 | 1.9 | 1.9 |
| 315 | 1.8 | 2.1 | 2.1 | 2.1 | 2.1 |
| 330 | 2.0 | 2.3 | 2.4 | 2.4 | 2.4 |
| 345 | 2.3 | 2.8 | 2.8 | 2.8 | 2.8 |
| 360 | 2.7 | 3.4 | 3.5 | 3.5 | 3.5 |

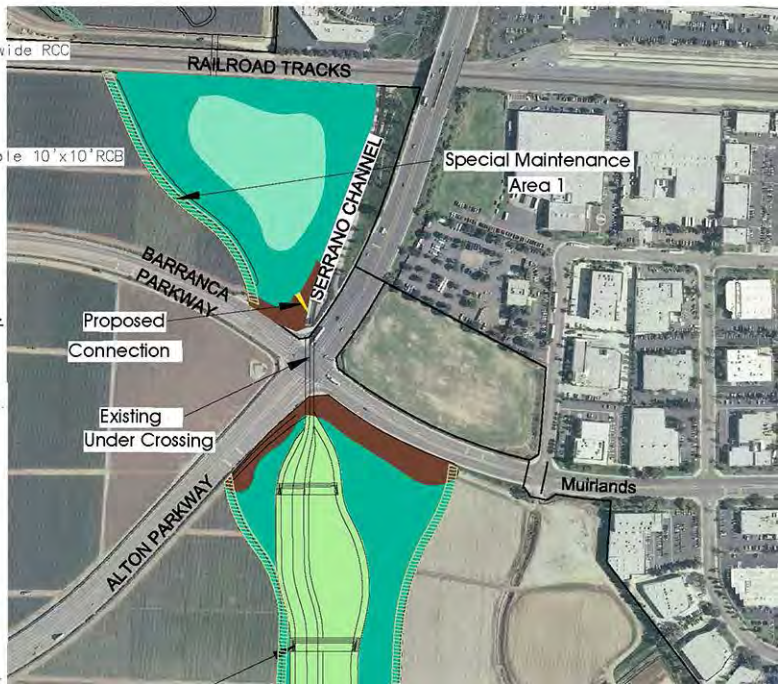
Section 7 is in the next segment, Segment 3 South, south of Section 6. This section will be bounded on all sides by roadway and/or concrete channel except for the west side. The west side will be bermed and planted in a similar manner as section 6. The development interface to the SW will be the same and the same level of protection would be provided. The NW interface (SW wind) will not be needed as the only exposure is Alton Parkway.




Section 7:7

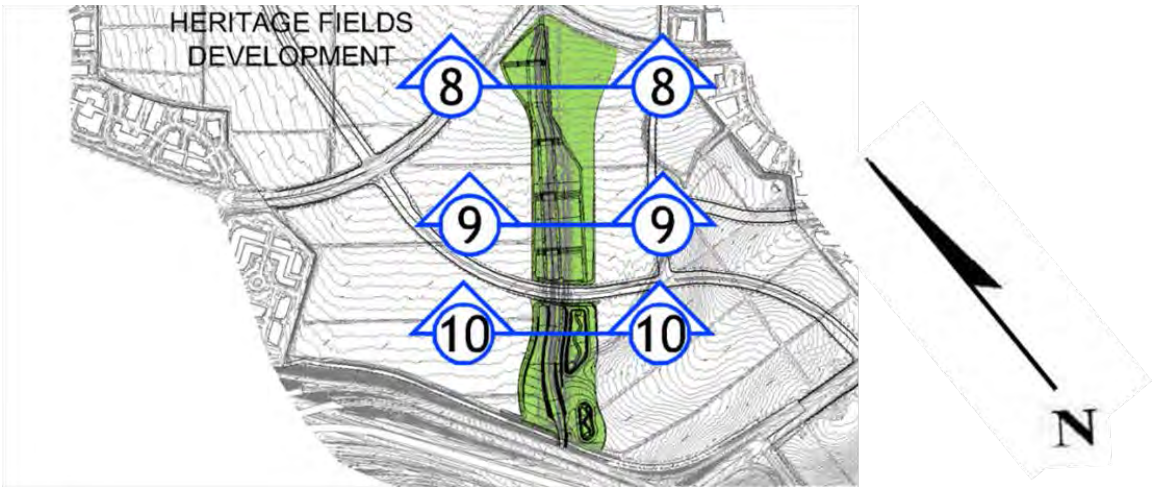


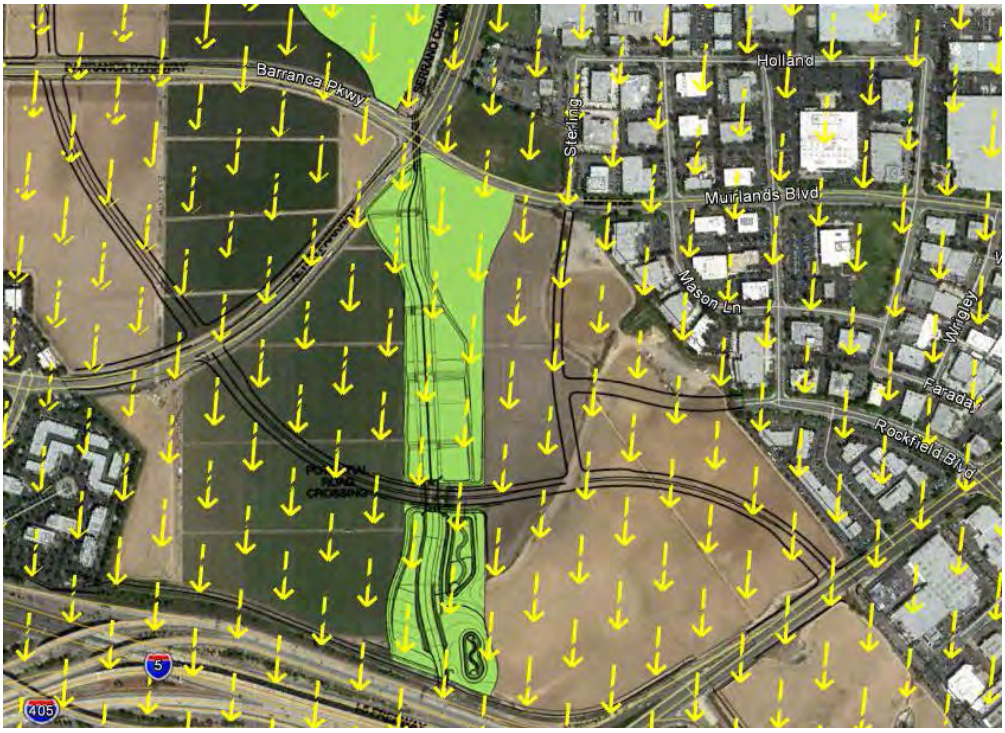



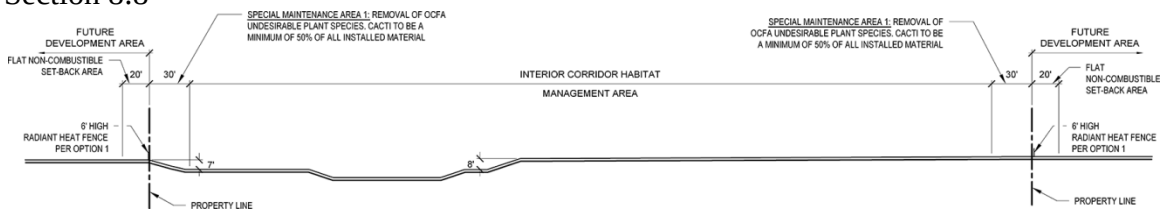
## Interface Sections 8, 9 and 10

Sections 8, 9 and 10 are all essentially the same from an interface standpoint. The wind runs parallel with the drainage channel. Fuels would range from upland grasses to riparian areas in the bottom of the channel. The lack of wind alignment and arrangement of the fuels relative to the development sites make this interface a low risk.

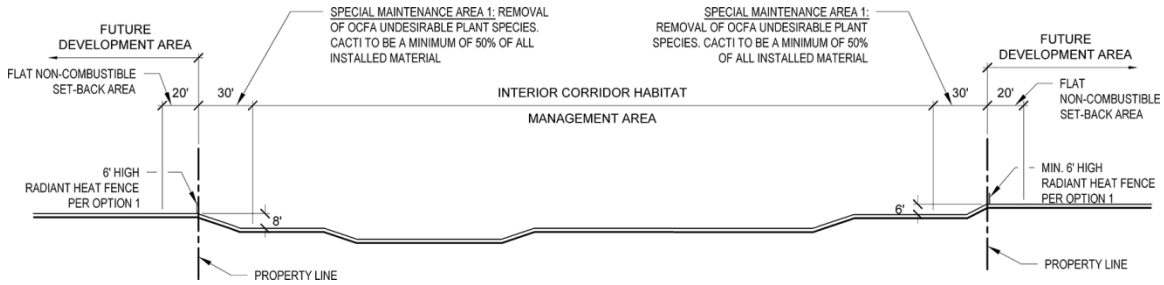


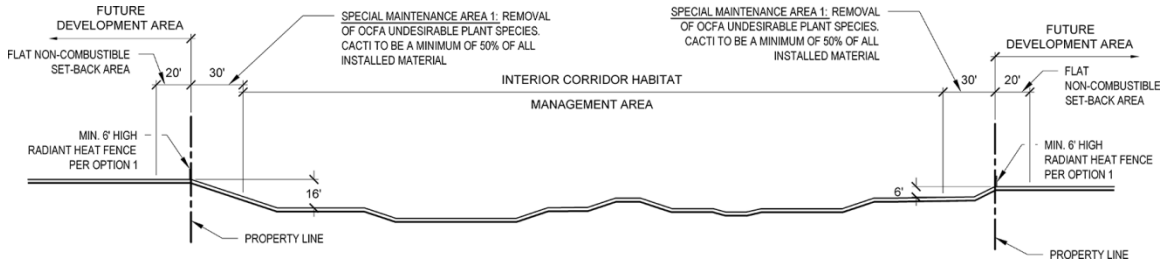
Section 8:8




Section 9:9



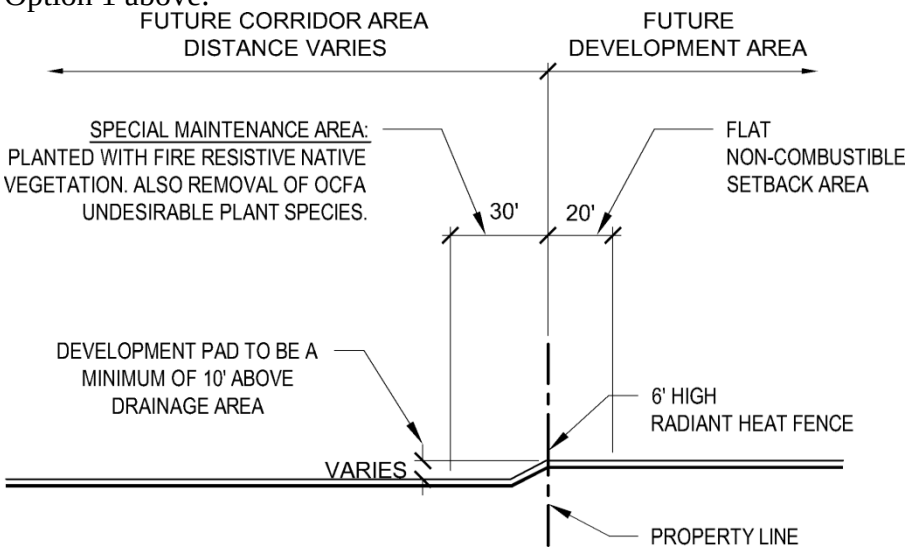

Section 10:10



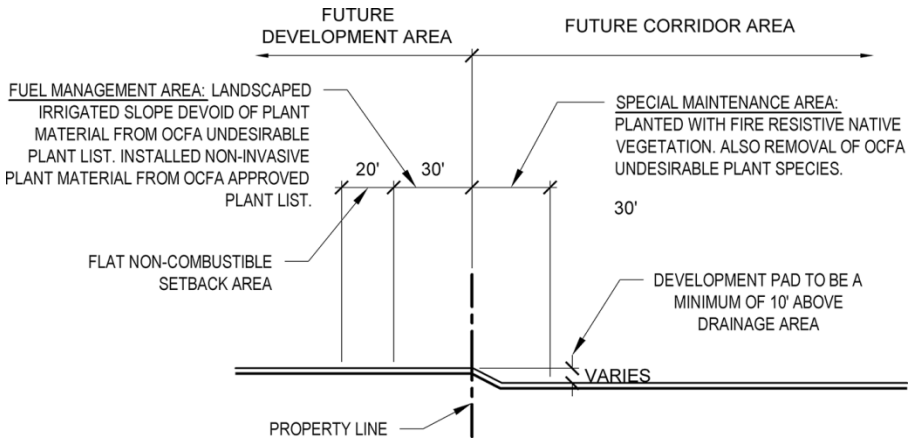

All three interfaces would be managed by one of the following options:

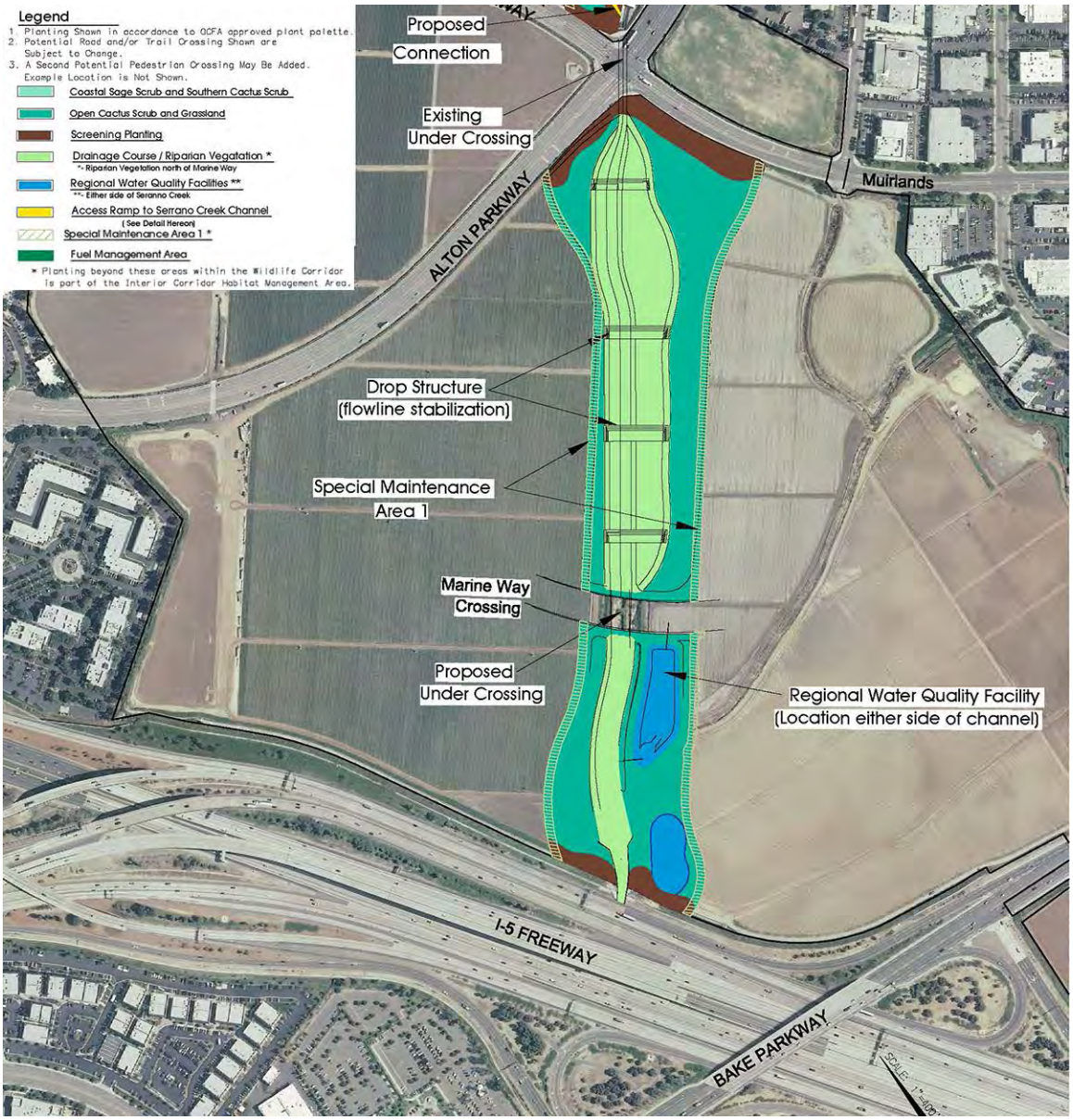
1. A thirty foot Special Maintenance Area within the Corridor planted with fire resistive native vegetation as well as removal of OCFA Undesirable Plant species, a six foot high radiant heat fence (block wall or combination tempered glass and block view fence) and a twenty foot flat non-combustible set back zone.
2. A thirty foot Special Maintenance Area within the Corridor planted with fire resistive native vegetation as well as removal of OCFA Undesirable Plant species, a thirty foot Fuel Management Zone on the development side followed by a twenty foot non-combustible setback zone.

Shown below is a typical section for the interface within Segments 3 South and 4 per Option 1 above:




Shown below is a typical section for the interface within Segments 3 South and 4 per Option 2 above:




Legend
1. Planting Shown in accordance to OCFA approved plant palette.
2. Potential Road and/or Trail Crossing Shown are Subject to Change.
3. A Second Potential Pedestrian Crossing May Be Added. Example Location is Not Shown.
Coastal Sage Scrub and Southern Cactus Scrub
Open Cactus Scrub and Grassland
Screening Planting
Drainage Course / Riparian Vegatation *
*- Riparian Vegetation north of Marine Way
Regional Water Quality Facilities **
**- Either side of Seranno Creek
Access Ramp to Serrano Creek Channel
( See Detail Hereon)
Special Maintenance Area 1 *
Fuel Management Area
* Planting beyond these areas within the Wildlife Corridor is part of the Interior Corridor Habitat Management Area.
Proposed Connection
Existing Under Crossing
Muirlands
ALTON PARKWAY
Drop Structure (flowline stabilization)
Special Maintenance Area 1
Marine Way Crossing
Proposed Under Crossing
Regional Water Quality Facility (Location either side of channel)
I-5 FREEWAY
BAKE PARKWAY

## Summary

The relocated Wildlife Corridor Feature would be constructed in an area that is currently in use as agriculture, a former golf course and managed grasslands (flail mowed for weed abatement and fire safety). The corridor would be constructed in a manner that would not allow a fire from within the corridor to threaten structures along the corridor's interface. This would be accomplished using several methods. First, the eastern portions of the corridor where there are existing adjacent developments will have the fire safety features retained or enhanced. For example, the box channel and maintenance road between the corridor and the existing development will remain and will act as a buffer and a fuel break along this edge, and within the corridor towards the southern portion of Segment 3. The box channel and roadway provide an approximately 50' plus noncombustible partition that runs the majority of the northern portion of Segments 2 and 3 of the corridor along the eastern interface.

Second, the corridor would have an earthen berm that would assist in keeping a fire within the corridor on the development edges. This berm is a minimum of ten feet high from the drainage area. The berm would have increased cactus and/or succulent planting or reduced vegetation on the corridor side and irrigated non-invasive species fron the OCFA approved plant palette on the development side when used as the interface buffer.

Third, the vegetation within the corridor has been selected to keep flame lengths and energy generation within the corridor to a minimum while still providing acceptable habitat for the corridor. This has been done by avoiding use of plant species which are on the OCFA Undesirable Plant list within the Special Maintenance Areas 1 and 2, and by reducing the fuel loading in critical areas by introducing succulents such as cactus and by using rock to keep the average fuel depth down to the level modeled in the system native habitat design. Additional, as described above and within the Irvine Wildlife Corridor Plan, vegetation management will occur within the Interior Corridor Habitat Management Area for removal of invasives, removal of chaparral species and limited removal of certain coastal sage scrub species within the open southern cactus scrub areas.

Finally, the corridor configuration avoids alignment with the worst case wind scenarios in most cases. The corridor segments are further divided by roadways, channels and storm drain facilities which would keep a "line of fire" from progressing down the corridor for long stretches. This means that fire would have to spot into the next compartment and re-establish its momentum in order to have flame length at the equilibrium rates shown in the fire modeling (worst case). In all cases, the corridor design of the corridor has taken all aspects of this fire modeling into account and developed a performance based protection system so that a fire would remain within the corridor and not spread to adjacent areas.

# Appendix A: Dynamic Fuel Models

Dynamic Fuel Models

## Dynamic Fuel Models

In this new set, all fuel models that have a live herbaceous component are "dynamic", meaning that their herbaceous load shifts between live and dead depending on the specified live herbaceous moisture content. See the model parameters list ("fuel model type" column) to see which models contain live herbaceous load and are therefore dynamic.

The dynamic fuel model process is described by Burgan (1979); the method is outlined and illustrated below.

- If live herbaceous moisture content is 120 percent or higher, the herbaceous fuels are green and all herbaceous load stays in the live category at the given moisture content.
- If live herbaceous moisture content is 30 percent or lower the herbaceous fuels considered fully cured and all herbaceous load is transferred to dead herbaceous.
- If live herbaceous moisture content is between 30 and 120 percent, then part of the herb load is transferred to dead. For example, if live herb moisture content is 75 percent (halfway between 30 and 120 percent), then half of the herbaceous load is transferred to dead herbaceous, the remainder stays in the live herbaceous class.

