

Fire Ecology and Management of Vegetation Types

Fire Ecology and Management of Monrovia Foothills Vegetation Types.....	2
4.1. Vegetation Communities of the Monrovia Foothills.....	2
4.1.1. Rare and Protected Plants and Wildlife of the Monrovia Foothills	5
4.2. Chaparral and other Scrub-Type Vegetation.....	9
4.2.1. Chaparral Plant Adaptations to Fire	10
4.2.2. Chaparral Fire Regime	11
4.2.3. Chaparral Conservation and Fuel Modification Objectives.....	13
4.2.4. Chaparral Fuel Modification Treatment Prescription.....	15
4.3. Oak Woodland.....	18
4.3.1. Oak Woodland Role of Fire	18
4.3.2. Oak Woodland Fire Regime.....	19
4.3.3. Oak Woodland Plant Adaptations to Fire.....	19
4.3.4. Oak Woodland Conservation and Fuel Modification Objectives	19
4.3.5. Oak Woodland Fuel Modification Treatment Prescription.....	20
4.4. Riparian	22
4.4.1. Riparian Role of Fire	23
4.4.2. Riparian Fire Regime.....	23
4.4.3. Riparian Plant Adaptations to Fire	24
4.4.4. Riparian Conservation and Fuel Modification Objectives.....	24
4.4.5. Riparian Vegetation Fuel Modification Treatment Prescription.....	24
4.5. Grassland	26
4.5.1. Grassland Role of Fire	27
4.5.2. Grassland Fire Regime.....	27
4.5.3. Grassland Plant Adaptations to Fire	27
4.5.4. Grassland Conservation and Fuel Modification Objectives	27
4.5.5. Grassland Fuel Modification Treatment Prescription.....	28
4.6. Landscape-Level Fuel Management in Monrovia’s Wildland Interface	29
4.7. Monrovia Foothills Best Management Practices	30
4.7.1. Tree Planting and Care.....	33
4.8. Seasonal Guide to Fire Preparedness	36
4.9. Plant Lists.....	37

Fire Ecology and Management of Monrovia Foothills Vegetation Types¹

4.1. Vegetation Communities of the Monrovia Foothills

The distribution of different types of vegetation within the fire hazard portion of Project Area is shown in Figure 4-1. The mapped units are what ecologists call *vegetation communities*² and they are identified in Table 4-2, and further described in the subsections below. The map is founded on vegetation maps of the Hillside Wilderness Preserve (HWP), which were created previously for the environmental documentation during 2006 and 2010. As the CWPP project area covers an additional area of about 1,000 acres that are outside of the HWP, the previously mapped area has been extended to the WUI border by means of extrapolating from the mapped vegetation zones using aerial photograph review. Figure 4-1 presents the resulting vegetation map.

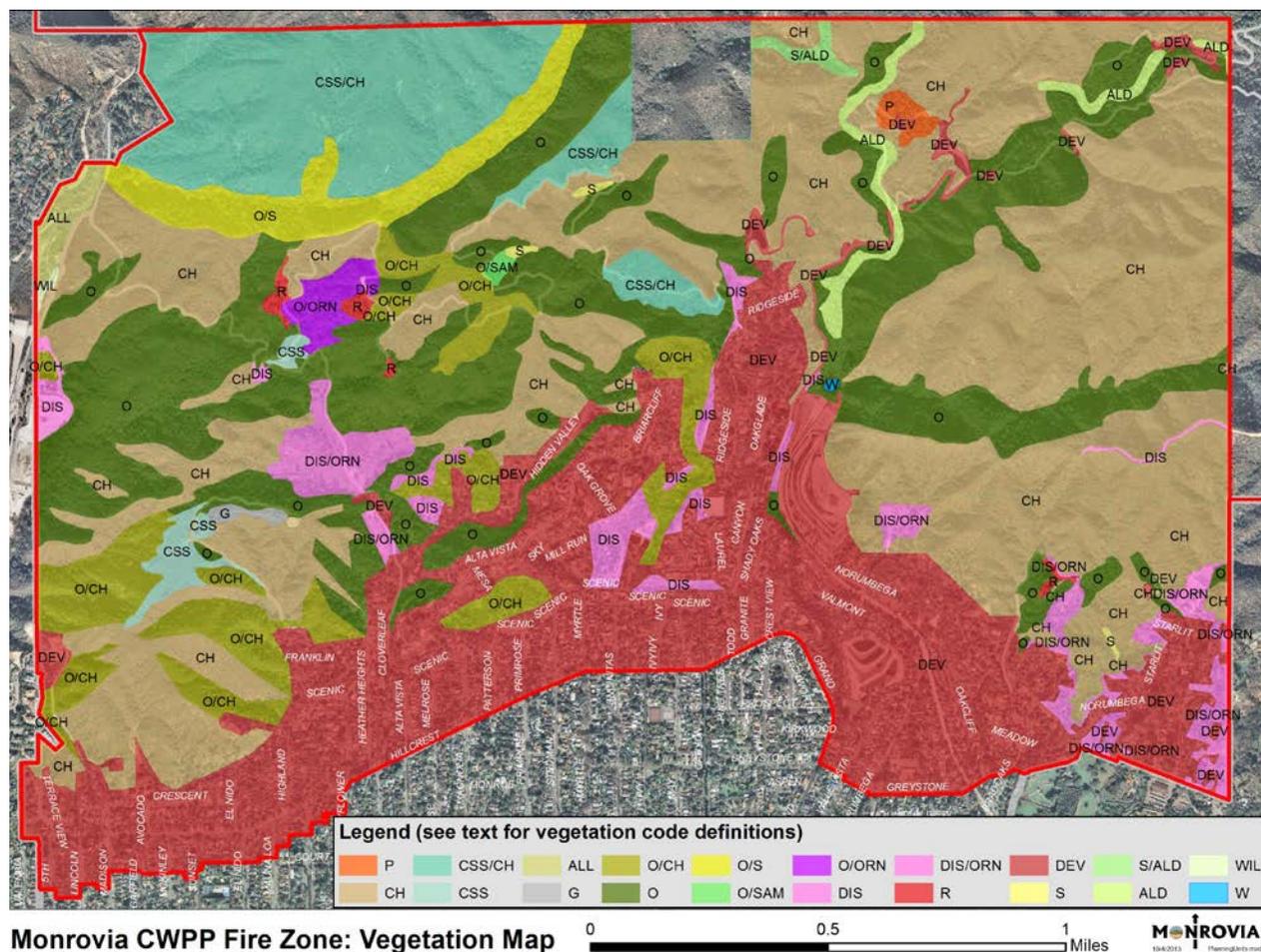


Figure 4-1: Monrovia CWPP Fire Zone Vegetation Map

¹ This section is adapted from a publication by Marko Bey, Lomakatsi Ecological Services, and Susan Britting, Ph.D., and a report, "Vegetation Ecology and Management in the Monrovia Foothills: Best Management Practices for Living with Wildfire", April 22, 2011, by Daniel S. Cooper, Cooper Ecological Monitoring, Inc., 5850 W. 3rd St., #167, Los Angeles, CA 90036, prepared for the City of Monrovia. The original Cooper report is provided in Appendix A-1 of this CWPP.

² Vegetation Community: A group of plants that are interrelated and occupy a given area.

Table 4-1 Monrovia CWPP Fire Zone Vegetation Summary

Vegetation Type	Vegetation Community	Conservation Status	Acres
Chaparral			812.2
	Southern Mixed Chaparral (CH)		812.2
Scrub			211.4
	Alluvial Fan Scrub (ALL)	Rare ³	10.2
	Coastal Sage Scrub (CSS)	Rare	14.3
	Coastal Sage Scrub/Chaparral Ecotone (CSS/CH)		186.9
Oak Woodlands			664.6
	Southern Coast Live Oak Woodland (O)	Rare	462.2
	Oak/Chaparral Ecotone (O/CH)		132.2
	Mixed Oak/Ornamental Landscaping (O/ORN)		12.9
	Oak/Sycamore Woodland (O/S)		55.6
	Oak/Sambucus(Elderberry) Ecotone O/SAM		1.8
Riparian			28.0
	Alder Riparian Forest (ALD)		19.2
	Sycamore Riparian Woodland (S)	Rare	2.1
	Sycamore/Alder Riparian Woodland (S/ALD)		5.3
	Water (W)		0.4
	Willows (WIL)		1.0
Grasslands			2.7
	Grassland (G)		2.7
Developed and/or Disturbed			715.8
	Developed Areas (DEV)		613.0
	Disturbed (DIS)		33.0
	Disturbed/Ornamental Landscaping Mix (DIS/ORN)		58.8
	Pine Species (P)		5.4
	Rural Residential (R)		5.6
Grand Total			2434.8

In Figure 4-1 and Table 4-1 we present the vegetation distribution within only that portion of the CWPP project area that is within the Very High Fire Hazard Severity Zone (VHFHSZ). We do not include the vegetation within the Ember Protection Zone (EPZ) because that area is removed from the wildland vegetation, or of the Safety Zone (SZ) because that area is even more urbanized. However, we need to recognize that this is a simplification of conditions: significant areas of almost-wild vegetation may exist within urbanized areas, and vice versa.

Following are brief descriptions of these vegetation types. (Each is discussed in greater detail in the subsequent sections devoted to their fire ecology and management.)

³ Reference/explanation needed.

Chaparral

Chaparral vegetation (CH) consists of evergreen, dark - green leaved, medium - height to tall shrubs that are adapted to occasional wildfires. Plant species commonly found in the chaparral in Monrovia include laurel sumac (*Malosma laurina*), chamise (*Adenostoma fasciculatum*), toyon (*Heteromeles arbutifolia*), and redberry (*Rhamnus crocea*). As the community matures, it becomes woody and produces high fuel loads. Chaparral is found on steep slopes of all aspects in the Project Area. In some areas, the coastal sage scrub elements exist in patchy association with chaparral. Scrub oak (*Quercus berberidifolia*) also occurs sporadically throughout this community. Also noteworthy is a stand of arborescent goldenbush (*Ericameria arborescence*) that is found in a historically excavated bowlshaped area located north of Highland Place. This species appears to be only sporadically found throughout the surrounding hillside areas.

Scrub

Scrub also describes a principally shrub vegetation types, often nicknamed “soft chaparral”. Plant species commonly found in the scrub in Monrovia include California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), white sage (*Salvia apiana*), black sage (*Salvia mellifera*), and deer weed (*Lotus scoparius*). Urbanization and agricultural land conversion have resulted in a dramatic loss of scrub habitat in southern California, which makes this remaining habitat in Monrovia especially important. Coastal sage scrub (CSS) communities are scattered throughout the site in relatively small patches on ridge tops and hillsides. These communities are interspersed with the more common chaparral habitat – this vegetation is known as an “ecotone” – an area in which different plant communities grade into one another (CSS/CH) . Alluvial fan scrub (coded ALL) has been mapped only in two areas: approximately 10 acres at the extreme west side of the project area, adjacent to Santa Anita Canyon and a small fragment of <1 acre that has been observed adjacent to the park on upper Grand Ave., adjacent to settling ponds along a wash, owned and operated by the Los Angeles Co. Flood Control District. This vegetation type is typically restricted to alluvial fans and flood plains, which tend to be altered by flood control activities that circumvent the periodic flooding necessary to maintain the habitat.

In subsequent sections, Chaparral and Scrub will often be grouped together, as they often intermix in Monrovia hillsides.

Riparian

Riparian habitats consist of trees, shrubs, or herbs that occur along watercourses and bodies of water. The vegetation is adapted to flooding and soil saturation during at least a portion of its growing season. Riparian communities are considered sensitive by the California Department of Fish and Wildlife. Of the riparian vegetation communities occurring in the CWPP area, white alder (*Alnus rhombifolia*) riparian woodland (ALD) is the most widespread. Occasionally, small stands of mulefat scrub habitat, which is typically composed of dense, monotypic stands of mulefat (*Baccharis salicifolia*) often accompanied by coyote brush (*Baccharis pilularis*), Mexican elderberry (*Sambucus mexicana*), poison oak (*Toxicodendron diversilobum*), and coastal goldenbush are observed in small areas.

Southern Coast Live Oak Woodland

Coast live oak, the dominant woodland community tree species in the Monrovia foothills, is typically located on the north - facing slopes where dense stands of oaks form a closed canopy. These woodlands are present on upper slopes with chaparral community, in drainages where it intermingles with riparian vegetation, and also within residential foothill communities. Southern coast live oak woodland is dominated by coast live oak (*Quercus agrifolia* var. *agrifolia*) with associated shrubs such as scrub oak, holly - leaved redberry (*Rhamnus ilicifolia*), lemonade berry (*Rhus integrifolia*), golden currant (*Ribes aureum*), California coffee berry (*Rhamnus californica* ssp. *californica*), toyon, fuchsia - flowered gooseberry (*Ribes speciosum*), Mexican elderberry, and heart - leaved penstemon (*Keckiella cordifolia*). Poison oak is widely represented in this habitat type. In moister areas, ferns and deep leaf litter are common components of the understory, while in parts of this community found upslope, the understory is similar to that found in chaparral.

Developed and/or Disturbed Areas

This category incorporates a range of land cover that is dominated by human rather than natural influence. Developed areas (DEV) include the built landscape as well as ornamental landscaping. Residential neighborhoods fall principally into this category, as do developed areas within Canyon Park and the Trask Boy Scout Camp, historic sites that were formerly developed, private residences and the associated landscaping on the privately held parcels along the Lower Clamshell motorway (mapped as “Rural Residential” - R), paved and unpaved roads, and water tanks and reservoirs. Ornamental landscaping (ORN) consists of introduced trees, shrubs and turf grass found in residential neighborhoods and in Canyon Park adjacent to the parking lots and the nature center. Some of these species are escaping from the previously cultivated areas and spreading into surrounding native habitat. Disturbed sites (DIS) are those that have been graded or cleared of natural vegetation by human or natural means, including those cleared for fuel modification or graded as roads or trails. They may be partly bare or taken over by opportunistic weeds. Disturbed areas and ornamental landscaping mix in many areas. These include abandoned agricultural areas, specifically, the former Lux Arboretum property, former San Lorenzo Nursery and the Bowden property, where many ornamental trees and shrubs are prevalent. Many of the exotic species are interspersed with native species at boundaries. The Pine category refers to ornamental plantations of non-native species of pine that are located within Canyon Park and Trask Scouts Camp. These pines may have been planted to evoke a “woody” look, however within the Monrovia foothills, there is no native pine or coniferous tree. Our closest native conifer is the Big-Cone Douglas Spruce (*Pseudotsuga macrocarpa*), found at higher elevations in our adjacent mountains. However, within the Monrovia foothills, pines and other conifers are not generally well-adapted and may be particularly susceptible to drought stress and insect and wind damage.

As the map, table, and above descriptions reveal, several diverse vegetation types are found in the area, which range the full spectrum from urban areas to pristine natural landscapes. Also found within the area are several plant communities that are considered environmentally sensitive or rare.

4.1.1. Rare and Protected Plants and Wildlife of the Monrovia Foothills⁴

Our Monrovia foothills are rich in biological diversity, and are host to some rare and even endangered species. Most Monrovia residents are familiar with the term “endangered species,” which is associated with the Federal Endangered Species Act (ESA), passed by the U.S. Congress in 1973.

The ESA is one of a number of Federal, State and local programs for protection of plants, animals, and their habitats that Monrovians need to be aware of when considering management of our foothill vegetation.



⁴ Based on presentation given December 5, 2012 by Daniel S. Cooper, Cooper Ecological, for the Monrovia CWPP Advisory Group.

Here is a brief list⁵:

Federal	Endangered Species Act (USFWS; plants/animals) Clean Water Act (U.S. Army Corps; major streams)
State	Endangered Species Act/CEQA (CDFW; plants/animals) California Environmental Quality Act Clean Water Act (CDFW; “blue line” streams) Migratory Bird Treaty Act (CDFW; native nesting birds)
L.A. County	Regional Planning (Oak Tree Ordinance) Public Works (Debris basins)
City of Monrovia	Oak Tree Ordinance (MMC 17.20.040) ⁶ Wildlife Ordinance (MMC 6.30)

The highest level of protection goes to plant and animal species that are in the greatest peril of extinction and have been legally designated as threatened or endangered by the State of California or by the U.S. Congress. Many additional species, as well as plant communities and wildlife habitats have not received this designation but are still considered to be environmentally sensitive, declining or rare, and these receive some protection as well from other laws. The affected species or plant communities are listed in Tables 4-2, 4-3 and 4-4) and discussed further in the sections addressing specific vegetative communities, later in this chapter.

When Monrovia residents work in their landscape to create or maintain defensible space, they need to be aware that all native bird species are protected by the Migratory Bird Treaty Act (MBTA), but only when actively nesting (late winter - early summer). Ninety percent (90%) of nesting occurs in April and May, for all species, however, raptors typically nest earliest and may nest as early as January. This includes the red-tailed hawk and Cooper’s hawk, our most common raptors. Therefore, the California Department of Fish and Wildlife (CDFW) requires that surveys begin January 1st for raptors, and February 15th for the remaining species. Typically, prior to a fuel reduction project, a biologist or other trained person surveys the project area for nests, and if any active nests are detected, will monitor the nest until the chicks have fledged, at which time the project may commence.

Table 4-2 Rare Vegetation Communities of the Monrovia foothills

Oak woodland
Coast live oak woodland containing:
Engelmann oak
San Gabriel Mountain Leather Oak
Riparian vegetation
Sycamores, alders, willows in streams
Mulefat thickets
Alluvial fan scrub (in washes)

⁵ USFWS: United States Fish and Wildlife Service; CEQA: California Environmental Quality Act; CDFW: California Department of Fish and Wildlife; MMC: Monrovia Municipal Code

⁶ <http://www.cityofmonrovia.org/hpc/page/oak-trees>

Table 4-3 Rare Plants Known or Likely to Occur in the Monrovia Foothills

Name	Status ⁷	Notes
Braunton's milk-vetch	FE, CNPS 1B	arid scrub/ridgetop chaparral
Slender mariposa-lily	CNPS 1B	Arid scrub/ridgetop chaparral
Plummer's mariposa-lily	CNPS 1B	Arid scrub/ridgetop chaparral
Rare dudleyas (2)	CNPS 1B	rock walls of canyons
San Gabriel Mountains bedstraw	CNPS 4	Arid scrub/ridgetop chaparral
Mesa horkelia?	CNPS 1B	very few records; alluvial washes
Sonoran maiden fern	CNPS 2	deep canyons; (clinging to canyon walls)
Robinson's pepper-grass	CNPS 1B	Arid scrub/ridgetop chaparral
San Gabriel Mountains Leather-Oak	CNPS 4	

Figure 4-2 at the end of this chapter shows the location of the critical habitat for the endangered Braunton's milk-vetch, the location of known occurrences of this species along the Lower Clamshell Motorway, and of rare vegetative communities within Monrovia's hillsides.

Table 4-4 Rare Animals Known or Likely to Occur in the Monrovia Foothills

Name	Status ⁸	Notes
Coast Range newt	CSC	permanent streams/canyon bottoms
Southwestern pond-turtle	CSC	permanent streams/canyon bottoms
Two-striped garter-snake	CSC	permanent streams/canyon bottoms
Black swift	CSC	permanent streams/canyon bottoms (nests only at remote waterfalls)
Yellow warbler	CSC	permanent streams/canyon bottoms
Yellow-breasted Chat	CSC	permanent streams/canyon bottoms
Mountain lion	Special protection in CA	permanent streams/canyon bottoms
Coast horned lizard	CSC	Arid scrub/ridgetop chaparral
Coast patch-nose snake		Arid scrub/ridgetop chaparral
San Diego desert woodrat		Arid scrub/ridgetop chaparral

4.1.1.1. Management of Braunton's Milkvetch on the Lower Clamshell Motorway

Planning for the repair and maintenance of the Lower Clamshell Motorway will have to take into account the presence of the Federally-endangered plant species, Braunton's milkvetch, abbreviated as BMV, (scientific species name *Astragalus brauntonii*), and the designated critical habitat for that species, which overlaps the road, as seen in Figure 4-2 at the end of this chapter. The area designated as critical habitat for BMV within the Monrovia foothills comprises roughly 280 acres. The observed occurrences of this species lie along an approximately ½-mile segment of the Lower Clamshell Motorway.

⁷ FE: Federally Endangered; CNPS: California Native Plant Society; ranking system from 1A (most in peril) to 4 (less peril) is as follows: 1A=Extirpated in CA and rare/extinct elsewhere. 1B=Rare CA endemics (only found in CA). 2A=Extirpated in CA but more common elsewhere. 2B=Rare in CA but more common elsewhere. 3= Under review. 4= Watch list. As accessed 10/4/13 at <http://www.cnps.org/cnps/rareplants/ranking.php>

⁸ CSC = California Species of Special Concern

The United States Fish and Wildlife Service (USFWS) regulates management of BMV under the Federal Endangered Species Act (ESA)⁹. BMV was listed under the ESA in 1997 (62 FR 4172; 12/01/1997). A recovery plan for this species was completed in 1999, which indicated only four areas where the species was found – the Simi Hills, the Santa Monica Mountains, the Santa Ana Mountains, and Monrovia, noting that all occurrences of the plant were in areas of expanding human development. The recovery plan lays out general strategies for stabilizing existing BMV populations and conducting further research required before specific management actions can be determined to promote the species' recovery. (USFWS 9/30/1999 "Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin" http://ecos.fws.gov/docs/recovery_plan/990930a.pdf).

The California Department of Fish and Wildlife (CDFW, formerly California Department of Fish and Game) regulates BMV by virtue of its jurisdiction over the conservation, protection, and management of California wildlife, native plants, and habitat necessary to maintain biologically sustainable populations (Fish and Game Code §1802). BMV meets CDFW's criteria as a "special status species", which also occasions protections under the California Environmental Quality Act (CEQA)¹⁰.

CDFW met with City and County representatives in September 2004 to discuss maintenance needs on the Clamshell Motorway, with regard to protection of the BMV. CDFW summarized this meeting and prepared a series of recommendations in a letter dated September 30, 2004, addressed to Mr. William Romo, County of Los Angeles Fire Department. That letter is included in A-1e. The CDFW personnel involved were C. F. Raysbrook, Regional Manager and Mary Meyer, Plant Ecologist (805) 640-8019. CDFW's recommendations included both short- and long-term actions, as follows:

CDFW Short –Term Recommendations:

- Limit grading to a single blade width (the width of an automobile)
- Use hand crews only for clearing of road shoulders and edges.
- CDFW collect seed material

CDFW Long-Term Recommendations:

- Minimize introduction of weeds, specifically "Bush pea" (*Bituminaria bituminosa*), observed along the roadway
- Removal of invasive Bush pea
- Establishment of localized BMV stimulation/introduction treatment sites off the roadway

Critical habitat for BMV was designated by USFWS in 2006 (71 FR 66374) and comprised a total of 3,300 acres in Ventura, Los Angeles and Orange Counties. Approximately 280 acres of these are in the Monrovia foothills. Links to the ESA, and associated rules listing BMV and designating its critical habitat are included in Appendix A-1.

A 5-year review of the species' status was conducted by USFWS in 2009. This review found no change in the species' status since the time of listing. Included among the recommendations in this review was one with direct bearing on management of the Lower Clamshell Motorway: "Work with local agencies, fire departments, and utility companies to ensure that maintenance activities, such as grading of roads and/or mowing along dirt fire access roads

⁹ United States Endangered Species Act of 1973 <http://www.fws.gov/endangered/laws-policies/>

¹⁰ California Environmental Quality Act of 1970 <https://www.dfg.ca.gov/habcon/ceqa/ceqapolicy.html>

and utility corridors, do not negatively impact *Astragalus brauntonii*. This includes conservation measures such as waiting until seeds mature to cut plants, and depositing plants and seeds on-site so that they replenish the seed bank.” (USFWS Braunton’s milk-vetch (*Astragalus brauntonii*), 5-Year Review: Summary and Evaluation, January 2009 http://ecos.fws.gov/docs/five_year_review/doc2381.pdf)

USFWS initiated its second 5-year review of the status of BMV, beginning on April 1, 2013, and has requested that the public provide any information that may be relevant to this review. The contact person is:

Connie Rutherford, Listing and Recovery Coordinator— Plants,
U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office,
2493 Portola Road, Suite B, Ventura, CA 93003.
805-644-1766 (phone); fw8vfw05year@fws.gov (email).

The results of the latest review have not yet been published.

The above documents and agency personnel should be referred to when planning projects to repair and maintain the Lower Clamshell Motorway in order to protect the endangered species there.

4.2. Chaparral and other Scrub-Type Vegetation

Scrub-type vegetation includes Chaparral, Coastal Sage Scrub, and other scrub-types. We will discuss them together, but point out some distinctions in their response to fire.

Chaparral is the most extensive habitat in Monrovia’s foothills, representing about half the acreage of all native habitats present. The local subtype, formerly called “Southern Mixed Chaparral” (Holland 1986), is a highly diverse, heterogeneous mix of tall, dense shrubs interspersed with shorter, more open vegetation that develops on steep slopes and in areas disturbed by earth-moving such as grading. Chaparral plants are mainly evergreen and drop their leaves constantly, year-round, though not all at once (unlike deciduous trees and shrubs). This leaf-drop produces a thick layer of leaves and twigs known as “duff”, which is vital to the survival of the native wildlife of the chaparral and discourages non-native plants from invading. Many chaparral shrubs also maintain a dense growth of seemingly-dead branches around their base. However, despite their dead appearance, these branches are generally alive and functioning as reserves for the plant. Mammals such as dusky-footed woodrat *Neotoma fuscipes* frequently build large stick-nests in these stems.

The same recommendations for chaparral apply the other main arid scrub habitat types in the Monrovia foothills, coastal sage scrub and alluvial fan scrub (the latter being extremely rare locally). Coastal sage scrub is found sparingly at the lowest elevations in the foothills, where it intergrades widely with chaparral. Typically, the most exposed south-facing slopes at the base of the foothills will support low-growing, summer-deciduous coastal sage scrub species (especially California sagebrush *Artemisia californica* and sages *Salvia* spp.), forming a mosaic with larger, evergreen chaparral species such as scrub oaks (*Quercus* spp.), *Ceanothus* and chamise (*Adenostoma fasciculata*). With some exceptions (for example, large evergreen species such as laurel sumac and lemonadeberry) CSS plants are generally weakly woody subshrubs (i.e. sages) or suffrutescents (i.e. deerweed, monkeyflower).

In the lower Monrovia foothills, no chaparral shrub species appears to be truly dominant, though some very common ones include scrub oak (*Quercus berberidifolia*), chamise (*Adenostoma fasciculatum*), laurel sumac (*Malosma laurina*), birch-leaf mountain-mahogany (*Cercocarpus betuloides*), black sage (*Salvia mellifera*), and California sagebrush (*Artemisia californica*), among over a dozen other very common, widespread shrubs. Chaparral plants have a year-round growing season, depending on the species, and stay lush and green if well watered, although in dry areas, some species, such as California sagebrush, may become dormant in late summer. Many, including most local species of California-lilac (*Ceanothus* spp.) and toyon (*Heteromeles arbutifolia*) are winter-blooming, producing fruit and seeds in early spring, while others such as oaks (*Quercus* spp.) bloom (with tiny flowers on catkins) in spring and

produce fruit (acorns) in late summer and fall. Compared with other habitats in California, wildflowers are relatively sparse in dense chaparral, but a few characteristic species include western wallflower (*Erysimum capitatum*), golden yarrow (*Eriophyllum confertifolium*), and California peony (*Paeonia californica*). Often, wildflowers are most diverse on more exposed ridges and other open areas within chaparral itself.

4.2.1. Chaparral Plant Adaptations to Fire¹¹

Fire is a critical component of the life cycle of chaparral, but too-frequent fire can permanently damage chaparral. In the foothills of the San Gabriel Mountains, given natural conditions, chaparral that burns is generally replaced by more chaparral, owing to a combination of coarse, well-drained soil (which discourages non-native weeds), dependable winter rains, and a massive native seed bank both in the local soil and in that of higher slopes. Most of the larger chaparral shrubs re-sprout quickly after fire, often within a few days, even after a hot burn that has left nothing but ash and blackened stumps. The reason for this lies beneath the ground: just a few inches down where fire cannot reach, the root crown of the shrub simply sends up shoots through the loose, burned soil, these shoots sprout leaves, and within a few weeks, the shrubs start growing normally again. Even seemingly delicate plants such as ferns and lilies can quickly re-sprout following fire, using their own ecological adaptations.

Chaparral plant communities have developed important adaptations for fire survival and regrowth. Sprouting from the underground rootstock and the stimulation of seed germination are examples of such adaptations. Some shrub species that usually reproduce by seeds are able to resprout from rootstock after fire; these plants are called *facultative sprouters*.¹² Other shrub species either only regrow from seeds (*obligate seeders*¹³) or from rootstock (*obligate sprouters*¹⁴). Shrub species that usually reproduce by seeds but are also able to resprout from the rootstock after fire, and are called “facultative sprouters”. Other shrub species either regrow only from seeds (“obligate seeders”) or only from rootstock (“obligate sprouters”). A large suite of wildflowers are termed “fire followers”, and may only bloom in the first year or two following a fire – even a small/distant burn. The seeds of many herbaceous plants remain dormant in the soil until germination is triggered directly or indirectly by fire. These are stimulated to germinate by heat or smoke, and include whispering-bells (*Emmenanthe peduliflora*), large-flowered phacelia (*Phacelia grandiflora*), stinging lupine (*Lupinus hirsutissimus*), and several species of poppy (Papaveraceae). However, most species are not fire-followers, and particularly for the long-lived shrubs that dominate the chaparral community, their seedbank in the soil can be seriously depleted by too-frequent fire, such that they may never recover locally (Odion and Tyler 2002, Minnich 2008).

A major difference between chaparral and coastal sage scrub is the relatively minimal presence of obligate seeders in coastal sage scrub and the greater dominance of non-woody species. Although the majority of the shrub species found are considered facultative seeders/sprouters, many of the perennial herbs are obligate resprouters. As in chaparral, coastal sage scrub has a diverse community of herbaceous flora that grows in the first several years following a fire.¹⁵

Chaparral can be damaged by short fire return intervals and high fire frequencies. Slow growing obligate seeder species (i.e. some *Ceanothus* and *Arctostaphylos* species) can be eliminated by a short fire return interval between

¹¹ Material in this section was adapted from Cooper, April 22, 2011 and from the Final Santa Monica Mountains Community Wildfire Protection Plan (SMM CWPP 2013) adopted June 2013, as accessed 10/8/13 at http://fire.lacounty.gov/forestry/PDF/SMM_CWPP_02MAY2012_FINAL_v3.pdf

¹² Facultative Sprouter: A species of plant that can resprout after a fire from the rootstock, although this may not be its usual method of reproduction in the absence of fire. The ability to resprout may be dependent on the intensity of the fire.

¹³ Obligate Seeder: A plant that reseeds itself after fire as a means of recovery and regeneration.

¹⁴ Obligate Sprouter: A plant that resprouts after fires as a means of recovery and regeneration.

¹⁵ SMM CWPP 2013 pg. 43-44

fires because the second fire kills the young plants before they have had time to replenish their soil seed bank (Fross, and Wilken, 2006; Jacobsen et al. 2004).

Facultative sprouters usually suffer some degree of mortality after fire and are therefore susceptible to population declines from repeated fires. While obligate sprouter species experience the least post-fire mortality, there are differences among species and the more sensitive of these can also experience some population declines from repeated fires.

Compared to chaparral, coastal sage scrub (CSS) vegetation contains large amounts of fine fuel and can exhibit intense and rapid moving fire behavior earlier in the season than chaparral. The live fuel component of CSS changes much more rapidly than that of chaparral so that it reaches a critical threshold earlier – but it also recovers from seasonal drought sooner than chaparral.

Coastal sage scrub species exhibit a range of post-fire responses from obligate seeders to obligate sprouters. Fire intensity and increasing age of plants both adversely affect post-fire recovery. CSS species are much more variable in their post-fire survivorship and seedling recruitment than chaparral species and it is much more difficult to predict how it will come back following fire. Small sites with CSS may be extirpated following small fires. Unlike most chaparral species, CSS resprouts often produce large amounts of seed that contribute to abundant seedling recruitment in the second year following a fire.

4.2.2. Chaparral Fire Regime

Historically, in the absence of human-caused ignitions, chaparral fires were ignited only by lightning. Since lightning is rare in Southern California, the timing of chaparral fires – technically termed the “fire return interval” (FRI) – was highly variable, although the intervals tended to be long, on the order of 30 to 200 years¹⁶. This variability added to the biodiversity, giving rise to many different strategies for survival. As discussed in Chapter 3, regardless of return interval, chaparral fires are almost always high-intensity crown fires that burn sufficiently hot to consume all of the aboveground plant material, but leave the underground parts -- roots, tubers and seeds – alive to start the next generation, due to the insulating power of soil.

Chaparral fires generally occur in summer and fall, depending on the dryness of the year and site.

Fire and Invasive Plants in the Chaparral

Monrovians often marvel as we see our hillsides turn lush green with the winter rains, but quickly change to the dun color of dead weeds as summer approaches. This phenomenon is a result of the takeover of our native hillside ecosystems by non-native, invasive annual grasses and other weeds.

According to H. E. Erickson and R. White,¹⁷

Invasive nonnative plants are plants introduced into areas outside of their natural ranges, usually as a result of human activities. Plants that are successful invaders often have high growth rates and typically reproduce prolifically. Thus, they have the potential to spread relatively quickly over large areas. Invasive plants may be responsible for serious, long-term ecological impacts; they can cause the decline of native plant species, disrupt nutrient cycling and hydrology, and alter fire ecology.

¹⁶ California Department of Forestry and Fire Protection and Placer County Resource conservation District, Forestland Steward, Summer 2013, “Fire in California: north vs. south”, pages 4-5.

¹⁷ Erickson, Heather E. and White, Rachel, November 2007; Invasive Plant Species and the Joint Fire Science Program; United States Department of Agriculture Forest Service Pacific Northwest Research Station, General Technical Report PNW-GTR-707.

European settlers introduced many plants to California over the centuries. A number of these plants naturalized and spread, and some became invasive. Among the most widespread invaders are annual grasses such as wild oats, ripgut brome and foxtail barley. Invasive annual forbs include black mustard and Russian thistle. Many perennial plants, such as Giant Reed Grass, Spanish broom, fan palms and others have become problems. Invasive plants in the Monrovia foothills are listed in Table 4-2- at the end of this chapter.

These non-native weeds not only wreak havoc on ecosystems, they themselves actually increase the risk and frequency of fire. From Halsey (*Ibid*, p. 26):

As the amount and type of fuels continues to change in favor of lighter ones, the invasive species alter the fire regime and then flourish under the new environment they create (Brooks et al. 2004). These plants dry out earlier in the spring and thus increase the length of the fire season in the chaparral (Keeley 2000). In addition, they create fine, high surface to volume ratio fuels making them highly combustible (Rundel 1981), increasing probability of ignition.

These invasive plants can affect chaparral ecology and alter the fire regime. As stated by biologist Sabrina Drill:¹⁸

After a fire, disturbed areas are highly prone to invasion by weedy pioneers such as annual grasses. Vegetation types that may have been fire tolerant and recovered well under natural conditions may now be subject to type conversion. Type conversion is a process by which after disturbance, one type of plant community replaces the one that had originally been there. Frequent fires may cause replacement of chaparral by non-native grasslands. There is a feedback loop – exotic grasses invade a natural area, leaving the area more fire prone, then they recover faster than the native plants. Hence, the progression is from a native community, to a native community with some invasive plants, to a community dominated by invasive plants.

From Halsey (*op cit.*, p. 25):

“Because they grow faster and have more aggressive seed dispersal mechanisms, exotic weedy annuals quickly fill in areas scraped clean of vegetation, burned too frequently, or disturbed by other types of activity...Under natural fire regimes, chaparral replaces chaparral. But as fire frequencies increase, exotic grasses and weeds can easily establish themselves and begin the process of type conversion.”

Chaparral Is Not Forest

We stated earlier that chaparral fires are almost always high-intensity crown fires that destroy virtually all above-ground plant parts, but leaving the underground parts. This is true even where chaparral has burned within fewer than 10 years. As the Monrovia fire history maps in Chapter 3 show, and as has been repeatedly observed, a recent fire in the chaparral is no insurance against another one happening very soon – maybe not in the first year or two, while the growth may still be sparse, but very shortly thereafter.

This latter point distinguishes chaparral sharply from forested ecosystems, and causes deep and pervasive confusion in fire policy when we fail to distinguish between them.

While chaparral has only one living layer, or story – the shrub canopy -- forests have multiple layers – they contain the upper tree canopy and one or more understories, plus the forest floor. Tree trunks and major limbs are not easy to ignite, and the more easily-ignitable twigs and leaves of a mature tree are high above the forest floor, where they are – ideally – far away and safe from the flames of a surface fire. Furthermore, our forest ecosystems – at least those in

¹⁸ Drill, Sabrina L., April 2010, Sustainable and Fire-Safe Landscapes: Achieving Wildfire Resistance and Environmental Health in the Wildland-Urban Interface; in *Fremontia – Journal of the California Native Plant Society*; Vol 38 No. 2&3; April and July 2010 (Special Issue: Native Plants and Fire Safety)

California – are typically in mountainous areas where lightning is a frequent occurrence. Without human influence, lightning-sparked fires would burn often – perhaps several times a decade -- but they would only burn through the forest-floor litter and the small understory plants, leaving the mature trees alive and healthy. These frequent, low-intensity burns would maintain the readily-ignitable fuel at a low level, both in height and overall amount. Human intervention, in the form of aggressive suppression of fires, changed this. After decades of fire suppression, the undergrowth built up so much that when fire did come, it could burn all the way into the upper tree canopy, destroying the forest.

Now, forest fire policy has acknowledged this problematic cycle and has sought to return our forests to their natural fire regime by thinning the undergrowth. If we are successful at this, we can hope to reduce the risks and costs of forest fires and at the same time restore the habitat and the natural functioning of the forest ecosystem – a win-win. The Healthy Forests Restoration Act (HFRA), signed into law by George W. Bush, was principally a response to this situation, and promotes fuel reduction by the acre to mitigate the forest fire problem.

As passage of the HFRA indicates, the above understanding of the forest fire problem has been widely understood and accepted by the public. It has entered the common wisdom, in fact, but it also misleads us when we consider fire policy in non-forest ecosystems, such as chaparral.

Chaparral is not forest. Chaparral has only one living story, and when it burns, it burns, basically, to the ground. This is its natural fire intensity. Even aggressive fire suppression does not change this. What humans have changed is that we have moved into the chaparral and sparked frequent fires. And at the same time, we have introduced plants that benefit from this change, and thus take over, and make ignitions even more likely.

4.2.3. Chaparral Conservation and Fuel Modification Objectives

Chaparral conservation has historically been seriously under-appreciated, even by trained biologists, and only recently has this unique natural system been identified for its ecosystem services – such erosion control, and watershed protection, and its biological merits as a storehouse of rare and declining species, endemic/range-restricted species, and obligate species wholly dependent on the chaparral ecosystem for their survival. Chaparral is also a highly variable, strongly seasonal community, with often dramatically different microhabitats forming based on local microclimate, slope, aspect, soil drainage, and other factors. Because of its late winter/early spring growing season, its seasonal flora (which contributes heavily to its diversity) and the presence of seasonally restricted animals (e.g., spring-nesting birds, summer-flying butterflies), its ecological features are not always apparent.

Until recently, the ecological and economic benefits of chaparral were so little-appreciated and the perceived fire behavior of chaparral was so dreaded, that homeowners and land managers typically avoided using native chaparral plants in gardens and landscaped areas and went much further, attempting to entirely eradicate as much chaparral as possible, even beyond cultivated areas. Eradication methods included clearing, disking or tilling, grazing, controlled burning, use of herbicides and introducing replacement vegetation. Popular replacements included introduced groundcovers, such as ivies and ice plants. These shallow-rooted groundcovers have been found to do little to stabilize hillsides against erosion, and when they are not regularly and properly pruned or mowed, develop a hidden thatch layer of dead and dying fuel that can carry a fire. Irrigation – often done in an attempt to keep the plants too moist to burn -- only makes the problem worse, encouraging rampant growth and even-shallower roots. Where eradication was not followed up with planting and maintaining a replacement groundcover, weeds naturally colonized the cleared ground, bringing their own sets of fire, ecological and economic hazards. Moreover, few plant assemblages function as well as native chaparral in its own environment to stabilize hillsides, regenerate after fire, moderate hydrology, and support wildlife.

In recent years, improved practices have been recommended to reduce and restructure chaparral fuels at the urban-wildland interface without completely eradicating or converting the chaparral. These recommendations generally involve pruning and thinning to create an overall reduction in the amount of fuel, and, even more important, to create

openings in both the vertical and horizontal directions to reduce fuel continuity. For example, a dense thicket of scrub oak and chamise might be transformed into an open woodland-like community of scattered shrubs, their limbs starting several feet from the ground, with – at least temporarily – an open understory of grasses and forbs. Certain wildlife species may actually benefit from these changes. For example, mule deer often utilize the newly-opened pathways, and they eat the new growth that is stimulated by pruning. However, the animals that benefit from thinning of chaparral are more likely to be generalists, such as mule deer, rather than species with very particular habitat requirements. Thus, thinning of chaparral may ultimately increase wildlife abundance while decreasing wildlife biodiversity.

Unfortunately, the reality of even our improved approaches is that without diligent maintenance, the understory in such a situation very quickly transforms into an expanse of quick-to-dry annual grasses and weedy forbs that are more prone to ignition than the chaparral community it replaced. Given the susceptibility of chaparral to disturbance and the ubiquitous presence of aggressive weeds ready to colonize any opening, it is almost inevitable that ecological degradation will result from even the most carefully executed fuel reduction projects in chaparral. This degradation will not be limited to invasion by weeds, but will include losses in plant and animal biodiversity, breakdown of soil structure, and increased accessibility by people, whether authorized or not. Restoring degraded chaparral to its natural plant assemblage may not be feasible, so we must commit to bearing the cost of controlling the weeds for the foreseeable future. Therefore, modification of pristine chaparral involves inevitable ecological and economic losses that are justified only if the work is demonstrably needed in order to protect lives and property and if we can commit to the continued maintenance of the area.

For this reason, we strongly recommend that minimal fuel modification be conducted within patches of dense chaparral dominated by native species, particularly when this vegetation occurs on steep slopes (>20%)¹⁹, and only in proximity to roads and structures. We do not recommend the creation of landscape-level preventative fuel breaks within the chaparral because such features have proven ineffective in modifying fire behavior and, if not scrupulously maintained, become more of an ignition risk due to the introduction of a dense growth of annual, non-native grasses into the system²⁰.

Where fuel modification within chaparral is deemed necessary guidelines should be followed:

- Cut only during the winter season (e.g., Nov. – early March), or when sufficient rainfall and lack of wind has decreased the local fire risk. Note though that late March is the start of the nesting bird season (runs mid-Mar. to mid-Aug.).
- Cut only to provide defensible space for structures or access routes or safety zones.
- Do not cut on steep slopes.
- Refrain from cutting in late summer and fall due to risk of catastrophic fire at this time, or during the height of the bird nesting season (i.e., late April – late June), which coincides with the active period for many chaparral organisms, including reptiles and small mammals.
- Avoid cutting of any long-lived, obligate-seeding chaparral species (e.g. scrub oak, *Ceanothus*, mountain-mahogany, etc.). While these plants can persist in the seed bank, they will not continue to rebound in a given area if repeatedly cut (Jacobson et al. 2004).
- Avoid cutting native species that are clearly infrequent or unusual in the area.
- Avoid creating new fuel breaks, which serve to provide non-native, fire-prone annual species with “introduction routes” into a formerly intact, native-dominated habitat.
- Consider retiring fuel breaks that are redundant or that do not clearly improve fire-fighter access to areas around homes. Retired fuel breaks may eventually passively restore themselves, but they will require at least

¹⁹ Recent guidelines adopted by the Santa Monica Mountains National Recreation Area (SMM NRA) set 20% as the upper limit of safe and effective clearing, with no fuel-reduction activity recommended on slopes above 40%.

²⁰ Note: this does not apply to necessary trimming, such as clearing low-hanging limbs from fire roads, maintaining enough distance on either side of the road for emergency vehicles, etc.

monitoring to prevent weed infestation. Most likely, they will also require at least some weed removal, and they may need to be actively restored to a natural shrub environment.

- Avoid clearing in natural drainages, which are often wet year-round, and which pose only a minor ignition risk. Even seasonal drainages in arid areas (such as those that support chaparral) strongly concentrate wildlife species and are extremely vulnerable to invasion by non-native riparian species that can radically alter the natural community.

Post-Fire Restoration of Chaparral

During wildfire incidents, such as the Madison Fire (April 2013), the cutting of firebreaks is a key part of containment of the fire. However, after the fire, these firebreaks may become infested with invasive weeds, which can then spread into the burned area. The source of the invading weed seeds might be an existing seed bank in the soil or an adjacent infestation. However, an additional likely source is the equipment used to create the firebreak (bulldozers, chainsaws, hand tools, etc.) If firebreaks are created in chaparral in the course of fighting a fire, therefore, monitoring for invasive plants and a rapid response to remove identified invasive plants, should be undertaken.

4.2.4. Chaparral Fuel Modification Treatment Prescription

Fuel modification prescriptions are generally developed for large-scale projects, also known as “landscape-level” treatments. These are intended to modify fuel behavior over tens to thousands of acres. In the Monrovia WUI, we are not recommending this sort of landscape level approach. Instead, we are focusing on the Home Ignition Zone (see Chapter 5) and protection of critical infrastructure. The reasoning behind this is set out in Section 4.7 below. The following section provides guidance when doing small-scale projects within a chaparral area.

Treatment Preparation and Layout

Prior to beginning fuel reduction work in chaparral plant communities, it is vitally important that the treatment area is pre-designated and flagged. Since chaparral tends to be contiguous and dense, it is easy to over cut and greatly reduce the vegetative cover.

Begin the *layout*²¹ by selecting the strategic areas to clear chaparral and create openings. If needed, you may delineate these areas with flagging. Select patches with a high proportion of obligate seeders to retain. Continue the layout by selecting the trees to keep and clearing chaparral around them. Planning and layout of fuel treatments in chaparral prior to beginning work will ensure that portions of this diverse habitat are conserved.

Following identification of “cut areas,” identify *leave-patches*.²² These can be of varying sizes based on the site. Make leave-patches bigger at first; their size can be reduced later if needed. When selecting leave-patches, identify natural features that would benefit from retaining vegetation. For example, select leave-patches on steeper areas, or areas where there are healthy and abundant native plant groupings, wildlife habitat zones, along ravines, etc. It is important to read the landscape.

For laying out chaparral fuel treatments, determine a leave-patch color, e.g. green. Laying out a treatment in this plant community will require crawling around on hands and knees; therefore, it is best if two people work together designating the leave-patches. Patches may range in lengths between ten to thirty feet; flag in a random circumference while communicating with the flagging partner regarding what direction to move. Hang 16-inch strips of flagging every ten to fifteen feet so it is clearly visible to whoever will be treating the site later. This leave-patch flagging will identify a “no-cut, no-entry boundary” in which all of the material both dead and alive will be retained.

²¹ Layout: In this case, defining and designating forest operations for a specific location.