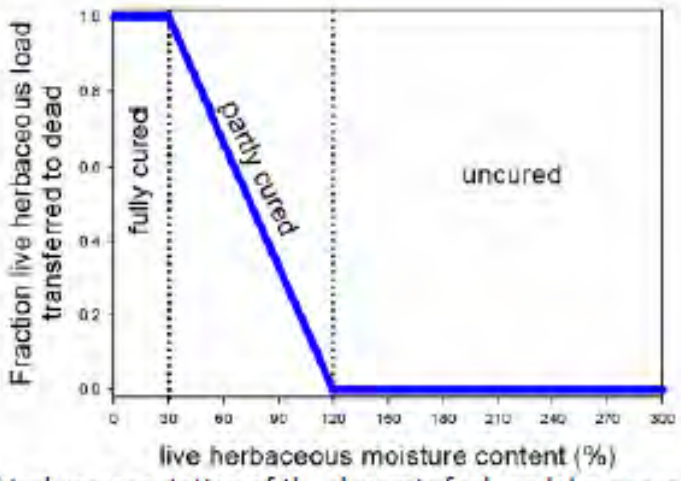



**Figure 1** -- Graphical representation of the dynamic fuel model process.

# Appendix B: Fire Acceleration

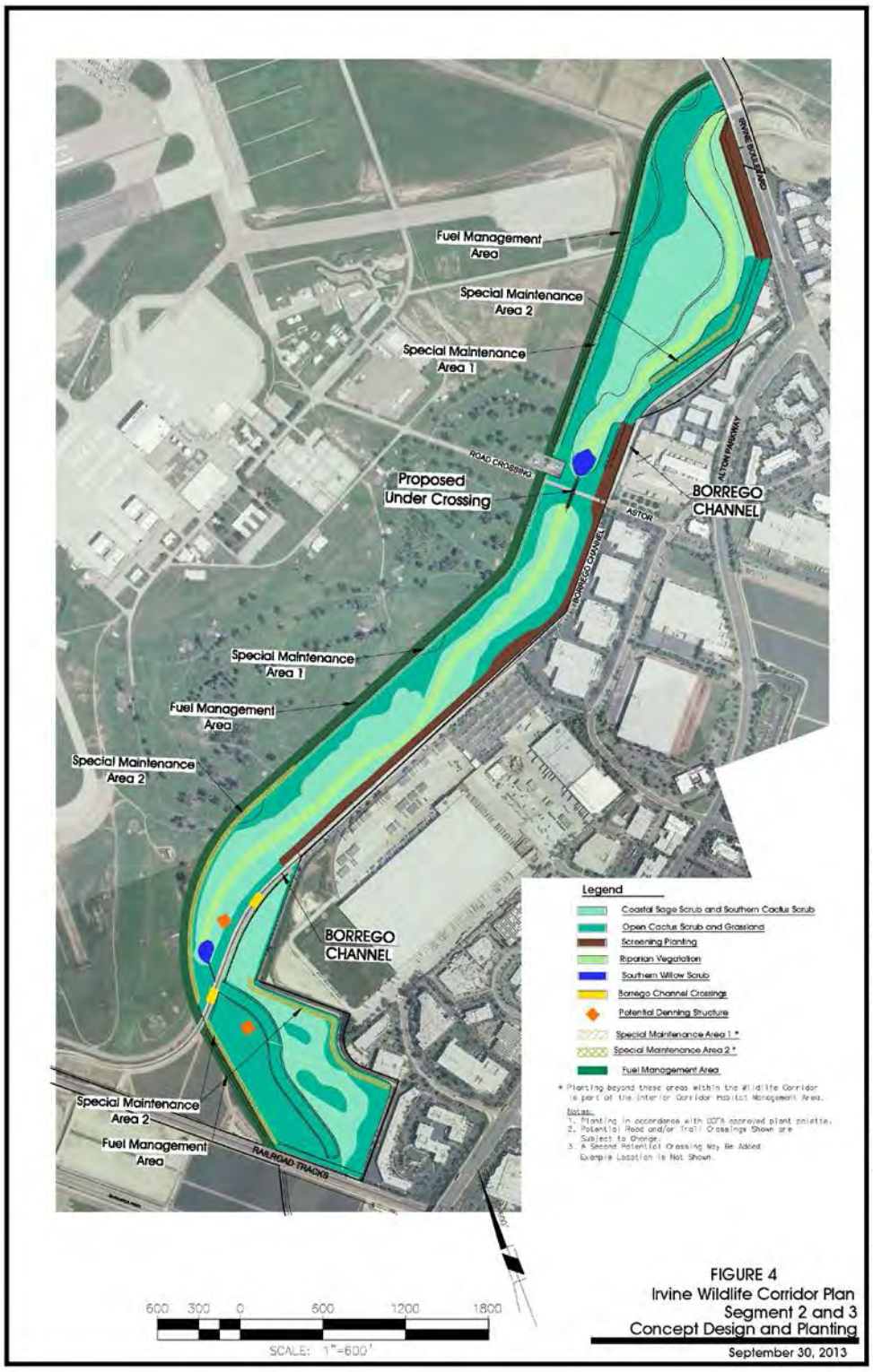
Fire Acceleration

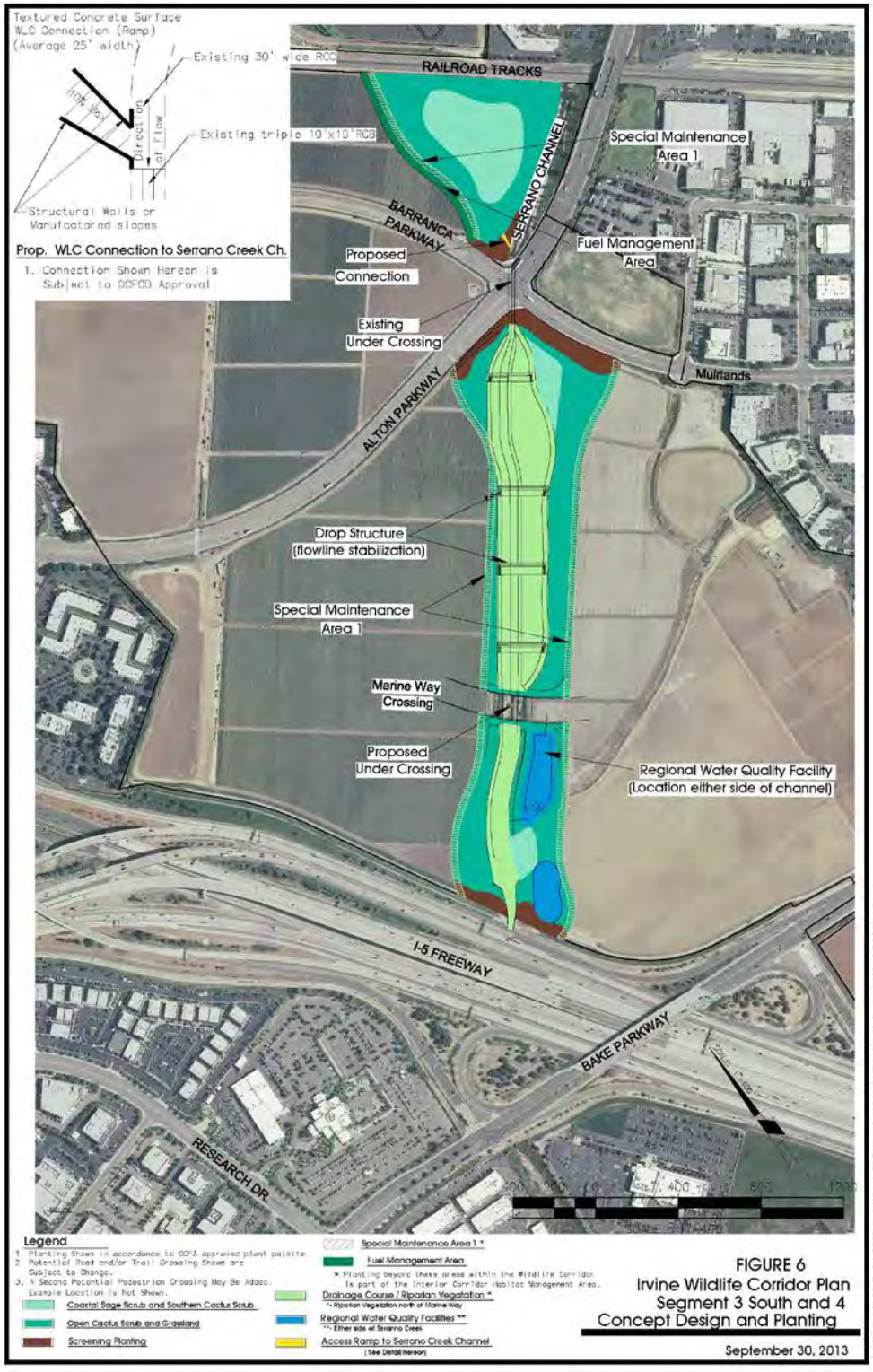
Fire acceleration is defined as the rate of increase in spread rate/fire line intensity from a given source. It is also defined as the rate of increase in spread rate from the current rate to an equilibrium spread rate under constant environmental conditions. Fire acceleration measures the amount of time required for a fire spread rate to achieve the theoretical steady state spread rate given 1) its existing spread rate, and 2) constant environmental conditions. Fire acceleration is fuel dependent but independent of fire behavior. The incorporation of acceleration means that fire spread rates will not immediately adjust to the equilibrium spread rates when conditions change.

The rate of fire acceleration is dependent on a rate factor. The default rate for acceleration to 90% of equilibrium rates after 20 minutes from a point source fire. Line source fires are known to accelerate much faster (Johansen 1987) than point source fires. Although the equilibrium spread rate is dependent on fuel conditions, the buildup or acceleration rate has been found to be fuel independent for a variety of fuel types (excelsior, pine needles, conifer understories).

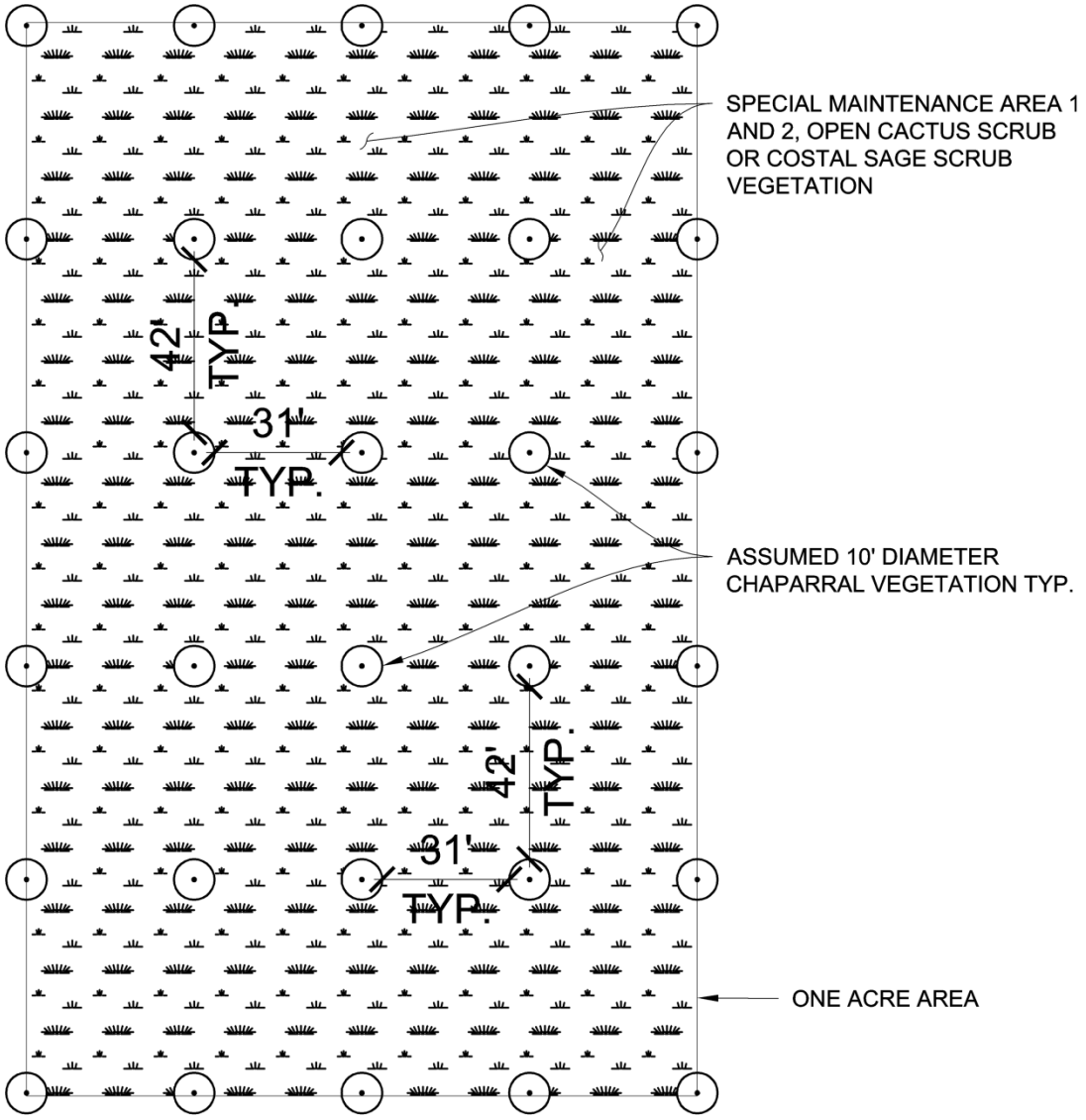
A single acceleration rate may not be accurate for all fuel types (McAlpine and Wakimoto 1991), especially between very different fuel types. Fire in grass fuels is expected to accelerate more rapidly than in slash fuels, but there is little data to guide these settings. Acceleration is presumed to be independent of the fire behavior or eventual spread rate.

# Appendix C: Concept Design and Planting Exhibits




Textured Concrete Surface
WLC Connection (Ramp)
(Average 25' width)
Existing 30' wide RCC
Existing triple 10'x10' RCB
Direction of Flow
Structural Walls or Manufactured slopes
Prop. WLC Connection to Serrano Creek Ch.
1. Connection Shown Hereon is Subject to OCFCD Approval
RAILROAD TRACKS
SERRANO CHANNEL
Special Maintenance Area 1
BARRANCA PARKWAY
Fuel Management Area
Proposed Connection
Existing Under Crossing
Mulrlands
ALTON PARKWAY
Drop Structure (flowline stabilization)
Special Maintenance Area 1
Marine Way Crossing
Proposed Under Crossing
Regional Water Quality Facility (Location either side of channel)
I-5 FREEWAY
BAKE PARKWAY
RESEARCH DR
Legend
1. Planting Shown in accordance to OCFA approved plant palette.
2. Potential Road and/or Trail Crossing Shown are Subject to Change.
3. A Second Potential Pedestrian Crossing May Be Added. Example Location is Not Shown.
Coastal Sage Scrub and Southern Cactus Scrub
Open Cactus Scrub and Grassland
Screening Planting
Special Maintenance Area 1 *
Fuel Management Area
* Planting beyond these areas within the Wildlife Corridor is part of the Interior Corridor Habitat Management Area.
Drainage Course / Riparian Vegetation *
*- Riparian Vegetation north of Marine Way
Regional Water Quality Facilities **
**- Either side of Serrano Creek
Access Ramp to Serrano Creek Channel
(See Detail Hereon)
FIGURE 6
Irvine Wildlife Corridor Plan
Segment 3 South and 4
Concept Design and Planting
September 30, 2013

# EXAMPLE PLANTING OF INTERIOR CORRIDOR WITH 5% COVERAGE OF CHAPARRAL SPECIES



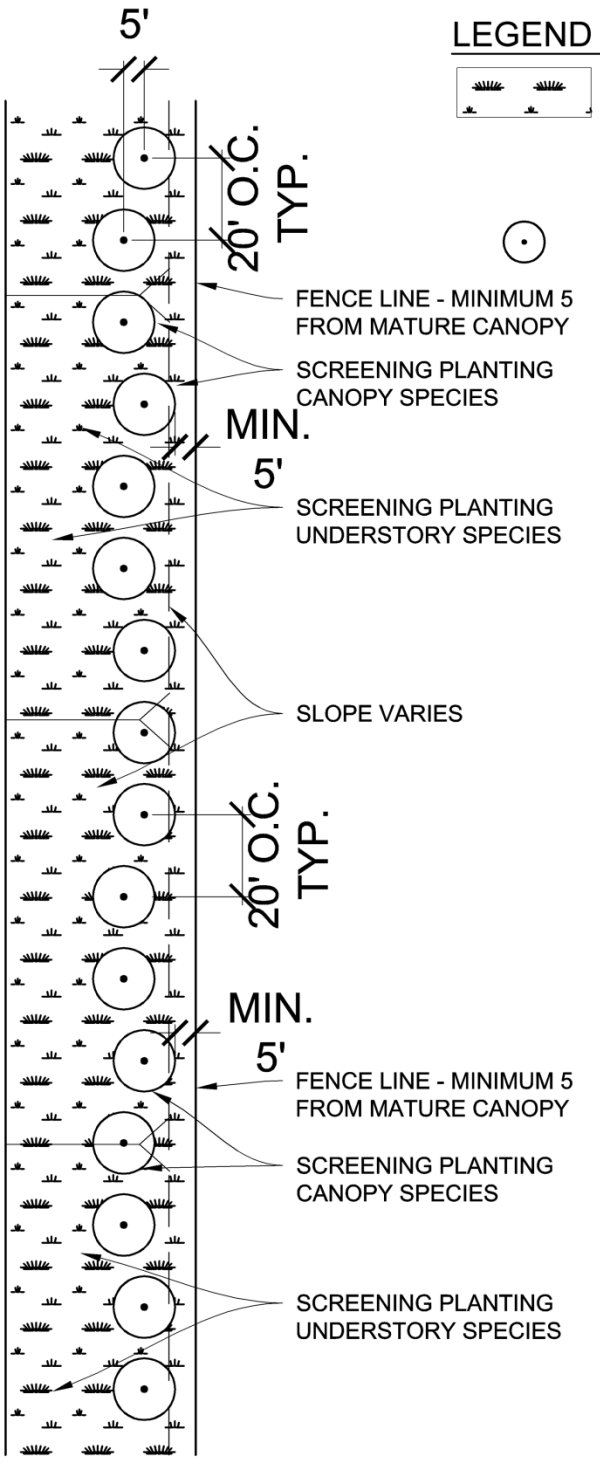

## LEGEND

SPECIAL MAINTENANCE AREA 1 AND 2, COASTAL SAGE SCRUB, OPEN CACTUS SCRUB, RIPARIAN VEGETATION, OR SOUTHERN WILLOW SCRUB PLANTED WITHIN THE INTERIOR OF THE CORRIDOR

ASSUMED 10' DIAMETER "VOLUNTEER" CHAPARRAL VEGETATION THAT WOULD SEED WITHIN THE INTERIOR OF THE CORRIDOR. "VOLUNTEER" CHAPARRAL SPECIES THAT ARE TO BE REMOVED WHEN ABSOLUTE COVER EXCEEDS 5% OR ANY INDIVIDUALS THAT DO NOT EXHIBIT 30-FOOT SPACING FROM OTHER CHAPARRAL INDIVIDUALS. SPECIES INCLUDE: LAUREL SUMAC ( *MALOSMA LAURINA*), CHAMISE (*ADENOSTOMA FASCICULATA*), CEANOTHUS (*CEANOTHUS SPP.*), MOUNTAIN MAHOGANY (*CERCOCARPUS BETULOIDES*), MANZANITA *(ARCTOSTAPHYLOS SPP.*), AND SCRUB OAK (*QUERCUS BERBERIDIFOLIA).*

**NOTE:** BLUE ELDERBERRY (*SAMBUCUS NIGRA*) IS A COMPONENT OF THE MULEFAT SCRUB AND SHALL NOT BE TREATED AS THE OTHER CHAPARRAL SPECIES.

# EXAMPLE PLANTING OF PERIMETER SCREENING PLANTING AREAS PER FIGURES 4 AND 6




LEGEND

SCREENING PLANTING UNDERSTORY SPECIES. SPECIES INCLUDE: COYOTE BRUSH, BIG SALTBUSH, BLADDERPOD, PRICKLY PEAR AND COASTAL CHOLLA.

SCREENING PLANTING CANOPY SPECIES. SPECIES INCLUDE: ELDERBERRY, LEMONADEBERRY, TOYON AND SUGAR BUSH.

# Appendix D: Behave Reports

Behave Reports

Appendix D-1: NE wind event
Appendix D-2: SW wind event
Appendix D-3: No wind event
Appendix D-4: SW grasses analysis
Appendix D-5: gr2 wind analysis

## Inputs: SURFACE

| | | |
|---|---|---|
| Description | | Eastern Corridor NE Wind at 60 mph |

### Fuel/Vegetation, Surface/Understory

| | | |
|---|---|---|
| Fuel Model | | gr4, gs2, sh7, SCAL18 |

### Fuel Moisture

| | | |
|---|---|---|
| 1-h Moisture | % | 4 |
| 10-h Moisture | % | 5 |
| 100-h Moisture | % | 6 |
| Live Herbaceous Moisture | % | 30 |
| Live Woody Moisture | % | 60 |

### Weather

| | | |
|---|---|---|
| Midflame Wind Speed | mi/h | 30 |
| Wind Direction (from north) | deg | 45 |

### Terrain

| | | |
|---|---|---|
| Slope Steepness | % | 0 |
| Aspect | deg | 0 |

### Fire

| | | |
|---|---|---|
| Spread Direction (from north) | deg | 15, 30, 45, 60, 75, 90, 105, 120, |

---

## Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are for the specified spread directions [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind and spread directions are degrees clockwise from north [SURFACE].

Wind direction is the direction from which the wind is blowing [SURFACE].

---

## Output Variables

Surface Rate of Spread (ch/h) [SURFACE]

Fireline Intensity (Btu/ft/s) [SURFACE]

Flame Length (ft) [SURFACE]

Direction of Maximum Spread (from north) (deg) [SURFACE]

Flame Residence Time (s) [SURFACE]

(continued on next page)

Input Worksheet (continued)

## Notes

# Eastern Corridor NE Wind at 60 mph

## Surface Rate of Spread (ch/h)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 6.2 | 1.9 | 1.7 | 1.0 |
| 30 | 5.9 | 1.8 | 1.6 | 0.9 |
| 45 | 5.8 | 1.7 | 1.6 | 0.9 |
| 60 | 5.9 | 1.8 | 1.6 | 0.9 |
| 75 | 6.2 | 1.9 | 1.7 | 1.0 |
| 90 | 6.8 | 2.0 | 1.8 | 1.1 |
| 105 | 7.7 | 2.3 | 2.1 | 1.2 |
| 120 | 9.2 | 2.8 | 2.5 | 1.4 |
| 135 | 11.5 | 3.5 | 3.1 | 1.8 |
| 150 | 15.5 | 4.6 | 4.2 | 2.4 |
| 165 | 22.8 | 6.8 | 6.1 | 3.6 |
| 180 | 38.2 | 11.5 | 10.4 | 6.1 |
| 195 | 80.0 | 24.4 | 22.1 | 12.9 |
| 210 | 255.4 | 80.6 | 75.9 | 44.5 |
| 225 | 1011.5 | 380.2 | 445.7 | 261.0 |
| 240 | 255.4 | 80.6 | 75.9 | 44.5 |
| 255 | 80.0 | 24.4 | 22.1 | 12.9 |
| 270 | 38.2 | 11.5 | 10.4 | 6.1 |
| 285 | 22.8 | 6.8 | 6.1 | 3.6 |
| 300 | 15.5 | 4.6 | 4.2 | 2.4 |
| 315 | 11.5 | 3.5 | 3.1 | 1.8 |
| 330 | 9.2 | 2.8 | 2.5 | 1.4 |
| 345 | 7.7 | 2.3 | 2.1 | 1.2 |
| 360 | 6.8 | 2.0 | 1.8 | 1.1 |

# Eastern Corridor NE Wind at 60 mph

## Fireline Intensity (Btu/ft/s)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 53 | 18 | 74 | 69 |
| 30 | 50 | 17 | 70 | 65 |
| 45 | 49 | 17 | 69 | 64 |
| 60 | 50 | 17 | 70 | 65 |
| 75 | 53 | 18 | 74 | 69 |
| 90 | 58 | 20 | 81 | 75 |
| 105 | 66 | 22 | 92 | 85 |
| 120 | 78 | 27 | 109 | 102 |
| 135 | 98 | 33 | 137 | 128 |
| 150 | 132 | 45 | 185 | 172 |
| 165 | 194 | 66 | 272 | 254 |
| 180 | 326 | 112 | 460 | 429 |
| 195 | 682 | 236 | 980 | 913 |
| 210 | 2176 | 782 | 3363 | 3133 |
| 225 | 8617 | 3685 | 19747 | 18399 |
| 240 | 2176 | 782 | 3363 | 3133 |
| 255 | 682 | 236 | 980 | 913 |
| 270 | 326 | 112 | 460 | 429 |
| 285 | 194 | 66 | 272 | 254 |
| 300 | 132 | 45 | 185 | 172 |
| 315 | 98 | 33 | 137 | 128 |
| 330 | 78 | 27 | 109 | 102 |
| 345 | 66 | 22 | 92 | 85 |
| 360 | 58 | 20 | 81 | 75 |

# Eastern Corridor NE Wind at 60 mph

## Flame Length (ft)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 2.8 | 1.7 | 3.3 | 3.1 |
| 30 | 2.7 | 1.7 | 3.2 | 3.1 |
| 45 | 2.7 | 1.6 | 3.2 | 3.1 |
| 60 | 2.7 | 1.7 | 3.2 | 3.1 |
| 75 | 2.8 | 1.7 | 3.3 | 3.1 |
| 90 | 2.9 | 1.8 | 3.4 | 3.3 |
| 105 | 3.1 | 1.9 | 3.6 | 3.5 |
| 120 | 3.3 | 2.0 | 3.9 | 3.8 |
| 135 | 3.7 | 2.3 | 4.3 | 4.2 |
| 150 | 4.2 | 2.6 | 5.0 | 4.8 |
| 165 | 5.1 | 3.1 | 5.9 | 5.7 |
| 180 | 6.4 | 3.9 | 7.6 | 7.3 |
| 195 | 9.1 | 5.6 | 10.7 | 10.4 |
| 210 | 15.4 | 9.6 | 18.9 | 18.3 |
| 225 | 29.1 | 19.7 | 42.6 | 41.2 |
| 240 | 15.4 | 9.6 | 18.9 | 18.3 |
| 255 | 9.1 | 5.6 | 10.7 | 10.4 |
| 270 | 6.4 | 3.9 | 7.6 | 7.3 |
| 285 | 5.1 | 3.1 | 5.9 | 5.7 |
| 300 | 4.2 | 2.6 | 5.0 | 4.8 |
| 315 | 3.7 | 2.3 | 4.3 | 4.2 |
| 330 | 3.3 | 2.0 | 3.9 | 3.8 |
| 345 | 3.1 | 1.9 | 3.6 | 3.5 |
| 360 | 2.9 | 1.8 | 3.4 | 3.3 |