²² Leave-Patches: Swaths or clusters of trees or other vegetation that have been selected to remain standing in an area of fuel treatment.

Thinning

Implement mosaic thinning to reduce the abundance of some chaparral while conserving portions of this valuable habitat. Such thinning creates islands, corridors, thickets, and open understory shrub and herbaceous communities of random shapes, sizes, and occurrences.

In chaparral fields, patches will be created to enhance structural habitat diversity and to separate fuel continuity. Impenetrable and contiguously dense chaparral will be separated and thinned to create isolated islands, grouping fuels into clumps. Partial chaparral reduction will be created via random mosaics—or strip patches with the long axis oriented along contours—using a variety of spacing between strip patches of ten to thirty feet. Strip patches should be offset from one another so as not to lie directly up and down the slope (to lower fuel connectivity and erosion potential).

Retain old-growth chaparral individuals by leaving surrounding chaparral intact as a support structure and leave-patch. Within many chaparral zones, old-growth, tree-form-sized manzanita will be present. Sometimes these individuals exceed thirty feet in height. When shrub removal around these trees is too heavy, they can break in half from exposure to weather events such as high winds or snow. Careful consideration should be made to protect these individual locations.

Clumps and groupings of trees will be retained where appropriate. Thinning will occur in a ten-foot radius beyond the drip lines of the outer clump trees. Smaller stems beyond the clumps, and in between and around tree groupings, will be thinned to fifteen by fifteen feet spacing, to break up fuel connectivity between groups of trees in an effort to maintain structural diversity. Forked trees (another element of structural diversity) will be retained for wildlife. Leave-trees will be *limbed up*²³ to ten feet from the ground.

Smaller snags, less than ten inches DBH, will be cut and left as downed wood. Larger snags will be left standing for wildlife habitat. In areas where snags are not abundant, smaller snags may also be retained.

Slash Treatment

*Slash*²⁴ accumulated from fuel treatments in chaparral will be abundant; the disposal of this material will need to be performed carefully. Regardless of what methods are used for slash treatment, it is important that a portion of the cut material be left on site and placed across the slopes of the treatment area for erosion control and soil productivity. Preferred materials for scattering on the slopes are the main chaparral trunks greater than four inches in diameter. The fine (smaller) branches are best removed. These main trunks should make contact with the ground and be left as intact as possible, four to ten feet long. Manzanita trunks are generally smaller in diameter; they can be combined by lying them along the contour of the slope, where they are placed together (either on top of or below each other) to make ground contact. Lay them as close together as possible. Within a year they will sink into the ground and be naturally anchored. By combining four to six smaller-diameter pieces you can increase their total diameter, replicating a log. Wood placement should be done randomly in openings or at the edge of leave-patches. The goal is to have coarse woody material present on the site without creating a fuel problem. This lopping and scattering of the thinned chaparral throughout the site will not significantly reduce fuel hazards, therefore the majority of the cut material will need to be chipped or utilized for biomass.

Prior to planning treatments and utilization strategies it is best to take into consideration each specific treatment location and to estimate both the ecological and economic implications of your biomass and slash disposal strategies. Slash disposal may have greater impact than the initial treatment. An example is steep areas with lengthy yarding distances. Plan slash treatments in a site-specific manner. Even within a twenty-acre property, three different slash treatment methods may be used.

²³ Limb Up: To remove the lower branches from a woody plant to create a defined space between the forest floor and the canopy.

²⁴ Slash: The wood debris left on the ground after pruning, thinning, or brushing—may include branches, bark, chips, or logs.

Chipping and Biomass Utilization

Slash may be disposed by chipping and *biomass* utilization²⁵. Chipping can be expensive, depending on the *site-specific*²⁶ location of your treatment area. For example, if you are working in the middle of a steep slope, far away from road access, the added expense of either *machine yarding*²⁷ materials or hand-carrying them long distances to process can be significant. In areas closest to main roads, secondary logging roads, or skid trails, the removal of biomass can be cost-effective if planned correctly. Choose areas within fifty feet of a road or landing, preferably on a downhill drag; hand-carrying upslope is extremely time-consuming and should be avoided if possible. Where material must be dragged, consider that the dragging process “sweeps” the ground of all material, particularly in the haul routes. Because hand labor is usually used on the steepest slopes, the bare earth that this sweeping produces can be a concern. There will be a tradeoff between erosion potential and future germination of local native plants. The site will need to be re-covered with chips, other small material from the site, or with commercial erosion-control products. Chips should not exceed one inch in depth along the surface. Try to limit the areas subjected to sweeping by designating a few haul routes. In general, areas that are not economically feasible for chipping and biomass utilization are usually areas where ecological impacts would increase from activities due to the difficulties of material extraction. In areas that have limited access or are located at mid-slope or on steeper locations, it can be very expensive (both ecologically and economically) to remove or chip treatment slash.

Grazing

Grazing with goats is sometimes used to reduce fuel loads and remove weeds. The use of goats is free of a number of problems that are sometimes associated with other methods of fuel reduction – for example, the danger of starting a fire by using power equipment or by a prescribed burn getting out of control, or concerns with overspray when using herbicides. Furthermore, goats can graze in terrain too rugged for human workers.

The principal objection to grazing is the potential for dispersal of weed seeds via the goats’ coats or their feces, as some weed seeds can survive a goat’s digestive system. Problems can arise if the goats are moved to a weed-free area from an area infested with a particular weed while it is in flower or fruit, or while seeds remain on the plants. This problem can be avoided by quarantine of the goats until the weed seed is purged from their system. Meanwhile, they need to be fed weed-free forage, and groomed to remove seeds or other *propagules*²⁸ adhering to their coats. The required quarantine period is typically 7 to 10 days.²⁹

Goats are best used in areas that do not have a large number of plants to be retained since all plants (other than large trees) will likely be damaged or killed unless protected. Grazing under contract with a large herd of goats is a possibility for larger acreages; or one to three goats can be grazed on smaller parcels. In this situation, alternate locations should be arranged for additional grazing when they have eaten all undesirable plants on the site. Goats can be placed on any steepness of slope and can generally graze any shape or size of parcel. However, care should be taken with steep slopes because goats can denude the site and cause significant erosion.

²⁵ Biomass: The term "biomass" is used to denote the use of wood as a continuous renewable resource that can be used as a fuel to generate electric power and other forms of energy products.

²⁶ Site-Specific: A specific unit of land marked as a designated area.

²⁷ Yarding: A technique for moving felled trees, limbs, and brush by hauling them to the road with a cable and tractor.

²⁸ Propagule: any portion of a plant, such as a bud or off-shoot, from which a new individual may develop.

²⁹ Davison, Jason; Smith, Ed, and Wilson, Linda; “Livestock Grazing Guidelines for Controlling Noxious Weeds in the Western United States”, University of Nevada (Reno), UNR Cooperative Extension Publication No EB-06-05; accessed on 1/2/12 at <http://www.unce.unr.edu/publications/files/ag/2006/eb0605.pdf>

4.3. Oak Woodland

Oak woodland is one of the iconic natural landscapes of California, including the foothill communities at the base of the San Gabriel Mountains. Unfortunately, each year, more oak woodland is lost to fragmentation, development, disease, and other factors. While mitigation requirements of projects in oak woodland areas frequently require that oak trees are replaced (often at a high ratio, such as 1:3), simply planting young oak trees obviously does not replace a living, functional oak woodland (see: <http://lacountyoakwoodlandplan.org/>). Thus, it is critically important that these woodlands are retained and protected where they still exist.

In the Monrovia foothills, the dominant species of oak is the coast live oak (*Quercus agrifolia*), with two rarer species co-occurring locally, the Engelmann oak (*Q. engelmannii*) and the San Gabriel Mountains leather oak (*Q. durata* var. *gabrielensis*), which is more of a scrub oak than a “tree” oak. Other species of scrub oaks occur (including the widespread *Q. berberidifolia*), but are best considered part of the chaparral community rather than part of oak woodland based on their structure and the species they support. The coast live oak frequently occurs in natural areas of the foothills, and trees have been planted for decades within residential areas of Monrovia. Most of Monrovia’s oaks, whether on private or public property, are protected from removal, cutting, and encroachment by local ordinance (MMC 17.20.040). The definition of “oak woodland” (versus one or more oak *trees*), has been debated by various cities and counties across the state; however, it seems clear that because of the keystone importance of oaks – particularly mature individuals – in the ecology of the foothills, a single tree may legitimately be considered oak woodland, owing to its role in supporting oak woodland species, and the association of oak woodland understory plants with even single trees. Characteristic animal species such as acorn woodpecker (*Melanerpes formicivorus*), oak titmouse (*Baeolophus inornatus*), and California sister (*Adelpha bredowii*), a butterfly, are frequently seen in – and are highly dependent on – single oak trees across the wildland-urban interface.

In many areas, regeneration of oak woodlands has become a problem due to widespread failure of oak seedlings to be *recruited*³⁰ to take the place of aging trees. Some of the factors limiting oak regeneration are known: two of these are grazing by livestock and the decline in predator populations, which caused corresponding explosions in populations of herbivores such as deer and ground squirrels, which eat acorns and young oaks. In addition, it is believed that the spread of introduced annual grasses, which grow rapidly in spring and deplete the soil moisture, has affected oak regeneration. However, the influence of fire on oak regeneration is much less well-understood.³¹ As a result of these various factors, as older oaks die, young oaks are not available to take their place in the ecosystem.

4.3.1. Oak Woodland Role of Fire

Periodic fires in oak woodlands were used by Native Americans to increase acorn yields and promote specific understory plants, such as various basketry materials, as well as types of brodiaea, which produced edible bulbs.³² Large coast live oak trees have the thickest bark of any California oak, which makes them exceptionally fire resistant. Seedlings and saplings, however, may be killed by low to moderately severe fires. However, a typical stand can return nearly to its pre-fire density within about 10 years after a fire.³³

³⁰ Recruitment: the transition of a seedling into a sapling or pole-sized tree.

³¹ Pavlik, Muick, Johnson and Popper, op cit., page 123.

³² Carle, page 67

³³ Sawyer, Keeler-Wolf and Evens, A Manual of California Vegetation, 2nd edition, California Native Plant Society Press, Sacramento, CA, 2009. page 246

4.3.2. Oak Woodland Fire Regime

Historically, fires in these woodlands were usually of low to moderate severity with occasional high-intensity areas. Only a few studies have examined the time between coast live oak woodland fires, and they have proven to be highly variable, in the range of 30-100+ years.

Woodland understory can influence the intensity of a burn in oak woodland; where grasses and herbaceous plants or dry oak leaf duff dominate the understory, woodlands tend to burn less intensely than those dominated by shrubs such as toyon, and oak trees may recover quickly after fire. However, non-native annual grasses (esp. bromes/*Bromus* spp.) and forbs such as poison hemlock (*Conium maculatum*) and thistles (family: Asteraceae), now frequent components of oak woodland understory, may promote an earlier onset to burning season because they dry and cure earlier than native perennials would. Therefore, native scrub in the understory of oak woodland tends to encourage hotter fires, but at the same time reduces the chances of ignition. Living oaks themselves are relatively resistant to ignition even during their dormant period due to retained moisture within the plant tissues.

In an urban interface setting, oak trees may be threatened by fire originating in man-made fuels, such as a home. Other fire threats to oak trees can result from their proximity to hazardous natural or ornamental vegetation – for example, if a thicket of oleander is allowed to encroach within the dripline of an oak, the oleander may provide a fuel ladder, and a heavy fuel load, that could result in ignition of the oak's crown.

4.3.3. Oak Woodland Plant Adaptations to Fire

Oak tree response to fire in the foothill woodland is varied, and bark thickness, tree structure, and sprouting response can each affect the ability of a given species to resist or recover from fire. Coast live oaks often vigorously re-sprout from their stumps and crowns following fire. Even heavily-charred trees often prove that they are still alive by resprouting after a while, therefore, one should wait at least a year after a fire before giving up on a mature oak tree. Seed stored in the soil is another source for regrowth for all oaks.

4.3.4. Oak Woodland Conservation and Fuel Modification Objectives

Oak woodlands provide habitat for an astonishing array of native animals. The trees themselves provide shade for larger mammals such as mule deer (*Odocoileus hemionus*) during summer and fall, and leaves and shoots of oaks serve as forage. The thick duff on the ground below oaks provides fertile organic matter and protects loose soil for burrowing animals, and dead and dying boughs are utilized for nesting cavities for a variety of birds (not just woodpeckers, but flycatchers, titmice, owls, and many others). Understory native plant diversity can be abundant within an intact woodland ecosystem, including at the ecotones with other plant communities, such as chaparral, coastal sage scrub and riparian scrub, at the edges of woodland patches.

Ecologically, the *closed-canopy*³⁴ quality of local oak woodland is probably crucial to supporting native oak woodland species. For example the western gray squirrel (*Sciurus griseus*), has been shown to require intact (typically oak) woodland to persist (Ryan and Carey 1995). Passing from tree to tree along upper branches enables the gray squirrel to avoid predators on the ground³⁵.

Healthy oak trees themselves require little or no modification, because they contain relatively little fine fuel that can support a fire. In severe fire situations and given ladder fuels, a coast live oak tree may torch, but the coast live oak woodland is not known to carry active crown fires³⁶. Instead, one or more oak trees can actually function to shield

³⁴ “Closed-canopy” refers to the configuration of trees whose crowns are touching each other creating a contiguous expanse of branches and leaves overhead. This provides deep shade and is apparently essential at least for the western gray squirrel, and probably for other oak woodland species as well.

³⁵ Pavlik, Muick, Johnson and Popper, *Oaks of California*, Cachuma Press, Oakland, CA 1991. Pg. 78.

³⁶ Sawyer, Keeler-Wolf and Evens, op cit.

assets (such as houses) from winds and flying embers. By contrast, dead or dying oak trees can increase fire risk. Therefore, maintenance of oak tree health is vital to fire prevention.

Fuel modification in Oak Woodland should focus on six objectives:

1. Protect and maintain the health of the oak trees in both urban and natural settings.
2. Manage understory fuels, targeting introduced and invasive species or excessive fuel accumulations.
3. Promote oak seedling recruitment.
4. Minimize impacts on birds and other wildlife of fuel modification activities.
5. In residential areas with oaks, maintain required road and chimney clearances and prevent branches from overhanging roofs.
6. In natural or semi-natural areas, in order to benefit wildlife, avoid breaking up any sections of continuous oak canopy.

Therefore, fuel modification in oak woodland, and among residential oaks is aligned with and focused on best tree health practices. For oaks, three practices are paramount to protect tree health:

- Avoid overwatering, especially avoiding summer watering.
- Avoid harm to the soil in the root zone.
- Avoid excessive or improper pruning.

Oaks, like the western sycamore (*Platanus racemosa*) and other large trees, are very likely to host nesting birds, which are themselves protected from disturbance during the nesting season (March – August). For these reasons, oak trimming should be done only in the fall and winter and only when absolutely necessary to prevent damage to life and property, or to provide access for emergency vehicles and personnel.

We recommend a highly conservative approach to pruning; when it comes to thinning, one can always remove more later but no one can put back what’s been taken away. Over-cutting of oaks, particularly higher branches and foliage in the canopy, should always be avoided, as this will surely lead to more sunlight hitting the ground, and more invasion by non-native species.

Considerations should be made to protect oak seedlings within a stand and in residential areas that can support oak trees. Young oaks are a valuable resource for expanding oak stands and replacing older trees. As with any ecologically-based fuel modification, retaining a diversity of ages will support the long-term health of the stand. Special emphasis should be placed on retaining different age classes of standing dead oaks (called “snags”) for wildlife habitat, as cavities present in oak snags serve as long-term habitat for many wildlife species.

4.3.5. Oak Woodland Fuel Modification Treatment Prescription

Care of Oak Trees

Proper care of existing oak trees to keep them healthy, and thus fire-resistant, is a major tenet of fuel modification goals in Monrovia’s oak woodlands.

Over-watering oaks has probably resulted in more oak deaths than fire along the wildland-urban interface zone in Monrovia. Oaks do not need summer water, and if surrounded by a lush lawn or within a sprinkler system, they become highly susceptible to rot, fungi, and other harmful factors. The natural southern California precipitation regime, not surprisingly, is ideal for oaks – several bursts of heavy rain a few times each winter, a cool, cloudy spring, followed by a long, warm and dry summer and fall. Over-watering of oaks is typically a by-product of other landscaping choices, for example, oaks and lawns are not compatible, as the lawn requires frequent summer water.

Harm to the soil in an oak's root zone can result from compaction, trenching, changes in grade, suffocation due to paving or removal of the soil's protective blanket of mulch or dead leaves. Oaks obtain water and nutrients principally from shallow roots within the upper 18-24" below the soil surface. These feeder roots typically extend well out beyond the dripline of the oak, often in a complex configuration. One common fuel modification practice that can harm oaks is the denuding of the soil by raking or blowing all leaves away, leaving bare soil, which is subject to large temperature fluctuations and unable to maintain needed moisture levels, or support the complex microbial interactions needed by oak roots. This practice should be avoided. Choice and placement of landscape mulches involves a number of variables.

If not done correctly, pruning can place undue stress on oak trees, and evidence of this may be seen throughout the residential edge in Monrovia where certain oaks have been subject to 50% or more reduction in their canopy extent. Additional harm has been observed where tree trimmers have used spikes to climb the oak, or made improper cuts that will not heal over properly. The only sure way to avoid these problems is to hire only qualified, licensed arborists to work on our trees. The accepted licensing organization is the International Society for Arboriculture (ISA), which can provide listings of local licensed arborists.³⁷

Generally, it is best to minimize the pruning of oaks, avoiding pruning unless needed for removal of diseased limbs or other corrective pruning or to maintain mandated clearances³⁸. A licensed arborist should be consulted.

Overhanging limbs are a particular hazard due to the problem of leaf litter. Even though city code only requires a 5' clearance between the roof and any overhanging limbs, tree limbs at any height over a roof can drop leaf litter. If this litter is allowed to accumulate in the gutter or on the roof it can form a significant fuel bed that may be readily ignited by flying embers, endangering the whole building. Coast live oaks do not lose their leaves all at once, like sycamores, but gradually throughout the year. This means that the roof needs to be checked often for oak leaf litter build-up. Preferably limbs of oak or other trees overhanging the roof should generally be cut back so they do not overhang the roof. However, this should not be done if it would endanger the tree, as overpruning or the cutting of major scaffold branches can do permanent damage to an oak tree. If outright removal of overhanging branches is not feasible, extra attention must be paid to promptly cleaning any leaf litter that has fallen on the roof.

Understory Thinning

Remove understory introduced shrubs, vines and small trees under drip lines. Mow or weedwhack introduced grasses and forbs. Do not prune lower branches of oaks trees except as needed to facilitate work. As a rule, leave native understory plants alone.

In closed-canopy woodland habitats, select productive shrub habitat and understory vegetation as isolated *retention patches*³⁹ under multi-stemmed oaks. Diversify this mosaic thinning treatment by reducing shrubs and *thinning from below*⁴⁰ other closed-canopy areas.

Incorporate a variety of treatments based on strategic fuel modification locations. For example, if working near a road or trail that can serve as an area where firefighters can suppress fire or set a *backfire*,⁴¹ thin the understory more

³⁷ The ISA can be contacted at P.O. Box 3129 • Champaign, IL 61826. 217.355.9411, or online at <http://www.isa-arbor.com>.

³⁸ Clearance requirements mandated under Monrovia Municipal Code for trees within 200' of homes are: 15' separation from structures or adjacent tree canopy, 5' from rooflines, and at least 5' ground clearance. For all trees, vertical clearance 13'6" is required over roads (MMC 8.14).

³⁹ Retention Patch: A clump of vegetation that has been isolated from contiguous fuels and retained for wildlife habitat and/or native plant species diversity.

⁴⁰ Thinning From Below: Silvicultural practice where smaller understory trees are selectively removed below overstory trees. This method is also called "low thinning."

⁴¹ Backfire: A technique used in certain locations to direct fire spread against the wind while doing prescribed burns.

thoroughly. If on a mid slope or more distant corner of the property away from roads, consider retaining more patches of multi-stemmed oaks and brush as one large clump for the benefit of wildlife habitat.

Thinning

Thinning may encourage undesirable understory growth, necessitating more frequent maintenance. If you decide to thin the canopy, be conservative and use the *Precautionary Principle*.⁴² You can always thin more later but you can't put back what you've taken, especially where oak regeneration is problematic.

If oaks are mixed in with non-native trees, target thinning efforts in order to remove the introduced tree species. In Monrovia residential areas, these may include a number of invasive tree species, such as Tree of Heaven, eucalyptus, various ash species, pecan, fan palms, date palms, phoenix palms, Chinese elm, myoporum and others. Additional species that may be chosen for removal are conifers such as Canary Island pine, Italian cypress, Aleppo pine, redwood, etc. None of the conifers found in the Monrovia urban interface are native. A number of these trees are particularly susceptible to bark beetle attack. Whether cutting native or introduced trees it is necessary to abide by the seasonal limits given above in order to avoid disturbing nesting birds or other wildlife.

Retain as much canopy closure as possible in *ephemeral*⁴³ and *perennial*⁴⁴ stream gulches.

4.4. Riparian

Strictly speaking, “riparian” applies to the zone along the edge of freshwater rivers and streams. In the Monrovia foothills, riparian zones are highly variable, depending on the amount of water near the surface, the steepness of a site (stream gradient), and soil type. The largest, deepest canyons will support a foothill riparian woodland with a diverse array of trees such as bigleaf maple (*Acer macrophyllum*), white alder (*Alnus rhombifolia*), California bay (*Umbellularia californica*), and canyon live oak (*Quercus chrysolepis*), and at highest elevations in the coolest sites, Bigcone douglas-fir (*Pseudotsuga macrocarpa*), the only locally native conifer in the study area⁴⁵. Many plant and animal species typical of this habitat type are absent from the surrounding chaparral and even from oak and oak-sycamore woodland at slightly lower elevations, being more typical of montane locations at higher elevations (e.g. Northern Pygmy-owl *Glaucidium californicum*). We found this habitat type to be rare in the study area, but present locally in side canyons above “Station 103” and along Monrovia Cyn. Truck Trail above Sawpit Dam.

The most frequent riparian woodland type in the Monrovia foothills appears to be oak-sycamore woodland, comprised of western sycamore (*Platanus racemosa*) and coast live oak (*Quercus agrifolia*), the latter dominating on loamy (as opposed to gravelly/sandy) sites and often forming a pure woodland on drier sites (pers. obs.). Frequent and characteristic understory plants include mugwort (*Artemisia douglasiana*), golden currant (*Ribes aureum*), and basket rush (*Juncus textilis*). Willows (*Salix* spp.), indicative of surface water and lower-gradient streams, are relatively rare in the foothills, and consequently so are willow-dependent riparian wildlife species typical of river-bottom sites downslope of the foothills (e.g., lower San Gabriel River/Whittier Narrows). Most wildlife species typical of oak woodland are found in oak-sycamore riparian sites and vice-versa, with the addition of several aquatic species such as amphibians, including the Coast Range newt⁴⁶ (*Taricha torosa torosa*), a Species of Special Concern, which requires

⁴² Precautionary Principle: A concept that promotes a cautious approach to development and managing the environment when information is uncertain or unreliable. Erring on the side of caution and conservation is encouraged, along with a “Better safe than sorry” attitude.

⁴³ Ephemeral: Meaning short duration or life, as in an ephemeral stream that only exists after a rainstorm or during the rainy season.

⁴⁴ Perennial: In reference to water, a stream that holds water year-round during a typical year. May have some flux in a drought year.

⁴⁵ All of the various conifers planted around the Monrovia foothills are non-native, being either low-elevation species imported from the Mediterranean (e.g., Aleppo pine *Pinus halepensis*), or, more rarely, species found in the lower montane zone in our local mountains (e.g., Coulter pine *Pinus coulteri*). The “pine zone” in the San Gabriel Mountains begins around 5,000', well above the Monrovia foothills.

⁴⁶ Also called “California newt” and “Western newt” in the RMP (LSA 2008).

permanent water. An excellent example of this habitat type on the urban-wildland interface is in the “Sleepy Hollow” area along upper Norumbega Rd., where it persists adjacent to houses between Norumbega and Starlit Lane.

The most arid riparian areas cannot support trees, but feature a very dense, nearly impenetrable thicket of mulefat (*Baccharis salicifolia*), coyotebush (*Baccharis pilularis*), and Mexican elderberry (*Sambucus mexicana*), a community frequently referred to as “riparian scrub”. These thickets can hold water after heavy rain, or they can be dry year-round, supported only by ground water pushed to the surface because of geological features (e.g., arroyos/drainages). Often, this vegetation will develop at the base of steep hills, or near rocky areas within loose (aka “well-drained”) soils. Though this dense riparian scrub may not support a full complement of riparian-dependent wildlife (often just a few very common indicator species are present, such as song sparrow *Melospiza melodia*), it can be vitally important for local species to find food (esp. elderberries) and cover during hot weather, or for juvenile birds to hide from predators following fledging. Nesting birds, including raptors, seem to increase in abundance and diversity along riparian zones, while the surrounding scrub may support only a handful of species that take advantage of the variety of plant height and vegetation structure that exists along nearby arroyos.

4.4.1. Riparian Role of Fire

While natural at a long interval, fire can be extremely damaging in both the short and long term to all types of riparian vegetation, and, particularly, stream function. Typically, riparian zones are *mesic*⁴⁷, humid areas less prone to drying than scrub-covered slopes, for example. Streamside plants retain a high moisture content throughout the year, and stay surprisingly cool through the hottest days of summer and early fall.

4.4.2. Riparian Fire Regime

As a result, riparian areas are often considered to be barriers to wildfire spread. However, several invasive plants have altered this dynamic and have made affected riparian areas more prone to burning. The most notorious of these invasives are giant reed grass (*Arundo donax*) and tamarisk (aka “salt cedar”), which are both highly flammable and able to re-sprout rapidly from underground portions.⁴⁸ Although arundo and tamarisk have not been reported in the study area so far, other invasive plants associated with changes in fire regime have been documented within riparian zones in the study area. These include the following invasive species of particular concern due to their potential to alter fire regimes in riparian areas:⁴⁹

Tree-of-Heaven (*Ailanthus altissima*) – fire tolerant; litter burns

Tasmanian blue gum (*Eucalyptus globulus*) – can enhance fire intensity; source of firebrands

Fan palms (*Washingtonia robusta*, *W. filifera*) – source of firebrands

Cape ivy (*Delairea odorata*) – hanging dry biomass could be fuel

Black mustard (*Brassica nigra*) – high standing biomass

Thistles (*Carduus spp.*, *Cirsium spp.*, *Cynara cardunculus*, *Silybum marianum*) – could be ladder fuels

Yellow starthistle (*Centaurea solstitialis*) – large stands provide continuous fuel

Perennial pepperweed (*Lepidium latifolium*) – dense stands of standing biomass in wetland margins

Russian thistle (*Salsola tragus*) – can accumulate along fence lines and structures, causing a build-up of fuels.

⁴⁷ Mesic - In ecology, a mesic habitat is a type of habitat with a moderate or well-balanced supply of moisture

⁴⁸ Adam M. Lambert, Carla M. D’Antonio, and Tom L. Dudley, “Invasive Species and Fire in California Ecosystems”, *Fremontia*, Volume 38:2/38:3, April-July 2010, page 33.

⁴⁹ The list and notes are extracted from Lambert, D’Antonio and Dudley, op cit., Table 1, page 34-35.

When fire comes through riparian areas, it not only kills trees outright, it opens the canopy, leaving the understory extremely vulnerable to invasion by non-native weeds, such as poison-hemlock, sticky eupatory⁵⁰ (*Ageratina adenophora*), and others, including the fire-prone species listed above. Native animals that depend on moisture, such as amphibians (including arboreal salamander *Aneides lugubris*) have fewer options for burrowing and reproducing after a fire, though they can survive infrequent ones.

4.4.3. Riparian Plant Adaptations to Fire

Riparian scrub, often dominated by mulefat and elderberry, can regenerate quickly after a fire by crown-sprouting; however, mature oaks and sycamores may take decades to achieve the pre-fire level of canopy cover, and even longer for a full compliment of characteristic species – the riparian “community” – to return, if it does at all. Thus, the post-fire effect in foothill riparian zones is often one of a lush growth of widespread chaparral and riparian shrubs, abundant weeds, and scattered charred trees. After serious, hot fires, certain oak and sycamore riparian areas may lose sedentary forest-dependent species like western gray squirrel and oak titmouse, as happened in Turnbull Canyon in the Whittier Hills after a single fire in the late 1960s (Cooper 2000); without a ready source of colonizers, these woodland species may not be able to re-enter the resultant ecosystem, leaving the woodland that eventually grows back less distinguishable from the surrounding landscape.

Fire severity is often much lower in the shaded, cool, and moist conditions of riparian areas than on the surrounding shrub covered slopes and ridges. Most commonly, riparian plants are scorched or the outermost portion of the tree canopies burned. Oak, sycamore and willows are all strong resprouters and if fire severity is low, the structure of the riparian canopy can quickly recover after fire. In rare cases, entire trees can be consumed. While these can recover by resprouting, years are required to restore the pre-fire woodland canopy cover. Alders, in comparison to the other riparian species, are very fire sensitive and often display delayed mortality, falling in the first several years after fire.

4.4.4. Riparian Conservation and Fuel Modification Objectives

Vegetation modification should avoid all intact riparian areas, as in their natural state these areas already function as barriers to fire spread. Furthermore, these zones are too few, too sensitive to weed invasion (which is too often essentially permanent), and support too diverse a species community year-round to justify clearing its understory (including the removal of downed wood). Where feasible, riparian areas that have been cleared in the past should be allowed to reestablish themselves on their own, through rainfall and natural water movement, and unless there’s a clear, obvious danger to surrounding homes (such as piles of dead braches dumped into a gully by tree-trimmers adjacent to houses), vegetation should be retained as-is in riparian zones, up to the upper limit of riparian vegetation, well away from a drainage.

Where riparian areas have been significantly impacted by invasive species of concern listed above, or others considered likely to increase fire hazard and damage the natural riparian ecosystem, fuel reduction efforts can be carried out in a way that aligns with ecological restoration goals. Target only the invasive species of concern, minimizing impacts to native riparian species. Riparian areas may also be impacted by human activities that could alter fire behavior, such as unauthorized trash disposal. In this case, fuel reduction would consist of cleaning up the area to return it to its natural state, and adopting practices and procedures to minimize impact on native riparian species, as detailed below.

4.4.5. Riparian Vegetation Fuel Modification Treatment Prescription

Use cost-effective methods such as approved herbicides to eradicate invasive species populations where possible, to avoid the need to return for repeated treatments.

⁵⁰ Known locally as “quickweed”, per Rachel Wing (2011).

Consider and mitigate for unintended consequences, such as stimulating growth by cutting (e.g., with *Ailanthus*) or spreading propagules (e.g. by careless handling of Cape Ivy).

Avoid periods of rain and wet weather, as amphibians and other species that typically live underground emerge and are most vulnerable to disturbance at this time.

Do not remove large, fallen boughs and slabs of bark, as they shelter a wide variety of wildlife.

Avoid trimming or otherwise disturbing trees during the nesting season, which peaks from late April through June (but may begin much earlier for raptors, in late winter).

Consider the natural movement of water through a site, and avoid removing dead vegetation located in or adjacent to a stream channel, or that is otherwise serving a hydrological purpose (that may not be immediately apparent).

Avoid trampling matted riparian vegetation, such as beds of mugwort which can support native small mammals, including shrews (*Sorex* spp.) and dusky-footed woodrat (*Neotoma fuscipes*).

Slash Treatment

The majority of the slash produced by the recommended riparian fuel modification will consist of invasive plant debris. This material may or may not be left on site, depending on the nature and the amount of the material:

- Stems and leaves that are free of propagules and are not prone to re-sprouting may be left in contact with the ground to decay or serve as mulch, or in brush piles onsite except that they must be placed above the expected high-water mark and must not be placed in a manner that will shade or harm other vegetation.
- Debris that is free of propagules but still prone to re-rooting may be hung or draped on other brush above the high-water line, in such a manner to cause it to dry out. Only very limited amounts of debris can be placed in this manner, as this technique tends to increase the amount of aerial fuels.
- Debris containing seeds, fruits or other propagules of invasive plants should be contained by tying, tarping or bagging and removed off-site for disposal. Alternately, the seeds and fruit can be collected for removal, leaving the remainder of the debris behind, as described above.
- Large woody debris, such as sections of tree trunks, can be selectively left onsite in a manner that imitates the current natural distribution of fallen trees, but avoiding placing them in the water or the wetted zone, or harming native plants. If a lot of cutting is done in a small area, most of the debris will need to be removed offsite.
- Ensure surface fuels are less plentiful and more compact than before treatment. Do this by lopping into small pieces, weighing them down with larger pieces, and ensuring that all slash is in direct contact with the ground to facilitate quick decomposition. Cutting material from the mid-story and crown and placing it on the surface will increase short-term fire hazard, but reduce long-term hazards.

4.5. Grassland

This plant community, as currently represented along the wildland-urban interface, is typically not native to the Monrovia foothills, but rather is the result of clearing, grazing, grading or other disturbance. Notably, small patches of naturally-occurring, native annual grassland, including a diverse array of annual forbs⁵¹, would have occurred throughout the Monrovia foothills, in areas where water is present just below the ground surface, or where abiotic features keeps the ground moist into late spring, such as a steep, north-facing slope. Fine soils, often dominated by clay, would typically allow for grassland to thrive and out-compete shrubs and trees, although annual grassland can dominate gravelly, sandy and well-drained soils if disturbance is frequent, such as from grading/discing⁵², weed-whacking, or frequent fire. Unfortunately, most of these patches of native forb habitat, including native grassland, are now very rare throughout the state, including in the study area.

Many perennial herbs experience minimal wildfire impact despite increasing fire frequency because they enter dormancy before late summer and early fall when most wildfires occur, and living plant parts are protected below ground. However, early season fires that burn native perennials while they are still actively growing may kill the plants and deplete the seed bank over time. Because grass fires burn quickly over an area, the heat rarely penetrates deeply into the soil, leaving the seed bank viable.

More common are disturbed areas that have grown to be dominated by largely non-native annual grassland, which occur in several places locally, including at the north end of Highland Place and at “Station 103”, as well as other areas where livestock such as cattle or horses have been kept. Dominant species include introduced grasses (e.g. ripgut brome, *Bromus diandrus*), thistles (esp., Maltese star thistle, *Centaurea melatensis*) and others that have invaded many native grasslands. Common indicator species of native grassland/forb fields would include needlegrass (*Nassella* spp.), blue dicks (*Dichelostemma capitatum*), and fascicled tarweed (*Deinandra fasciculata*); on clay and fine-grained sedimentary shale (locally very rare), one would expect native lilies such as goldenstars (*Bloomeria crocea*) and Catalina mariposa lily (*Calochortus catalinae*); on coarser, well-drained soil, forbs such as miniature lupine (*Lupinus bicolor*), clovers (*Trifolium* spp.), evening-primroses (*Camissonia* spp.), bishop lotus (*Lotus strigosus*) and Spanish clover (*Lotus purshianus*) are frequently present in our area.

However, even as currently represented in disturbed areas of the foothills, this largely non-native community can support many native species, and should not be considered inferior to oak woodland or another habitat type; often, it represents a very early successional stage of another native community such as coastal sage scrub, chaparral or alluvial fan scrub, and “forcing” it to become, for example, an oak woodland by planting, irrigation, mulching, and other techniques may not always be the best approach. Any open, grassy patches within the chaparral-woodland mosaic – even if strongly dominated by non-native plant species – can be important microhabitats for butterflies, small mammals and other native wildlife, not to mention for wide-ranging fauna such as mule deer and foraging hawks and both great horned owl (*Bubo virginianus*) and western screech-owl (*Otus kenicottii*). However, when grassland – or simply dense grass or thistle – is present along roads or at the edge of development, it is highly prone to ignition, arguably much more so than other vegetation types due to its ease of ignition, and so its role in providing wildlife habitat must be weighed against a fire risk, particularly along roads.

⁵¹ Forbs include both “wildflowers” as known colloquially, and non-woody vegetation such as mustards, spurges, and others that make up the grassland communities of California.

⁵² “Discing” refers to the practice of pulling a plough fitted with free-rotating metal discs across the land, generally done to mow larger weeds. However, this practice also breaks up the soil and encourages the growth of more weeds, thus leading to more discing the following winter. Originally, it was probably developed for use in the Midwest and East, where the summer growing season was followed by a hard frost that kept the ground open in future years; however, with Southern California’s winter growing season, spring and summer discing simply results in the soil’s being “primed” for massive weed growth when fall rains arrive.

4.5.1. Grassland Role of Fire

Introduced annual weedy grasses and forbs have two characteristics that make them highly prone to ignition: they have a high surface-to-volume ratio (making them like tinder), and they dry out earlier in the spring than the native shrubs, extending the fire season. Firefighters describe these fuels as “flashy” because of the ease of ignition and the rapid rate of spread of fire within a field of cured (that is, dried) annual grass.

Fire rejuvenates annual grassland; grasses are often among the first to return (or to “invade”) following fire, especially if fire has been so frequent that larger shrubs and trees have been lost. However, it must be recognized that frequent fire, as with any disturbance, deprives the system of native species, thus degrading the ecological integrity of a site. So, while grassland itself is dependent on fire, the more complex interactions and species diversity that make up a native grassland or forb habitat may be displaced and even eliminated by too-frequent fire.

4.5.2. Grassland Fire Regime

Annual grassland fires tend to be of low-to-moderate intensity, and burn only briefly in a given area, with a low heat output and low severity because of the limited amount of biomass. It should be noted that burning initiated by native Americans and early settlers to California occurred in some areas as frequently as every one to three years, often set to encourage new shoots for mule deer to browse, or to clear away chaparral and scrub to encourage wildflowers such as chia (*Salvia columbariae*), whose seeds were harvested by the basket-full, and native lilies with edible bulbs such as blue dicks. However, today, both chia and many other native annuals such as those in the family Polemoniaceae (incl. phloxes) are increasingly rare and localized in our area, occurring only in small patches (esp. on roadcuts and very steep sites) where fire intensity and competition with non-native grasses and weeds has been low.

4.5.3. Grassland Plant Adaptations to Fire

The rapid and early seed germination of many annual grasses is suited to a fire regime that results in most of the aboveground material being burned. Because grass fires burn quickly over an area, the heat rarely penetrates deep into the soil, leaving the seed bank viable. The rootstock and underground rhizomes⁵³ of perennial grasses often survive brief fires. These living, underground plant parts are then able to re-sprout quickly following the next rains. In the case of non-native grass and forb species, this means that once an area is invaded by these species, they are increasingly hard to get rid of, and are even encouraged both by repeated fire, as well as the very techniques so often used to reduce fire risk: discing and hand-clearing.

Grassland adjacent to chaparral creates a particular fuel mix along the border area that can be harmful or beneficial, depending on specifically how it is managed. As we have already seen, chaparral fuels, which are principally carried several feet above-ground in the canopy layer, do not easily ignite under normal temperature and moisture conditions. However, if the adjacent weedy flashy fuels are allowed to touch and invade the edges of the chaparral they can act as wicks, carrying a light grassfire up into the shrub canopy. Once the chaparral is ignited, fire conditions become more severe. Unfortunately, as we have also seen, any fuel modification efforts within the chaparral tend to encourage incursions of weeds, which can perpetuate this dangerous mix of chaparral and grass. On the other hand, if the weedy grasses can be kept out of and away from the chaparral, the grassland can function as a potential fuel break.

4.5.4. Grassland Conservation and Fuel Modification Objectives

Because of the dominance by non-natives of the annual grassland found at the urban-wildland interface, its conservation has not been a high concern. However, this habitat type contributes meaningfully to the habitat mosaic that makes up the Monrovia foothills, and where appropriate (e.g., at “Station 103”, on land formerly occupied by a

⁵³ Rhizome: An underground stem that has the ability to send out roots and shoots. Grasses and irises are two plants that exhibit rhizomes.

nursery), it could be maintained through regular mowing and weed-pulling (thus allowing the few native grasses and forbs present to thrive). Of all the major vegetation types across the California, grasslands and other forb (wildflower)-dominated habitats have the smallest percentage remaining today since European settlement (Minnich 2008). Indeed, the famous poppy fields of Pasadena, often featured on turn-of-the- (last) century postcards and paintings, have long been replaced by houses, and this habitat simply does not exist higher up into the foothills.

In some areas, grasslands and wildflower fields have naturally converted to chaparral or woodlands. The majority of grasslands in California that remain have been converted from native perennial grasses and forbs, with ample areas of bare ground between plants, that carry shorter flame lengths, to tall, dense, annual non-native grasslands that produce longer flame lengths and faster spread rates. This change has increased the potential dangers of wildfire in grasslands throughout California, and probably operates on a smaller scale in the Monrovia foothills as well.

Short-term fuel-reduction objectives for managing grasslands are to manage them in winter to early summer by methods of “*weed eating*,”⁵⁴ cutting, or mowing prior to setting seeds and well before the beginning of fire season. Long-term objectives are to convert back to native grasses and forbs (from exotic annuals) through gradual, passive restoration. Timing of fuel treatments is important in grasses. Selectively mow alien annuals in the winter and spring before seed set to retain and promote native perennials, as well as to enhance fire safety. Convert annual grasses to perennials because the greater proportion of perennials, the more benign the fire effects. Perennial grasses tend to shorten the ignition season and dampen fire intensity and spread.

Fuel-reduction efforts at the edges of neighboring shrub lands will be an important activity for fire behavior modification plans. Similar to meadows, grasslands can serve as natural fuel breaks and fire suppression *anchor points*.⁵⁵ However, grasses and chaparral create a dangerous mix, which should be avoided by creating separation between the two adjacent areas. An additional short-term fuel-reduction objective for managing grassland habitat should be to vigorously reduce fuels in areas where ignitions are most probable, that is, along roads. Places where roads and trails cut through grassland, or where pullouts for cars border grassland, should be minimized if possible, either by re-routing these built features or by planting and maintaining fire resistant vegetation along the roadsides. Weed-cutting and mowing should be done sparingly and carefully so as to not disturb the surface of the soil, which would lead to more weeds, and more fire risk.

4.5.5. Grassland Fuel Modification Treatment Prescription

- ✓ Native shrubs and forbs should be identified within the grassland in late winter when first emerging (e.g., February), continuing through spring, and marked with visible flagging.
- ✓ Workers should be instructed to stay several feet away from all flagged plants and to avoid damaging them by trampling or hitting them with tools or debris.
- ✓ Mowing, using hand-tools, should begin along roads in late winter, or whenever the grasses begin to grow to about knee-high. Clearance consisting of a strip of mowed grass (e.g., 10' wide) should be maintained on either side of the road into spring, with limited mowing after April 15, when the annual grasses begin to cure and pose the greatest fire risk from ignition by the use of power tools.
- ✓ If high grass is still present in late spring along the road (after April 15), mulch may be introduced only along the roadsides in lieu of mowing after this period, when fire risk is highest.
- ✓ Away from the roads and trails, mowing should be minimized and eventually phased-out, and native shrubs and forbs should be allowed to re-colonize. Invasive perennials in these grassy areas, such as castorbean (*Ricinus communis*) and Chinese tree-of-heaven (*Ailanthus altissima*), should be eliminated using established, cost-effective techniques. The use of approved herbicides should be considered, to be applied under properly-licensed supervision.

⁵⁴ Weed Eater: A hand-held tool that utilizes a gas or electric motor and a rotating nylon string or metal blade to cut down vegetation.

⁵⁵ Anchor Point: The point at which firefighters begin fireline construction, usually blocked from the spreading fire to protect firefighters from harm.

- ✓ Discing should be phased-out entirely within the wildland-urban interface zone, since it encourages fire-prone weeds, and causes hard-to-repair ecological damage to the soil and ecosystem.
- ✓ Mulch is to be used sparingly, and not broadcast across fields and slopes⁵⁶.
- ✓ Grazing by goats for use in grass control is not recommended, due to the small areas involved, and the concern for churning the soil and encouraging non-native weeds.

4.6. Landscape-Level Fuel Management in Monrovia's Wildland Interface

The foregoing subsections detailed fuels management considerations within our specific vegetation types, such as chaparral and oak woodland. As Chapter -5 will more fully address, management of vegetative fuels within a home's defensible space or "Home Ignition Zone" is critical. We also want to create a managed are to provide a buffers around other infrastructure, such as roads. In Chapter 5 as well we will delve into the question of how far that buffer needs to extend beyond the structure – whether that is measured in the 10s or 100s of feet. However, modern fire science has made clear that there is an upper limit beyond which fuel treatments for the protection of a specific structure have reached the point of diminishing returns⁵⁷.

Beyond that distance, any fuel management can be considered to be undertaken for other purposes than the protection of one or more specific structures. We dub these management efforts "landscape-level fuels management". Examples of landscape-level fuel modification are the removal of understory in a timber stand or the creation of a fuel break along ridgelines in the mountains. The latter, in fact, used to be carried out in the mountains of Southern California, until it proved both too costly to maintain, and counter-productive because it resulted in weed infestations. Cutting of preventative fuel breaks, no longer common practice in southern California, distinct from the containment lines cut around active fires, which is an essential part of the wildland firefighting toolkit. For example, during the Station Fire in 2009, machines and hand crews cleared miles of line around the fire in order to contain it. This CWPP only address, and recommends against, the practice of cutting preventative fire breaks across the landscape.

Our approach to landscape-level fuels management in Monrovia's WUI recognizes that landscape-level fuels management may be carried out for one or more purposes, including:

- To protect or enhance a natural resource, such as a timber stand
- To halt degradation of an ecological area or wildlife habitat
- To restore the natural ecological processes of an area, including its fire regime⁵⁸
- To mitigate the expected fire behavior within an area strategically chosen to assist fire fighters to control a probable or "worst-case" event, based on fire modeling studies.

Chapter 9 includes a small number of projects that are aimed at restoring natural ecological processes, but the majority of fuel reduction projects are limited to the defensible space of homes or infrastructure.

Quoting from the Santa Monica Mountains CWPP:

⁵⁶ Mulch frequently contains weed seeds, and thus introduces harmful, non-native plants into a system where they weren't present prior. In addition, it is costly, and breaks down quickly into the soil. It also has limited effect on discourages weeds unless spread deeply (e.g., 6" or more) and maintained through weeding and/or spraying with herbicide; otherwise, a variety of non-native weeds, including bristly ox-tongue (*Picris echioides*), fan-palms (*Washingtonia* spp.) and crane's-bill (*Erodium* spp.), quickly invade mulched areas and need to be treated.

⁵⁷ Note that fire science has also shown us how we can build and maintain structures that can withstand attack by embers, which can fly many 100s to 1000s of feet beyond the fire front.)

⁵⁸ C. Witherspoon and C. Skinner, Landscape-Level Fuel Strategies for Forest Fuel Management, US Forest Service Pacific Southwest Research Station, in: Sierra Nevada Ecosystem Project: Final report to Congress, vol. II, Assessments and scientific basis for management options. Davis: University of California, Centers for

Water and Wildland Resources, 1996., http://pubs.usgs.gov/dds/dds-43/VOL_II/VII_C56.PDF, as accessed 8/16/13.