# Eastern Corridor NE Wind at 60 mph

## Direction of Maximum Spread (from north) (deg)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 225 | 225 | 225 | 225 |
| 30 | 225 | 225 | 225 | 225 |
| 45 | 225 | 225 | 225 | 225 |
| 60 | 225 | 225 | 225 | 225 |
| 75 | 225 | 225 | 225 | 225 |
| 90 | 225 | 225 | 225 | 225 |
| 105 | 225 | 225 | 225 | 225 |
| 120 | 225 | 225 | 225 | 225 |
| 135 | 225 | 225 | 225 | 225 |
| 150 | 225 | 225 | 225 | 225 |
| 165 | 225 | 225 | 225 | 225 |
| 180 | 225 | 225 | 225 | 225 |
| 195 | 225 | 225 | 225 | 225 |
| 210 | 225 | 225 | 225 | 225 |
| 225 | 225 | 225 | 225 | 225 |
| 240 | 225 | 225 | 225 | 225 |
| 255 | 225 | 225 | 225 | 225 |
| 270 | 225 | 225 | 225 | 225 |
| 285 | 225 | 225 | 225 | 225 |
| 300 | 225 | 225 | 225 | 225 |
| 315 | 225 | 225 | 225 | 225 |
| 330 | 225 | 225 | 225 | 225 |
| 345 | 225 | 225 | 225 | 225 |
| 360 | 225 | 225 | 225 | 225 |

# Eastern Corridor NE Wind at 60 mph

## Flame Residence Time (s)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 12.62 | 12.61 | 18.69 | 29.35 |
| 30 | 12.62 | 12.61 | 18.69 | 29.35 |
| 45 | 12.62 | 12.61 | 18.69 | 29.35 |
| 60 | 12.62 | 12.61 | 18.69 | 29.35 |
| 75 | 12.62 | 12.61 | 18.69 | 29.35 |
| 90 | 12.62 | 12.61 | 18.69 | 29.35 |
| 105 | 12.62 | 12.61 | 18.69 | 29.35 |
| 120 | 12.62 | 12.61 | 18.69 | 29.35 |
| 135 | 12.62 | 12.61 | 18.69 | 29.35 |
| 150 | 12.62 | 12.61 | 18.69 | 29.35 |
| 165 | 12.62 | 12.61 | 18.69 | 29.35 |
| 180 | 12.62 | 12.61 | 18.69 | 29.35 |
| 195 | 12.62 | 12.61 | 18.69 | 29.35 |
| 210 | 12.62 | 12.61 | 18.69 | 29.35 |
| 225 | 12.62 | 12.61 | 18.69 | 29.35 |
| 240 | 12.62 | 12.61 | 18.69 | 29.35 |
| 255 | 12.62 | 12.61 | 18.69 | 29.35 |
| 270 | 12.62 | 12.61 | 18.69 | 29.35 |
| 285 | 12.62 | 12.61 | 18.69 | 29.35 |
| 300 | 12.62 | 12.61 | 18.69 | 29.35 |
| 315 | 12.62 | 12.61 | 18.69 | 29.35 |
| 330 | 12.62 | 12.61 | 18.69 | 29.35 |
| 345 | 12.62 | 12.61 | 18.69 | 29.35 |
| 360 | 12.62 | 12.61 | 18.69 | 29.35 |

# Discrete Variable Codes Used
## Eastern Corridor NE Wind at 60 mph

Fuel Model

| | |
|---|---|
| gr4 | Moderate load, dry climate grass (D) (104) |
| gs2 | Moderate load, dry climate grass-shrub (D) (122) |
| sh7 | Very high load, dry climate shrub (S) (147) |
| SCAL18 | Sage / Buckwheat |

## Inputs: SURFACE

| | | |
|---|---|---|
| Description | | Eastern Corridor SW Wind at 30 |

### Fuel/Vegetation, Surface/Understory

| | | |
|---|---|---|
| Fuel Model | | gr4, gs2, sh7, SCAL18 |

### Fuel Moisture

| | | |
|---|---|---|
| 1-h Moisture | % | 4 |
| 10-h Moisture | % | 5 |
| 100-h Moisture | % | 6 |
| Live Herbaceous Moisture | % | 30 |
| Live Woody Moisture | % | 60 |

### Weather

| | | |
|---|---|---|
| Midflame Wind Speed | mi/h | 15 |
| Wind Direction (from north) | deg | 225 |

### Terrain

| | | |
|---|---|---|
| Slope Steepness | % | 0 |
| Aspect | deg | 0 |

### Fire

| | | |
|---|---|---|
| Spread Direction (from north) | deg | 15, 30, 45, 60, 75, 90, 105, 120, |

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## Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are for the specified spread directions [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind and spread directions are degrees clockwise from north [SURFACE].

Wind direction is the direction from which the wind is blowing [SURFACE].

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## Output Variables

Surface Rate of Spread (ch/h) [SURFACE]

Fireline Intensity (Btu/ft/s) [SURFACE]

Flame Length (ft) [SURFACE]

Direction of Maximum Spread (from north) (deg) [SURFACE]

Flame Residence Time (s) [SURFACE]

(continued on next page)

Input Worksheet (continued)

## Notes

# Eastern Corridor SW Wind at 30

## Surface Rate of Spread (ch/h)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 81.7 | 25.4 | 29.0 | 20.3 |
| 30 | 224.8 | 70.0 | 79.8 | 55.8 |
| 45 | 559.0 | 174.0 | 198.3 | 138.7 |
| 60 | 224.8 | 70.0 | 79.8 | 55.8 |
| 75 | 81.7 | 25.4 | 29.0 | 20.3 |
| 90 | 40.6 | 12.6 | 14.4 | 10.1 |
| 105 | 24.5 | 7.6 | 8.7 | 6.1 |
| 120 | 16.8 | 5.2 | 5.9 | 4.2 |
| 135 | 12.5 | 3.9 | 4.4 | 3.1 |
| 150 | 10.0 | 3.1 | 3.5 | 2.5 |
| 165 | 8.4 | 2.6 | 3.0 | 2.1 |
| 180 | 7.4 | 2.3 | 2.6 | 1.8 |
| 195 | 6.8 | 2.1 | 2.4 | 1.7 |
| 210 | 6.4 | 2.0 | 2.3 | 1.6 |
| 225 | 6.3 | 2.0 | 2.2 | 1.6 |
| 240 | 6.4 | 2.0 | 2.3 | 1.6 |
| 255 | 6.8 | 2.1 | 2.4 | 1.7 |
| 270 | 7.4 | 2.3 | 2.6 | 1.8 |
| 285 | 8.4 | 2.6 | 3.0 | 2.1 |
| 300 | 10.0 | 3.1 | 3.5 | 2.5 |
| 315 | 12.5 | 3.9 | 4.4 | 3.1 |
| 330 | 16.8 | 5.2 | 5.9 | 4.2 |
| 345 | 24.5 | 7.6 | 8.7 | 6.1 |
| 360 | 40.6 | 12.6 | 14.4 | 10.1 |

# Eastern Corridor SW Wind at 30

## Fireline Intensity (Btu/ft/s)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 696 | 246 | 1284 | 1428 |
| 30 | 1915 | 678 | 3534 | 3932 |
| 45 | 4762 | 1687 | 8787 | 9775 |
| 60 | 1915 | 678 | 3534 | 3932 |
| 75 | 696 | 246 | 1284 | 1428 |
| 90 | 346 | 122 | 638 | 710 |
| 105 | 209 | 74 | 385 | 429 |
| 120 | 143 | 51 | 264 | 293 |
| 135 | 107 | 38 | 197 | 219 |
| 150 | 85 | 30 | 157 | 175 |
| 165 | 72 | 25 | 132 | 147 |
| 180 | 63 | 22 | 116 | 130 |
| 195 | 58 | 20 | 107 | 119 |
| 210 | 55 | 19 | 101 | 113 |
| 225 | 54 | 19 | 100 | 111 |
| 240 | 55 | 19 | 101 | 113 |
| 255 | 58 | 20 | 107 | 119 |
| 270 | 63 | 22 | 116 | 130 |
| 285 | 72 | 25 | 132 | 147 |
| 300 | 85 | 30 | 157 | 175 |
| 315 | 107 | 38 | 197 | 219 |
| 330 | 143 | 51 | 264 | 293 |
| 345 | 209 | 74 | 385 | 429 |
| 360 | 346 | 122 | 638 | 710 |

# Eastern Corridor SW Wind at 30

## Flame Length (ft)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 9.1 | 5.7 | 12.1 | 12.7 |
| 30 | 14.6 | 9.0 | 19.3 | 20.3 |
| 45 | 22.1 | 13.7 | 29.3 | 30.8 |
| 60 | 14.6 | 9.0 | 19.3 | 20.3 |
| 75 | 9.1 | 5.7 | 12.1 | 12.7 |
| 90 | 6.6 | 4.1 | 8.8 | 9.2 |
| 105 | 5.3 | 3.3 | 7.0 | 7.3 |
| 120 | 4.4 | 2.7 | 5.8 | 6.1 |
| 135 | 3.9 | 2.4 | 5.1 | 5.4 |
| 150 | 3.5 | 2.2 | 4.6 | 4.8 |
| 165 | 3.2 | 2.0 | 4.3 | 4.5 |
| 180 | 3.0 | 1.9 | 4.0 | 4.2 |
| 195 | 2.9 | 1.8 | 3.9 | 4.0 |
| 210 | 2.8 | 1.8 | 3.8 | 4.0 |
| 225 | 2.8 | 1.7 | 3.7 | 3.9 |
| 240 | 2.8 | 1.8 | 3.8 | 4.0 |
| 255 | 2.9 | 1.8 | 3.9 | 4.0 |
| 270 | 3.0 | 1.9 | 4.0 | 4.2 |
| 285 | 3.2 | 2.0 | 4.3 | 4.5 |
| 300 | 3.5 | 2.2 | 4.6 | 4.8 |
| 315 | 3.9 | 2.4 | 5.1 | 5.4 |
| 330 | 4.4 | 2.7 | 5.8 | 6.1 |
| 345 | 5.3 | 3.3 | 7.0 | 7.3 |
| 360 | 6.6 | 4.1 | 8.8 | 9.2 |

# Eastern Corridor SW Wind at 30

## Direction of Maximum Spread (from north) (deg)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 45 | 45 | 45 | 45 |
| 30 | 45 | 45 | 45 | 45 |
| 45 | 45 | 45 | 45 | 45 |
| 60 | 45 | 45 | 45 | 45 |
| 75 | 45 | 45 | 45 | 45 |
| 90 | 45 | 45 | 45 | 45 |
| 105 | 45 | 45 | 45 | 45 |
| 120 | 45 | 45 | 45 | 45 |
| 135 | 45 | 45 | 45 | 45 |
| 150 | 45 | 45 | 45 | 45 |
| 165 | 45 | 45 | 45 | 45 |
| 180 | 45 | 45 | 45 | 45 |
| 195 | 45 | 45 | 45 | 45 |
| 210 | 45 | 45 | 45 | 45 |
| 225 | 45 | 45 | 45 | 45 |
| 240 | 45 | 45 | 45 | 45 |
| 255 | 45 | 45 | 45 | 45 |
| 270 | 45 | 45 | 45 | 45 |
| 285 | 45 | 45 | 45 | 45 |
| 300 | 45 | 45 | 45 | 45 |
| 315 | 45 | 45 | 45 | 45 |
| 330 | 45 | 45 | 45 | 45 |
| 345 | 45 | 45 | 45 | 45 |
| 360 | 45 | 45 | 45 | 45 |

# Eastern Corridor SW Wind at 30

## Flame Residence Time (s)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 12.62 | 12.61 | 18.69 | 29.35 |
| 30 | 12.62 | 12.61 | 18.69 | 29.35 |
| 45 | 12.62 | 12.61 | 18.69 | 29.35 |
| 60 | 12.62 | 12.61 | 18.69 | 29.35 |
| 75 | 12.62 | 12.61 | 18.69 | 29.35 |
| 90 | 12.62 | 12.61 | 18.69 | 29.35 |
| 105 | 12.62 | 12.61 | 18.69 | 29.35 |
| 120 | 12.62 | 12.61 | 18.69 | 29.35 |
| 135 | 12.62 | 12.61 | 18.69 | 29.35 |
| 150 | 12.62 | 12.61 | 18.69 | 29.35 |
| 165 | 12.62 | 12.61 | 18.69 | 29.35 |
| 180 | 12.62 | 12.61 | 18.69 | 29.35 |
| 195 | 12.62 | 12.61 | 18.69 | 29.35 |
| 210 | 12.62 | 12.61 | 18.69 | 29.35 |
| 225 | 12.62 | 12.61 | 18.69 | 29.35 |
| 240 | 12.62 | 12.61 | 18.69 | 29.35 |
| 255 | 12.62 | 12.61 | 18.69 | 29.35 |
| 270 | 12.62 | 12.61 | 18.69 | 29.35 |
| 285 | 12.62 | 12.61 | 18.69 | 29.35 |
| 300 | 12.62 | 12.61 | 18.69 | 29.35 |
| 315 | 12.62 | 12.61 | 18.69 | 29.35 |
| 330 | 12.62 | 12.61 | 18.69 | 29.35 |
| 345 | 12.62 | 12.61 | 18.69 | 29.35 |
| 360 | 12.62 | 12.61 | 18.69 | 29.35 |

# Discrete Variable Codes Used
# Eastern Corridor SW Wind at 30

Fuel Model

| | |
|---|---|
| gr4 | Moderate load, dry climate grass (D) (104) |
| gs2 | Moderate load, dry climate grass-shrub (D) (122) |
| sh7 | Very high load, dry climate shrub (S) (147) |
| SCAL18 | Sage / Buckwheat |

## Inputs: SURFACE

| | | |
|---|---|---|
| Description | | Eastern Corridor No Wind |

### Fuel/Vegetation, Surface/Understory

| | | |
|---|---|---|
| Fuel Model | | gr4, gs2, sh7, SCAL18 |

### Fuel Moisture

| | | |
|---|---|---|
| 1-h Moisture | % | 4 |
| 10-h Moisture | % | 5 |
| 100-h Moisture | % | 6 |
| Live Herbaceous Moisture | % | 30 |
| Live Woody Moisture | % | 60 |

### Weather

| | | |
|---|---|---|
| Midflame Wind Speed | mi/h | 0 |
| Wind Direction (from north) | deg | 45 |

### Terrain

| | | |
|---|---|---|
| Slope Steepness | % | 0 |
| Aspect | deg | 0 |

### Fire

| | | |
|---|---|---|
| Spread Direction (from north) | deg | 15, 30, 45, 60, 75, 90, 105, 120, |

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## Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are for the specified spread directions [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind and spread directions are degrees clockwise from north [SURFACE].

Wind direction is the direction from which the wind is blowing [SURFACE].

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## Output Variables

Surface Rate of Spread (ch/h) [SURFACE]

Fireline Intensity (Btu/ft/s) [SURFACE]

Flame Length (ft) [SURFACE]

Direction of Maximum Spread (from north) (deg) [SURFACE]

Flame Residence Time (s) [SURFACE]

(continued on next page)

Input Worksheet (continued)

## Notes

# Eastern Corridor No Wind

## Surface Rate of Spread (ch/h)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 4.7 | 1.7 | 2.7 | 2.4 |
| 30 | 4.7 | 1.7 | 2.7 | 2.4 |
| 45 | 4.7 | 1.7 | 2.7 | 2.4 |
| 60 | 4.7 | 1.7 | 2.7 | 2.4 |
| 75 | 4.7 | 1.7 | 2.7 | 2.4 |
| 90 | 4.7 | 1.7 | 2.7 | 2.4 |
| 105 | 4.7 | 1.7 | 2.7 | 2.4 |
| 120 | 4.7 | 1.7 | 2.7 | 2.4 |
| 135 | 4.7 | 1.7 | 2.7 | 2.4 |
| 150 | 4.7 | 1.7 | 2.7 | 2.4 |
| 165 | 4.7 | 1.7 | 2.7 | 2.4 |
| 180 | 4.7 | 1.7 | 2.7 | 2.4 |
| 195 | 4.7 | 1.7 | 2.7 | 2.4 |
| 210 | 4.7 | 1.7 | 2.7 | 2.4 |
| 225 | 4.7 | 1.7 | 2.7 | 2.4 |
| 240 | 4.7 | 1.7 | 2.7 | 2.4 |
| 255 | 4.7 | 1.7 | 2.7 | 2.4 |
| 270 | 4.7 | 1.7 | 2.7 | 2.4 |
| 285 | 4.7 | 1.7 | 2.7 | 2.4 |
| 300 | 4.7 | 1.7 | 2.7 | 2.4 |
| 315 | 4.7 | 1.7 | 2.7 | 2.4 |
| 330 | 4.7 | 1.7 | 2.7 | 2.4 |
| 345 | 4.7 | 1.7 | 2.7 | 2.4 |
| 360 | 4.7 | 1.7 | 2.7 | 2.4 |

# Eastern Corridor No Wind

## Fireline Intensity (Btu/ft/s)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 40 | 17 | 118 | 166 |
| 30 | 40 | 17 | 118 | 166 |
| 45 | 40 | 17 | 118 | 166 |
| 60 | 40 | 17 | 118 | 166 |
| 75 | 40 | 17 | 118 | 166 |
| 90 | 40 | 17 | 118 | 166 |
| 105 | 40 | 17 | 118 | 166 |
| 120 | 40 | 17 | 118 | 166 |
| 135 | 40 | 17 | 118 | 166 |
| 150 | 40 | 17 | 118 | 166 |
| 165 | 40 | 17 | 118 | 166 |
| 180 | 40 | 17 | 118 | 166 |
| 195 | 40 | 17 | 118 | 166 |
| 210 | 40 | 17 | 118 | 166 |
| 225 | 40 | 17 | 118 | 166 |
| 240 | 40 | 17 | 118 | 166 |
| 255 | 40 | 17 | 118 | 166 |
| 270 | 40 | 17 | 118 | 166 |
| 285 | 40 | 17 | 118 | 166 |
| 300 | 40 | 17 | 118 | 166 |
| 315 | 40 | 17 | 118 | 166 |
| 330 | 40 | 17 | 118 | 166 |
| 345 | 40 | 17 | 118 | 166 |
| 360 | 40 | 17 | 118 | 166 |

# Eastern Corridor No Wind

## Flame Length (ft)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 2.4 | 1.6 | 4.0 | 4.7 |
| 30 | 2.4 | 1.6 | 4.0 | 4.7 |
| 45 | 2.4 | 1.6 | 4.0 | 4.7 |
| 60 | 2.4 | 1.6 | 4.0 | 4.7 |
| 75 | 2.4 | 1.6 | 4.0 | 4.7 |
| 90 | 2.4 | 1.6 | 4.0 | 4.7 |
| 105 | 2.4 | 1.6 | 4.0 | 4.7 |
| 120 | 2.4 | 1.6 | 4.0 | 4.7 |
| 135 | 2.4 | 1.6 | 4.0 | 4.7 |
| 150 | 2.4 | 1.6 | 4.0 | 4.7 |
| 165 | 2.4 | 1.6 | 4.0 | 4.7 |
| 180 | 2.4 | 1.6 | 4.0 | 4.7 |
| 195 | 2.4 | 1.6 | 4.0 | 4.7 |
| 210 | 2.4 | 1.6 | 4.0 | 4.7 |
| 225 | 2.4 | 1.6 | 4.0 | 4.7 |
| 240 | 2.4 | 1.6 | 4.0 | 4.7 |
| 255 | 2.4 | 1.6 | 4.0 | 4.7 |
| 270 | 2.4 | 1.6 | 4.0 | 4.7 |
| 285 | 2.4 | 1.6 | 4.0 | 4.7 |
| 300 | 2.4 | 1.6 | 4.0 | 4.7 |
| 315 | 2.4 | 1.6 | 4.0 | 4.7 |
| 330 | 2.4 | 1.6 | 4.0 | 4.7 |
| 345 | 2.4 | 1.6 | 4.0 | 4.7 |
| 360 | 2.4 | 1.6 | 4.0 | 4.7 |

# Eastern Corridor No Wind

## Direction of Maximum Spread (from north) (deg)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 180 | 180 | 180 | 180 |
| 30 | 180 | 180 | 180 | 180 |
| 45 | 180 | 180 | 180 | 180 |
| 60 | 180 | 180 | 180 | 180 |
| 75 | 180 | 180 | 180 | 180 |
| 90 | 180 | 180 | 180 | 180 |
| 105 | 180 | 180 | 180 | 180 |
| 120 | 180 | 180 | 180 | 180 |
| 135 | 180 | 180 | 180 | 180 |
| 150 | 180 | 180 | 180 | 180 |
| 165 | 180 | 180 | 180 | 180 |
| 180 | 180 | 180 | 180 | 180 |
| 195 | 180 | 180 | 180 | 180 |
| 210 | 180 | 180 | 180 | 180 |
| 225 | 180 | 180 | 180 | 180 |
| 240 | 180 | 180 | 180 | 180 |
| 255 | 180 | 180 | 180 | 180 |
| 270 | 180 | 180 | 180 | 180 |
| 285 | 180 | 180 | 180 | 180 |
| 300 | 180 | 180 | 180 | 180 |
| 315 | 180 | 180 | 180 | 180 |
| 330 | 180 | 180 | 180 | 180 |
| 345 | 180 | 180 | 180 | 180 |
| 360 | 180 | 180 | 180 | 180 |

# Eastern Corridor No Wind

## Flame Residence Time (s)

| Spread Dir | Fuel Model | | | |
|---|---|---|---|---|
| deg | gr4 | gs2 | sh7 | SCAL18 |
| 15 | 12.62 | 12.61 | 18.69 | 29.35 |
| 30 | 12.62 | 12.61 | 18.69 | 29.35 |
| 45 | 12.62 | 12.61 | 18.69 | 29.35 |
| 60 | 12.62 | 12.61 | 18.69 | 29.35 |
| 75 | 12.62 | 12.61 | 18.69 | 29.35 |
| 90 | 12.62 | 12.61 | 18.69 | 29.35 |
| 105 | 12.62 | 12.61 | 18.69 | 29.35 |
| 120 | 12.62 | 12.61 | 18.69 | 29.35 |
| 135 | 12.62 | 12.61 | 18.69 | 29.35 |
| 150 | 12.62 | 12.61 | 18.69 | 29.35 |
| 165 | 12.62 | 12.61 | 18.69 | 29.35 |
| 180 | 12.62 | 12.61 | 18.69 | 29.35 |
| 195 | 12.62 | 12.61 | 18.69 | 29.35 |
| 210 | 12.62 | 12.61 | 18.69 | 29.35 |
| 225 | 12.62 | 12.61 | 18.69 | 29.35 |
| 240 | 12.62 | 12.61 | 18.69 | 29.35 |
| 255 | 12.62 | 12.61 | 18.69 | 29.35 |
| 270 | 12.62 | 12.61 | 18.69 | 29.35 |
| 285 | 12.62 | 12.61 | 18.69 | 29.35 |
| 300 | 12.62 | 12.61 | 18.69 | 29.35 |
| 315 | 12.62 | 12.61 | 18.69 | 29.35 |
| 330 | 12.62 | 12.61 | 18.69 | 29.35 |
| 345 | 12.62 | 12.61 | 18.69 | 29.35 |
| 360 | 12.62 | 12.61 | 18.69 | 29.35 |

# Discrete Variable Codes Used
## Eastern Corridor No Wind

Fuel Model

| | |
|---|---|
| gr4 | Moderate load, dry climate grass (D) (104) |
| gs2 | Moderate load, dry climate grass-shrub (D) (122) |
| sh7 | Very high load, dry climate shrub (S) (147) |
| SCAL18 | Sage / Buckwheat |

## Inputs: SURFACE

| | | |
|---|---|---|
| Description | | Eastern Corridor SW Wind at 30 |

### Fuel/Vegetation, Surface/Understory

| | | |
|---|---|---|
| Fuel Model | | gr1, gr2, gr4 |

### Fuel Moisture

| | | |
|---|---|---|
| 1-h Moisture | % | 4 |
| 10-h Moisture | % | 5 |
| 100-h Moisture | % | 6 |
| Live Herbaceous Moisture | % | 30 |
| Live Woody Moisture | % | 60 |

### Weather

| | | |
|---|---|---|
| Midflame Wind Speed | mi/h | 15 |
| Wind Direction (from north) | deg | 225 |

### Terrain

| | | |
|---|---|---|
| Slope Steepness | % | 50 |
| Aspect | deg | 225 |

### Fire

| | | |
|---|---|---|
| Spread Direction (from north) | deg | 15, 30, 45, 60, 75, 90, 105, 120, |

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## Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are for the specified spread directions [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind and spread directions are degrees clockwise from north [SURFACE].

Wind direction is the direction from which the wind is blowing [SURFACE].