“As science and fire history demonstrates, reducing the vulnerability of structures and enhancing fire safety along travel routes are the only viable methods to reduce the wildfire threat. Implementing hazard mitigation work away from structures or important travel corridors does little to enhance public or firefighter safety or reduce the threat to structures, and does not meet the purpose of this CWPP.”⁵⁹

4.7. Monrovia Foothills Best Management Practices

Vegetation Manipulation

“The devil is in the details”, and as Halsey observes (below), the “solution” can often create more problems than it fixes (*op cit.*, p. 66):

“The basic principle behind clearing is to increase the distance of a structure from potentially flammable materials to prevent ignition by radiation or convection...Determining how much distance is crucial because too much will create problems that can be extremely difficult to correct, specifically the replacement of drought tolerant native vegetation by nonnative, weedy annuals...(that) provide flashy fuels that ignite more readily than native shrubbery.”

Whatever the surrounding habitat type, clearing of any native, naturally-occurring vegetation should always be done sparingly, by a trained crew, and only during certain seasons. Vegetation manipulation should focus first on the 30’ zone around a given structure, be it a house or an out-building.

The Los Angeles County Forestry Fuel Modification Plan’s (1998) “specifically prohibits the practice of ‘clear-cutting’ all vegetation w/in 200 foot clearance zone. Instead it outlines clear rules on how to preserve as much of the canopy as possible”.

In the case of the Monrovia Foothills, many hillsides here are too steep to safely and effectively support any type of vegetation clearing or modification. Monrovia’s current code exempts homeowners from brush clearance requirements on slopes over 70% (about 35 degrees)..

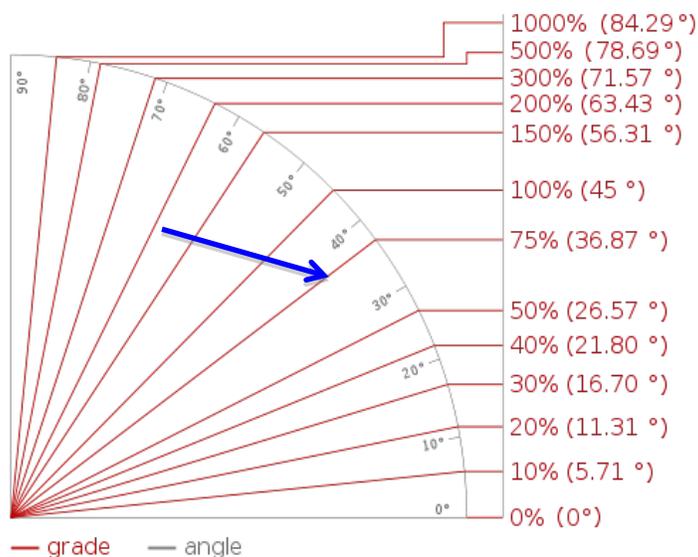


Figure 4-3. Diagram of slope degrees and percentages (reproduced from Wikicommons). Blue arrow notes a 70% slope.

⁵⁹ Pg. 101, http://fire.lacounty.gov/forestry/PDF/SMM_CWPP_02MAY2012_FINAL_v3.pdf

Thus, a typical Monrovia foothill yard, with chaparral and oaks on a steep slope rising above the backyard, or a ridgetop home, would be inappropriate for vegetation clearing and manipulation, beyond the immediate vicinity of the home, due to excessively-steep slopes. In cases like this, home construction becomes even more important.

Chipping and Biomass Utilization

Historically, in areas where pruning/clearing has been done, the *slash*⁶⁰ has been removed from site (composted, etc.) or chipped⁶¹ on-site into mulch (and removed). However, this tends to remove vital resources from the soil and ground-layer, such as vegetation used by a variety of invertebrates and small vertebrates, especially burrowing animals. It also leaves large gaps that are readily invaded by weedy, fire-prone species such as annual grasses that alter these natural communities, often reducing the local biodiversity. As an alternative, we recommend the following practices for limbing:

- Larger limbs (e.g., >1” diameter) should be left on-site, where cut. These are very unlikely to ignite except in a very large fire (at which point it probably does not matter what plant material is present⁶²).
- Smaller slash (leaves, twigs) may either be spread on the ground on-site, or transported off-site for use for biofuel, if desired.
- Slash to be removed should be carried downslope to the nearest possible staging/pickup area, rather than dragged long distances or through intact habitat (this practice can disrupt the vegetation structure of the surrounding community and encourage local soil erosion).
- Chipping areas should be located well out of natural vegetation area, as close to an existing road as possible, and away from sites that could support sensitive/nesting birds and other vulnerable wildlife (e.g. streambeds, mature trees).

Planting/Irrigation

Past fire hazard reduction efforts have encouraged a variety of planting and irrigation at the urban-wildland interface. Low-growing, drought-resistant and/or succulent species such as ice plant (Family: Aizoaceae), periwinkle (*Vinca major*) and lantana (*Lantana* spp.) were long recommended for hillside home landscapes, where several species have become serious pests in natural areas. Such recommendations have also emphasized over-watering these zones around structures, maintaining a lush, almost tropical band of vegetation around houses in hopes of keeping fire at bay.

Today, we realize that while well intended, both approaches have major disadvantages, particularly in chaparral zones. From the human-safety perspective, the type of vegetation planted around a house has little correlation with the chances that home will be damaged or lost to wildfire. Other, factors such as home construction materials (wood vs. cement, etc.), the proximity of tall, old trees⁶³ to structures, maintenance of the existing vegetation and “land-use decisions” (piled firewood, etc.) are now understood to play a much more important role in fending off an approaching fire.

Traditionally, steep slopes have been seen as a landslide hazard, and planting/irrigation has been seen as mitigating this hazard. However, irrigating ornamental (or even native) plants does not automatically reduce erosion or otherwise

⁶⁰ Dead limbs, bark, and other plant material cut from living or dead trees and shrubs.

⁶¹ Plant material ground with a large machine into small pieces of wood that are then used for mulch and/or biofuel.

⁶² A large fire spreads and threatens homes through flying embers; clearing chaparral will not affect the behavior of flying embers.

⁶³ In many cases, these trees have not been planted by the current owners, who have little incentive to spend thousands of dollars on their removal.

stabilize a slope; rather, the native plants that are adapted to a particular site – and that become established naturally regardless of irrigation – are greatly preferable ecologically to anything planted, and do a fine job of stabilizing even the steepest slopes. Many of the plants sold widely as ground-covers are extremely invasive, and are far from neutral when planted in the wildland-urban interface since they tend to quickly escape into the surrounding wildland to the detriment of the local ecology. Finally, there are other downsides to the addition of water to a steep slope in a chaparral environment, particularly in summer when the slope should be dry and the vegetation relatively dormant. Water can actually encourage erosion by creating rills in the soil that grow larger and are vulnerable to large wash-outs when rains start falling in early winter. Irrigation pipes frequently leak, and even small leaks, over time, will affect the integrity of the soil a slope. For these reasons, we suggest that the best treatment for steep slopes within chaparral is simply to leave them alone, or to allow the natural vegetation to re-establish itself, which it will, over time.

As part of fire management in the Monrovia foothills:

X	!
We DO NOT RECOMMEND the following activities:	We RECOMMEND CAUTION in the use of the following techniques:
Landscape-level fuel modification (i.e., fuel modification beyond the defensible space requirements for a specific structure).	Grazing (by goats, etc.). If the goats are not properly quarantined, they can spread weeds, also, they can churn or compact the soil.
Irrigating (or planting species requiring irrigation). Irrigation encourages invasive weeds (which in turn can make an area more fire-prone), attracts non-native animals such as Argentine ants, and on steep slopes, undermines soil, causing erosion.	Mulching. Except in special cases, such as along roadsides within annual grassland, mulch should not be introduced into wildland or wildland-edge areas due to the likelihood that the mulch will contain invasive weed seeds, and new weeds quickly “colonize” mulch-covered areas.
Controlled-burning	Herbicides: to be used only under all applicable requirements of the California Department of Pesticide Regulation.

Fire-safe Planting

Despite years of recommending plants appropriate for fire-prone areas, or warning against using certain species there is simply no scientific consensus on what constitutes a “fire-safe” plant species. What is clear is that, as Halsey (*op cit.*, p. 68) observes, “no plant is fireproof”, and all will burn, regardless of their growth form, height, oil content, deciduousness, or amount of watering the homeowner does. However, a few rules of thumb apply in choosing plants for fire-prone regions (adapted from Halsey):

Use (native) plants that:

- have easily distinguished dead vs. living material
- require minimal maintenance
- are easily pruned w/o killing plant
- have a slow/moderate growth rate
- have a robust root system
- are long-lived

Avoid plants that...

- have thorns (hard to maintain)
- have dead leaves in canopy or around trunk/main stems (can ignite from flying embers)
- have small leaves that persist when dry (buckwheat, sagebrush, sages, chamise)
- produce large amounts of litter (e.g., palms, eucalyptus, pines)

While we cannot recommend that a landowner plant certain species in hopes of staving off fire, or reducing the chance of ignition, if presented with a choice of whether to plant a native or a non-native species, we strongly support using local natives, and encourage landowners to phase-out non-natives, particularly invasive ones. Table 4-3 below presents a list of local natives that are commonly available in one of the larger native plant nurseries in the region, as well as non-natives to avoid – found on Table 4-4 (several of which are commonly sold at local retail nurseries and “big-box” home-improvement stores).

4.7.1. Tree Planting and Care

Trees can increase or decrease wildfire risk to our homes, depending on the trees’ location, condition, and other characteristics. The following table lists some conditions of beneficial trees versus fire-hazardous ones:

Table 4-3 Tree and Site Characteristics for Beneficial vs Hazardous Urban Forest		
	Beneficial Tree	Harmful or Fire-Hazardous Tree
Health of tree	Healthy	Dead, dying, damaged, diseased, or stressed.
Size of tree	“Fits” site – can grow to mature size	Too large for site; cannot grow naturally
Height of tree	Moderate	Towers above surroundings; or has been “topped”.
Location of tree	<u>Right tree in right place:</u> Tree well-suited to site conditions of water, sun, slope, wind, soil.	<u>Wrong tree for place:</u> Tree branches overhang buildings or hang too low over roads or interfere with utility lines. Tree not well-suited to site conditions.
Maintenance of tree	Easy to maintain	Tree is too costly or difficult to maintain; neglected, stressed or “topped”; fallen leaves allowed to accumulate.
Companion plants	Companion plants, if any, are compatible – require similar watering schedule, soil, etc.	Incompatible with preferred companion plants – needs more water, etc.
Growth rate	Slow to moderate growth rate	Rapid growth, “grows like a weed”
Fire ladder	Clean trunk; clearance provided between ground and lower branches	“Fire ladder” – small trees and bushes, branches, vines, dead palm fronds, peeling bark, etc. on or near trunk that could carry a ground-level fire into tree canopy.
Leaves	Leaves fairly broad or thick; not resinous	Needles or narrow leaves; resinous
Roots	Root zone protected from disturbance, soil healthy; extensive roots to hold soil	Roots disturbed, soil compacted, flooded, paved. Shallow roots that will not help hold soil.
Spacing of trees	Separation between trees or between clumps of trees.	A continuous canopy of trees, without break, could carry fire to homes.
Water needs	Drought-tolerant; retains its internal moisture even in dry conditions	Thirsty – may become drought-stressed if irrigation is interrupted
Embers (firebrands)-	Tree may help screen home from flying embers	Tree likely to produce flying embers that can spread fire long distances (e.g. palm fronds)
Utility Lines	Tree does not interfere with utility lines.	Tree will grow to interfere with utility lines, or requires frequent or damaging pruning to avoid lines.
Topping	Tree not “topped”	Tree “topped”, causing permanent damage to structure or health of tree.
Invasiveness	Native tree, or non-invasive exotic.	Invasive tree – basically a large weed. May increase fuel for fires or clog drainages.

The key to a healthy and firesafe urban forest is the right tree in the right place. For example, you wouldn't plant a moisture-loving redwood in a desert, or an oak tree in a pot in a tiny courtyard! We must always respect the requirements of the tree and the existing conditions of the site. It is best to choose a tree that will thrive and please us with minimal tending because a tree is a legacy. In the future, without our care, the tree may become a hazard.

Certain trees are strongly discouraged in Monrovia's fire zone. These include the fan palm, which can get to 100 feet tall and sport a massive "beard" of dry palm fronds. Those fronds ignite easily from flying embers, and then become like torches, spreading fire. The dead fronds must be removed annually, which can be quite expensive and dangerous, especially as the trees approach mature height.

The Monrovia Fire Department has identified 22 tree species that should be avoided in the fire zone. These are listed in Table 4-2:

Table 4-2 Trees to Avoid in Monrovia's Fire Hazard Zone				
BOTANICAL NAME	COMMON NAME(S)	FIRE- HAZARDOUS	INVASIVE*	COMMENTS
Acacia baileyana	Bailey Acacia; Cootamundra Wattle		x	
Acacia dealbata	Silver Wattle; Mimosa		x	
Acacia decurrens	Green Wattle		x	
Acacia longifolia	Golden Wattle		x	
Acacia melanoxylon	Blackwood Acacia		x	
Ailanthus altissima	Tree of Heaven		x	extremely invasive
Cupressus sempervirens	Mediterranean Cypress; Italian Cypress	x		Creates heavy litter and hazard of vertical fire spread.
Elaeagnus angustifolia	Russian Olive		x	
Eucalyptus camaldulensis	Red Gum	x	x	Creates abundant flammable debris and stringy bark. Generates embers.
Eucalyptus globulus	Blue Gum; Tasmanian Blue Gum	x	x	Creates abundant flammable debris and stringy bark. Generates embers.
Fraxinus uhdei	Shamel ash		x	
Juniperus spp.	Juniper	x		Fine, dense foliage
Myoporum laetum	Myoporum; Ngaio tree; Mousehole Tree		x	extremely invasive
Phoenix canariensis	Canary Island Date palm	x	x	creates dead fronds
Phoenix dactylifera	Date Palm	x	x	creates dead fronds
Pinus species	Pine	x		Needle accumulation; susceptible to pests
Schinus molle	Peruvian Pepper; "California" Pepper		x	
Schinus terebinthifolius	Brazilian Pepper		x	
Sequoia sempervirens	Coast Redwood	x		Fine foliage; stressed by drought, and sun exposure
Tamarix spp.	Salt Cedar; Tamarisk		x	extremely invasive
Washingtonia filifera	California Fan Palm	x		creates dead fronds
Washingtonia robusta	Mexican Fan Palm	x	x	creates dead fronds

* All invasive plants can become fire-hazardous if unchecked. This is because their "fast and furious" growth can increase fuel loads. They also can alter the structure or health of the vegetation in a way that may enable a fire to spread more readily.

“A tree lives for 100 years and dies for 100 years.”

Even long-lived trees will die eventually, but sometimes they begin to die prematurely. Often by the time they show signs of decline, the damage has already been done and cannot be reversed. It may be because the roots or bark have been damaged, allowing disease or insects in. Improper pruning can cause irreversible damage - it is vital to have only a qualified person do this work. Root pruning, grading or soil compaction can severely weaken a tree, as can improper watering. The tree professional who understands how to keep trees healthy is called an arborist. For all but very routine care, it is recommended that you hire a qualified arborist.



4.8. Seasonal Guide to Fire Preparedness

JANUARY	<ul style="list-style-type: none"> ✓ Non-native/hazard tree removal (contact residents with pine, palm, eucalyptus, etc. trees around their houses, and encourage their removal). ✓ Pruning (encourage homeowners to do the majority of pruning of trees and shrubs now) ✓ Mowing/weed-whipping (encourage homeowners to do the majority of mowing now) ✓ Inspection/enforcement of defensible space buffer around structures
FEBRUARY - MARCH	<ul style="list-style-type: none"> ✓ Raptor surveys in trees that are to be taken out, or where other activity is planned for fall/winter (e.g., mowing/pruning). ✓ Nesting songbird surveys in wildland-urban interface where activity is planned (starting early March) ✓ Pruning of trees/shrubs (to end in mid-Feb.) ✓ Mowing/weed-whipping (to end in early March to protect ground-nesting birds) ✓ Finish inspection/enforcement of defensible space buffer around structures (mid-Feb)
APRIL - MAY	<ul style="list-style-type: none"> ✓ Perform regular (every two years?) rare plant surveys (Braunton's milkvetch in April, Plummer's mariposa lily in late May) ✓ Perform nesting songbird surveys if any late work needs to be done April/May (e.g., mowing/pruning)
JUNE - AUGUST	<p><i>No clearing activity is to be done June through August (start of highest fire risk period)</i></p>
SEPTEMBER	<p><i>No clearing activity is to be done in September (high fire risk period) except for light work done with hand-tools (for example, raking).</i></p> <p>Draft and mail letters to homeowners notifying them that <i>October</i> (or the first soaking rainstorm) is the time to begin: Hazard tree removal; Pruning; Mowing; Defensible space fire-safe zone around structures.</p>
OCTOBER - DECEMBER	<ul style="list-style-type: none"> ✓ Non-native/hazard tree removal (contact residents with pine, palm, eucalyptus, etc. trees around their houses, and encourage their removal). ✓ Pruning (encourage homeowners to do the majority of pruning of trees and shrubs now) ✓ Mowing/weed-whipping (encourage homeowners to do the majority of mowing now) ✓ Perform inspection/enforcement of defensible space buffer around structures

4.9. Plant Lists

The following plant species (Table 4-3) were confirmed as present within the HWP. The list includes both native and non-native plant species. Because many Monrovians have an interest in choosing native species for their gardens and landscapes, the table indicates whether the plant is native or non-native.

Certain non-native plant species have the capacity to become weedy or even damaging. Table 4-4 below lists species we consider to be of highest concern in the study area, regardless of their representation on a statewide level (of which CAL-IPC⁶⁴ categories are based). We do not include non-invasive, uncommon non-natives.

⁶⁴ CAL-IPC: California Invasive Plant Council.

Table 4-1. Flora of the Wildland-Urban Interface zone, Monrovia foothills.

Group	Family	Latin name	English name	N= native	Observed
Dicots	Aceraceae	Acer macrophyllum	big leaf maple	N	Y
Dicots	Anacardiaceae	Malosma laurina	laurel sumac	N	Y
Dicots	Anacardiaceae	Rhus integrifolia	lemonade berry	N	?
Dicots	Anacardiaceae	Rhus ovata	sugar bush	N	Y
Dicots	Anacardiaceae	Rhus trilobata	skunkbrush	N	Y
Dicots	Anacardiaceae	Toxicodendron diversilobum	poison oak	N	Y
Dicots	Apiaceae	Anthriscus caucalis	bur chervil		Y
Dicots	Apiaceae	Conium maculatum	poison hemlock		Y
Dicots	Apocynaceae	Vinca major	periwinkle		Y
Dicots	Araliaceae	Hedera helix	English ivy		Y
Dicots	Asclepiadaceae	Asclepias eriocarpa	Indian milkweed	N	Y
Dicots	Asteraceae	Ageratina adenophora	eupatory		?
Dicots	Asteraceae	Ambrosia psilostachya var. californica	western ragweed	N	Y
Dicots	Asteraceae	Artemisia californica	California sagebrush	N	Y
Dicots	Asteraceae	Artemisia douglasiana	mugwort	N	Y
Dicots	Asteraceae	Artemisia dracunculus	wild tarragon	N	Y
Dicots	Asteraceae	Baccharis pilularis	coyote brush	N	Y
Dicots	Asteraceae	Baccharis salicifolia	mulefat	N	Y
Dicots	Asteraceae	Brickellia californica	California bricklebrush	N	Y
Dicots	Asteraceae	Carduus pycnocephalus	Italian thistle		Y
Dicots	Asteraceae	Centaurea melitensis	tocolote		Y
Dicots	Asteraceae	Delairea odorata	German ivy		Y
Dicots	Asteraceae	Gnaphalium bicolor	two-tone everlasting	N	Y
Dicots	Asteraceae	Gnaphalium californicum	California everlasting	N	Y
Dicots	Asteraceae	Hazardia squarrosa var. grindelioides	saw-tooth goldenbush	N	Y
Dicots	Asteraceae	Helianthus annuus	common sunflower	N	Y
Dicots	Asteraceae	Helminthotheca echioides	bristly ox-tongue		Y
Dicots	Asteraceae	Heterotheca grandiflora	telegraph weed	N	Y
Dicots	Asteraceae	Hypochaeris glabra	cat's-ear		Y
Dicots	Asteraceae	Senecio mikanooides	ivy		?
Dicots	Asteraceae	Solidago californica	California goldenrod	N	Y
Dicots	Brassicaceae	Cardamine oligosperma	little western bittercress	N	Y
Dicots	Brassicaceae	Hirschfeldia incana	Mediterranean mustard		Y

Group	Family	Latin name	English name	N= native	Observed
Dicots	Brassicaceae	Lobularia maritima	sweet alyssum		Y
Dicots	Cactaceae	Opuntia littoralis	coastal prickly pear	N	Y
Dicots	Cactaceae	Opuntia littoralis x ficus indica	hybrid cactus		Y
Dicots	Caprifoliaceae	Lonicera subspicata var. denudata	southern honeysuckle	N	Y
Dicots	Caprifoliaceae	Sambucus mexicana	Mexican elderberry	N	Y
Dicots	Caprifoliaceae	Symphoricarpos mollis	creeping snowberry	N	Y
Dicots	Caryophyllaceae	Cerastium glomeratum	mouse-ear chickweed		?
Dicots	Convolvulaceae	Calystegia macrostegia subsp. cyclostegia	south coast morning-glory	N	Y
Dicots	Cucurbitaceae	Marah macrocarpus var. macrocarpus	wild cucumber	N	Y
Dicots	Euphorbiaceae	Euphorbia lathyris	caper spurge		Y
Dicots	Euphorbiaceae	Ricinus communis	castor bean		Y
Dicots	Fabaceae	Acacia dealbata	silver wattle		Y
Dicots	Fabaceae	Lotus scoparius var. scoparius	deerweed	N	Y
Dicots	Fabaceae	Lotus strigosus	bishop lotus	N	Y
Dicots	Fabaceae	Lupinus bicolor	dove lupine	N	Y
Dicots	Fabaceae	Lupinus truncatus	collar lupine	N	Y
Dicots	Fabaceae	Medicago polymorpha	bur clover		Y
Dicots	Fagaceae	Quercus agrifolia	coast live oak	N	Y
Dicots	Fagaceae	Quercus berberidifolia	scrub oak	N	Y
Dicots	Fagaceae	Quercus durata var. gabrielensis	San Gabriel Mtns. leather oak	N	Y
Dicots	Fagaceae	Quercus engelmannii	Engelmann oak		Y
Dicots	Geraniaceae	Erodium botrys	long-beaked filaree		?
Dicots	Geraniaceae	Erodium cicutarium	red-stem filaree		?
Dicots	Geraniaceae	Erodium moschatum	white-stem filaree		?
Dicots	Grossulariaceae	Ribes aureum var. gracillimum	golden currant	N	Y
Dicots	Hydrophyllaceae	Phacelia cicutaria var. hispida	caterpillar phacelia	N	Y
Dicots	Hydrophyllaceae	Phacelia minor	wild cantebury bells	N	Y
Dicots	Juglandaceae	Juglans californica var. californica	So. Cal. black walnut	N	?
Dicots	Lamiaceae	Marrubium vulgare	horehound		Y
Dicots	Lamiaceae	Salvia apiana	white sage	N	Y
Dicots	Lamiaceae	Salvia mellifera	black sage	N	Y
Dicots	Lamiaceae	Stachys bullata	southern hedge-nettle	N	Y
Dicots	Moraceae	Ficus carica	common fig		Y
Dicots	Myrtaceae	Eucalyptus citriodorus	lemon-scented gum		?