---

## Output Variables

Surface Rate of Spread (ch/h) [SURFACE]

Fireline Intensity (Btu/ft/s) [SURFACE]

Flame Length (ft) [SURFACE]

Direction of Maximum Spread (from north) (deg) [SURFACE]

Flame Residence Time (s) [SURFACE]

(continued on next page)

Input Worksheet (continued)

## Notes

# Eastern Corridor SW Wind at 30

## Surface Rate of Spread (ch/h)

| Spread Dir | Fuel Model | | |
|---|---|---|---|
| deg | gr1 | gr2 | gr4 |
| 15 | 10.8 | 39.4 | 81.8 |
| 30 | 17.1 | 96.7 | 230.0 |
| 45 | 21.4 | 192.1 | 601.8 |
| 60 | 17.1 | 96.7 | 230.0 |
| 75 | 10.8 | 39.4 | 81.8 |
| 90 | 6.8 | 20.3 | 40.4 |
| 105 | 4.6 | 12.4 | 24.3 |
| 120 | 3.3 | 8.6 | 16.6 |
| 135 | 2.6 | 6.4 | 12.4 |
| 150 | 2.1 | 5.1 | 9.9 |
| 165 | 1.8 | 4.3 | 8.3 |
| 180 | 1.6 | 3.8 | 7.3 |
| 195 | 1.5 | 3.5 | 6.7 |
| 210 | 1.4 | 3.3 | 6.4 |
| 225 | 1.4 | 3.3 | 6.3 |
| 240 | 1.4 | 3.3 | 6.4 |
| 255 | 1.5 | 3.5 | 6.7 |
| 270 | 1.6 | 3.8 | 7.3 |
| 285 | 1.8 | 4.3 | 8.3 |
| 300 | 2.1 | 5.1 | 9.9 |
| 315 | 2.6 | 6.4 | 12.4 |
| 330 | 3.3 | 8.6 | 16.6 |
| 345 | 4.6 | 12.4 | 24.3 |
| 360 | 6.8 | 20.3 | 40.4 |

# Eastern Corridor SW Wind at 30

## Fireline Intensity (Btu/ft/s)

| Spread Dir | Fuel Model | | |
|---|---|---|---|
| deg | gr1 | gr2 | gr4 |
| 15 | 16 | 173 | 697 |
| 30 | 25 | 425 | 1960 |
| 45 | 31 | 844 | 5126 |
| 60 | 25 | 425 | 1960 |
| 75 | 16 | 173 | 697 |
| 90 | 10 | 89 | 344 |
| 105 | 7 | 55 | 207 |
| 120 | 5 | 38 | 142 |
| 135 | 4 | 28 | 106 |
| 150 | 3 | 23 | 84 |
| 165 | 3 | 19 | 71 |
| 180 | 2 | 17 | 63 |
| 195 | 2 | 15 | 57 |
| 210 | 2 | 15 | 54 |
| 225 | 2 | 14 | 53 |
| 240 | 2 | 15 | 54 |
| 255 | 2 | 15 | 57 |
| 270 | 2 | 17 | 63 |
| 285 | 3 | 19 | 71 |
| 300 | 3 | 23 | 84 |
| 315 | 4 | 28 | 106 |
| 330 | 5 | 38 | 142 |
| 345 | 7 | 55 | 207 |
| 360 | 10 | 89 | 344 |

# Eastern Corridor SW Wind at 30

## Flame Length (ft)

| Spread Dir | Fuel Model | | |
|---|---|---|---|
| deg | gr1 | gr2 | gr4 |
| 15 | 1.6 | 4.8 | 9.1 |
| 30 | 2.0 | 7.3 | 14.7 |
| 45 | 2.2 | 10.0 | 22.9 |
| 60 | 2.0 | 7.3 | 14.7 |
| 75 | 1.6 | 4.8 | 9.1 |
| 90 | 1.3 | 3.5 | 6.6 |
| 105 | 1.1 | 2.8 | 5.2 |
| 120 | 0.9 | 2.4 | 4.4 |
| 135 | 0.8 | 2.1 | 3.8 |
| 150 | 0.8 | 1.9 | 3.5 |
| 165 | 0.7 | 1.7 | 3.2 |
| 180 | 0.7 | 1.6 | 3.0 |
| 195 | 0.6 | 1.6 | 2.9 |
| 210 | 0.6 | 1.5 | 2.8 |
| 225 | 0.6 | 1.5 | 2.8 |
| 240 | 0.6 | 1.5 | 2.8 |
| 255 | 0.6 | 1.6 | 2.9 |
| 270 | 0.7 | 1.6 | 3.0 |
| 285 | 0.7 | 1.7 | 3.2 |
| 300 | 0.8 | 1.9 | 3.5 |
| 315 | 0.8 | 2.1 | 3.8 |
| 330 | 0.9 | 2.4 | 4.4 |
| 345 | 1.1 | 2.8 | 5.2 |
| 360 | 1.3 | 3.5 | 6.6 |

# Eastern Corridor SW Wind at 30

## Direction of Maximum Spread (from north) (deg)

| Spread Dir | Fuel Model | | |
|---|---|---|---|
| deg | gr1 | gr2 | gr4 |
| 15 | 45 | 45 | 45 |
| 30 | 45 | 45 | 45 |
| 45 | 45 | 45 | 45 |
| 60 | 45 | 45 | 45 |
| 75 | 45 | 45 | 45 |
| 90 | 45 | 45 | 45 |
| 105 | 45 | 45 | 45 |
| 120 | 45 | 45 | 45 |
| 135 | 45 | 45 | 45 |
| 150 | 45 | 45 | 45 |
| 165 | 45 | 45 | 45 |
| 180 | 45 | 45 | 45 |
| 195 | 45 | 45 | 45 |
| 210 | 45 | 45 | 45 |
| 225 | 45 | 45 | 45 |
| 240 | 45 | 45 | 45 |
| 255 | 45 | 45 | 45 |
| 270 | 45 | 45 | 45 |
| 285 | 45 | 45 | 45 |
| 300 | 45 | 45 | 45 |
| 315 | 45 | 45 | 45 |
| 330 | 45 | 45 | 45 |
| 345 | 45 | 45 | 45 |
| 360 | 45 | 45 | 45 |

# Eastern Corridor SW Wind at 30

## Flame Residence Time (s)

| Spread Dir | Fuel Model | | |
|---|---|---|---|
| deg | gr1 | gr2 | gr4 |
| 15 | 11.22 | 12.66 | 12.62 |
| 30 | 11.22 | 12.66 | 12.62 |
| 45 | 11.22 | 12.66 | 12.62 |
| 60 | 11.22 | 12.66 | 12.62 |
| 75 | 11.22 | 12.66 | 12.62 |
| 90 | 11.22 | 12.66 | 12.62 |
| 105 | 11.22 | 12.66 | 12.62 |
| 120 | 11.22 | 12.66 | 12.62 |
| 135 | 11.22 | 12.66 | 12.62 |
| 150 | 11.22 | 12.66 | 12.62 |
| 165 | 11.22 | 12.66 | 12.62 |
| 180 | 11.22 | 12.66 | 12.62 |
| 195 | 11.22 | 12.66 | 12.62 |
| 210 | 11.22 | 12.66 | 12.62 |
| 225 | 11.22 | 12.66 | 12.62 |
| 240 | 11.22 | 12.66 | 12.62 |
| 255 | 11.22 | 12.66 | 12.62 |
| 270 | 11.22 | 12.66 | 12.62 |
| 285 | 11.22 | 12.66 | 12.62 |
| 300 | 11.22 | 12.66 | 12.62 |
| 315 | 11.22 | 12.66 | 12.62 |
| 330 | 11.22 | 12.66 | 12.62 |
| 345 | 11.22 | 12.66 | 12.62 |
| 360 | 11.22 | 12.66 | 12.62 |

# Discrete Variable Codes Used
## Eastern Corridor SW Wind at 30

Fuel Model

| | |
|---|---|
| gr1 | Short, sparse, dry climate grass (D) (101) |
| gr2 | Low load, dry climate grass (D) (102) |
| gr4 | Moderate load, dry climate grass (D) (104) |

## Inputs: SURFACE

| | | |
|---|---|---|
| Description | | Eastern Corridor gr2 Wind Analysis |

### Fuel/Vegetation, Surface/Understory

| | | |
|---|---|---|
| Fuel Model | | gr2 |

### Fuel Moisture

| | | |
|---|---|---|
| 1-h Moisture | % | 4 |
| 10-h Moisture | % | 5 |
| 100-h Moisture | % | 6 |
| Live Herbaceous Moisture | % | 30 |
| Live Woody Moisture | % | 60 |

### Weather

| | | |
|---|---|---|
| Midflame Wind Speed | mi/h | 0, 5, 7.5, 15, 30 |
| Wind Direction (from north) | deg | 225 |

### Terrain

| | | |
|---|---|---|
| Slope Steepness | % | 50 |
| Aspect | deg | 225 |

### Fire

| | | |
|---|---|---|
| Spread Direction (from north) | deg | 15, 30, 45, 60, 75, 90, 105, 120, |

---

## Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are for the specified spread directions [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind and spread directions are degrees clockwise from north [SURFACE].

Wind direction is the direction from which the wind is blowing [SURFACE].

---

## Output Variables

Surface Rate of Spread (ch/h) [SURFACE]

Fireline Intensity (Btu/ft/s) [SURFACE]

Flame Length (ft) [SURFACE]

(continued on next page)

Input Worksheet (continued)

## Notes

# Eastern Corridor gr2 Wind Analysis

## Surface Rate of Spread (ch/h)

| Spread Dir | Midflame Wind Speed mi/h | | | | |
|---|---|---|---|---|---|
| deg | 0.0 | 5.0 | 7.5 | 15.0 | 30.0 |
| 15 | 15.6 | 31.1 | 36.1 | 39.4 | 39.4 |
| 30 | 20.9 | 56.9 | 76.6 | 96.7 | 96.7 |
| 45 | 23.7 | 79.4 | 124.1 | 192.1 | 192.1 |
| 60 | 20.9 | 56.9 | 76.6 | 96.7 | 96.7 |
| 75 | 15.6 | 31.1 | 36.1 | 39.4 | 39.4 |
| 90 | 11.1 | 18.0 | 19.6 | 20.3 | 20.3 |
| 105 | 8.1 | 11.7 | 12.3 | 12.4 | 12.4 |
| 120 | 6.1 | 8.3 | 8.6 | 8.6 | 8.6 |
| 135 | 4.9 | 6.3 | 6.5 | 6.4 | 6.4 |
| 150 | 4.0 | 5.1 | 5.2 | 5.1 | 5.1 |
| 165 | 3.5 | 4.3 | 4.4 | 4.3 | 4.3 |
| 180 | 3.1 | 3.8 | 3.9 | 3.8 | 3.8 |
| 195 | 2.9 | 3.5 | 3.5 | 3.5 | 3.5 |
| 210 | 2.8 | 3.3 | 3.4 | 3.3 | 3.3 |
| 225 | 2.7 | 3.3 | 3.3 | 3.3 | 3.3 |
| 240 | 2.8 | 3.3 | 3.4 | 3.3 | 3.3 |
| 255 | 2.9 | 3.5 | 3.5 | 3.5 | 3.5 |
| 270 | 3.1 | 3.8 | 3.9 | 3.8 | 3.8 |
| 285 | 3.5 | 4.3 | 4.4 | 4.3 | 4.3 |
| 300 | 4.0 | 5.1 | 5.2 | 5.1 | 5.1 |
| 315 | 4.9 | 6.3 | 6.5 | 6.4 | 6.4 |
| 330 | 6.1 | 8.3 | 8.6 | 8.6 | 8.6 |
| 345 | 8.1 | 11.7 | 12.3 | 12.4 | 12.4 |
| 360 | 11.1 | 18.0 | 19.6 | 20.3 | 20.3 |

# Eastern Corridor gr2 Wind Analysis

## Fireline Intensity (Btu/ft/s)

| Spread Dir | Midflame Wind Speed mi/h | | | | |
|---|---|---|---|---|---|
| deg | 0.0 | 5.0 | 7.5 | 15.0 | 30.0 |
| 15 | 68 | 136 | 158 | 173 | 173 |
| 30 | 92 | 250 | 336 | 425 | 425 |
| 45 | 104 | 348 | 545 | 844 | 844 |
| 60 | 92 | 250 | 336 | 425 | 425 |
| 75 | 68 | 136 | 158 | 173 | 173 |
| 90 | 49 | 79 | 86 | 89 | 89 |
| 105 | 35 | 51 | 54 | 55 | 55 |
| 120 | 27 | 36 | 38 | 38 | 38 |
| 135 | 21 | 28 | 28 | 28 | 28 |
| 150 | 18 | 22 | 23 | 23 | 23 |
| 165 | 15 | 19 | 19 | 19 | 19 |
| 180 | 14 | 17 | 17 | 17 | 17 |
| 195 | 13 | 15 | 16 | 15 | 15 |
| 210 | 12 | 15 | 15 | 15 | 15 |
| 225 | 12 | 14 | 15 | 14 | 14 |
| 240 | 12 | 15 | 15 | 15 | 15 |
| 255 | 13 | 15 | 16 | 15 | 15 |
| 270 | 14 | 17 | 17 | 17 | 17 |
| 285 | 15 | 19 | 19 | 19 | 19 |
| 300 | 18 | 22 | 23 | 23 | 23 |
| 315 | 21 | 28 | 28 | 28 | 28 |
| 330 | 27 | 36 | 38 | 38 | 38 |
| 345 | 35 | 51 | 54 | 55 | 55 |
| 360 | 49 | 79 | 86 | 89 | 89 |

# Eastern Corridor gr2 Wind Analysis

## Flame Length (ft)

| Spread Dir | Midflame Wind Speed mi/h | | | | |
|---|---|---|---|---|---|
| deg | 0.0 | 5.0 | 7.5 | 15.0 | 30.0 |
| 15 | 3.1 | 4.3 | 4.6 | 4.8 | 4.8 |
| 30 | 3.6 | 5.7 | 6.5 | 7.3 | 7.3 |
| 45 | 3.8 | 6.6 | 8.2 | 10.0 | 10.0 |
| 60 | 3.6 | 5.7 | 6.5 | 7.3 | 7.3 |
| 75 | 3.1 | 4.3 | 4.6 | 4.8 | 4.8 |
| 90 | 2.7 | 3.4 | 3.5 | 3.5 | 3.5 |
| 105 | 2.3 | 2.8 | 2.8 | 2.8 | 2.8 |
| 120 | 2.0 | 2.3 | 2.4 | 2.4 | 2.4 |
| 135 | 1.8 | 2.1 | 2.1 | 2.1 | 2.1 |
| 150 | 1.7 | 1.9 | 1.9 | 1.9 | 1.9 |
| 165 | 1.6 | 1.7 | 1.8 | 1.7 | 1.7 |
| 180 | 1.5 | 1.6 | 1.7 | 1.6 | 1.6 |
| 195 | 1.4 | 1.6 | 1.6 | 1.6 | 1.6 |
| 210 | 1.4 | 1.5 | 1.6 | 1.5 | 1.5 |
| 225 | 1.4 | 1.5 | 1.5 | 1.5 | 1.5 |
| 240 | 1.4 | 1.5 | 1.6 | 1.5 | 1.5 |
| 255 | 1.4 | 1.6 | 1.6 | 1.6 | 1.6 |
| 270 | 1.5 | 1.6 | 1.7 | 1.6 | 1.6 |
| 285 | 1.6 | 1.7 | 1.8 | 1.7 | 1.7 |
| 300 | 1.7 | 1.9 | 1.9 | 1.9 | 1.9 |
| 315 | 1.8 | 2.1 | 2.1 | 2.1 | 2.1 |
| 330 | 2.0 | 2.3 | 2.4 | 2.4 | 2.4 |
| 345 | 2.3 | 2.8 | 2.8 | 2.8 | 2.8 |
| 360 | 2.7 | 3.4 | 3.5 | 3.5 | 3.5 |

# Discrete Variable Codes Used
## Eastern Corridor gr2 Wind Analysis

Fuel Model

| | |
|---|---|
| gr2 | Low load, dry climate grass (D) (102) |

# Appendix D

Peer Review Report (Conservation Biology Institute 2013)

This wildlife corridor design was finalized following intensive review and input by an independent panel of top experts in wildlife movements, corridor design, restoration ecology, and fire management. The panel included the following experts:

- Dr. Kevin Crooks, Colorado State University, is a wildlife conservation biologist with extensive experience researching wildlife movements in urbanizing areas, including studies of bobcats, mountain lions, and other carnivores in southern California. He has published numerous journal articles and books on wildlife movements and habitat connectivity.
- Dr. Paul Beier, Northern Arizona University, is a professor of wildlife biology who is widely recognized as one of the nation's leading experts on habitat connectivity and the design of wildlife corridors. He has studied the movements of mountain lions in southern California, has published numerous journal articles on designing, conserving, and managing functional corridors in urbanizing areas, and is the founder of CorridorDesign.org.
- Dr. Wayne Spencer, Conservation Biology Institute, is a wildlife conservation biologist with extensive experience studying wildlife movements and the design of functional wildlife corridors. He was the Principal Investigator of the California Essential Habitat Connectivity Project, and has authored or coauthored numerous articles on wildlife movements, corridor design, and adaptive management in California and the western US.
- Dr. James Strittholt is the Executive Director of the Conservation Biology Institute and a leader in the development of GIS-based methods for designing and assessing wildlife reserve systems.
- Dr. Erin Boydston is a Research Ecologist with the USGS who specializes in carnivore behavior, wildlife movements, and mitigation of road effects on wildlife. She has conducted or managed numerous studies of carnivore movements in southern California, including Orange County.
- Lisa Lyren, also with USGS, has conducted numerous field studies on wildlife distribution and movements in southern California, including assessments of wildlife movements, roadkill, and the design of effective wildlife road-crossing structures and fencing to keep wildlife off of roads.
- Trish Smith of The Nature Conservancy is a plant ecologist and habitat restoration expert with extensive experience designing and implementing vegetation restoration projects in southern California and is a specialist in California gnatcatcher habitat restoration.
- Dr. CJ Fotheringham is a fire ecologist with a deep understanding and numerous publications on fire ecology, fire management, and restoration ecology in southern California. A focus of her research is on methods of reducing the risks of fires to human communities and minimizing mitigation impacts in fire-prone ecosystems.

Overall, the panelists were impressed with the attention to details by the Heritage Field representatives and consultants, and their willingness to refine the corridor design in response to recommendations of scientific experts. The panelists reviewed several drafts of the corridor design and supporting documents, walked the corridor system in the field with Heritage Fields representatives and consultants (November 4, 2012), and participated in a corridor review workshop (November 5, 2012) and a follow-up webinar to discuss and refine the corridor plan. The Peer Reviewers also reviewed this revised version of the WLC Plan, which reflects comments by The City of Irvine and the comments of the Fish and Wildlife Service and the California Department of Fish and Wildlife on the draft Second Supplemental EIR. They examined all scientific and technical aspects of the Heritage Fields wildlife corridor plan and reviewed all aspects of the Wildlife Corridor Plan including its:

-location and width,

- plantings,

-internal crossings and features, including at-grade Railroad crossing and crossings for Astor and Marine Way,

-fire control measures,

-edge effects,

-adaptive management, and

-all types of in-corridor maintenance for fire suppression, flood control, and storm water treament BMPs.

Additional potential crossings were included in the draft WLC Plan reviewed for the corridor review workshop, but were not reviewed in detail. Subsequent revisions of the WLC Plan further refined the locations and design criteria for a potential road/trail crossing between Astor and the Railroad and a potential pedestrian crossing between Barranca and I-5. The specific design of the wildlife movement elements of the road/trail crossing and pedestrian crossing (height to width ratio, substrate and proximity to other crossings) will be reviewed by the City and Peer Reviewers.

The Peer Reviewers concluded that the plan presented in this document is reasonably designed given the setting and various constraints on planning and it provides for development of a biologically effective corridor between Irvine Boulevard and I-5. They also concluded that the plan would likely accommodate movement of all 4 focal species (coyote, bobcat, coastal California gnatcatcher, and least Bell's vireo) from inland habitats southward through the entire length of the Heritage Fields project area to the edge of I-5. Two of the focal species (coyotes and bobcats) might be able to move beyond the project area (i.e., cross under I-5 to coastal natural areas) often enough (e.g., one coyote/bobcat every 2-4 years) to transfer genes from one

region to another on either end of the corridor. The gnatcatcher could be expected to cross I-5 approximately once every two years. The panel identified ongoing challenges for the long term success of the inland-to-coastal corridor (e.g., the I-5 crossing), but felt these challenges might be overcome with careful monitoring, innovation, and political will to find solutions by the various stakeholders.

In addition to serving the movement needs of specific target species, the science panel identified numerous other biological values for the proposed corridor system. For example, native habitats restored within the corridor would serve as live-in habitat for native plants and animals, such as the California gnatcatcher, the Least Bell's Vireo and coastal cactus wren. This could be a valuable environmental amenity and an educational opportunity for people in the City of Irvine.

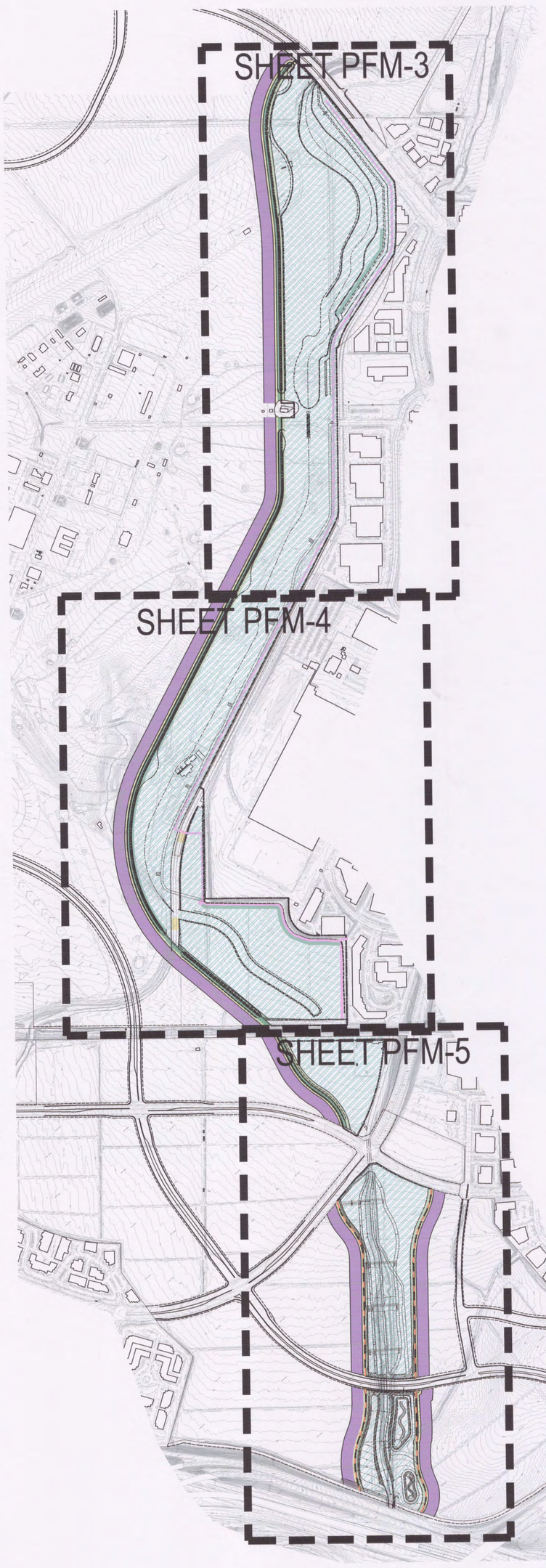
The science panel also emphasized the need for flexibility in addressing issues that may arise during and after implementation, which would depend on an effective corridor monitoring program. Monitoring use of the corridor by wildlife could be performed in part by local schools, citizen action groups, and local residents, thus presenting an educational opportunity and potentially imbuing the local community with a feeling of investment and ownership in this unique urban amenity. The proposed wildlife corridor plan could very well serve as a model for providing wildlife connectivity in a heavily urbanized landscape that will be emulated throughout California and elsewhere.

Wayne Spencer, Ph.D.,
Conservation Biology Institute, San Diego, CA

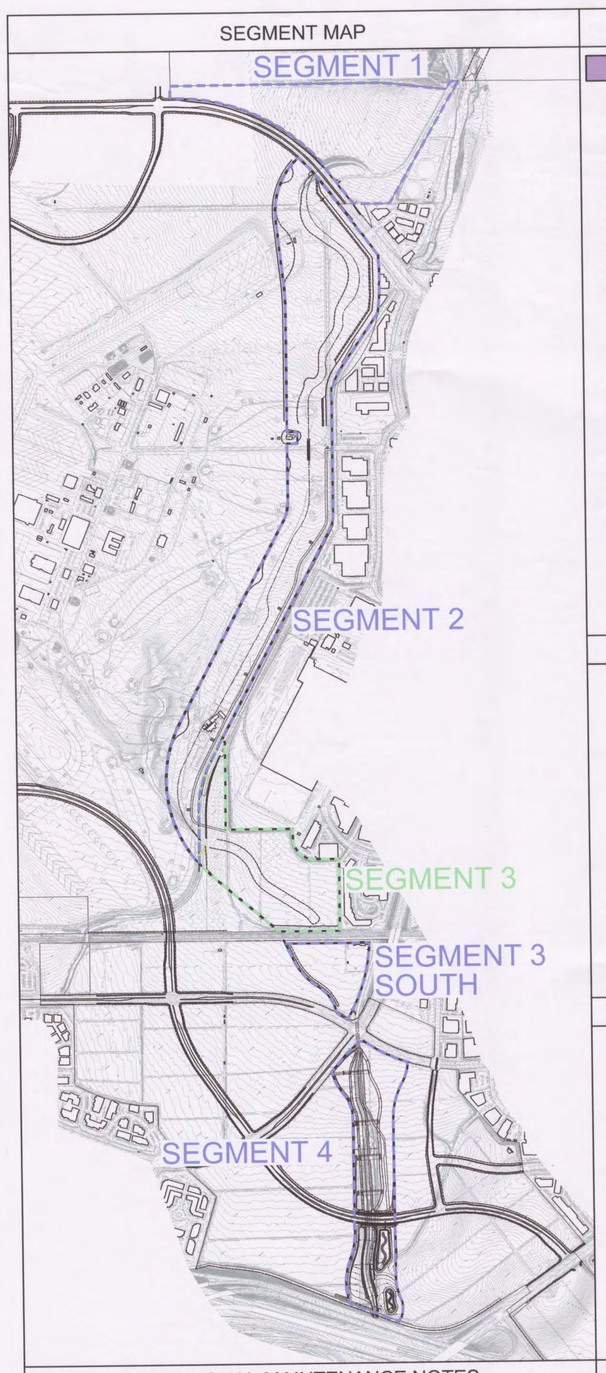
James Strittholt, Ph.D.,
Conservation Biology Institute, Corvallis, OR

# Appendix E

Irvine Wildlife Corridor Plan - Preliminary Fuel Management Plan
(Firesafe Planning Solutions 2013)




## SEGMENT MAP




## CBC CHAPTER 7A SCREENING FORM

RADIANT HEAT ZONE

Fire Protection Plan 2010 CBC Chapter 7A Screening Form
(To be completed by the Project Architect)
*Does your Design and Plans Meet the Full Requirements of the Code Sections?
For all, "NO" responses, provide a separate document explaining what you are proposing

| Chapter 7A Code Section | Yes | No | OCFA has approved the following: |
|---|---|---|---|
| 703A.2 Testing Qualifications | X | | |
| 703A.3 Approved Agency | X | | |
| 703A.4 Labeling | X | | |
| 703A.5 Weathering and Surface Protection | X | | |
| 703A.7 Standards of Quality | X | | |
| 704A.2 Ignition Resistant Material (or) see 704A.3 | X | | |
| 704A.3 Alternative for 704A.2 above ? | X | | |
| 705A.1 Roofing General | X | | |
| 705A.2 Roof Coverings | X | | |
| 705A.3 Roof Valleys | X | | |
| 705A.4 Roof Gutters | X | | Covered w/ min. 1/4" non-corrosice screens |
| 706A.1 Vents General | X | | |
| 706A.2 Vents Requirements | X | | |
| 706A.3 Vents Eaves and Cornices | X | | |
| 707A.2 Exterior Covering General | X | | |
| 707A.3 Exterior Walls | X | | |
| 707A.3.1 Extent of Exterior Wall Covering | X | | |
| 707A.4 Open Roof Eaves | X | | |
| 707A.5 Enclosed roof Eaves and Roof Soffits | X | | |
| 707A.6 Exterior Porch Ceilings | X | | |
| 707A.7 Floor Projections | X | | |
| 707A.8 Underfloor Projection | X | | |
| 707A.9 Underside of Appendages | X | | |
| 708A.2.1 Exterior Window and Glazed Doors | | X | |
| 708A.2.2 Structural Glass Veneer | | X | |
| 708A.3.1 Exterior Door Glazing | | X | |
| 708A.3 Exterior Doors | | X | |
| 709A.3 Decking Surfaces | X | | |
| 710A.1 Accessory Structures General | X | | |
| 710A.2 Applicability | X | | |
| 710A.3 Location of Accessory Structures | X | | |
| 710A.4 Requirements Construction Type | X | | |

If separate buildings within the same Tract have different responses above, then you must submit additional Screening Form(s) for each portion of the development that has different designs.

Name of Community: EXAMPLE SCREENING FORM

List the final tract and lot numbers on the lines below that this form is associated to:

Print and Sign Project Owner's Name, Contact Phone, and Date

## CRC SECTION R327 SCREENING FORM

RADIANT HEAT ZONE

Fire Protection Plan 2010 CRC Section R327 Screening Form
(To be completed by the Project Architect)
*Does your Design and Plans Meet the Full Requirements of the Code Sections?
For all, "NO" responses, provide a separate document explaining what you are proposing

| Section R327 Code Section | Yes | No | OCFA has approved the following: |
|---|---|---|---|
| R327.3.2 Testing Qualifications | X | | |
| R327.3.3 Approved Agency | X | | |
| R327.3.4 Labeling | X | | |
| R327.3.5 Weathering and Surface Protection | X | | |
| R327.3.7 Standards of Quality | X | | |
| R327.4.2 Ignition Resistant Material (or) see 704A.3 | X | | |
| R327.4.3 Alternative for 704A.2 above ? | X | | |
| R327.5.1 Roofing General | X | | |
| R327.5.2 Roof Coverings | X | | |
| R327.5.3 Roof Valleys | X | | |
| R327.5.4 Roof Gutters | X | | Covered w/ min. 1/4" non-corrosice screens |
| R327.6.1 Vents General | X | | |
| R327.6.2 Vents Requirements | X | | |
| R327.6.3 Vents Eaves and Cornices | X | | |
| R327.7.2 Exterior Covering General | X | | |
| R327.7.3 Exterior Walls | X | | |
| R327.7.3.1 Extent of Exterior Wall Covering | X | | |
| R327.7.4 Open Roof Eaves | X | | |
| R327.7.5 Enclosed roof Eaves and Roof Soffits | X | | |
| R327.7.6 Exterior Porch Ceilings | X | | |
| R327.7.7 Floor Projections | X | | |
| R327.7.8 Underfloor Projection | X | | |
| R327.7.9 Underside of Appendages | X | | |
| R327.8.2.1 Exterior Window and Glazed Doors | | X | |
| R327.8.2.2 Structural Glass Veneer | | X | |
| R327.8.3.1 Exterior Door Glazing | | X | |
| R327.8.3 Exterior Doors | | X | |
| R327.9.3 Decking Surfaces | X | | |
| R327.10.1 Accessory Structures General | X | | |
| R327.10.2 Applicability | X | | |
| R327.10.3 Location of Accessory Structures | X | | |
| R327.10.4 Requirements Construction Type | X | | |

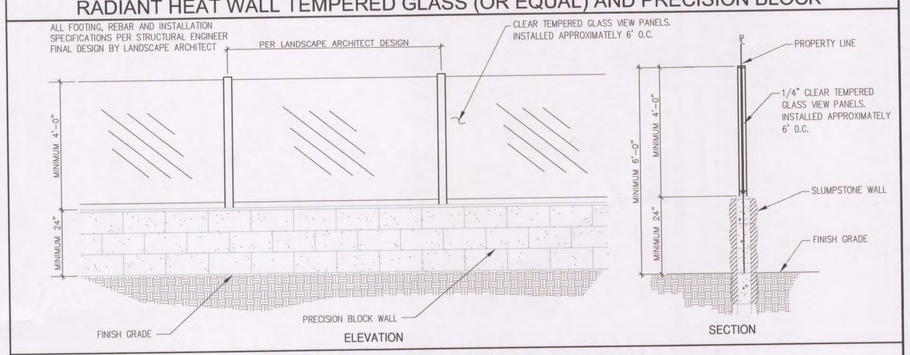
If separate buildings within the same Tract have different responses above, then you must submit additional Screening Form(s) for each portion of the development that has different designs.

Name of Community: EXAMPLE SCREENING FORM

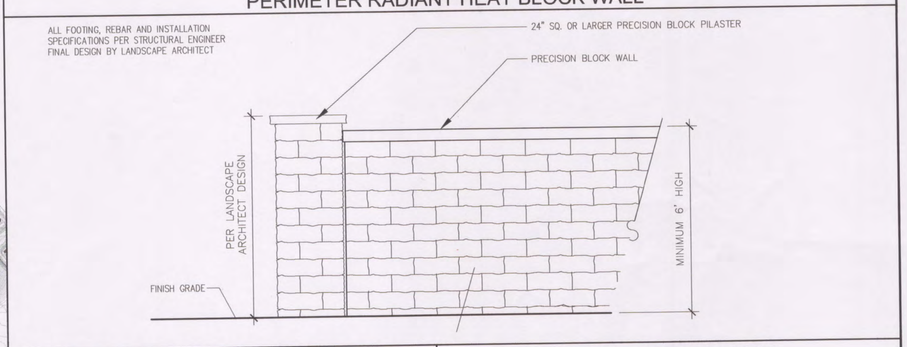
List the final tract and lot numbers on the lines below that this form is associated to:

Print and Sign Project Owner's Name, Contact Phone, and Date

## RADIANT HEAT WALL TEMPERED GLASS (OR EQUAL) AND PRECISION BLOCK




## PERIMETER RADIANT HEAT BLOCK WALL




## ADDITIONAL MAINTENANCE NOTES

- AN ENTITY SHALL BE ESTABLISHED AND NAMED FOR MAINTENANCE OF THE NON-COMBUSTIBLE ZONE AND THE FUEL MANAGEMENT AREA PRIOR TO APPROVAL OF THE PRECISE FUEL MANAGEMENT PLAN.
- AN ENTITY TO MAINTAIN THE SPECIAL MAINTENANCE AREAS 1 AND 2, AND THE INTERIOR CORRIDOR HABITAT MANAGEMENT AREA WITHIN THE WILDLIFE CORRIDOR PER THE REQUIREMENTS ON THIS PLAN WILL BE NAMED PRIOR TO APPROVAL OF THE PRECISE FUEL MANAGEMENT PLAN FOR THE WILDLIFE CORRIDOR.
- THE RESPONSIBLE ENTITIES SHALL BE AWARE THAT MAINTENANCE IS REQUIRED TO BE COMPLETED ANNUALLY AND CANNOT EVER CEASE.
- THE ENTITIES WILL CREATE AND MAINTAIN IN PERPETUITY A PROCESS OUTLINING THE TECHNICAL ASPECTS OF PERFORMING MAINTENANCE OF THE CORRIDOR AND BE ABLE TO PERFORM INSPECTIONS TO CAUSE PROPER MAINTENANCE TO OCCUR, WITHOUT OCFA STAFF PRESENT.
- VEGETATION INSTALLATION PLANTING PLANS SHALL BE PROVIDED TO OCFA AT THE TIME OF THE PRECISE FUEL MANAGEMENT PLAN FOR REVIEW AND APPROVAL TO ENSURE THE ACCURACY OF THE INSTALLATION FOR PROGRAM REQUIREMENTS.
- A MAINTENANCE SUMMARY GUIDE SHALL BE CREATED FOR THE ENTITY RESPONSIBLE FOR THE MAINTENANCE, PRIOR TO THE COMMENCEMENT OF MAINTENANCE AND PRIOR TO APPROVAL OF THE PRECISE FUEL MANAGEMENT PLAN.

## OCFA MAINTENANCE GUIDELINES

ATTACHMENT 5
SAMPLE CC&R MAINTENANCE LANGUAGE

It is recommended that the following language be included in the CC&Rs recorded for a common interest development:

The duty of the homeowners' association/property ownership association/other district to perform (HOA/POA/OD) "Fire Prevention Maintenance" (as defined below) for all Fuel Management Areas and manufactured interior slopes within the Prevention Maintenance" (as defined below) for all Fuel Management Areas and manufactured interior slopes within the development shall be included as an express obligation in the recorded CC&Rs for the development. Similarly, each Owner whose Lot (or Condominium) is subject to Non-Combustible Construction Area restrictions (e.g., non-combustible structure setback, etc.) shall be obligated to comply with such restrictions.

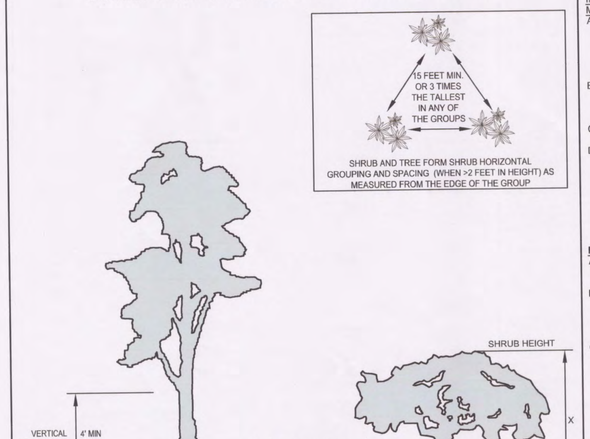
1. The OCFA will be designated as a third party beneficiary of a homeowner association's/property ownership association's/other district's duty to perform "Fire Prevention Maintenance" (as defined below) for all portions of the Association Property (or Common Area) that constitute fuel management areas and designated interior/manufactured slopes to be maintained by the HOA/POA/OD, and of any Owner's duty to comply with any non-combustible construction area restrictions applicable to their lot (or condominium). Additionally, OCFA shall have the right, but not the obligation, to enforce the homeowners' association's duty to perform such Fire Prevention Maintenance, and to enforce compliance by any owner with any non-combustible construction area restrictions applicable to their lot (or Condominium). In furtherance of such right the OCFA shall be entitled to recover its costs of suit, including its actual attorneys' fees, if it prevails in an enforcement action against a HOA/POA/OD and/or an individual owner. (A sample third party beneficiary provision to be incorporated into the CC&Rs is attached hereto as Addendum "1").

2. As used herein, "Fire Prevention Maintenance" shall mean the following:
   (i) All portions of the Association Property (or Common Area) that constitute fuel management area or designated interior/manufactured slopes shall be regularly maintained by the HOA/POA/OD on a year-round basis in accordance with the fuel management plan on file with the property manager for the development.
   (ii) The irrigation system for fuel management area or designated interior/manufactured slopes shall be kept in good condition and proper working order at all times. The irrigation system shall not be turned off except for necessary repairs and maintenance.

ADDENDUM "1"

Enforcement by the OCFA: The OCFA is hereby designated as an intended third party beneficiary of the HOA/POA/OD duties to perform "Fire Prevention Maintenance" for all portions of the Association Property (or Common Areas) consisting of fuel management areas or designated interior/manufactured slopes in accordance with the fuel management plan, and of each Owner's duty to comply with any non-combustible construction area or designated interior/manufactured slopes restrictions applicable to his Lot (or condominium) as set forth in the fuel management plan. In furtherance thereof, the OCFA shall have the right, but not the obligation, to enforce the performance by the HOA/POA/OD of its duties and any other fire prevention requirements which were imposed by the OCFA or other public agency as a condition of approval for the development (e.g. , prohibition of parking in fire lanes, maintenance of the blue reflective markers indicating the location of fire hydrants, etc.) and shall also have the right, but not the obligation, to enforce compliance by any owner with any non-combustible construction area or designated interior/manufactured slopes restrictions applicable to his lot (or condominium) as set forth in the fuel management plan. If in its sole discretion, the OCFA shall deem it necessary to take legal action against the HOA/POA/OD or any owner to enforce such duties or other requirements, and prevails in such action, the OCFA shall be entitled to recover the full costs of said action including its actual attorneys' fees, and to impose a lien against the association property, or an owner's lot (or condominium), as the case may be, until said costs are paid in full.

ATTACHMENT 6
HORIZONTAL SPACING AND VERTICAL SEPARATION REQUIREMENTS FOR INSTALLATION AND MAINTENANCE IN ALL FUEL MANAGEMENT ZONES




NOT TO SCALE

### Horizontal Spacing

Less than 2 Feet in Height (Ground Cover / Grasses):
- No horizontal spacing or vertical separation is required. Ground cover / Grasses should cover the entire ground between groups of shrubs or trees. Ground cover shall not exceed 2 feet in height.

2 Feet in Height or Greater:

Shrub and Tree Group Size:
- All Shrubs and Trees can be in groups of 3 specimens or less. No horizontal spacing is required inside the group.

Shrub / Tree-form Shrub Group Spacing:
- Groups of shrubs shall be spaced by the greater of the following two measurements: A distance of 15 feet minimum (or) 3 times the height of the tallest specimen in any of the groups.
- No vegetation over 2 feet in height is allowed within 15 feet from the edge of tree canopy(s).

Tree Group Spacing:
- Groups of Trees shall be spaced by a distance of 30 feet minimum regardless of height.

### Vertical Separation

Less than 10 Feet in Height:
- When the fuel management zone is within 30 feet of the structure, a vertical separation of 2 feet minimum is required from the vegetation below.

10 Feet in Height or Greater:
- A vertical separation of 4 feet minimum is required to be maintained from the vegetation below.
- Trees only: All vegetation located underneath trees, shall be a maximum of 2 feet in height.

## FUEL MANAGEMENT MAINTENANCE NOTES

**Non-Combustible Construction Area - Irrigated Structure Setback Area :**
The purpose of the setback area is to provide a defensible space for fire suppression forces and to protect structures from radiant and convective heat. **The entire area is to be located on a level, graded area at the top or base of the slope.**

If the non-combustible construction area is located within the lot containing the protected structure and another entity is maintaining the fuel management area, it shall be located at the most distal level 20 feet prior to the beginning of the slope. If the non-combustible construction zone is located outside of the lot containing the protected structure, it shall begin at the lot property line. The non-combustible construction zone may incorporate trails, roadways, and other non-combustible surfaces that create defensible space for fire crews heat reduction between the protected structure and the fire.

**Non-Combustible Construction Area - Specific Maintenance Requirements:**
A. Automatic irrigation systems to maintain healthy vegetation with high moisture content and be regularly irrigated.
B. Pruning of foliage to reduce fuel load, maintain vertical continuity, and removal of plant litter and dead wood in accordance with Attachment 6 provided on this plan.
C. Complete removal of undesirable plant species (See Attachment 7 provided on this plan). There is also minimal allowance for retention of selected native vegetation.
D. Plants in this area shall be highly fire resistant and selected from the Attachment 8 for the non-combustible construction area and given geographical area. (Refer to Attachment 8 and Section 3 of the OCFA Guideline C-05).
E. Tree species within non-combustible construction area are not allowed within 10 feet of combustible structures (measured from the edge of a full growth crown).
F. Maintenance includes thinning and removal of over-growth, replacement of dead/dying fire resistant plantings, and maintenance of the operation of the irrigation system.
G. Devices that burn solid fuels are not permitted in the non-combustible construction area.
H. No combustible construction shall be allowed within the non-combustible construction area.

**Fuel Management Area:**
The Fuel Management Area consists of irrigated landscaping. This irrigated area is a minimum of 30 feet in width. The precise fuel management plans must delineate that portion of the fuel management area that will be permanently and regularly irrigated. The landscape architect shall select plant species, design an irrigation system, and design a maintenance program which sensitively addresses water conservation practices and includes methods of erosion control to protect against slope failure. All irrigation shall be kept a minimum of 20 feet from the drip line of any existing native Quercus (oak) species.

The Fuel Management Area shall be cleared of all undesirable plant species, irrigated, and planted with non-invasive species from the OCFA approved plant list.

**Fuel Management Area - Specific Maintenance Requirements:**
A. Groundcover shall be installed and maintained at a height not to exceed 2 feet.
B. In order to maintain proper coverage, native grasses shall be allowed to go to seed. Native grasses shall be cut after annual seeding. Cut heights shall be approximately 4 -inches.
C. Apply irrigation rates to maintain healthy vegetation with high moisture content based on plant species specific needs.
D. All plant species designed for Fuel Management Area shall be non-invasive and selected from OCFA approved plant list developed for the Wildlife Corridor Plan. Existing fuel management maintenance programs are limited to the plants listed on the approved plans unless a revision is requested. Planting and maintenance shall be in accordance with planting restrictions from Attachments 6, and 7 provided on this plan and OCFA Approved Plant Palette Attachment 8 of the OCFA Guideline C-05.
E. Groups of trees, tree-form shrubs, and shrubs that naturally exceed 2 feet in height shall be vertically pruned, and horizontally spaced in accordance with Attachment 6 as provided on this plan.
F. Removal of dead and dying vegetation and undesirable plant species from Attachment 7 as provided on this plan.
G. Devices that burn solid fuels are not permitted in the fuel management area.
H. Combustible construction is not allowed within the Fuel Management Area.

**Special Maintenance Area:**
Both Special Maintenance Area 1 and Special Maintenance Area 2 shall be planted with fire resistive native vegetation and removal of OCFA Undesirable Plant Species per Attachment 7 provided on this plan. Vegetation in this area to be a minimum of 50% cactus for Special Maintenance Area 1 and a minimum of 70 % cactus (or 50% cactus and 20% rock) for Special Maintenance Area 2. Subject to availability, planting may occur in multiple growing seasons to achieve the densities set for the plant palette for both Special Maintenance Areas.

Special Maintenance Area - Specific Maintenance Requirements:
A. Maintenance would be limited to removal of:
   A.A. Non-native invasive species that volunteer,
   A.B. "Undesirable" species listed in Attachment 7, and
   A.C. Chaparral species, including laurel sumac ( *Malosma laurina* ), chamise (*Adenostoma fasciculata* ), ceanothus ( *Ceanothus spp.* ), mountain mahogany (*Cercocarpus betuloides* ), manzanita (*Arctostaphylos spp.* ), and Scrub oak ( *Quercus berberidifolia)* as described below in "D".
   A.D. Blue Elderberry ( *Sambucus nigra* ) is a component of the Mulefat scrub and shall not be treated as the other Chaparral species.
B. Maintenance would be limited to up to twice per year, requiring a few days by small crews using only hand held tools.
C. Vegetation management will be done
   C.A. With hand held tools consistent with best management practices;
   C.B. Outside of the avian nesting season, or if during the nesting season, only after a biological monitor confirms that there will be no effects to nesting birds;
   C.C. In a manner that will not reduce or eliminate any plants that are planned for the area; and
   C.D. In a manner that minimizes effects to either the target species (Gnatcatcher or Vireo) and to more common species that are protected under the Migratory Bird Treaty Act (MBTA).
D. Removal of chaparral species, to maintain absolute cover at less than 5 percent with a minimum of 30-foot spacing between chaparral individuals, from areas of riparian habitat, coastal sage scrub and cactus scrub is important because the Gnatcatcher is an identified target species.
E. Any changes to the plant palette would require approval by OCFA and Heritage Fields.
F. Devices that burn solid fuels are not permitted in any Special Maintenance Area.
G. Combustible construction is not allowed within any Special Maintenance Area.

Interior Corridor Habitat Management Area:
Maintenance within the Remainder of the Wildlife Corridor
A. In addition to the vegetation management in the Special Maintenance Areas, chaparral species listed in "A" under Special Maintenance Areas - Specific Maintenance Requirements will be removed in the remainder of the Wildlife Corridor (i.e., outside of Special Maintenance Areas) to maintain absolute cover at less than 5 percent with a minimum of 30-foot spacing between chaparral individuals in order to maintain optimal habitat conditions for the Gnatcatcher.
B. It will be important to maintain the target vegetation as summarized in Tables 1 - 5 of the Irvine Wildlife Corridor Plan to ensure that the Gnatcatcher and other target species have optimal habitat conditions within the WLCF. Any changes to the plant palette would require approval by OCFA and Heritage Fields.
C. Maintaining optimal habitat for the Gnatcatcher by preventing conversion of areas of coastal sage scrub and cactus scrub to chaparral also minimizes fire risks.
D. While not included in the plant palette for areas of Open Southern Cactus Scrub Mosaic, other coastal sage scrub species such as California sagebrush and California buckwheat are likely to colonize these areas over time. Such species can, combined, reach 10-percent total cover within the open cactus scrub areas. Where it exceeds 10-percent cover, maintenance would be performed to maintain it at 10-percent cover or less and in accordance with specific vegetation maintenance standards for Special Maintenance Areas, as set forth in "C.A." - "C.D." under Special Maintenance Areas - Specific Maintenance Requirements. The need for this maintenance would be infrequent.