Group	Family	Latin name	English name	N= native	Observed
Dicots	Myrtaceae	Eucalyptus camaldulensis	red river gum		?
Dicots	Myrtaceae	Eucalyptus cinerea	silver dollar gum		Y
Dicots	Myrtaceae	Eucalyptus cladocalyx	sugar gum		?
Dicots	Myrtaceae	Eucalyptus globulus	blue gum		?
Dicots	Myrtaceae	Eucalyptus rudis	desert gum		?
Dicots	Nyctaginaceae	Mirabilis laevis	wishbone bush	N	Y
Dicots	Oleaceae	Fraxinum uhdei	shamel ash		Y
Dicots	Oxalidaceae	Oxalis pes-caprae	Bermuda buttercup		?
Dicots	Platanaceae	Platanus racemosa	Western sycamore	N	Y
Dicots	Polygonaceae	Eriogonum fasciculatum var. fasciculatum	Calif. buckwheat	N	Y
Dicots	Polygonaceae	Rumex crispus	curly dock		Y
Dicots	Primulaceae	Anagallis arvensis	scarlet pimpernel		Y
Dicots	Rhamnaceae	Ceanothus spinosus	greenbark ceanothus	N	Y
Dicots	Rhamnaceae	Rhamnus californica	coffeeberry	N	Y
Dicots	Rhamnaceae	Rhamnus crocea	redberry	N	Y
Dicots	Rhamnaceae	Rhamnus ilicifolia	hollyleaf redberry	N	Y
Dicots	Rosaceae	Adenostoma fasciculatum var. fasciculatum	chamise	N	Y
Dicots	Rosaceae	Cercocarpus betuloides var. betuloides	mountain mahogany	N	Y
Dicots	Rosaceae	Heteromeles arbutifolia	toyon	N	Y
Dicots	Rosaceae	Prunus ilicifolia subsp. ilicifolia	holly-leaf cherry	N	Y
Dicots	Rubiaceae	Galium angustifolium subsp. angustifolium	shrubby bedstraw	N	Y
Dicots	Rubiaceae	Galium aparine	cleavers		Y
Dicots	Salicaceae	Salix lasiolepis	arroyo willow	N	Y
Dicots	Scrophulariaceae	Keckiella cordifolia	heart-leaf penstemon	N	Y
Dicots	Scrophulariaceae	Mimulus aurantiicus	sticky monkey-flower	N	Y
Dicots	Scrophulariaceae	Penstemon spectabilis var. subviscosus	showy penstemon	N	Y
Dicots	Scrophulariaceae	Veronica persica	bird's eye speedwell		Y
Dicots	Simaroubaceae	Ailanthus altissima	tree-of-heaven		Y
Dicots	Solanaceae	Nicotiana glauca	tree tobacco		Y
Dicots	Solanaceae	Solanum douglasii	Douglas' nightshade	N	Y
Dicots	Solanaceae	Solanum xanti var. intermedium	purple nightshade	N	Y

Group	Family	Latin name	English name	N= native	Observed
Dicots	Verbenaceae	Lantana montevidensis	trailing lantana		Y
Ferns and allies	Pteridaceae	Aspidotis californica	lace fern	N	?
Monocots	Arecaceae	Phoenix canariensis	Canary Island date palm		?
Monocots	Arecaceae	Washingtonia robusta	Mexican fan palm		Y
Monocots	Juncaceae	Juncus textilis	Indian rush	N	Y
Monocots	Liliaceae	Agave americana	century plant		Y
Monocots	Liliaceae	Dichelostemma capitatum subsp. capitatum	blue dicks	N	Y
Monocots	Liliaceae	Yucca whipplei	chaparral yucca	N	Y
Monocots	Poaceae	Achnatherum coronatum	giant needlegrass		Y
Monocots	Poaceae	Arundo donax	arundo		Y
Monocots	Poaceae	Avena barbata	slender oats		?
Monocots	Poaceae	Avena fatua	wild oats		?
Monocots	Poaceae	Bromus carinatus	California brome	N	?
Monocots	Poaceae	Bromus diandrus	ripgut brome		?
Monocots	Poaceae	Bromus hordeaceus	soft chess		?
Monocots	Poaceae	Bromus mollis	soft chess		?
Monocots	Poaceae	Bromus rubens	red brome		?
Monocots	Poaceae	Cortaderia selloana	pampas grass		Y
Monocots	Poaceae	Ehrharta erecta	panic veldtgrass		?
Monocots	Poaceae	Hordeum murinum	Foxtail barley		Y
Monocots	Poaceae	Leymus condensatus	giant wildrye	N	Y
Monocots	Poaceae	Lolium multiflorum	Italian ryegrass		Y
Monocots	Poaceae	Nassella pulchra	purple needlegrass	N	Y
Monocots	Poaceae	Pennisetum sp.	fountain grass		Y
Monocots	Poaceae	Piptatherum miliaceum	smilo grass		Y
Monocots	Poaceae	Poa annua	annual blue grass		Y

Table 4-2. Invasive/non-native and undesirable plants of urban-wildland interface, City of Monrovia

Species	“Fire-encouraging”	Invasiveness	Status	Habitat where invading	Treatment technique ⁶⁵		
					Removal	Herbicide, etc.	Solarization ⁶⁶
Fan palm <i>Washingtonia</i> spp.	High; allow fires to gain height	Med	Scattered individuals; escapee from yards and mulch piles	Oak woodland, riparian, ruderal	Hand-pull smaller plants; cut larger trees to ground	Stem injection	
Eucalyptus <i>Eucalyptus</i> spp.	High; allow fires to gain height	Low	Frequent around older homes; a few at urban interface	Riparian	Hand-pull smaller plants; cut larger trees to ground	Cut-stump treatment	Yes
Wattle <i>Acacia</i> spp.	High; allow fires to gain height	Med	Scattered individuals; escapee from yards and mulch piles	All habitats	Hand-pull smaller plants; cut larger trees to ground	Cut-stump treatment	Yes
Pines <i>Pinus</i> spp.	High; allow fires to gain height	Low	Frequent around older homes; a few at urban interface	Ruderal, riparian, oak woodland	Cut trees to ground		
Tree-of-heaven <i>Ailanthus altissima</i>	High; allow fires to gain height	High	Small clusters, generally in cleared/disturbed areas	Riparian, ruderal	Hand-pull seedlings only; cut/re-cut trees prior to flowering	Girdling; basal bark and cut-stump treatment	Yes
Periwinkle <i>Vinca major</i>	Low	High	Localized; shady areas, often under oaks	Riparian, oak woodland	Hand-pull	Foliar spray (all stems)	Yes
Lantana <i>Lantana</i> spp.	Low	High	Localized; shady areas, often under oaks	Riparian, oak woodland	Hand-pull		
Castor bean <i>Ricinus communis</i>	Med	High	Local infestations in disturbed areas of scrub	Riparian, ruderal	Hand-pull small plants, cut larger trees to ground	Foliar spray, cut-stump treatment	Yes
Iceplant (several genera in family Aizoaceae)	Low	Low	Localized, mainly in front yards	Ruderal	Hand-pull mats		Yes
Ivy <i>Hedera</i> spp.; <i>Delairea odorata</i> and <i>Senecio mikanioides</i>	Low	High	Localized; shady areas, often under oaks	Riparian, oak woodland	Cut 1-yard-wide strip around infested area; tease out roots with mini-rake; roll up like carpet.	Spray resprouts (foliar/wick), taking care not to touch other plants	Yes

⁶⁵.Los Angeles County Weed Management Area, 2005, Best Practices for Vegetation Management http://lacountywma.org/publications/WeedBMP_lo_res_WebVersion.pdf

⁶⁶ Solarization (same as Soil Solarization) – a non-chemical method using a plastic tarp to trap heat energy from the sun to kill weeds. This and other weed control methods are thoroughly described in the LA County Weed Management publication referenced above.

Species	“Fire-encouraging”	Invasive-ness	Status	Habitat where invading	Treatment technique		
					Removal	Herbicide, etc.	Solarization
Ivy <i>Hedera</i> spp.; <i>Delawarea odorata</i> and <i>Senecio mikanioides</i>	Low	High	Localized; shady areas, often under oaks	Riparian, oak woodland	Cut 1-yard-wide strip around infested area; tease out roots with mini-rake; roll cape ivy up like carpet.	Spray resprouts (foliar/wick), taking care not to touch other plants	Yes
Tree tobacco <i>Nicotiana glauca</i>	Med	Med	Widespread in scrub, but few major infestations	All habitats	Hand-pull seedlings only; cut/re-cut trees prior to flowering	Foliar spray, cut-stump treatment	Yes
Annual grasses (<i>Hordeum</i> , <i>Bromus</i> , etc.)	High; quick-burning	High	Frequent throughout	All habitats	Mowing/weed-whipping late winter		
Tocalote <i>Centaurea melitensis</i>	High; quick-burning	High	Frequent throughout	All habitats, esp. ruderal	Mowing/weed-whipping late winter (just before flowers open)	Foliar spray	Yes
Fountain grass <i>Pennisetum setaceum</i>	High; quick-burning	High	Frequent throughout	Coastal sage scrub, chaparral, ruderal	Mowing/weed-whipping late winter		Yes
Smilo grass <i>Piptatherum miliaceum</i>	High; quick-burning	High	Frequent throughout	Ruderal	Mowing/weed-whipping late winter		Yes
Pampas grass <i>Cortaderia selloana</i>	Med	High	Localized, mainly in drainages	Riparian	“Pop” out with shovel, remove and chop root mass	Spray on leaves during growing period, or on stems immediately after cutting	Yes
Poison hemlock <i>Conium maculatum</i>	Low	High	Localized; shady areas, often under oaks	Oak woodland, riparian	Hand-pull; mow annually, starting in March	Spray on leaves during growing period, or on stems immediately after cutting	Yes

Includes information from Guide to Native and Invasive Streamside Plants (Ventura County Planning Division 2006) and “Don’t Plant a Pest” (www.cal-ipc.org)

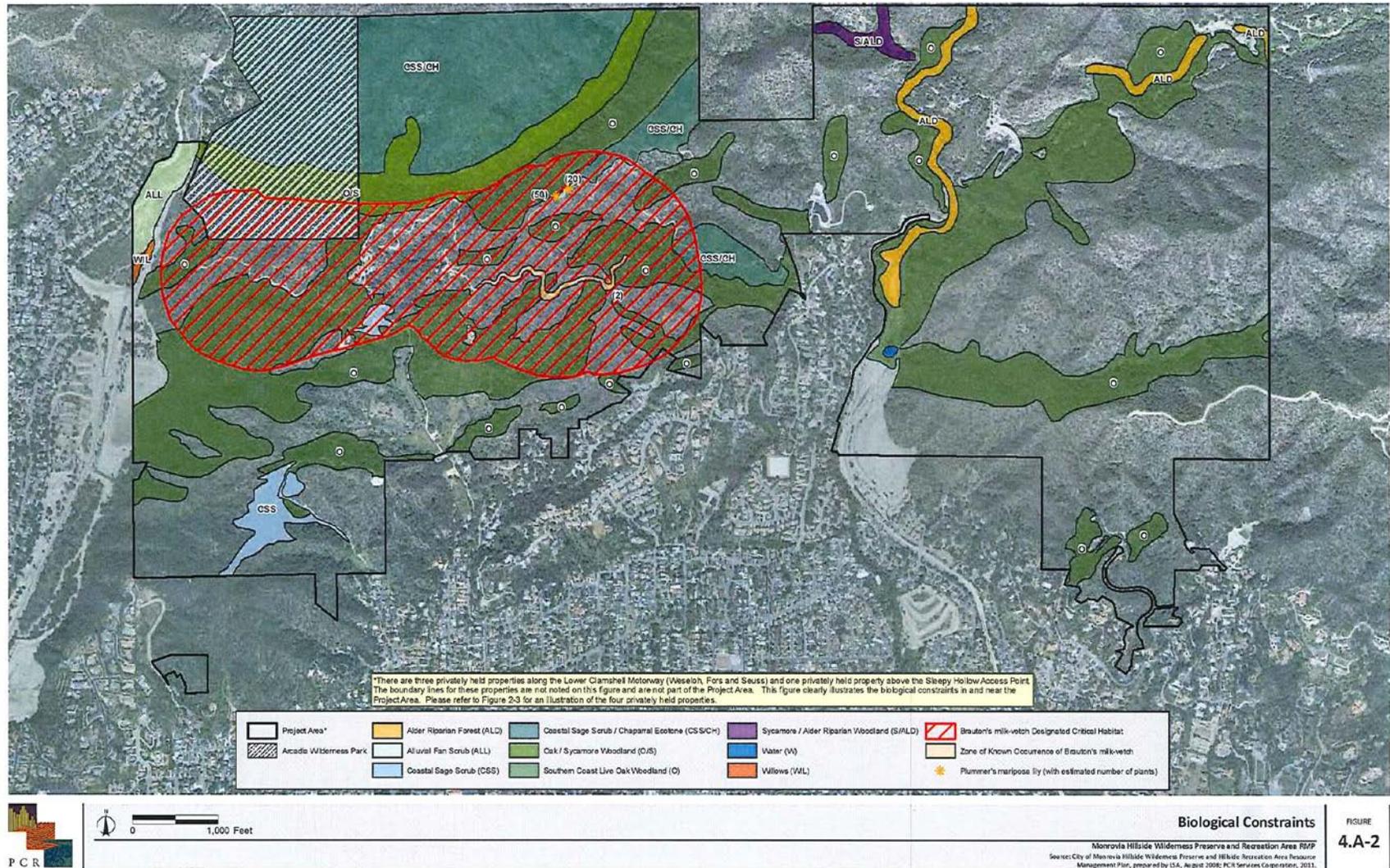


Figure 4-2 Rare Plants and Vegetative Communities. (source Hillside Wilderness Preserve Final EIR)

The Home Ignition Zone

5.	Hardening the Home.....	2
5.1.	From the House Out—The Home Ignition Zone.....	3
5.1.1.	California WUI Building Codes	4
5.1.2.	Hardened Homes.....	5
5.1.3.	Defensible Space “from the House Out”	9
5.2.	Ready, Set, Go	9

5. Hardening the Home

Why is Hardening the Home Important?

The importance of hardening the home to make it resistant to wildfire has been characterized by California's State Fire Marshal as follows:

Public fire-safety education, law enforcement and fire protection prevent 98% of California wildfires from becoming large or damaging. However, wildfires are inevitable in California's fire-prone environments. It will not be possible to prevent all wildfires. Some wildland fires will escape the best fire suppression efforts and a few will become large conflagrations with disastrous. But experience shows us that the large losses of buildings can be substantially reduced. Large wildfires are inevitable, but the disastrous house loss associated with interface (WUI) fires can be prevented by reducing hazardous conditions at and immediately around buildings before the fires start. This will keep California's fire protection systems from becoming overwhelmed and help reduce fire suppression costs as well as interface fire losses.

The most important step in mitigating interface fire hazards is building construction that reduces the risk of building ignition.¹

In California, the Office of the State Fire Marshal (OSFM) has adopted and regularly updates minimum statewide building construction regulations. State and local government agencies are responsible for the application of these regulations at a minimum, but may enact stricter regulations. Monrovia has adopted the California standards, and has added additional provisions, making our standards even more rigorous than the state mandates.

When building construction regulations are applied, in conjunction with hazardous vegetation management, the losses from disastrous wildfires are reduced. Detailed information on California's wildfire protection building program can be found at:

<http://osfm.fire.ca.gov/codedevelopment/wildfireprotectionbuildingconstruction.php>

Applicable Monrovia building codes are included in Appendix A-1c.

¹ (Office of the State Fire Marshal, 2013)

Community Fire Safety Begins at Home²

Monrovia residents can improve their chances to survive wildfire and minimize their losses. In fact, compared to hurricanes, tornadoes, earthquakes, avalanches, floods or tsunamis, wildfire is the most manageable of our natural perils because it is neither a force nor a material object. Instead, fire is simply a process—the process of combustion – and it is a process over which we can exert considerable control. For the process of fire to occur, three things are required:

HEAT OXYGEN FUEL

Without any one of these, the process of combustion will not occur, or if a fire has started, the removal of one of these items will cause combustion to cease. Of the three ingredients, there is only one that we can consistently manipulate – it is not heat, because there will be ignitions that we cannot predict or prevent; and it is certainly not oxygen, because we also require oxygen to breathe. Of course, that leaves fuel – anything combustible – including living and dead plants, our homes and many of our possessions, including cars.

Fortunately, to slow or stop combustion it is not necessary to remove all combustible materials, but only to limit their quantity, ease of ignitability and their arrangement that allows a fire to spread. Where fuels are abundant (including ignitable homes), a fire can burn very hot and move very quickly. When little fuel is present, fires tend to slow down and burn cooler. Cooler fires are easier to control fight. Reducing the amount, type, and arrangement of fuel in and around your home is your best defense against wildfire.

It's the fuels closest to a home—including the home itself—that often make the difference between the home's ability to survive a wildfire, or not. This chapter will show you how your preventative actions can help make your home an asset during a wildfire, instead of a liability.

5.1. From the House Out—The Home Ignition Zone

In Southern California, research and experience show that what you do to your house itself and the area

directly adjacent to it will have the biggest impact on your home's ability to withstand a wildfire. Therefore, this Community Wildfire Protection Plan promotes a strategy of preparation “from the house out.”

Many people are curious to know how homes ignite and are surprised when they learn the most common means by which houses burn down. There are three ways that an adjacent fire (whether it is a housefire or a brushfire) can transfer enough heat to your home to ignite some portion of it:

Embers

These are glowing or burning pieces of vegetation or construction *debris* that are lofted during the wildfire.

Embers can move up to a mile ahead of a firestorm. These small embers or sparks may fall on the vegetation near your home; on dry leaves, needles, or twigs on your roof; on the roof and then subsequently concentrate within 5 feet of the house; or under your deck with subsequent ignition of vegetation or debris that could then ignite and burn down your house. If ignited from embers that come from outlying areas, a continuous sequence of vegetation can carry

² (Tracy Katelman, 2010) The following sections are adapted from the draft Santa Monica Mountains CWPP (Tracy Katelman, 2010). Many thanks to ForEverGreenForestry and the County of Los Angeles Fire Department for permitting copying and distribution of the material in the document.

flames from your landscaping to your house. The concentration of embers that land on the roof and roll off of it makes the removal of all flammable material within 5 feet of the house critical.

Radiant Heat

This is the heat given off by burning materials that is transferred through the air to other materials or objects. Radiant heat from a fire near your house can heat the surface of combustible building materials to a point where combustion occurs.

Flame Impingement

This refers to the transfer of heat by direct flame exposure. Direct contact with fire flames will heat the combustible building materials of your home. Depending on the exposure (i.e., time and intensity) of the flame, materials can ignite or break. For example, in a high-intensity fire, your siding material could ignite or the glass in your windows could break.

Research shows that the cause for most homes igniting is usually not the fire front or wall of flames but the presence of wind-carried embers or *firebrands* in combination with sufficient fuel to be ignited.

The most effective strategy to limit home ignition potential is to create “*defensible space*.” According to the Los Angeles County Fire Department:

“Defensible space is the area around a structure free of flammable plants and objects that creates a zone in which firefighters can operate safely in order to help protect a home during a wildfire. This space is wide enough to prevent direct flame impingement and reduce the amount of radiant heat reaching the structure. The defensible space for each structure varies depending on the type of vegetation and topography.”³

Firefighters use the terms “defendable” and “not defendable” to distinguish between those houses with defensible space versus those that do not have it. The safety of firefighters is critical in structure protection (homes and buildings). If it is too dangerous for firefighters to get in and out of an area, they are instructed not to risk their lives and equipment to attempt to save something that may not survive. However, it’s not just about “defending” your home or property; fire safety efforts are designed to ensure a home’s survivability from fire under various conditions. This is the ultimate goal for conservation-based fuel reduction and fire-safety efforts: living *with* wildfire, and always being prepared for this possibility.

5.1.1. California WUI Building Codes

The California Building Code includes specific requirements for new construction within Wildland-Urban Interface (WUI) areas. These are known as the “Chapter 7A” requirements, also called “Materials and Construction Methods for Exterior Wildfire Exposure”. These requirements are enforced statewide by the Office of the State Fire Marshall, and locally by Monrovia’s Building Department when approving plans for new construction (which may include additions, remodels, etc., depending on specifics.) The Chapter 7A requirements do not guarantee that a home will be fireproof, but they represent decades of experience with factors that have contributed to, or prevented, property loss in wildfires. If you are doing construction in Monrovia’s VHFHSZ, your contractor should be knowledgeable about these requirements. However, even if your project does not fall within the scope of Chapter 7A, you can benefit from the experience that went into them. Also, it is important to keep in mind that these are only minimal requirements, and it is often possible to go beyond them, for additional fire resilience.

³ www.fire.lacounty.gov/safetypreparedness/ReadySetGo/pdf/Ready%20Set%20Go%2009.pdf.

The Chapter 7A WUI Building requirements (Title 14 Code of California Regulations: Division 1.5, Chapter 7, Subchapter 2, Articles 1-5)⁴ are enforced by the Office of the State Fire Marshal (OSFM). A list of building materials that comply with the new California requirements can be found in the WUI Product Handbook, published on-line by the OSFM - go to:

http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland.php and click on NEW PRODUCTS HANDBOOK.

5.1.2. Hardened Homes

Following is a summary of the parts of a home that are vulnerable to ignition due to ember entry, direct flame impingement or radiant heat⁵. You can delve deeper to find exhaustive information about each of these elements both in print and online sources. One of the best references, the “Home Survival” guide, is available free online at <http://anrcatalog.ucanr.edu/Details.aspx?itemNo=8393>. :

“Home Survival in Wildfire-Prone Areas: Building Materials and Design Considerations” by Quarles, Valachovic, Nakamura, Nader and de Lasaux, ANR Publication 8393, ISBN-13:978-1-60107-693-9.

Roofing

When considering wildfires, your roof is arguably the most vulnerable part of your home. It represents a relatively large horizontal surface where embers can land. If your roof covering is made from combustible materials, or debris has accumulated at certain locations, the embers can ignite these materials. While your home may only be subjected to the flaming front of the wildfire for a few minutes, your roof (and the rest of your house) can be subjected to wind-blown burning embers for a much longer period of time, as the wildfire approaches and burns through the area where you live.

How well your roof performs during a wildfire will depend on a number of factors, including:

- The roofing material used and its fire rating.
- The age and condition of your roof.
- Edge-of-roof issues.
- The complexity of your roof (that is, how many levels and wall/roof intersections you have, and how much debris can collect there).
- Gutters and other edge-of-roof factors.
- Vents and other penetrations in your roof (see next section).

Research shows that homes with a non-combustible roof and clearance of at least 30 to 60 feet have an 85-95% chance of survival in a wildfire.⁶

Fire ratings of A, B or C are determined for roof coverings based on test methods developed by standards writing organizations. These standards evaluate several fire-related characteristics of a roof covering. Class A is the highest

⁴ Office of the State Fire Marshal, http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_codes.php

⁵ Unless otherwise noted, information in this subsection is from the online resource, Homeowner’s Wildfire Mitigation Guide, provided by the University of California, Division of Agriculture and Natural Resources, (UCANR) accessed on 1/10/14 at <http://ucanr.edu/sites/Wildfire/> This permission is limited to this use only. Please reference the title of the publication and "© 2007 Regents of the University of California. Used by permission."