**Fuel Management Implementation & Required Inspections**
A. **Prior to Rough Grading Permit Issuance :** A Conceptual Fuel Management Plan shall be obtained.
B. **Prior to Precise Grading Permit Issuance :** A Precise Fuel Management Plan shall be obtained, with applicable note stating maintenance language will be provided in CC&Rs and reviewed prior to issuance of certificate of occupancy (Refer to Attachment 5 provided on this plan).
C. **Prior to Building Permit Issuance:** Prior to dropping lumber, the developer/builder shall implement those portions of the approved fuel management plan determined to be necessary by the OCFA prior to the introduction of any combustible materials into the area shall be implemented. Removal of undesirable species may meet this requirement or a separation of combustible vegetation for a minimum distance of 100 feet from the location of the structure and lumber stock-pile. This generally involves removal and thinning of plant materials indicated on the approved plan. An inspection and/or release letter to the building department is required.
D. **Prior to Issuance of Certification of Occupancy:** The fuel management areas adjacent to structures must be installed, irrigated, and inspected. This includes physical installation of features identified in the approved precise fuel management plan (including, but not limited to, plant establishment, thinning, irrigation, zone markers, access easements, etc). An OCFA Inspector will provide written approval of completion at the time of this final inspection. A written disclosure may be requested by the OCFA Inspector indicating that the homeowner is aware of the non-combustible construction area on their land and that they are aware of the associated restrictions of the area. Copies of buyer or builder signed emergency and maintenance access easements shall be presented upon occupancy final (See Section 1G).
E. **Prior to HOMEOWNERS ASSOCIATION/PROPERTY OWNERSHIP ASSOCIATION/OTHER DISTRICT (HOA/POA/OD) Maintenance Acceptance from Developer:** This inspection/meeting must include the Fire Inspector and the following representatives:
   - Landscape design professional
   - Installing landscape contractor
   - HOA/POA/OD management representative
   - HOA/POA/OD landscape maintenance contractor

   The fuel management areas shall be maintained as originally installed and approved, unless otherwise approved by OCFA. A copy of the approved plans must be provided to the HOA/POA/OD representatives at this time. Landscape professionals must convey ongoing maintenance requirements to HOA/POA/OD representatives. The CC&R language for maintenance must also be provided and approved by the OCFA (Refer to Attachment 5 on this plan).
F. **Annual Inspection and Maintenance:** The property owner is responsible for all maintenance of the fuel management area. All areas must be maintained indefinitely in accordance with notes on the approved fuel management plans. This includes a minimum of two growth reduction maintenance activities throughout all fuel management areas each year, and outside of nesting season for special maintenance areas. Perform maintenance sometime within time periods of mid to late spring and once again in early to mid fall. Other activities include maintenance of irrigation systems, replacement of dead or dying vegetation with approved species, removal of dead plant material, removal of trees and shrubs not on the approved plans, and removal of undesirable highly combustible species. The OCFA may conduct inspections of established fuel modification areas. Ongoing maintenance shall be conducted a minimum of twice each year regardless of the dates of these inspections. The property owner shall retain all approved fuel management plans. The plans should be used to perform the maintenance. As property is transferred, property owners shall disclose the location and regulations of fuel management area or non-combustible construction area to the new property owners.

## PLANT REMOVAL LIST

ATTACHMENT 7
UNDESIRABLE PLANT SPECIES (TARGET SPECIES)
FIRE-PRONE PLANT SPECIES (MANDATORY REMOVAL)
FROM FUEL MANAGEMENT ZONES AND SPECIAL MAINTENANCE AREA.

| Botanical Name | Common Name |
|---|---|
| Cynara Cardunculus | Artichoke Thistle |
| Ricinus Communis | Castor Bean Plant |
| Cirsium Vulgare | Wild Artichoke |
| Brassica Nigra | Black Mustard |
| Silybum Marianum | Milk Thistle |
| Sacsola Australis | Russian Thistle/Tumblewood |
| Nicotiana Bigelevil | Indian Tobacco |
| Nicotiana Glauca | Tree Tobacco |
| Lactuca Serriola | Prickly Lettuce |
| Conyza Canadensis | Horseweed |
| Heterothaca Grandiflora | Telegraph Plant |
| Anthemix Cotula | Mayweed |
| Urtica Urens | Burning Nettle |
| Cardaria Draba | Noary Cress, Perennial Peppergrass |
| Brassica Rapa | Wild Turnip, Yellow Mustard, Field Mustard |
| Adenostoma Fasciculatum | Chamise |
| Adenostoma Sparsifolium | Red Shanks |
| Cortaderia Selloana | Pampas Grass |
| Artemisia Californica | California Sagebrush |
| Enogonum Fasciculatum | Common Buckwheat |
| Salvia Mellifera | Black Sage |
| **Ornamental:** | |
| Cortaderia | Pampas Grass |
| Cupressus sp | Cypress |
| Eucalyptus sp | Eucalyptus |
| Juniperus sp | Juniper |
| Pinus sp | Pine |

## FUEL MANAGEMENT LEGEND

NON-COMBUSTILBE CONSTRUCTION AREA:
20' NON-COMBUSTIBLE CONSTRUCTION AREA ONLY. THE NON-COMBUSTIBLE CONSTRUCTION AREA SHALL BE MAINTAINED BY THE FUTURE HOMEOWNERS ASSOCIATION OR FUTURE PRIVATE HOMEOWNER DEPENDING ON FUTURE DEVELOPMENT ALONG THE WILDLIFE CORRIDOR.

FUEL MANAGEMENT AREA:
30' LANDSCAPED IRRIGATED SLOPE DEVOID OF PLANT MATERIAL FROM OCFA UNDESIRABLE PLANT LIST. INSTALLED NON-INVASIVE PLANT MATERIAL SHALL BE FROM THE OCFA APPROVED PLANT LIST.

SPECIAL MAINTENANCE AREA 1:
30' PLANTED WITH FIRE RESISTIVE NATIVE VEGETATION AND REMOVAL OF OCFA UNDESIRABLE PLANT SPECIES. VEGETATION IN THIS AREA TO BE A MINIMUM OF 50% CACTUS .

SPECIAL MAINTENANCE AREA 2:
INDICATED 30' PLANTED AREA WITH FIRE RESISTIVE NATIVE VEGETATION AND REMOVAL OF OCFA UNDESIRABLE PLANT SPECIES. VEGETATION IN THIS AREA TO BE A MINIMUM OF 70% CACTUS OR 50% CACTUS AND 20% ROCK.

## SYMBOL LEGEND

RADIANT HEAT CONSTRUCTION ZONE:
ANY STRUCTURE WITHIN 100' OF THE NON-COMBUSTIBLE CONSTRUCTION AREA AS INDICATED ON PLAN SHALL COMPLY WITH ALL SECTIONS OF THE 2010 CALIFORNIA BUILDING CODE CHAPTER 7A OR 2010 CALIFORNIA RESIDENTIAL CODE SECTION R327 EXCEPT FOR WINDOWS AND DOORS. REFER TO EXAMPLE SCREENING FORMS PROVIDED ON THIS PLAN.

RADIANT HEAT WALL
CONSTRUCTED PER THE REQUIREMENTS ON THE DETAIL PROVIDED ON THIS PLAN SHEET PFM-5. FINAL DESIGN TO BE PROVIDED BY A LANDSCAPE ARCHITECT.

FUEL MANAGEMENT SECTION LOCATIONS:
REFER TO THIS SHEET FOR FUEL MANAGEMENT SECTIONS ON PAGE PFM-6.

25' WIDE ACCESS SHALL BE ABLE TO SUPPORT TYPE III FIRE APPARATUS

TURN AROUND PROVIDED AT END OF 25' ACCESS

BORREGO CHANNEL CROSSING

INTERIOR CORRIDOR HABITAT MANAGEMENT AREA
VEGETATION MANAGEMENT LIMITED TO REMOVAL OF INVASIVES, REMOVAL OF CHAPARRAL SPECIES AND LIMITED REMOVAL OF CERTAIN COSTAL SAGE SCRUB SPECIES WITHIN OPEN SOUTHERN CACTUS SCRUB AREAS AS DESCRIBED WITHIN THE IRVINE WILDLIFE CORRIDOR PLAN.

## SHEET INDEX



## ADDITIONAL OCFA NOTES

- THERE IS NO EXISTING FEDERALLY PROTECTED ANIMAL OR BIRD HABITAT WITHIN THE FUEL MANAGEMENT AREAS WE ARE PROPOSING WITHIN THE HERITAGE FIELDS, LLC DEVELOPMENT AREA. THIS DOES NOT APPLY TO THE INTERIOR OF THE WILDLIFE CORRIDOR.
- THERE IS NO RESTRICTION REGARDING THE DATES OF PLANT DENSITY THINNING THROUGHOUT THE YEAR WITHIN THE FUEL MANAGEMENT AREAS WE ARE PROPOSING WITHIN THE HERITAGE FIELDS, LLC DEVELOPMENT AREA. THIS DOES NOT APPLY TO THE INTERIOR OF THE WILDLIFE CORRIDOR.
- MAINTENANCE IS REQUIRED IN THE LATE SPRING AND EARLY FALL EACH YEAR WITHIN THE FUEL MANAGEMENT AREAS WE ARE PROPOSING WITHIN THE HERITAGE FIELDS, LLC DEVELOPMENT AREA. THIS DOES NOT APPLY TO THE INTERIOR OF THE WILDLIFE CORRIDOR
- A 20' WIDE, 13'-6" VERTICAL CLEARANCE SHALL BE MAINTAINED AT ALL TIMES ON ACCESS.
- THE PRECISE FUEL MANAGEMENT PLAN SHALL USE THE SAME NON-COMBUSTIBLE CONSTRUCTION SET-BACK ZONE, FUEL MANAGEMENT ZONES AND SPECIAL MAINTENANCE AREAS DISTANCES AS APPROVED ON THIS PLAN.

## OCFA APPROVAL

**NOTE:** PRIOR TO THE ISSUANCE OF A PRECISE GRADING PERMIT FOR THE WILDLIFE CORRIDOR, A PRECISE FUEL MANAGEMENT PLAN SHALL BE SUBMITTED TO OCFA FOR REVIEW AND APPROVAL.

Not A Conceptual Fuel Mod Plan

ORANGE COUNTY FIRE AUTHORITY
REVIEWED by Planning & Development
Approval subject to field inspection and required test, notations hereon, conditions in correspondence and conformance with applicable regulations. The stamping of these plans shall not be held to permit or approve the violation of any law.
OCFA Service Request # 176729
Fee Codes: 4625
Plan Type: WRITTEN RESPONSE TO INQUIRY
By: B. Wheeler Date: 10-15-13
(Employee # 2529 )
ONLY STAMPED SHEETS REVIEWED BY ORANGE COUNTY FIRE AUTHORITY
Call 48 hrs. in advance to schedule inspections:
714-573-6150

SCALE: 1" = 450'-0"
0 450' 900' 1350' 1800'
NORTH

| IRVINE WILDLIFE CORRIDOR PLAN | PLAN SET: "B" |
|---|---|
| PLAN CONTROL | DATE: 10/04/2013 |

PREPARED FOR:
HERITAGE FIELDS EL TORO, LLC
25 ENTERPRISE
ALISO VIEJO, CA 92656

ENGINEER:
RBF CONSULTING
14725 ALTON PARKWAY
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949.472.3505 FAX 949.472.8122
www.RBF.com

BIOLOGIST:
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29 ORCHARD
LAKE FOREST, CA 92630

PREPARED BY:
firesafe PLANNING SOLUTIONS
302 N. EL CAMINO REAL, SUITE 202
SAN CLEMENTE, CA 92672
(949) 240-5911

# PRELIMINARY FUEL MANAGEMENT PLAN
# IRVINE WILDLIFE CORRIDOR PLAN
## TITLE SHEET

IRVINE, CA - OCFA SR# 176729
ORANGE COUNTY FIRE AUTHORITY

SHEET
PFM-1
OF 6



S:\HeritageFields\Interface\Cad Files\Heritage-WLC-Conceptual Fuel Mod.dwg ,Jerry Canales Plot date: October 14, 2013


## LEGEND

- Coastal Sage Scrub and Southern Cactus Scrub
- Open Cactus Scrub and Grassland
- Screening Planting
- Riparian Vegetation
- Southern Willow Scrub
- Borrego Channel Crossings
- Special Maintenance Area 1
- Special Maintenance Area 2
- Fuel Management Area

## PLANT PALETTES

### Southern Willow Scrub

**Table 1: Southern Willow Scrub**

| Botanic Name | Common Name | Stock Type | Plant Spacing | No. per Acre | Percent |
|---|---|---|---|---|---|
| **CANOPY** | | | | | |
| *Salix gooddingii* | Black willow | 1 gal | 20' o.c. | 50 | 14.3% |
| *Salix lasiolepis* | Arroyo willow | 1 gal | 10' o.c. | 100 | 28.6% |
| *Salix exigua* | Sandbar willow | 1 gal | 10' o.c. | 100 | 28.6% |
| *Baccharis salicifolia* | Mulefat | 1 gal | 10' o.c. | 100 | 28.6% |
| **Subtotal** | | | | 350 | 100% |
| **UNDERSTORY** | | | | | |
| *Juncus patens* | Spreading rush | Liner | Clumped. | 200 | 20% |
| *Rubus ursinus* | California blackberry | 1 gal | 8 o.c. | 100 | 10% |
| *Juncus textilis* | Basket rush | 1 gal | Clumped | 150 | 15% |
| *Leymus triticoides* | Creeping wild rye | Liner | 3' o.c. | 200 | 20% |
| *Rosa californica* | California wild rose | 1 gal. | 8' o.c. | 100 | 10% |
| *Muhlenbergia rigens* | Deergrass | 1 gal | 8 o.c. | 100 | 10% |
| *Artemisia douglasiana* | Mugwort | 1 gal | Clumped | 150 | 15% |
| **Subtotal** | | | | 1000 | 100% |
| **Total Container Stock** | | | | **1350** | |

### Riparian Vegetation

**Table 2: Mulefat Scrub**

| Botanic Name | Common Name | Stock Type | Plant Spacing | No. per Acre | Percent |
|---|---|---|---|---|---|
| **CANOPY** | | | | | |
| *Sambucus nigra* | Blue elderberry | 1 gal | 20' o.c. | 50 | 14.3% |
| *Baccharis salicifolia* | Mulefat | 1 gal | 10' o.c. | 100 | 28.6% |
| *Salix exigua* | Sandbar willow | 1 gal | 10' o.c. | 100 | 28.6% |
| *Baccharis emoryi* | Emoryi's baccharis | 1 gal | 10' o.c. | 100 | 28.6% |
| **Subtotal** | | | | 350 | 100% |
| **UNDERSTORY** | | | | | |
| *Baccharis pilularis* | Coyote Brush | 1 gal | 8' o.c. | 200 | 20% |
| *Lepidospartum squamatum* | Scalebroom | 1 gal | 8 o.c. | 150 | 15% |
| *Juncus patens* | Spreading rush | Liners | Clumped | 250 | 25% |
| *Leymus triticoides* | Creeping wild rye | Liner | 3' o.c. | 150 | 15% |
| *Muhlenbergia rigens* | Deergrass | 1 gal | 8 o.c. | 100 | 10% |
| *Artemisia douglasiana* | Mugwort | 1 gal | Clumped | 150 | 15% |
| **Subtotal** | | | | 1000 | 100% |
| **Total Container Stock** | | | | **1350** | |

### Coastal Sage Scrub and Southern Cactus Scrub

**Table 3: Coastal Sage Scrub**

| Botanic Name | Common Name | Stock Type | Plant Spacing | No. per Acre | Percent |
|---|---|---|---|---|---|
| **SHRUB LAYER** | | | | | |
| *Encelia californica* | California encelia | 1 gal | 8' o.c. | 200 | 20% |
| *Isocoma menziesii* | Coast goldenbush | 1 gal | 8' o.c. | 150 | 15% |
| *Baccharis pilularis* | Coyote bush | 1 gal | 8' o.c. | 150 | 15% |
| *Artemisia californica* | California sagebrush | 1 gal | 6' o.c. | 300 | 30% |
| *Eriogonum fasciculatum* | California buckwheat | 1-gal | 8' o.c. | 100 | 10% |
| *Salvia apiana* | White sage | 1-gal | 8' o.c. | 100 | 10% |
| **Subtotal** | | | | 1,000 | 100% |
| **NATIVE GRASSES** | | | | | |
| *Stipa pulchra* | Purple needlegrass | 1 gal | Clumped | 200 | 67% |
| *Melica imperfecta* | Coast range melic | 1 gal | 10' o.c. | 100 | 33% |
| **Subtotal** | | | | 300 | 100% |
| **Total Container Stock** | | | | **1300** | |
| *Encelia californica* | California encelia | Seed | Scattered | 2 lbs | 10% |
| *Artemisia californica* | California sagebrush | Seed | Scattered | 3lbs | 15% |
| *Isocoma menziesii* | Coast goldenbush | Seed | Scattered | 2 lbs | 10% |
| *Lotus scoparius* | Deerweed | Seed | Scattered | 1 lbs | 5% |
| *Phacelia circutaria* | Caterpillar phacelia | Seed | Scattered | 1 lbs | 5% |
| *Vulpia microstachys* | Small Fescue | Seed | Scattered | 1 lbs | 5% |
| *Lasthenia californica* | California goldfields | Seed | Scattered | 2 lbs | 10% |
| *Lupinus bicolor* | Miniature lupine | Seed | Scattered | 2 lbs | 10% |
| *Cryptantha intermedia* | Intermediate cryptantha | Seed | Scattered | 2 lbs | 10% |
| *Plantago erecta* | California plantain | Seed | Scattered | 2 lbs | 10% |
| *Deinandra fasciculata* | Fascicled tarplant | Seed | Scattered | 2 lbs | 10% |
| **Total Seed Stock** | | | | **20 LBS** | **100%** |

**Table 4: Southern Cactus Scrub**

| Botanic Name | Common Name | Stock Type | Plant Spacing | No. per Acre | Percent |
|---|---|---|---|---|---|
| **SHRUB LAYER** | | | | | |
| *Peritoma arborea* | Bladderpod | 1 gal | 8' o.c. | 100 | 10% |
| *Artemisia californica* | California sagebrush | 1 gal | 8' o.c. | 100 | 10% |
| *Encelia californica* | California encelia | 1 gal | 6' o.c. | 200 | 20% |
| *Baccharis pilularis* | Coyote bush | 1 gal | 6' o.c. | 100 | 10% |
| *Sambucus nigra* | Blue elderberry | 1 gal | 20' o.c. | 50 | 5% |
| *Opuntia littoralis* | Prickly Pear | Pads | Clumped | 250 | 25% |
| *Cylindropuntia prolifera* | Coastal cholla | Pads | Clumped | 200 | 20% |
| **Subtotal** | | | | 1,000 | 100% |
| **NATIVE GRASSES** | | | | | |
| *Stipa pulchra* | Purple needlegrass | 1 gal | Clumped | 300 | 75% |
| *Melica imperfecta* | Coast range melic | 1 gal | 10' o.c. | 100 | 25% |
| **Subtotal** | | | | 400 | 100% |
| **Total Container Stock** | | | | **1400** | |
| *Encelia californica* | California encelia | Seed | Scattered | 2 lbs | 10% |
| *Artemisia californica* | California sagebrush | Seed | Scattered | 2 lbs | 10% |
| *Isocoma menziesii* | Coast goldenbush | Seed | Scattered | 2 lbs | 10% |
| *Eriogonum fasciculatum* | Coast buckwheat | Seed | Scattered | 1 lb | 5% |
| *Acmispon glaber* | Deerweed | Seed | Scattered | 1 lb | 5% |
| *Phacelia circutaria* | Caterpillar phacelia | Seed | Scattered | 1 lb | 5% |
| *Vulpia microstachys* | Small Fescue | Seed | Scattered | 1 lb | 5% |
| *Lasthenia californica* | California goldfields | Seed | Scattered | 2 lbs | 10% |
| *Lupinus bicolor* | Miniature lupine | Seed | Scattered | 2 lbs | 10% |
| *Cryptantha intermedia* | Intermediate cryptantha | Seed | Scattered | 2 lbs | 10% |
| *Plantago erecta* | California plantain | Seed | Scattered | 2 lbs | 10% |
| *Deinandra fasciculata* | Fascicled tarplant | Seed | Scattered | 2 lbs | 10% |
| **Total Seed Stock** | | | **20 LBS** | **100%** | |

### Open Cactus Scrub and Grassland

**Table 5: Open Southern Cactus Scrub Mosaic**

| Botanic Name | Common Name | Stock Type | Plant Spacing | No. per Acre | Percent |
|---|---|---|---|---|---|
| **NATIVE GRASSES** | | | | | |
| *Stipa pulchra* | Purple needlegrass | 1 gal | 8' o.c. | 300 | 30% |
| *Melica imperfecta* | Coast range melic | 1 gal | 8' o.c. | 300 | 30% |
| *Bothriochloa barbinodis* | Beardgrass | 1 gal | 8' o.c. | 100 | 10% |
| *Stipa lepida* | Foothill needlegrass | 1 gal | 8' o.c. | 300 | 30% |
| **Subtotal** | | | | 1,000 | 100% |
| **NATIVE SHRUBS** | | | | | |
| *Opuntia littoralis* | Prickly Pear | Pads | Clumped | 200 | 20% |
| *Cylindropuntia prolifera* | Coastal cholla | Pads | Clumped | 200 | 20% |
| *Peritoma arborea* | Bladderpod | 1 gal | 8' o.c. | 150 | 15% |
| *Encelia californica* | California encelia | 1 gal | 8' o.c. | 200 | 20% |
| *Ericameria pachylepis* | Grassland goldenbush | 1 gal | Clumped | 200 | 20% |
| *Sambucus nigra* | Blue elderberry | 1 gal | 20' o.c. | 50 | 5% |
| **Subtotal** | | | | 1,000 | 100% |
| **Total Container Stock** | | | | **2,000** | |
| **SEED MIX** | | | | | |
| *Lasthenia californica* | California goldfields | Seed | Scattered | 4 lbs | 26.7% |
| *Cryptantha intermedia* | Intermediate cryptantha | Seed | Scattered | 2 lbs | 13.3% |
| *Salvia columbarae* | Chia | Seed | Scattered | 3 lbs | 20% |
| *Lupinus bicolor* | Miniature lupine | Seed | Scattered | 2 lbs | 13.3% |
| *Sisyrinchium bellum* | Blue-eyed grass | Seed | Scattered | 2 lbs | 13.3% |
| *Dichelostemma capitatum* | Wild hyacinth | Seed | Scattered | 2 lbs | 13.3% |
| **Total Seed Stock** | | | | **15 LBS** | **100%** |

### Screening Planting

**Table 6: Screening Plantings**

| Botanic Name | Common Name | Stock Type | Plant Spacing | No. per Acre | Percent |
|---|---|---|---|---|---|
| **CANOPY** | | | | | |
| *Sambucus nigra* | Blue elderberry | 1 gal | 20' o.c. | TDB | 25% |
| *Rhus ovata* | Suger bush | 1 gal | 20' o.c. | TDB | 25% |
| *Rhus integrifolia* | Lemonade berry | 1 gal | 20' o.c. | TDB | 25% |
| *Heteromeles arbutifola* | Toyon | 1 gal | 20 ' o.c. | TBD | 25% |
| **Subtotal** | | | | TBD | 100% |
| **UNDERSTORY** | | | | | |
| *Baccharis pilularis* | Coyote Brush | 1 gal | 8' o.c.. | TDB | 25% |
| *Peritoma arborea* | Bladderpod | 1 gal | 8' o.c. | TBD | 25% |
| *Opuntia littoralis* | Prickly Pear | Pads | Clumped | TBD | 25% |
| *Cylindropuntia prolifera* | Coastal cholla | Padsl | Clumped | TBD | 25% |
| **Subtotal** | | | | TBD | 100% |
| **Total Container Stock** | | | | **TBD** | |