⁶ Foote, Ethan. (August 2004). “Wildland-Urban Interface Ignition-Resistant Building Construction Recommendations.” Community Wildfire Protection Plan Workshops. California Fire Alliance and the California Fire Safe Council.

level, and is required by state and city regulations for new construction in the Very High Fire Hazard Severity Zone (which includes all of Planning Units 1-4 in this Plan). There are two ways for a roof to have a Class A fire rating:

- From the covering alone (sometimes called a ‘stand alone’ Class A roof)
- From the covering and underlying materials (sometimes called Class A ‘by assembly’)⁷

Even with the use of non-combustible roofing materials, any gaps in the roofing provide an avenue for embers or flame. Large gaps between the roof covering and roof deck (sheathing) have to be plugged. The most common example of this kind of gap is in a clay-barrel tile roof. Plugging is often called ‘bird stopping’. With non-bird stopped roofs, a bird can access the space between the roof covering and the sheathing, and build a nest. During a wildfire, embers can penetrate the roof edge and ignite the nest or other debris in that cavity. Gaps at the valleys, ridges and other junctions must also be avoided.⁸

Every thirty years or so, you will have the opportunity to select a new roof covering. In the meantime, one of the most important jobs you have is inspecting your home and near-home vegetation, and performing needed maintenance. The standard tests to determine fire performance are conducted on new covering materials. An older roof may not perform as well as a fire-resistant membrane. It will be up to you to make sure your roof covering is inspected and maintained, and replaced when needed.

Edge of Roof Issues

Even a Class A roof can be vulnerable at its edges. You can argue that the roof edge is no longer the roof, but regardless, it is still important to understand, and address, these vulnerabilities. Debris often accumulates in locations where the roof changes slope (for example, where the roof intersects with a wall and in the valley). During wildfires, embers will also collect at these locations, igniting the accumulated vegetative fine fuels (pine needles, leaves, etc.). If the material that your Class A roof intersects with doesn’t provide the same or similar protection, then your roof is vulnerable. For this reason, it is important to be vigilant about removing debris from your roof.

Gutters and Skylights

Combustible debris such as leaves and pine needles can accumulate in gutters, especially from nearby or overhanging trees. Due to difficulty in accessing upper stories of a home, gutters two and three floors high are even more problematic, since they will be difficult to clean out on a regular basis. If ignited, combustible debris in the gutter will expose the edge of the roof covering, typically the fascia and or roof sheathing. Depending on the condition of the wood and presence (or absence) of metal flashing at the edge of the roof, debris in the gutter may make it easier for fire to enter the attic. Metal flashing at the roof edge will provide additional protection to the roof edge and therefore is a recommended detail.

For best performance, skylights should consist of two layers, with one of them consisting of tempered glass (for improved resistance to larger embers striking and breaking the glass). Likely exposure for a skylight would be from the impact of an ember or other object lofted during a wildfire.

Vent Openings

Roof and crawl space vents are required by most building codes. The function of the vents is to remove excess moisture from those spaces. Evidence from recent wildfires in the West has shown that vents are an entry point for embers and flames. Embers can ‘rain’ on and around homes for hours before and after the wildfire flame-front reaches and passes your house. Embers that enter your attic can ignite construction materials and other items you may have stored there. Flames can also enter if embers ignite near-home vegetation or debris that has accumulated on a deck.

You should:

⁷ UCANR, Builder’s Wildfire Mitigation Guide (BWMG) as accessed 1/10/14
http://firecenter.berkeley.edu/new_bwmg/roof/code

⁸ UCANR, BWMG, cited above

- Inspect and maintain vegetation in the vicinity of under-eave vents. Remove highly combustible vegetation.
- Clean vents on a regular basis to minimize build up of debris in the mesh.
- Remove debris that accumulates near roof vents. This includes grounds near crawlspace vents.
- Consider preparing vent covers that can be temporarily installed when a wildfire approaches your home. Vent covers can be manufactured from plywood or other solid substance that would provide short term protection from embers and flame.

In some new construction, under-eave vents have been eliminated. In those cases, the inlet vent function is being performed by using through-roof vents located in the lower region of the roof (i.e., near the roof edge). In California, some vents have been accepted for use in the under-eave area. See information about these vents on the Office of the State Fire Marshal website. Provided that adequate defensible space is maintained, screening of vent openings with 1/16" to 1/8" mesh corrosion-resistant steel screens will minimize the entry of embers (during the ember blizzard that comes with a wildfire) into attics (most important) and crawl spaces. New homes that incorporate unvented attic spaces into the design are currently available, and are being built in some locations.

Eaves

The under-eave area is vulnerable if embers enter the attic area through any gaps that may exist in this area, or if flames from ignited vegetation, siding, or other near-home combustible materials reach the area. Attic vents are commonly found in the under-eave area, and embers can also enter the attic through these openings (see above).

In an open-eave design, the roof rafters or joists and roof sheathing are visible. With a soffited-eave design, the roof rafters and sheathing are hidden through the use of a panel or boards that extend horizontally from the edge of the roof (typically being attached to the bottom of the fascia) back to the exterior wall. "Boxing-in" the eave when sheathing or boards are attached to the bottom side of the roof rafters in the exterior portion of the eave. Many wildfire retrofit guides suggest replacing open-eave framing with either a soffited or boxed-in eave design. The open-eave design tends to trap heat in the under-eave area. If ignition occurs, the fire spreads laterally more quickly than when a soffited-eave construction is used.

Windows

If the glass in a window breaks during a wildfire, embers and flame can easily enter your home. Similarly, if your window frame ignites, it is possible that the resulting fire would burn through the frame material and ignite other material inside your home (for example, a curtain). Both of these scenarios could easily result in the loss of your home. Therefore, windows must be able to resist the following wildfire exposures:

A radiant exposure severe enough to break the glass in your window or ignite the exterior siding directly below it. Burning vegetation could also ignite combustible siding.

A flame contact exposure that could result from embers igniting vegetation and/or exterior cladding that burns up to your window.

Because of the importance of glass in the performance of a window in a wildfire, the most important thing you can do is install dual-pane windows. With dual pane windows, the outer pane often serves as a thermal shield and protects the inner pane. The inner pane is allowed to heat up more slowly, and uniformly, and therefore may not fail even if the outer pane does. Tempered glass is stronger than annealed glass, and will provide additional protection during a wildfire. Tempered glass is more expensive. Building Codes already require tempered glass in some locations, so some of your newer windows will already have tempered glass. A small white etching is often present in the corner of a piece of glass in a window if it is tempered.

Research has shown that metal insect screens improved the performance of glass under radiant exposures. However, research at UC has shown that screens do not provide added protection from a flame contact exposure. For additional protection homeowners could consider taking additional precautions to protect your windows. These precautions include fabricating covers (for example, 1/2-inch plywood covers), cut to size and marked so that it can easily be installed over a window prior to evacuation. Shutters or other roll-down devices could also be installed. In this case,

you will have to make these items part of your routine inspection and maintenance program to make sure they operate properly. All of these have the disadvantage of requiring an action to implement.

Siding

Siding (cladding) is an important aesthetic attribute for houses, but it also has a key role as part of a protective enclosure to help shed rain, while permitting excessive vapor to move through and out of the house.

If ignited, vertical flame spread on combustible siding will threaten other vulnerable components of a house, such as windows or the under-eave area. A common way for combustible siding to ignite by flame contact from burning vegetation, combustible mulch, or other combustible materials (firewood, lumber, etc.) stored near the home. All of these adjacent combustible materials very likely would have been ignited by embers.

A potential contributing problem with wood and wood-based siding products is fungal decay, particularly when present along the bottom edge. When dry, decayed wood is more easily ignited.

Vinyl siding deforms when exposed to heat from the wildfire, or other heat sources such as nearby burning vegetation or a burning building. Deformed vinyl siding will expose the underlying sheathing or wall cavity. At this point, a house will be relying on these materials for protection.

Decks

Decks include all types of horizontal walkways, including landings, porches, and patios that are directly connected or very close to a house or building. Decks are described by the surface that you walk on (called the deck covering). There are two basic kinds of decks – those that use deck boards as the deck covering, and those that have a solid surface deck covering. The deck boards are almost always made from combustible materials (wood or one of the wood-fiber plastic composite or 100% plastic deck board products). Solid surface deck coverings are usually made from noncombustible materials, and include light-weight concrete, stone or tile. Solid surface decks are often built over an occupied (living) space. Occasionally an open frame deck will be installed over a water-proof membrane, again built over an occupied space. As with normal decks that use combustible boards, this open-frame deck will also be vulnerable to accumulation of debris, and ignition by embers.

Decks are an important consideration because their proximity to homes and buildings. They are a source of fuel and if ignited, will provide a radiant heat and likely a direct flame contact exposure to siding and windows and doors, including glass sliders. The heat from the fire can cause the glass to break and permit the fire to enter the house.

For wood deck boards, the thicker, the better. Deck board gaps (which are there for drainage and ventilation) can permit embers to lodge and potentially cause ignitions. The accumulation of wind-blown debris in these gaps makes ignition from embers easier; therefore you should clean between-board gaps. Debris should also be removed from the areas where the deck connects to the wall. Elevated decks are even more vulnerable if you use the space underneath to store combustible materials. Raised decks are open to flames or embers, especially those on slopes. Decks that are just above ground level can be screened to prevent the accumulation of combustible debris in the under-deck area.

Provided that adequate defensible space is maintained, most solid wood decking is fire-resistant enough to withstand short-term heat load. The next greatest threat from decks is firefighter safety. Many new materials (synthetics) ignite more easily than wood and have a rapid structural collapse when subjected to high heat loads, creating a situation where firefighters could fall through.⁹

Fences

Fences — like vegetation — are a much greater hazard close to a house. Fences and gates can also be an access problem for fire crews trying to enter your yard, so it is advisable to get an inspection from the Monrovia Fire Department.

⁹ Further information on this available through the California State Fire Marshal's Building Materials Listing, osfm.fire.ca.gov/bmlisting.html.

There are several reasons for fences to be of concern. For one, a combustible fence or gate attached to a structure is an obvious threat if it catches on fire. The fire can arise in a number of ways. One is that debris (leaves, trash, etc) often collect at the bottom.

Another problem is that wooden fence boards in contact with soil will eventually decay in that area.

Combined with combustible debris, fences can be an excellent fuel source. Also, fence boards usually have small vertical openings where brands can lodge and even cause the fence boards to ignite directly. In all cases, the thinner the fence boards, the greater the risk!

Do not store combustible materials (such as firewood) against fences.

Outbuildings

Outbuildings (e.g. garages storage, wood, and tool sheds) with less than thirty feet of separation from main structures place homes at a high risk of loss, because if they catch fire, they can more easily catch the house on fire.

When houses are surveyed for wildfire vulnerabilities, quite often the garage is not considered even though it could be the most hazardous aspect of the house.

Garages are typically not well sealed since they are generally not heated or cooled. Gaps at the top, bottom and edges of doors can let glowing embers enter, and we all know that garages are full of flammable materials. Garages usually have vents at various locations, especially if they contain gas furnaces or hot water heaters. These vents are easy entry points for embers.

Small embers can easily enter through the door gaps. Sliding doors (that are hung at the top edge) have a special problem in that one side is offset, leaving a large gap at the top edge. In addition, many garage doors have glass in the top sections plus personnel entry doors that have single pane glass that (although it is tempered in newer construction) can easily be broken from heat or flying debris.

An even greater concern is attached carports or any type of garage that does not have doors. These types of garages would typically have an extreme number of combustibles and many nooks and crannies for embers to lodge.

Wood Piles

Wood piles with less than thirty feet of separation from structures often place homes at a high risk for loss.

Propane Tanks

Tanks with less than ten feet of clearance around them and thirty feet of separation from houses may place homes at a risk of loss.

5.1.3. Defensible Space “from the House Out”

Chapter 4 detailed principles and objectives for modifying vegetative fuel around a home. The main concepts are simple, and bear repeating here:

- Anything that can burn is a “fuel”.
- The closer to the house, the more important.

5.2. Ready, Set, Go

Monrovia has adopted a program called Ready, Set, Go!, which reinforces many of the concepts presented in this CWPP. The Ready, Set, Go! (RSG) Program is an international program managed by the International Association of Fire Chiefs (IAFC), which seeks to develop and improve the dialogue between fire departments and the residents they serve. Launched nationally in March 2011 at the Wildland-Urban Interface (WUI 2011) Conference, the program

helps fire departments to teach individuals who live in high risk wildfire areas – and the wildland-urban interface – how to best prepare themselves and their properties against fire threats. The RSG! Program tenets help residents be Ready with preparedness understanding, be Set with situational awareness when fire threatens, and to Go, acting early when a fire starts.

Monrovia’s Ready, Set, Go! program flier is included in Appendix A-3.

The Ready, Set, Go! Program utilizes firefighters to teach individuals through public outreach efforts who live in high risk wildfire areas how to best prepare themselves and their properties against Wildland fire threats. When firefighters encourage residents to take personal responsibility for preparing their property and family for WUI/wildland fire, residents become an active part of the solution to the problem of increasing fire losses.

The Ready, Set, Go! Program seeks to develop and improve the dialogue between fire departments and the residents they serve. Firefighters can explain what fire resources are available during an event and the role that individuals can play in preparedness and early evacuation – if called for by their local officials – to increase firefighter safety responding to a rapidly moving wildland fire event.

The Ready, Set, Go! Program works in complimentary and collaborative fashion with Firewise and other existing wildland fire public education efforts. It amplifies their messages to individuals to better achieve the common goal we all share of fire-adapted communities.

The program delivers a three step process that teaches homeowners to create their own Action Plan of preparedness, have situational awareness and leave early in the event of a fire. This process significantly increases the safety of residents and increases the safety of responding firefighters.

- ✓ **READY** – Take personal responsibility and prepare long before the threat of a wildfire so your home is ready in case of a fire. Create defensible space by clearing brush away from your home. Use fire-resistant landscaping and harden your home with fire-safe construction measures. Assemble emergency supplies and belongings in a safe spot. Make sure all residents residing within the home are on the same page, plan escape routes.
- ✓ **SET** – Act immediately. Pack your vehicle with your emergency items. Stay aware of the latest news from local media and your local fire department for updated information on the fire.
- ✓ **GO!** – Leave early! Following your Action Plan makes you prepared and firefighters are now able to best maneuver the wildfire and ensuring you and your family’s safety.

This diagram shows the zone concept for defensible space:

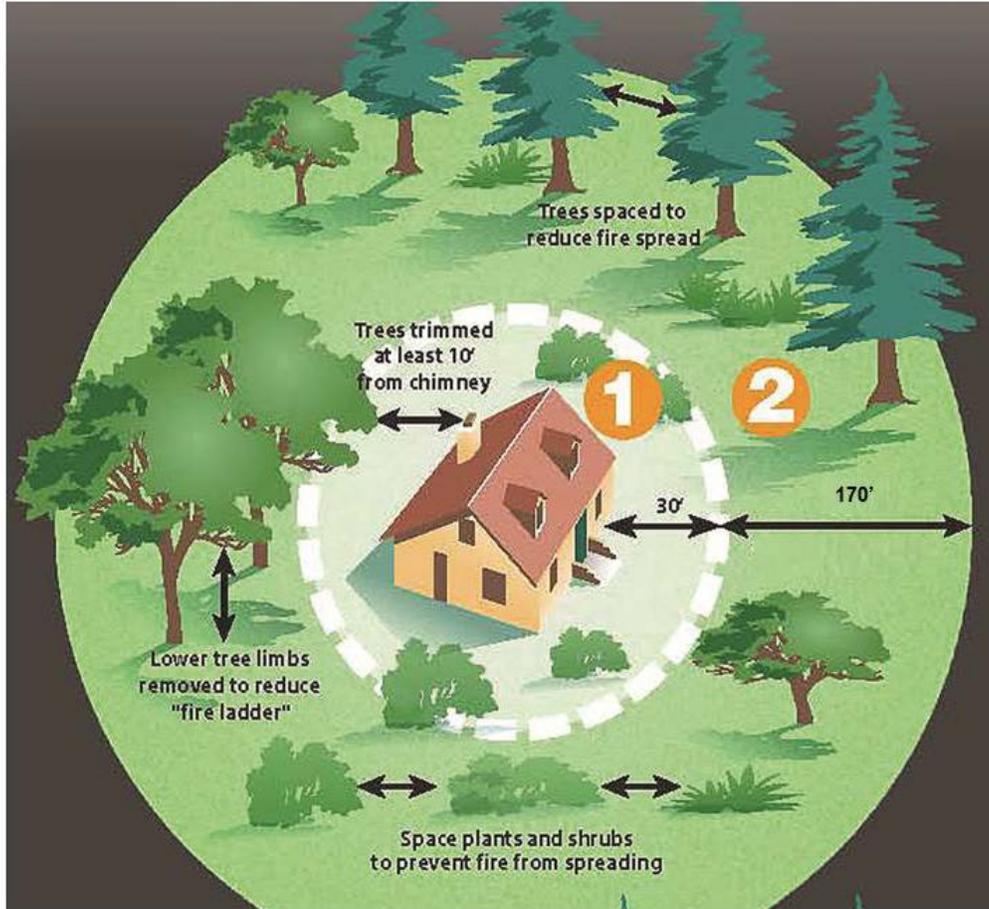


Figure 5-1 Defensible Space Zones

READY, SET, GO!

Residential Safety Checklist

Home

- Ember safe roof
- Roof/gutters clean
- Vent screens 1/8" (or less)
- Chimney has spark arrestor
- Non-combustible siding
- Boxed eaves
- Decks enclosed
- Windows 2-paned or tempered
- Decks, porches non-combustible
- Patio items. non-combustible
- Firewood stored 30' from house

Defensible Space

- 5' non-combustible around house
- 30' "clean and green" around house
- Dead vegetation cleared
- Shrubs given separation
- Tree crowns given separation
- Ladder fuels removed

Emergency Access

- House number visible from street
- House number fire-resistant
- Street signs at every intersection leading to house
- Street signs fire-resistant
- Driveway clearance 10'
- Overhangs removed
- Gate width and access adequate
- Turnarounds for long driveways

www.wildlandfireRSG.org

Community Features

6.	Monrovia Community Features.....	2
6.1.	General Facts	2
6.2.	Government.....	3
6.2.1.	Community Planning Context.....	4
6.3.	History.....	6
6.4.	Infrastructure.....	8
6.5.	Demographics	11
6.6.	Development Trends.....	12
6.7.	Housing and Land Use.....	13
6.7.1.	Land Use Goals and Objectives.....	13
6.7.2.	Housing.....	17
6.8.	Public Lands Management.....	19
6.8.1.	Municipal Parks and Open Space	20
6.8.2.	Other Public Lands	20

6. Monrovia Community Features

The Monrovia Community Wildfire Protection Plan is being prepared within the greater context of the City of Monrovia as a whole, which provides both basic and emergency services and urban amenities to the residents within the CWPP Project Area. The following section is intended to provide a snapshot of the City of Monrovia as a whole.

6.1. General Facts

Monrovia is located 20 miles northeast of Los Angeles in the foothills of the San Gabriel Mountains in the San Gabriel Valley in the county of Los Angeles.

Area: 13.73 sq. miles

Population: 36,929 (2010 Census)

Assessed Property Value: \$4,049,028,799¹

Households: 13,762

Average Household Income: \$45,300.00

Housing Units: 14,473

LEGISLATIVE DISTRICTS

Congressional 28th

State Senatorial 29th

State Assembly 59th

State Assembly 44th

Monrovia is located at 34.144156 North Latitude, -118.001848 West Longitude.

City Hall is located at: 415 South Ivy Avenue, Monrovia, CA 91016

Elevation: 560 feet

Incorporated: December 15, 1887

Area code: 626

Zip codes: 91016, 91017

¹ County of Los Angeles Taxpayers' Guide, 2012-2013, Secured Property – Taxable Net, pp.140-166; as referenced in Verdugo Fire Communications Center Annual Report 2012-2013; <http://www.verdugofire.org/pdf/verdugoannualreports/VerdugoAnnualReportFY2012-13.pdf>

6.2. Government

The City of Monrovia is organized under the general law type of government and operates under a council/manager format, as adopted in 1923. The City web site is: www.cityofmonrovia.org.

Elected Officials

- City Council - The City Council Members and the City Treasurer are elected officers identified in Government Code Section 87200 and file statements of economic interests with the City Clerk's office. City Council meetings are held the first and third Tuesdays of the month
- Mayor - Monrovia's Mayor is elected independently of the City Council for two-year terms.
- Mayor Pro Tem
- Council Members (2)
- City Clerk
- City Treasurer

Boards & Commissions

Members of City Boards and Commissions are appointed by the Mayor and City Council to act as advisors in specific areas of City business. All are volunteers. The Boards and Commissions listed below meet regularly to discuss public business in public settings.

- Planning Commission
- Community Services Commission
- Historic Preservation Commission
- Library Board
- Monrovia Old Town Advisory Board
- Traffic Safety Committee
- Youth Commission
- Development Review Committee

City Departments

- City Manager's Office (Economic Development, Public Information, Customer Service)
- Administrative Services (Finance and Information Systems)
- City Clerk's Office (Council Agendas, Notices, Information and Publications)
- Community Development (Building Inspection & Permits, Code Enforcement, Film Permit Guidelines, Housing, Planning, Redevelopment).
- Community Services (Library and Recreation)
- Fire Department
- Human Resources and Risk Management. .
- Police Department
- Public Works (Engineering, Facilities, Parks, Storm Drains, Streets, Traffic, and Water)

6.2.1. Community Planning Context

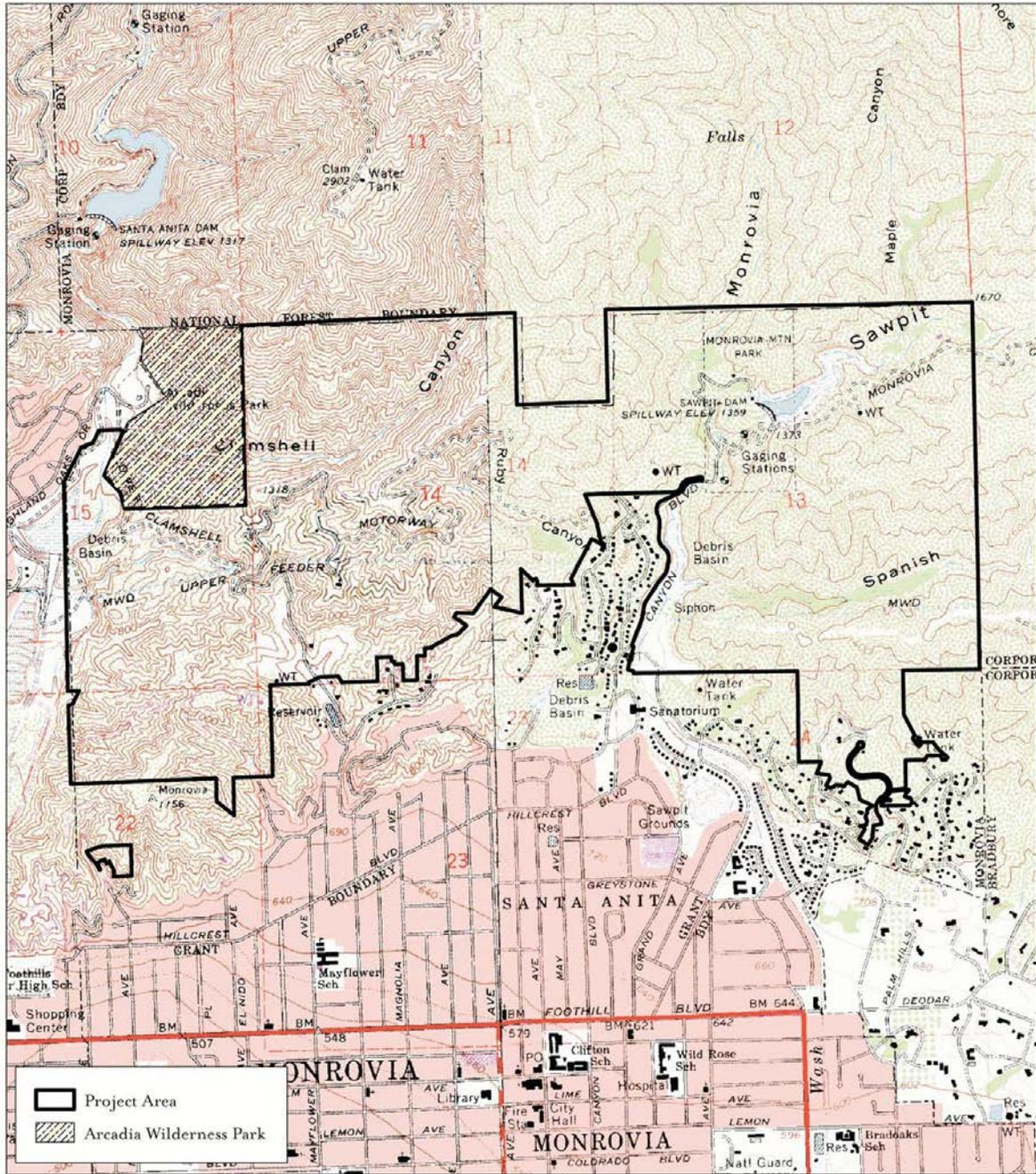
This CWPP exists in a context of several other planning activities:

- City of Monrovia General Plan; updates of various sections in progress
- City of Monrovia Local Hazard Mitigation Plan 2013 Update adopted.
- Los Angeles County Local Hazard Mitigation Plan 2005; 2011 update in progress
- Hillside Wilderness Preserve and Hillside Recreation Area Resource Management Plan; Environmental Impact Report (EIR) approved 2012.