### Special Maintenance Area 1

**Table 7: Open Southern Cactus Scrub Mosaic Within Special Management Area 1**

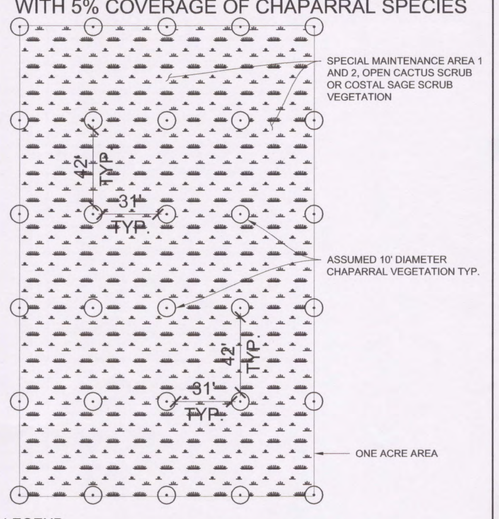
| Botanic Name | Common Name | Stock Type | Plant Spacing | No. per Acre | Percent |
|---|---|---|---|---|---|
| **NATIVE GRASSES** | | | | | |
| *Stipa pulchra* | Purple needlegrass | 1 gal | Clumped. | 100 | 10% |
| *Stipa lepida* | Foothill needlegrass | 1 gal | Clumped | 100 | 10% |
| **UNDERSTORY** | | | | | |
| *Opuntia littoralis* | Prickly Pear | Pads | Clumped | 250 | 25% |
| *Cylindropuntia prolifera* | Coastal cholla | Padsl | Clumped | 250 | 25% |
| *Peritoma arborea* | Bladderpod | 1 gal | 8' o.c. | 100 | 10% |
| *Isocoma menziesii* | Coast goldenbush | 1 gal | 8' o.c. | 100 | 10% |
| *Encelia californica* | California encelia | 1 gal | 8' o.c. | 100 | 10% |
| **Total Container Stock** | | | | **1,000** | **100%** |
| **SEED MIX** | | | | | |
| *Lasthenia californica* | California goldfields | Seed | Scattered | 4 lbs | 26.7% |
| *Cryptantha intermedia* | Intermediate cryptantha | Seed | Scattered | 2 lbs | 13.3% |
| *Salvia columbarae* | Chia | Seed | Scattered | 3 lbs | 20% |
| *Lupinus bicolor* | Miniature lupine | Seed | Scattered | 2 lbs | 13.3% |
| *Sisyrinchium bellum* | Blue-eyed grass | Seed | Scattered | 2 lbs | 13.3% |
| *Dichelostemma capitatum* | Wild hyacinth | Seed | Scattered | 2 lbs | 13.3% |
| **Total Seed Stock** | | | | **15 LBS** | **100%** |

### Special Maintenance Area 2

**Table 8: Open Southern Cactus Scrub Mosaic Within Special Management Area 2**

| Botanic Name | Common Name | Stock Type | Plant Spacing | No. per Acre | Percent |
|---|---|---|---|---|---|
| **NATIVE GRASSES** | | | | | |
| *Stipa pulchra* | Purple needlegrass | 1 gal | Clumped. | 100 | 10% |
| *Stipa lepida* | Foothill needlegrass | 1 gal | Clumped | 100 | 10% |
| **UNDERSTORY** | | | | | |
| *Opuntia littoralis* | Prickly Pear | Pads | Clumped | 250 | 35% |
| *Cylindropuntia prolifera* | Coastal cholla | Padsl | Clumped | 250 | 35% |
| *Peritoma arborea* | Bladderpod | 1 gal | 8' o.c. | 100 | 5% |
| *Isocoma menziesii* | Coast goldenbush | 1 gal | 8' o.c. | 100 | 5% |
| **Total Container Stock** | | | | **1,000** | **100%** |
| **SEED MIX** | | | | | |
| *Lasthenia californica* | California goldfields | Seed | Scattered | 4 lbs | 26.7% |
| *Cryptantha intermedia* | Intermediate cryptantha | Seed | Scattered | 2 lbs | 13.3% |
| *Salvia columbarae* | Chia | Seed | Scattered | 3 lbs | 20% |
| *Lupinus bicolor* | Miniature lupine | Seed | Scattered | 2 lbs | 13.3% |
| *Sisyrinchium bellum* | Blue-eyed grass | Seed | Scattered | 2 lbs | 13.3% |
| *Dichelostemma capitatum* | Wild hyacinth | Seed | Scattered | 2 lbs | 13.3% |
| **Total Seed Stock** | | | | **15 LBS** | **100%** |

## EXAMPLE PLANTING OF INTERIOR CORRIDOR WITH 5% COVERAGE OF CHAPARRAL SPECIES



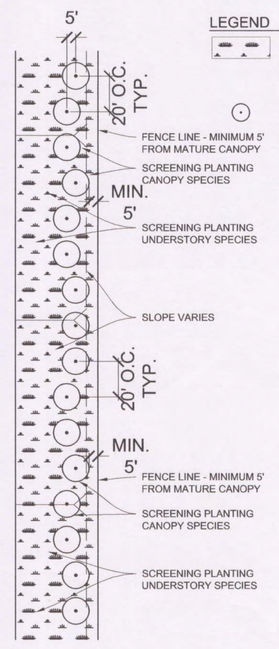

LEGEND

SPECIAL MAINTENANCE AREA 1 AND 2, COASTAL SAGE SCRUB, OPEN CACTUS SCRUB, RIPARIAN VEGETATION, OR SOUTHERN WILLOW SCRUB PLANTED WITHIN THE INTERIOR OF THE CORRIDOR

ASSUMED 10' DIAMETER "VOLUNTEER" CHAPARRAL VEGETATION THAT WOULD SEED WITHIN THE INTERIOR OF THE CORRIDOR. "VOLUNTEER" CHAPARRAL SPECIES THAT ARE TO BE REMOVED WHEN ABSOLUTE COVER EXCEEDS 5% OR ANY INDIVIDUALS THAT DO NOT EXHIBIT 30-FOOT SPACING FROM OTHER CHAPARRAL INDIVIDUALS. SPECIES INCLUDE: LAUREL SUMAC ( *MALOSMA LAURINA* ), CHAMISE (*ADENOSTOMA FASCICULATA* ), CEANOTHUS ( *CEANOTHUS SPP.* ), MOUNTAIN MAHOGANY ( *CERCOCARPUS BETULOIDES* ), MANZANITA *(ARCTOSTAPHYLOS SPP.* ), AND SCRUB OAK ( *QUERCUS BERBERIDIFOLIA).*

**NOTE:** BLUE ELDERBERRY ( *SAMBUCUS NIGRA* ) IS A COMPONENT OF THE MULEFAT SCRUB AND SHALL NOT BE TREATED AS THE OTHER CHAPARRAL SPECIES.

## EXAMPLE PLANTING OF PERIMETER SCREENING PLANTING AREAS PER FIGURES 4 AND 6




LEGEND

SCREENING PLANTING UNDERSTORY SPECIES. SPECIES INCLUDE: COYOTE BRUSH, BIG SALTBUSH, BLADDERPOD, PRICKLY PEAR AND COASTAL CHOLLA.

SCREENING PLANTING CANOPY SPECIES. SPECIES INCLUDE: ELDERBERRY, LEMONADEBERRY, TOYON AND SUGAR BUSH.

FIRE CHIEF ORANGE COUNTY FIRE AUTHORITY REVIEWED CALIFORNIA

176729

NOT TO SCALE

NORTH

| | |
|---|---|
| IRVINE WILDLIFE CORRIDOR PLAN | PLAN SET: "B" |
| PLAN CONTROL | DATE: 10/04/2013 |

PREPARED FOR:
HERITAGE FIELDS EL TORO, LLC
25 ENTERPRISE
ALISO VIEJO, CA 92656

ENGINEER:
RBF CONSULTING
14725 ALTON PARKWAY
IRVINE, CALIFORNIA 92618-2027
949.472.3505 FAX 949.472.8122
www.RBF.com

BIOLOGIST:
GLENN LUKOS ASSOCIATES, INC.
29 ORCHARD
LAKE FOREST, CA 92630

PREPARED BY:
firesafe PLANNING SOLUTIONS
302 N. EL CAMINO REAL, SUITE 202
SAN CLEMENTE, CA 92672
(949) 240-5911

# PRELIMINARY FUEL MANAGEMENT PLAN
# IRVINE WILDLIFE COORIDOR PLAN
## IRVINE WILDLIFE CORRIDOR PLAN CONCEPT DESIGN AND PLANTING
IRVINE, CA - OCFA SR# 176729
## ORANGE COUNTY FIRE AUTHORITY

SHEET
PFM-2
OF 6

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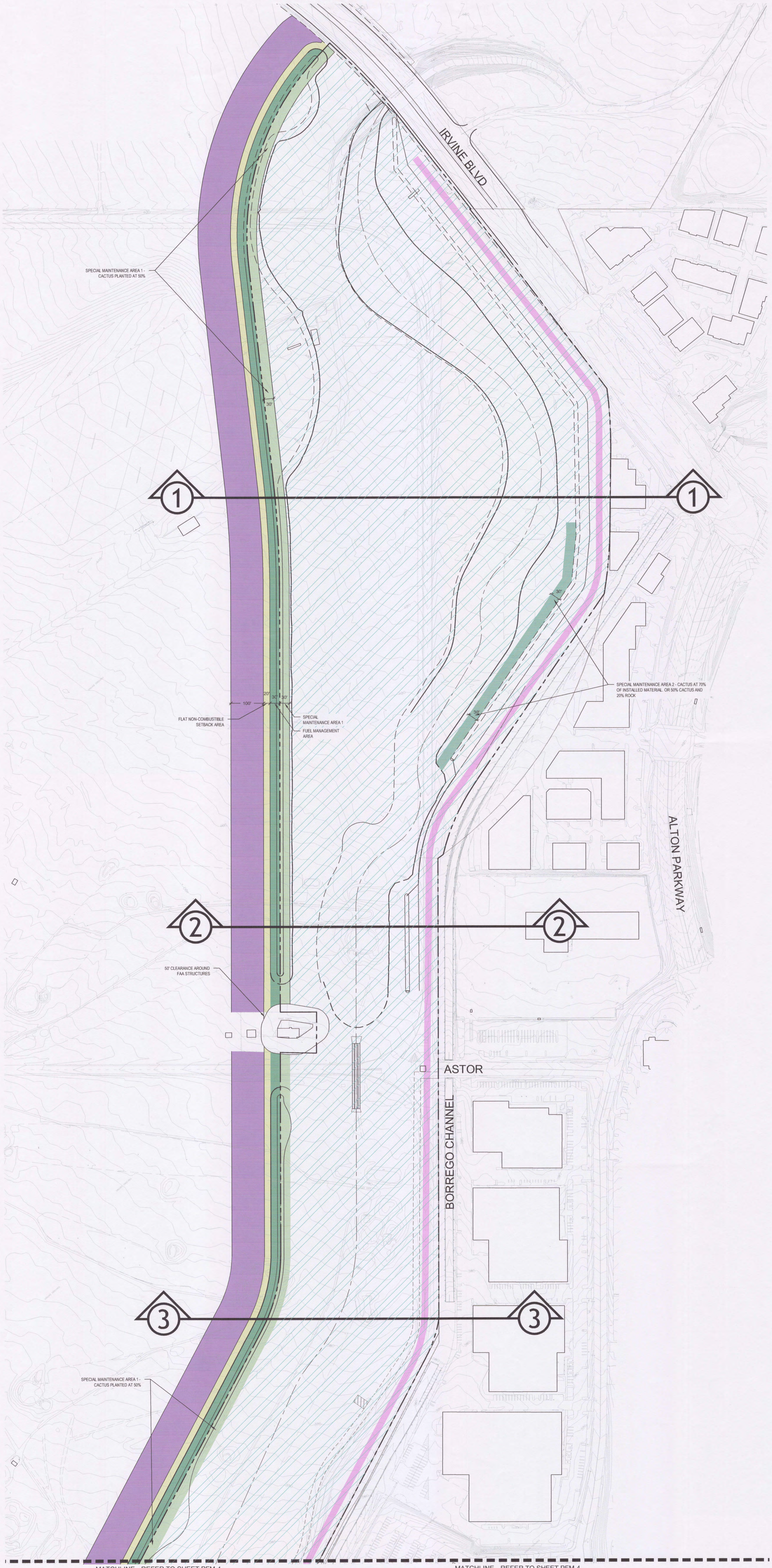


## PLANT REMOVAL LIST

ATTACHMENT 7
UNDESIRABLE PLANT SPECIES (TARGET SPECIES)
FIRE PRONE PLANT SPECIES (MANDATORY REMOVAL)
FROM FUEL MANAGEMENT ZONES AND SPECIAL MAINTENANCE AREA.

| Botanical Name | Common Name |
|---|---|
| Cynara Cardunculus | Artichoke Thistle |
| Ricinus Communis | Castor Bean Plant |
| Cirsium Vulgare | Wild Artichoke |
| Brassica Nigra | Black Mustard |
| Silybum Marianum | Milk Thistle |
| Sacsola Austails | Russian Thistle/Tumblewood |
| Nicotiana Bigelevil | Indian Tobacco |
| Nicotiana Glauca | Tree Tobacco |
| Lactuca Serriola | Prickly Lettuce |
| Conyza Canadensis | Horseweed |
| Heterothaca Grandiflora | Telegraph Plant |
| Anthemix Cotula | Mayweed |
| Urtica Urens | Burning Nettle |
| Cardaria Draba | Noary Cress, Perennial Peppergrass |
| Brassica Rapa | Wild Turnip, Yellow Mustard, Field Mustard |
| Adenostoma Fasciculatum | Chamise |
| Adenostoma Sparsifolium | Red Shanks |
| Cortaderia Selloana | Pampas Grass |
| Artemisia Californica | California Sagebrush |
| Eriogonum Fasciculatum | Common Buckwheat |
| Salvia Mellifera | Black Sage |
| **Ornamental:** | |
| Cortaderia | Pampas Grass |
| Cupressus sp | Cypress |
| Eucalyptus sp | Eucalyptus |
| Juniperus sp | Juniper |
| Pinus sp | Pine |

## FUEL MANAGEMENT LEGEND

**NON-COMBUSTILBE CONSTRUCTION AREA:**
20' NON-COMBUSTIBLE CONSTRUCTION AREA ONLY. THE NON-COMBUSTIBLE CONSTRUCTION AREA SHALL BE MAINTAINED BY THE FUTURE HOMEOWNERS ASSOCIATION OR FUTURE PRIVATE HOMEOWNER DEPENDING ON FUTURE DEVELOPMENT ALONG THE WILDLIFE CORRIDOR.

**FUEL MANAGEMENT AREA:**
30' LANDSCAPED IRRIGATED SLOPE DEVOID OF PLANT MATERIAL FROM OCFA UNDESIRABLE PLANT LIST. INSTALLED NON-INVASIVE PLANT MATERIAL SHALL BE FROM THE OCFA APPROVED PLANT LIST.

**SPECIAL MAINTENANCE AREA 1:**
30' PLANTED WITH FIRE RESISTIVE NATIVE VEGETATION AND REMOVAL OF OCFA UNDESIRABLE PLANT SPECIES. VEGETATION IN THIS AREA TO BE A MINIMUM OF 50% CACTUS .

**SPECIAL MAINTENANCE AREA 2:**
INDICATED 30' PLANTED AREA WITH FIRE RESISTIVE NATIVE VEGETATION AND REMOVAL OF OCFA UNDESIRABLE PLANT SPECIES. VEGETATION IN THIS AREA TO BE A MINIMUM OF 70% CACTUS OR 50% CACTUS AND 20% ROCK.

## SYMBOL LEGEND

**RADIANT HEAT CONSTRUCTION ZONE:**
ANY STRUCTURE WITHIN 100' OF THE NON-COMBUSTIBLE CONSTRUCTION AREA AS INDICATED ON PLAN SHALL COMPLY WITH ALL SECTIONS OF THE 2010 CALIFORNIA BUILDING CODE CHAPTER 7A OR 2010 CALIFORNIA RESIDENTIAL CODE SECTION R327 EXCEPT FOR WINDOWS AND DOORS. REFER TO EXAMPLE SCREENING FORMS PROVIDED ON THIS PLAN.

**RADIANT HEAT WALL**
CONSTRUCTED PER THE REQUIREMENTS ON THE DETAIL PROVIDED ON THIS PLAN SHEET PFM-5. FINAL DESIGN TO BE PROVIDED BY A LANDSCAPE ARCHITECT.

**FUEL MANAGEMENT SECTION LOCATIONS:**
REFER TO THIS SHEET FOR FUEL MANAGEMENT SECTIONS ON PAGE PFM-6.

**25' WIDE ACCESS SHALL BE ABLE TO SUPPORT TYPE III FIRE APPARATUS**

**TURN AROUND PROVIDED AT END OF 25' ACCESS**

**BORREGO CHANNEL CROSSING**

**INTERIOR CORRIDOR HABITAT MANAGEMENT AREA**
VEGETATION MANAGEMENT LIMITED TO REMOVAL OF INVASIVES, REMOVAL OF CHAPARRAL SPECIES AND LIMITED REMOVAL OF CERTAIN COSTAL SAGE SCRUB SPECIES WITHIN OPEN SOUTHERN CACTUS SCRUB AREAS AS DESCRIBED WITHIN THE IRVINE WILDLIFE CORRIDOR PLAN.

FIRE ORANGE COUNTY REVIEWED CALIFORNIA AUTHORITY
176729

SCALE: 1" = 100'-0"
0 100' 200' 300' 400'
NORTH

| | |
|---|---|
| IRVINE WILDLIFE CORRIDOR PLAN | PLAN SET: "B" |
| PLAN CONTROL | DATE: 10/04/2013 |

PREPARED FOR:
HERITAGE FIELDS
EL TORO, LLC
25 ENTERPRISE
ALISO VIEJO, CA 92656

ENGINEER:
RBF CONSULTING
14725 ALTON PARKWAY
IRVINE, CALIFORNIA 92618-2027
949.472.3505 FAX 949.472.8122
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BIOLOGIST:
GLENN LUKOS
ASSOCIATES, INC.
29 ORCHARD
LAKE FOREST, CA 92630

PREPARED BY:
firesafe PLANNING SOLUTIONS
302 N. EL CAMINO REAL, SUITE 202
SAN CLEMENTE, CA 92672
(949) 240-5911

# PRELIMINARY FUEL MANAGEMENT PLAN
# IRVINE WILDLIFE COORIDOR PLAN
## FUEL MANAGEMENT LAYOUT
## SEGMENT 2
IRVINE, CA - OCFA SR# 176729
ORANGE COUNTY FIRE AUTHORITY

SHEET
PFM-3
OF 6

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MATCHLINE - REFER TO SHEET PFM-3

MATCHLINE - REFER TO SHEET PFM-3

SPECIAL MAINTENANCE AREA 1 - CACTUS PLANTED AT 50%

BORREGO CHANNEL

SPECIAL MAINTENANCE AREA 2 - CACTUS AT 70% OF INSTALLED MATERIAL. OR 50% CACTUS AND 20% ROCK

SPECIAL MAINTENANCE AREA 2 - CACTUS AT 70% OF INSTALLED MATERIAL. OR 50% CACTUS AND 20% ROCK

SPECIAL MAINTENANCE AREA 2 - CACTUS AT 70% OF INSTALLED MATERIAL. OR 50% CACTUS AND 20% ROCK

SPECIAL MAINTENANCE AREA 2 - CACTUS AT 70% OF INSTALLED MATERIAL. OR 50% CACTUS AND 20% ROCK

30'

30'

RAILROAD TRACKS

ALTON PARKWAY

MATCHLINE - REFER TO SHEET PFM-5

MATCHLINE - REFER TO SHEET PFM-5

## PLANT REMOVAL LIST

ATTACHMENT 7

UNDESIRABLE PLANT SPECIES (TARGET SPECIES)

FIRE PRONE PLANT SPECIES (MANDATORY REMOVAL)
FROM FUEL MANAGEMENT ZONES AND SPECIAL MAINTENANCE AREA.

| Botanical Name | Common Name |
|---|---|
| Cynara Cardunculus | Artichoke Thistle |
| Ricinus Communis | Castor Bean Plant |
| Cirsium Vulgare | Wild Artichoke |
| Brassica Nigra | Black Mustard |
| Silybum Marianum | Milk Thistle |
| Sacsola Austails | Russian Thistle/Tumblewood |
| Nicotiana Bigelevil | Indian Tobacco |
| Nicotiana Glauca | Tree Tobacco |
| Lactuca Serriola | Prickly Lettuce |
| Conyza Canadensis | Horseweed |
| Heterothaca Grandiflora | Telegraph Plant |
| Anthemix Cotula | Mayweed |
| Urtica Urens | Burning Nettle |
| Cardaria Draba | Noary Cress, Perennial Peppergrass |
| Brassica Rapa | Wild Turnip, Yellow Mustard, Field Mustard |
| Adenostoma Fasciculatum | Chamise |
| Adenostoma Sparsifolium | Red Shanks |
| Cortaderia Selloana | Pampas Grass |
| Artemisia Californica | California Sagebrush |
| Eriogonum Fasciculatum | Common Buckwheat |
| Salvia Mellifera | Black Sage |
| **Ornamental:** | |
| Cortaderia | Pampas Grass |
| Cupressus sp | Cypress |
| Eucalyptus sp | Eucalyptus |
| Juniperus sp | Juniper |
| Pinus sp | Pine |

FIRE ORANGE COUNTY REVIEWED CALIFORNIA AUTHORITY

176729

## FUEL MANAGEMENT LEGEND

NON-COMBUSTILBE CONSTRUCTION AREA:
20' NON-COMBUSTIBLE CONSTRUCTION AREA ONLY. THE NON-COMBUSTIBLE CONSTRUCTION AREA SHALL BE MAINTAINED BY THE FUTURE HOMEOWNERS ASSOCIATION OR FUTURE PRIVATE HOMEOWNER DEPENDING ON FUTURE DEVELOPMENT ALONG THE WILDLIFE CORRIDOR.

FUEL MANAGEMENT AREA:
30' LANDSCAPED IRRIGATED SLOPE DEVOID OF PLANT MATERIAL FROM OCFA UNDESIRABLE PLANT LIST. INSTALLED NON-INVASIVE PLANT MATERIAL SHALL BE FROM THE OCFA APPROVED PLANT LIST.

SPECIAL MAINTENANCE AREA 1:
30' PLANTED WITH FIRE RESISTIVE NATIVE VEGETATION AND REMOVAL OF OCFA UNDESIRABLE PLANT SPECIES. VEGETATION IN THIS AREA TO BE A MINIMUM OF 50% CACTUS .

SPECIAL MAINTENANCE AREA 2:
INDICATED 30' PLANTED AREA WITH FIRE RESISTIVE NATIVE VEGETATION AND REMOVAL OF OCFA UNDESIRABLE PLANT SPECIES. VEGETATION IN THIS AREA TO BE A MINIMUM OF 70% CACTUS OR 50% CACTUS AND 20% ROCK.

## SYMBOL LEGEND

RADIANT HEAT CONSTRUCTION ZONE:
ANY STRUCTURE WITHIN 100' OF THE NON-COMBUSTIBLE CONSTRUCTION AREA AS INDICATED ON PLAN SHALL COMPLY WITH ALL SECTIONS OF THE 2010 CALIFORNIA BUILDING CODE CHAPTER 7A OR 2010 CALIFORNIA RESIDENTIAL CODE SECTION R327 EXCEPT FOR WINDOWS AND DOORS. REFER TO EXAMPLE SCREENING FORMS PROVIDED ON THIS PLAN.

RADIANT HEAT WALL
CONSTRUCTED PER THE REQUIREMENTS ON THE DETAIL PROVIDED ON THIS PLAN SHEET PFM-5. FINAL DESIGN TO BE PROVIDED BY A LANDSCAPE ARCHITECT.

FUEL MANAGEMENT SECTION LOCATIONS:
REFER TO THIS SHEET FOR FUEL MANAGEMENT SECTIONS ON PAGE PFM-6.

25' WIDE ACCESS SHALL BE ABLE TO SUPPORT TYPE III FIRE APPARATUS

TURN AROUND PROVIDED AT END OF 25' ACCESS

BORREGO CHANNEL CROSSING

INTERIOR CORRIDOR HABITAT MANAGEMENT AREA
VEGETATION MANAGEMENT LIMITED TO REMOVAL OF INVASIVES, REMOVAL OF CHAPARRAL SPECIES AND LIMITED REMOVAL OF CERTAIN COSTAL SAGE SCRUB SPECIES WITHIN OPEN SOUTHERN CACTUS SCRUB AREAS AS DESCRIBED WITHIN THE IRVINE WILDLIFE CORRIDOR PLAN.

SCALE: 1" = 100'-0"

0 100' 200' 300' 400'

NORTH

| | |
|---|---|
| IRVINE WILDLIFE CORRIDOR PLAN | PLAN SET: "B" |
| PLAN CONTROL | DATE: 10/04/2013 |

PREPARED FOR:
HERITAGE FIELDS
EL TORO, LLC
25 ENTERPRISE
ALISO VIEJO, CA 92656

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# PRELIMINARY FUEL MANAGEMENT PLAN
# IRVINE WILDLIFE COORIDOR PLAN
## FUEL MANAGEMENT LAYOUT
## SEGMENTS 2 AND 3
IRVINE, CA - OCFA SR# 176729

ORANGE COUNTY FIRE AUTHORITY

SHEET
PFM-4
OF 6



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MATCHLINE - REFER TO SHEET PFM-4

MATCHLINE - REFER TO SHEET PFM-4

RAILROAD TRACKS

ALTON PARKWAY

SERRANO CHANNEL

7

7

ALTON PARKWAY

BARRANCA PARKWAY

MUIRLANDS

8

8

100'

20'

30'

SPECIAL MAINTENANCE AREA 1

FLAT NON-COMBUSTIBLE SETBACK AREA

30'

20'

SPECIAL MAINTENANCE AREA 1

FLAT NON-COMBUSTIBLE SETBACK AREA

9

9

FUTURE MARINE WAY CROSSING

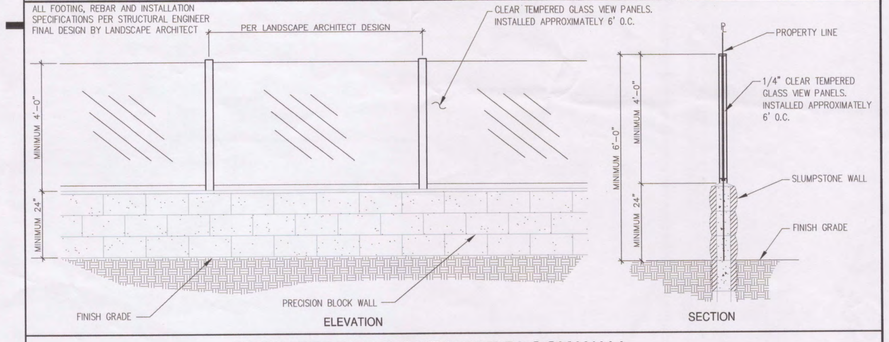
10

10

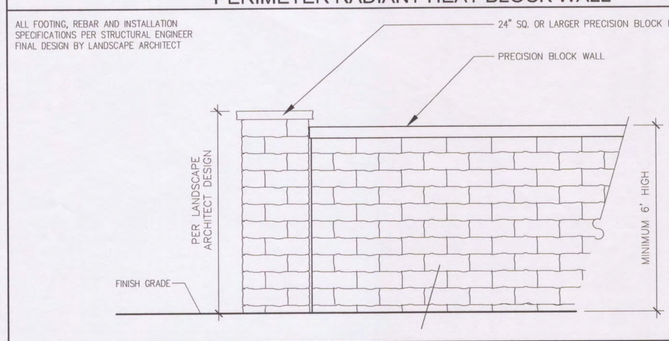
I-5 FREEWAY

BAKE PARKWAY

## RADIANT HEAT WALL TEMPERED GLASS (OR EQUAL) AND PRECISION BLOCK




## PERIMETER RADIANT HEAT BLOCK WALL

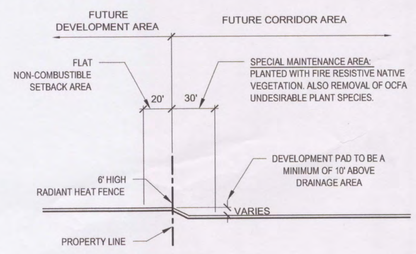



## INTERFACE OPTIONS FOR SEGMENTS 3 SOUTH AND 4

PER THE IRVINE WILDLIFE CORRIDOR FEATURE FIRE RELATED PROGRAM, TWO (2) OPTIONS FOR SEGMENTS 3 SOUTH AND 4 WERE JUSTIFIED. A FINAL DECISION FOR THESE OPTIONS WILL BE MADE AT THE TIME OF THE PRECISE FUEL MANAGEMENT PLAN.

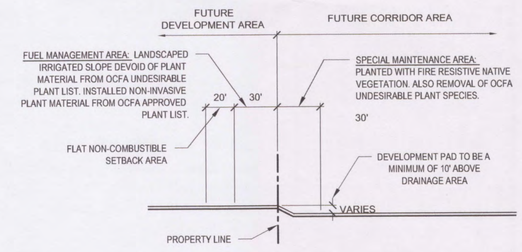
OPTION 1

A thirty foot Special Maintenance Area within the Corridor planted with fire resistive native vegetation as well as removal of OCFA Undesirable Plant species, a six foot high radiant heat fence (block wall or combination tempered glass and block view fence) and a twenty foot flat non-combustible set back zone.




OPTION 2

A thirty foot Special Maintenance Area within the Corridor planted with fire resistive native vegetation as well as removal of OCFA Undesirable Plant species, a thirty foot Fuel Management Zone on the development side followed by a twenty foot non-combustible setback zone.




## PLANT REMOVAL LIST

ATTACHMENT 7

UNDESIRABLE PLANT SPECIES (TARGET SPECIES)

FIRE PRONE PLANT SPECIES (MANDATORY REMOVAL) FROM FUEL MANAGEMENT ZONES AND SPECIAL MAINTENANCE AREA.

| Botanical Name | Common Name |
|---|---|
| Cynara Cardunculus | Artichoke Thistle |
| Ricinus Communis | Castor Bean Plant |
| Cirsium Vulgare | Wild Artichoke |
| Brassica Nigra | Black Mustard |
| Silybum Marianum | Milk Thistle |
| Sacsola Austails | Russian Thistle/Tumblewood |
| Nicotiana Bigelevil | Indian Tobacco |
| Nicotiana Glauca | Tree Tobacco |
| Lactuca Serriola | Prickly Lettuce |
| Conyza Canadensis | Horseweed |
| Heterothaca Grandiflora | Telegraph Plant |
| Anthemix Cotula | Mayweed |
| Urtica Urens | Burning Nettle |
| Cardaria Draba | Noary Cress, Perennial Peppergrass |
| Brassica Rapa | Wild Turnip, Yellow Mustard, Field Mustard |
| Adenostoma Fasciculatum | Chamise |
| Adenostoma Sparsifolium | Red Shanks |
| Cortaderia Selloana | Pampas Grass |
| Artemisia Californica | California Sagebrush |
| Eriogonum Fasciculatum | Common Buckwheat |
| Salvia Mellifera | Black Sage |
| **Ornamental:** | |
| Cortaderia | Pampas Grass |
| Cupressus sp | Cypress |
| Eucalyptus sp | Eucalyptus |
| Juniperus sp | Juniper |
| Pinus sp | Pine |

## FUEL MANAGEMENT LEGEND

NON-COMBUSTILBE CONSTRUCTION AREA:
20' NON-COMBUSTIBLE CONSTRUCTION AREA ONLY. THE NON-COMBUSTIBLE CONSTRUCTION AREA SHALL BE MAINTAINED BY THE FUTURE HOMEOWNERS ASSOCIATION OR FUTURE PRIVATE HOMEOWNER DEPENDING ON FUTURE DEVELOPMENT ALONG THE WILDLIFE CORRIDOR.

FUEL MANAGEMENT AREA:
30' LANDSCAPED IRRIGATED SLOPE DEVOID OF PLANT MATERIAL FROM OCFA UNDESIRABLE PLANT LIST. INSTALLED NON-INVASIVE PLANT MATERIAL SHALL BE FROM THE OCFA APPROVED PLANT LIST.

SPECIAL MAINTENANCE AREA 1:
30' PLANTED WITH FIRE RESISTIVE NATIVE VEGETATION AND REMOVAL OF OCFA UNDESIRABLE PLANT SPECIES. VEGETATION IN THIS AREA TO BE A MINIMUM OF 50% CACTUS .

SPECIAL MAINTENANCE AREA 2:
INDICATED 30' PLANTED AREA WITH FIRE RESISTIVE NATIVE VEGETATION AND REMOVAL OF OCFA UNDESIRABLE PLANT SPECIES. VEGETATION IN THIS AREA TO BE A MINIMUM OF 70% CACTUS OR 50% CACTUS AND 20% ROCK.

## SYMBOL LEGEND

RADIANT HEAT CONSTRUCTION ZONE:
ANY STRUCTURE WITHIN 100' OF THE NON-COMBUSTIBLE CONSTRUCTION AREA AS INDICATED ON PLAN SHALL COMPLY WITH ALL SECTIONS OF THE 2010 CALIFORNIA BUILDING CODE CHAPTER 7A OR 2010 CALIFORNIA RESIDENTIAL CODE SECTION R327 EXCEPT FOR WINDOWS AND DOORS. REFER TO EXAMPLE SCREENING FORMS PROVIDED ON THIS PLAN.

RADIANT HEAT WALL
CONSTRUCTED PER THE REQUIREMENTS ON THE DETAIL PROVIDED ON THIS PLAN SHEET PFM-5. FINAL DESIGN TO BE PROVIDED BY A LANDSCAPE ARCHITECT.

FUEL MANAGEMENT SECTION LOCATIONS:
REFER TO THIS SHEET FOR FUEL MANAGEMENT SECTIONS ON PAGE PFM-6.

25' WIDE ACCESS SHALL BE ABLE TO SUPPORT TYPE III FIRE APPARATUS

TURN AROUND PROVIDED AT END OF 25' ACCESS

BORREGO CHANNEL CROSSING

INTERIOR CORRIDOR HABITAT MANAGEMENT AREA
VEGETATION MANAGEMENT LIMITED TO REMOVAL OF INVASIVES, REMOVAL OF CHAPARRAL SPECIES AND LIMITED REMOVAL OF CERTAIN COSTAL SAGE SCRUB SPECIES WITHIN OPEN SOUTHERN CACTUS SCRUB AREAS AS DESCRIBED WITHIN THE IRVINE WILDLIFE CORRIDOR PLAN.

FIRE ORANGE COUNTY REVIEWED CALIFORNIA FIRE AUTHORITY

176729

SCALE: 1" = 100'-0"

0 100' 200' 300' 400'

NORTH

| | | |
|---|---|---|
| IRVINE WILDLIFE CORRIDOR PLAN | PLAN SET: | "B" |
| PLAN CONTROL | DATE: | 10/04/2013 |

PREPARED FOR:
HERITAGE FIELDS EL TORO, LLC
25 ENTERPRISE
ALISO VIEJO, CA 92656

ENGINEER:
RBF CONSULTING
14725 ALTON PARKWAY
IRVINE, CALIFORNIA 92618-2027
949.472.3505 FAX 949.472.8122
www.RBF.com

BIOLOGIST:
GLENN LUKOS ASSOCIATES, INC.
29 ORCHARD
LAKE FOREST, CA 92630

PREPARED BY:
firesafe PLANNING SOLUTIONS
302 N. EL CAMINO REAL, SUITE 202
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# PRELIMINARY FUEL MANAGEMENT PLAN
# IRVINE WILDLIFE COORIDOR PLAN
## FUEL MANAGEMENT LAYOUT SEGMENTS 3 SOUTH AND 4
IRVINE, CA - OCFA SR# 176729
ORANGE COUNTY FIRE AUTHORITY

SHEET
PFM-5
OF 6



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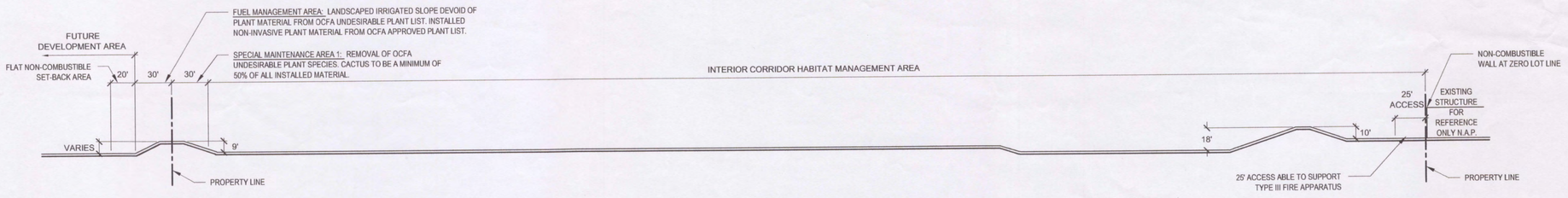
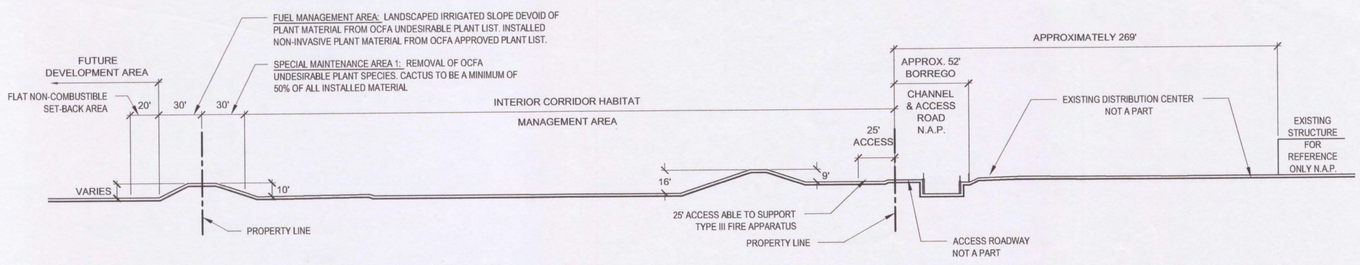
## SECTION 1 - 1



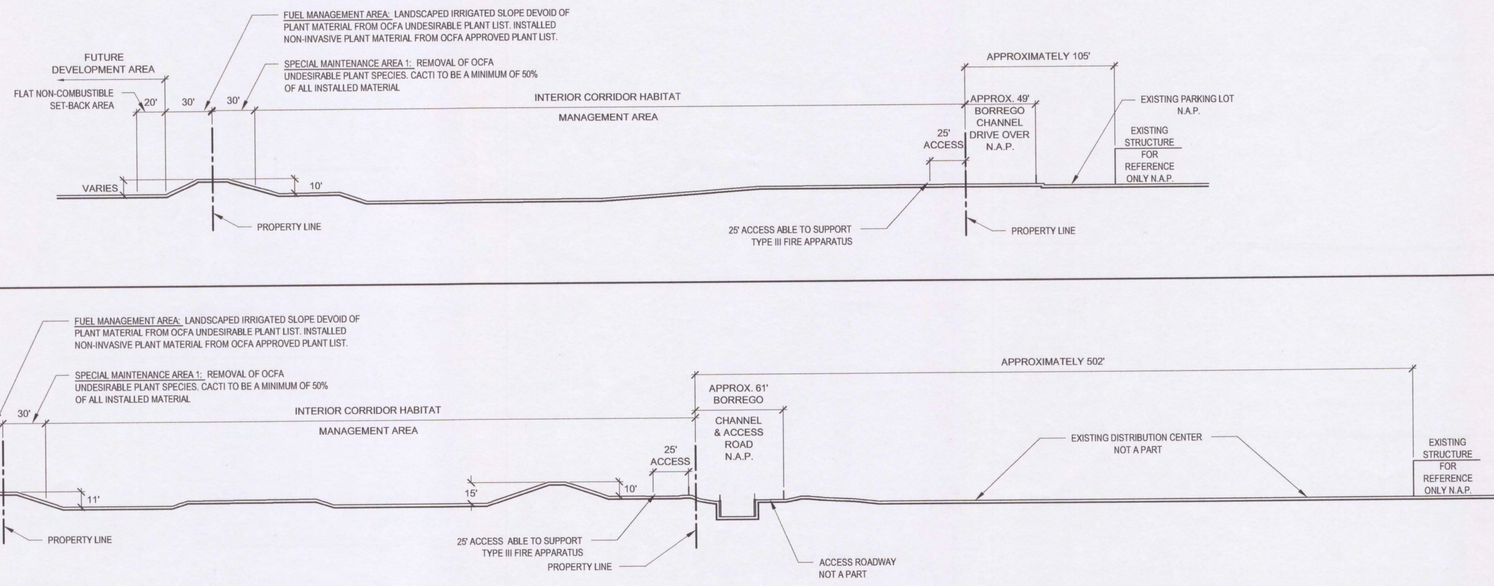

SCALE: 1" = 50'

## SECTION 2 - 2



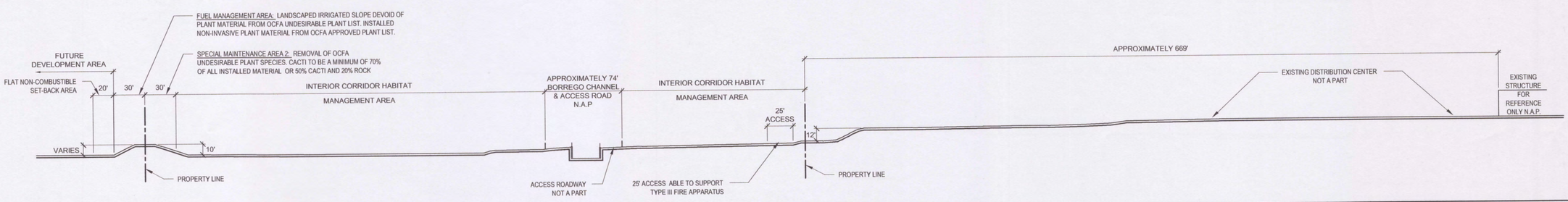

SCALE: 1" = 50'

## SECTION 3 - 3



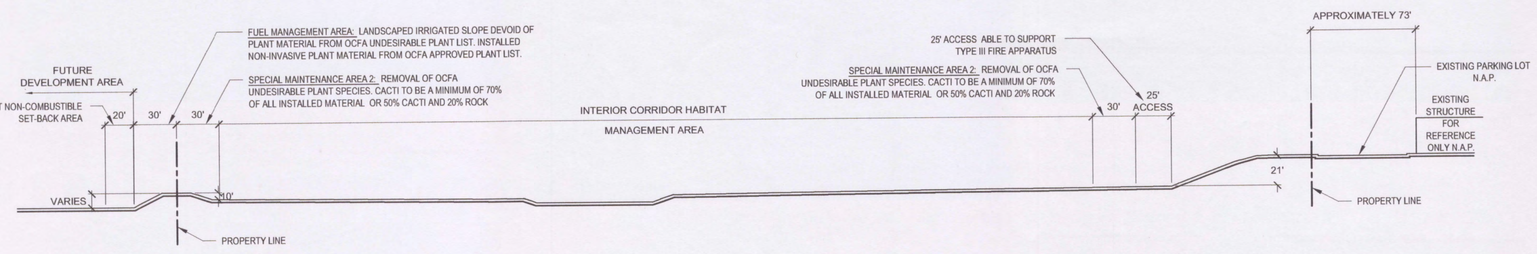

SCALE: 1" = 50'

## SECTION 4 - 4



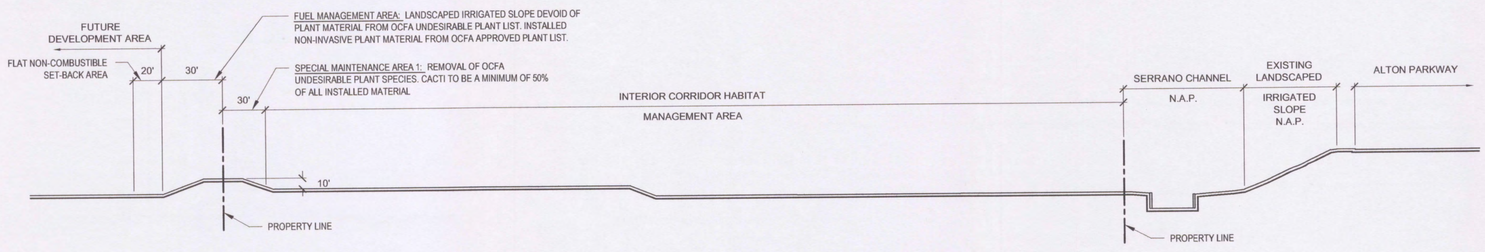

SCALE: 1" = 50'

## SECTION 5 - 5



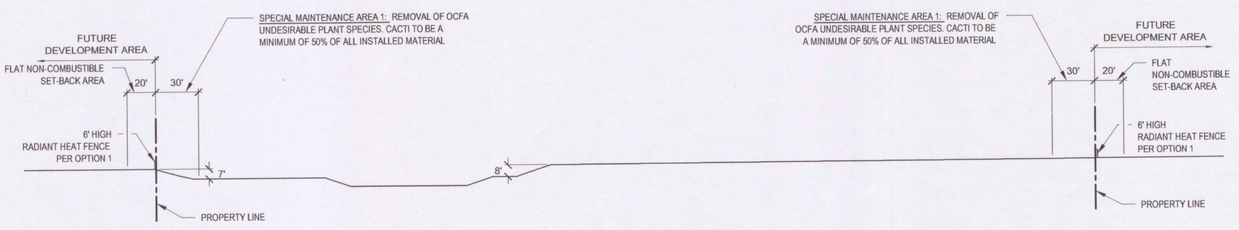

SCALE: 1" = 50'

## SECTION 6 - 6



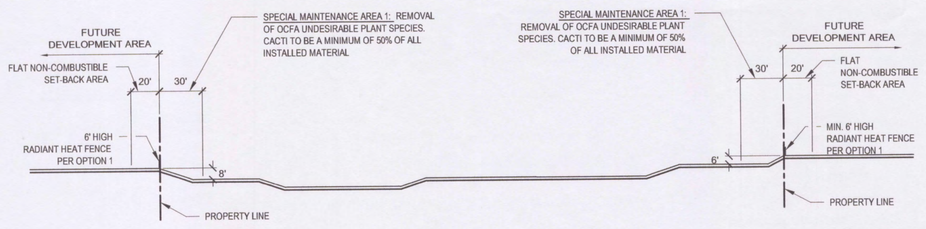

SCALE: 1" = 50'

## SECTION 7 - 7



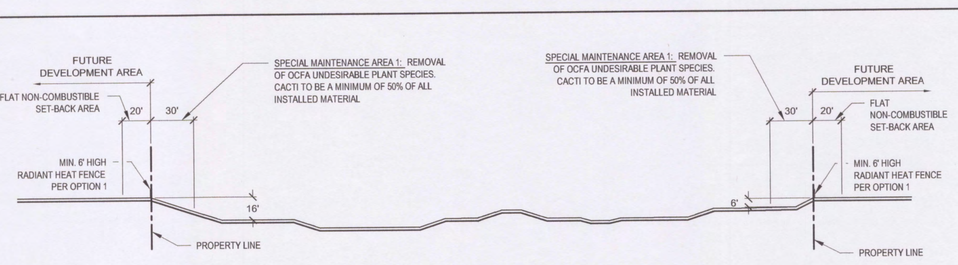

SCALE: 1" = 50'

## SECTION 8 - 8




SCALE: 1" = 50'

## SECTION 9 - 9



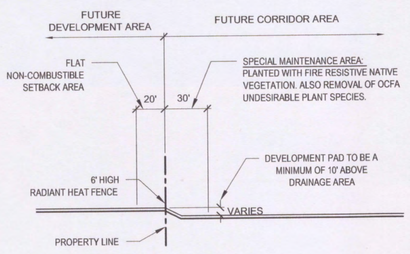

SCALE: 1" = 50'

## SECTION 10 - 10

### INTERFACE OPTIONS FOR SEGMENTS 3 SOUTH AND 4

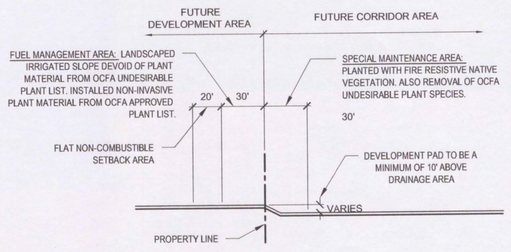
OPTION 1

A thirty foot Special Maintenance Area within the Corridor planted with fire resistive native vegetation as well as removal of OCFA Undesirable Plant species, a six foot high radiant heat fence (block wall or combination tempered glass and block view fence) and a twenty foot flat non-combustible set back zone.




OPTION 2

A thirty foot Special Maintenance Area within the Corridor planted with fire resistive native vegetation as well as removal of OCFA Undesirable Plant species, a thirty foot Fuel Management Zone on the development side followed by a twenty foot non-combustible setback zone.




PER THE IRVINE WILDLIFE CORRIDOR FEATURE FIRE RELATED PROGRAM, TWO (2) OPTIONS FOR SEGMENTS 3 SOUTH AND 4 WERE JUSTIFIED. A FINAL DECISION FOR THESE OPTIONS WILL BE MADE AT THE TIME OF THE PRECISE FUEL MANAGEMENT PLAN.

REVIEWED FIRE ORANGE COUNTY CALIFORNIA AUTHORITY
176729

| IRVINE WILDLIFE CORRIDOR PLAN | PLAN SET: "B" |
|---|---|
| PLAN CONTROL | DATE: 10/04/2013 |

PREPARED FOR:
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EL TORO, LLC
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# PRELIMINARY FUEL MANAGEMENT PLAN
# IRVINE WILDLIFE COORIDOR PLAN
## FUEL MANAGEMENT SECTIONS
IRVINE, CA - OCFA SR# 176729
ORANGE COUNTY FIRE AUTHORITY

SHEET
PFM-6
OF 6



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