The Monrovia General Plan incorporates the following elements: Circulation, Housing, Land Use, Public Service/Conservation, Recreation and Open Space, and Safety, which are updated on a variable schedule, ranging from 1966 to 2014.

Hazard Mitigation Plans (HMPs) are prepared for the City of Monrovia and the County of Los Angeles pursuant to the federal Disaster Mitigation Act of 2000 in order to qualify these jurisdictions for emergency mitigation federal funds. These plans address and prioritize all hazards. As HMPs include plans for fire prevention, pre-suppression and suppression activities and detail proposed mitigation actions, this CWPP incorporates relevant portions of the HMPs.

The Hillside Wilderness Preserve (HWP) and Hillside Recreation Area (HRA) Resource Management Plan (RMP) guide long-term management for the 1,416 acre RMP project area located in the foothills of the San Gabriel Mountains within the northern portion of the City. The boundary of the combined HWP and HRA is shown on the map below.



The RMP is focused on enhancing wildlife habitats, developing vegetation management practices, and providing safe, low impact recreational opportunities with public access. The HWP and HRA border and, in spaces, surround, the hillside edge of Monrovia residential development and are included within the CWPP project area.

6.3. History

Monrovia was founded May 17, 1886 and incorporated in 1887.

Human occupation of Monrovia extends prior to European contact, back to c. 500 BC, or earlier. The people who inhabited what is now the San Gabriel Valley were later referred to as the Gabrieliño Indians by early Spanish explorers, and are now referred to by some tribal members as the Tongva. There is no universally accepted name for this group of native people. Tongva/Gabrielino villages existed throughout the Los Angeles Basin and offshore islands, and many modern place names reflect the original village name, such as Azusa, which, in the Tongva/Gabrielino language is Azucsagna. The closest settlements to Monrovia were Momwahomomutngna (near present-day San Dimas) and Aleupkigna (present-day Santa Anita area in Arcadia).

Prior to European contact, the Tongva/Gabrielino were “a semi-nomadic coastal hunter-gatherer tribe that, at the time, populated a territory covering almost 4,000 miles including both of the offshore islands now known as Santa Catalina and San Clemente, part of Orange County, and most of modern day Los Angeles County. These lands in turn provided food and shelter for a population of nearly 5,000 people.. . abundant food resources included acorn, pine nut, small game, deer and quail. The Tongva traveled among other tribes on foot and also by canoes . . . The canoes allowed them to enjoy a rich variety of sea resources such as fish, shellfish, and sea mammals and to offer the resources in trade to their inland neighbors.”

(http://www.habitatauthority.org/pdf/native_american_history.pdf pg.4 “A Brief History of the Tongva Tribe: The Native Inhabitants of the Lands of the Puente Hills Preserve, by Rosanne Welch, PhD Program, Department of History, Claremont Graduate University, Claremont, California 91711, July 2006)

The Tongva/Gabrielino gathered wild seeds, berries, and plants along rivers and in marshlands. Abundant oaks in the San Gabriel valley, such as Coast Live Oak and Interior Live Oak provided a staple of the Tongva/Gabrielino diet: acorn mush made of boiled acorn flour. A small stone mortar for acorn production in the collection of the Monrovia Canyon Park Nature Center that was allegedly found within one mile of the Center is evidence of the presence of the Tongva/Gabrielino people in Monrovia.

It is generally accepted that the Tongva/Gabrielino people used fire to increase their harvest of food and basketry items, however, the exact manner and conditions under which they did this are not known to a degree that would allow us to imitate their stewardship practices by introducing fire deliberately to the landscape. Furthermore, many conditions clearly have changed, including:

- Takeover of burned areas by invasive weeds, which were absent in pre-contact times,
- Large permanent settlements vulnerable to wildland fire,
- Altered climatic conditions,
- Multiple other stressors on native habitats.

Therefore, we must not naively model our vegetation management practices on those of the native Californians, even though we may admire and learn much from them. Too much has changed to allow us to understand the consequences without thorough examination.

The post-contact history of Monrovia centered around part of two ranchos granted in 1841. Rancho Azusa de Duarte was granted to Andres Duarte, a Mexican soldier, and Rancho Santa Anita was given to Hugo Reid, a naturalized Mexican citizen of American birth. Andres Duarte built an adobe for himself and his family and settled on Rancho Azusa. Duarte and Reid used their land to raise cattle, as well as to grow fruits

Ranchos Azusa de Duarte and Santa Anita were both sold in the mid-1800s and subdivided. Some of those parcels eventually ended up as part of the ranch of William N. Monroe, the City of Monrovia's namesake. In 1886, Monroe and several other local land owners combined their land to form the Town of Monrovia Subdivision. Additionally,

these men formed the Monrovia Land and Water Company and attracted new settlers to the sparsely developed area with promises of free water for the town residents. To fulfill this promise, intricate systems to harness water were constructed in the foothills of the City, some of which are still visible today. With the construction of a steam railroad in 1887 that attracted even more residents, Monrovia was incorporated as a city in 1887.

During the early 20th Century, Monrovia's commercial downtown matured, and residential development continued. Further developments in transportation technology and infrastructure, such as Highway (Route) 66, brought additional settlers to the San Gabriel Valley. Population and development continued to grow following the end of World War II as American soldiers returned to southern California in search of homes and jobs. Former vacant lots and farm lands were transformed into housing tracts.

The foothills and canyons located above the City were also inhabited in the late 1800s, albeit sparsely. Several areas were used for agriculture, logging, and bee ranching. In the 1870s, a large manmade saw pit existed in the Monrovia foothills that came to be known as Sawpit Canyon. Logs were cut by hand on the hillside and hauled down by wagon to be processed there.

Two notable historic resorts have left their mark in the foothills of Monrovia:

Sawpit Canyon

Sawpit Canyon was used for both water supply and recreation early on. In 1894, William Monroe constructed a mule trail up Sawpit Canyon to an area called Deer Park, which is now a hiking destination accessible by a trail from Monrovia Canyon Park. Located near the head of Sawpit Canyon, Deer Park was used by many locals as a camp site during hunting expeditions. In 1907, Ben Overturff took a U.S. Forest Service lease for Deer Park and spent his weekends bringing building supplies up the canyon on mule-back to develop a lodge there.

On April 15, 1913, the City incorporated Sawpit Canyon, turning it into the Monrovia Canyon Park and a road was built that led part way up Sawpit Canyon near Emerson Flats to a picnic spot used by local residents. This road increased the amount of traffic to Deer Park. Many Monrovians visited Deer Park until the Great Depression and the start of World War II saw the decline of weekend tourism into the local mountains. The Overturffs abandoned the lodge in 1948, and the Forest Service demolished the buildings in 1958.

Cloverleaf Canyon

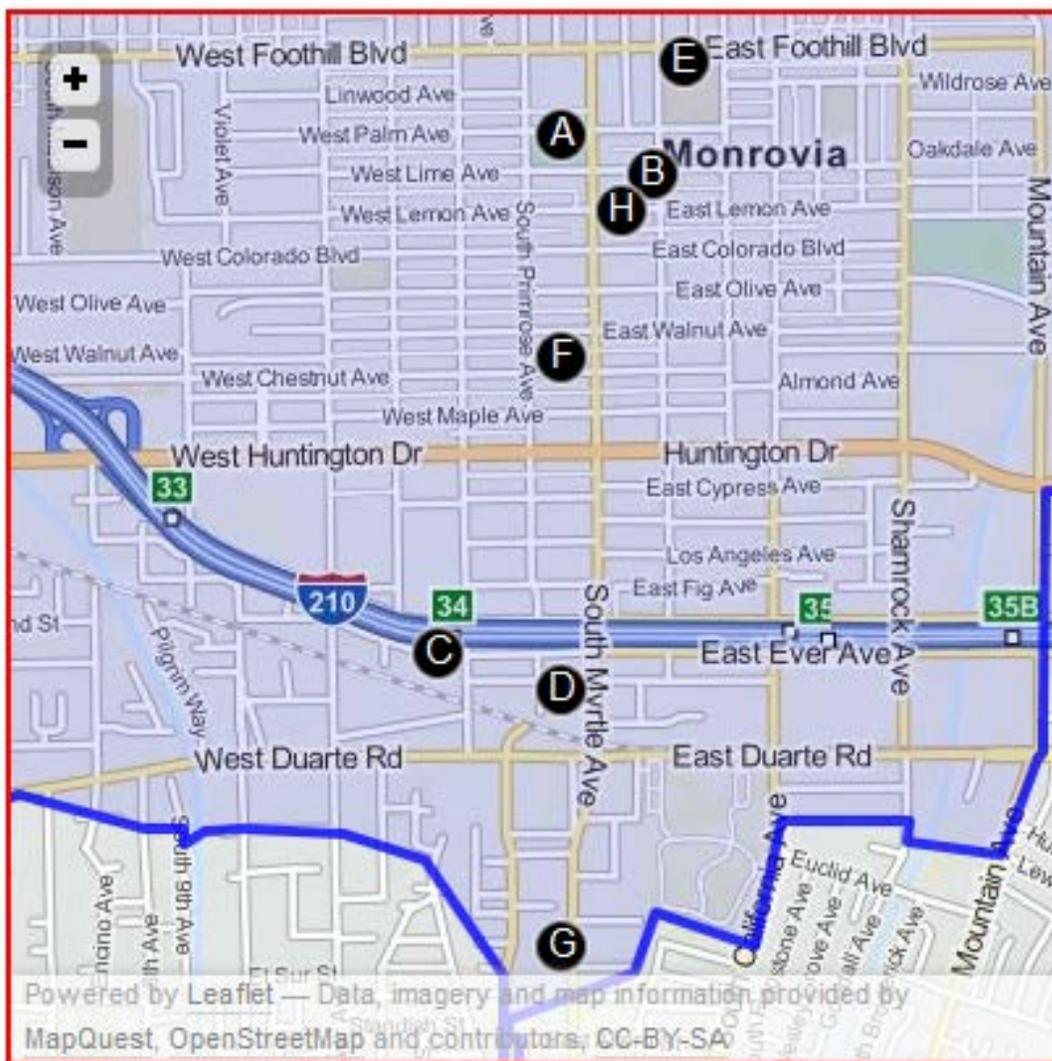
In 1906, the Clover Crest property was turned into a resort. Similar to Deer Park, the Clover Crest Resort became a popular destination for many people from the Los Angeles Basin. In 1925, Dr. George P. Lux bought the property and lived in a cabin before completing his house on Cloverleaf Drive. Dr. Lux was an amateur horticulturist who terraced 10 acres of this property and planted over 1,000 nonnative species in the area, known as the Lux Arboretum.

The Lux Arboretum was willed to the State of California and County of Los Angeles upon the death of Dr. Lux. The property was maintained by the Los Angeles County Arboretum until the late 1970s and was acquired by the City of Monrovia in 1997.

6.4. Infrastructure

Notable public facilities in Monrovia include (see map below)

- Monrovia Public Library (A),
- Monrovia City Hall (B),
- Medic 1 Ambulance Service Monrovia (C),
- Medic 1 Ambulance Service Headquarters (D),
- Monarc Ambulance (E), Aegis Ambulance Service (F),
- City of Monrovia Fire Department Station 102 (G),
- City of Monrovia Fire Department Station 101 Headquarters (H).



Monrovia's utility providers are as follows:

- Electric – Southern California Edison
- Gas – Southern California Gas Company
- Telephone – GTE
- Water – Municipal system
- Trash – Athens
- Wastewater treatment – Los Angeles Sanitation District at the San Jose Creek Treatment Facility
- Stormwater/Flood Control – Los Angeles County Department of Public Works

The City delivers potable water supplies through its pressurized distribution system which consists of 87 miles of piping from 4" to 30" in diameter. The City's water supply system currently consists of five (5) active wells with a combined capacity of approximately twenty (20) million gallons per day; a standby connection to Metropolitan Water District (MWD) of Southern California which is capable of delivering up to fourteen (14) million gallons per day; eleven (11) reservoirs with a combined storage capacity of approximately 25.08 million gallons; and six (6) booster pump stations. The City's distribution system is compromised of five (5) different pressure zones. The City of Monrovia maintains a 4-inch emergency connection to California American Water Company – Duarte District, to sell water.

Transportation

Interstate 210 Foothill Freeway bisects southern Monrovia, connecting the City to the metropolitan freeway system and transcontinental major highways.

Rail

There are two active light rail lines near Monrovia. The Metropolitan Transit Authority (MTA-LA) Gold Line currently has its eastern terminus at the Sierra Madre Villa Station, 5 miles west of Monrovia. The Metrolink San Bernardino Line has two stations south of Monrovia, in Baldwin Park and in El Monte, 6 to 7 miles from Monrovia.

The MTA Gold Line is slated to be extended out to Monrovia and points east, arriving in Azusa in 2015. The Foothill Extension from Pasadena to Azusa (Pasadena to Azusa) will add six stations in the cities of Arcadia, Monrovia, Duarte, Irwindale, and Azusa. Once completed, Monrovia will become accessible to Citrus College, Old Town Pasadena and Downtown Los Angeles by train. Gold Line construction updates are available at www.foothillextension.org.

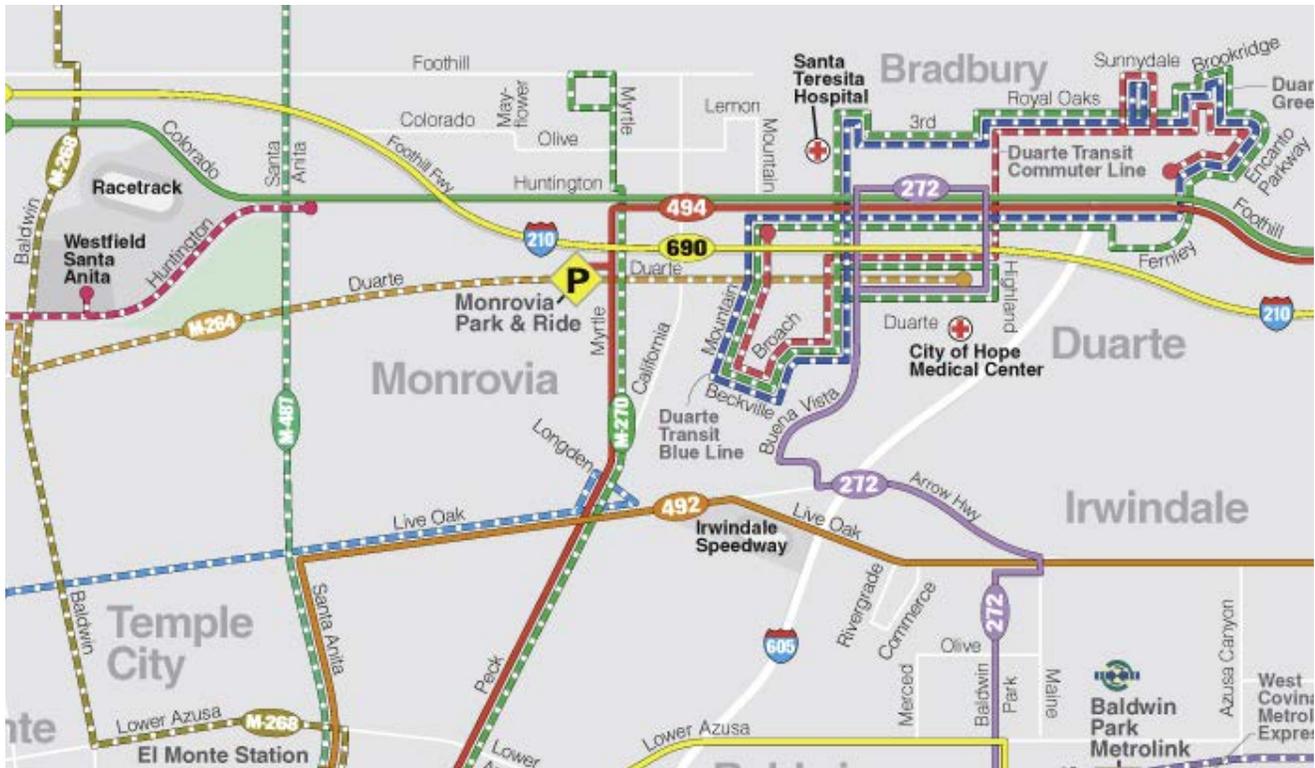
Access Para-transit

Access Services, facilitates the provision of complementary ADA para-transit services to certain persons with disabilities. Para-transit is an alternative mode of flexible passenger transportation that does not follow fixed routes or schedules. Typically, vans or mini-buses are used to provide para-transit service, but also shared taxis and jitneys are important providers as a form of transportation. Complementary ADA para-transit is a federally mandated civil right for persons with disabilities who cannot ride the accessible public fixed route buses and trains.

Aircraft Facilities

The nearest public airport is El Monte Airport, approximately 6 miles from Monrovia City Hall. El Monte Airport is owned by Los Angeles County and is the base for 335 aircraft, principally single-engine general aviation craft. (Source: <http://www.airnav.com/airport/KEMT> accessed on 2/4/12).

Foothills Transit Service (in and around Monrovia)



Parks

More than 140 developed acres of hiking and camping terrain, tennis courts, swimming pool & wading pools, Community Center, YMCA, Boys & Girls Club and an Aquatics Center.

Cultural Facilities

Monrovia’s cultural facilities and events include: Municipal Library, Monrovia Historical Museum, Historic Home Museum, Concerts in the Park, annual Monrovia Arts Festival, Monrovia Days Parade, Family Festival, Fridays, March-December.

Schools and Churches

Monrovia Unified School District is a K-12 district serving approximately 6,000 students in the five elementary, two middle, one comprehensive high school and one alternative high school. The district also includes a preschool/child development center, Independent Study Program, Home Independent Study program, and an extensive adult school program. Adult Education is provided by the Monrovia Community Adult School.

There are over 20 churches in Monrovia.

6.5. Demographics²

Population in 2011: 36,622.

Population change since 2000: -0.8%

Population density: 2664 people per square mile

Daytime population change due to commuting: +124 (+0.3%)

Workers who live and work in this city: 2,977 (18.1%)

Males: 17,504 (47.8%)

Females: 19,118 (52.2%)

Median resident age: 37.9 years

California median age: 45.6 years

Estimated median household income in 2009:

Monrovia: \$63,918 (it was \$45,375 in 2000)

California: \$58,931

Estimated per capita income in 2009: \$29,931

Estimated median house or condo value in 2009:

Monrovia: \$474,215 (it was \$224,200 in 2000)

California: \$384,200

March 2012 cost of living index in Monrovia: 133.8 (high, U.S. average is 100)

The 2010 United States Census reported that Monrovia had a population of 36,590. The population density was 2,668.1 people per square mile. The racial makeup of Monrovia was 21,932 (59.9%) White (41.1% Non-Hispanic White), 4,107 (11.2%) Asian, 2,500 (6.8%) African American, 279 (0.8%) Native American, 76 (0.2%) Pacific Islander, 5,818 (15.9%) from other races, and 1,878 (5.1%) from two or more races. Hispanic or Latino of any race were 14,043 persons (38.4%).

The census reported that 36,434 people (99.6% of the population) lived in households, 61 (0.2%) lived in non-institutionalized group quarters, and 95 (0.3%) were institutionalized.

There were 13,762 households, out of which 4,725 (34.3%) had children under the age of 18 living in them, 6,295 (45.7%) were opposite-sex married couples living together, 2,073 (15.1%) had a female householder with no husband present, 778 (5.7%) had a male householder with no wife present. There were 793 (5.8%) unmarried opposite-sex partnerships, and 131 (1.0%) same-sex married couples or partnerships. 3,649 households (26.5%) were made up of individuals and 1,276 (9.3%) had someone living alone who was 65 years of age or older. The average household size was 2.65. There were 9,146 families (66.5% of all households); the average family size was 3.24.

² http://en.wikipedia.org/wiki/Monrovia,_California

The population was spread out with 8,514 people (23.3%) under the age of 18, 3,084 people (8.4%) aged 18 to 24, 10,733 people (29.3%) aged 25 to 44, 10,018 people (27.4%) aged 45 to 64, and 4,241 people (11.6%) who were 65 years of age or older. The median age was 37.9 years. For every 100 females there were 91.6 males. For every 100 females age 18 and over, there were 87.0 males.

There were 14,473 housing units at an average density of 1,055.4 per square mile (407.5/km²), of which 6,809 (49.5%) were owner-occupied, and 6,953 (50.5%) were occupied by renters. The homeowner vacancy rate was 1.3%; the rental vacancy rate was 4.9%. 18,478 people (50.5% of the population) lived in owner-occupied housing units and 17,956 people (49.1%) lived in rental housing units.

According to the 2010 United States Census, Monrovia had a median household income of \$69,449, with 9.6% of the population living below the federal poverty line.

6.6. Development Trends³

Monrovia is a built-out community and has not experienced significant population growth since the 1980s, a decade during which the City grew by 14.3 percent and added nearly 4,500 new residents. During the 1990s, Monrovia's population increased by 3.3 percent, followed by a 0.9 percent drop in population during the 2000s. The State Department of Finance estimates the City's 2013 population at 36,943, offsetting the loss of the prior decade and bringing Monrovia's population back up to 2000 levels. Monrovia has been growing at a slower rate than the surrounding Upper San Gabriel Valley subregion, which in turn is experiencing far more limited population growth than Los Angeles County as a whole.

In terms of future growth trends, the Southern California Association of Governments (SCAG) forecasts that Monrovia's population growth will continue to be well below the County as a whole. By the year 2035, Monrovia's population is projected to grow to 39,400, a modest increase in approximately 3,000 residents above 2008 levels.

Age of Population

The most significant change in Monrovia's age profile between 1990 and 2010 occurred in the young adult (25-44 years) and middle age (45-64 years) groups. The proportion and number of young adults declined significantly over the past two decades, from 37 to 29 percent and dropping by nearly 2,500 residents. Conversely, the City's middle age population increased by over 4,400 residents and now comprises 28 percent of the population. Factors contributing to this shift in the age structure include an aging in place of young adults into the middle age bracket, and the limited number of new young adults and families moving into the community due in part to high housing costs. The aging of Monrovia's population is borne out by an increase in the median age from 31.0 years in 1990 to 37.9 years in 2010, well above the County's median age of 34.8 years.

Race and Ethnicity

Monrovia's population has continued to diversify over the past 20 years, becoming more similar to the County as a whole. Most notably is the increase in the Hispanic population (28% to 38%) and a decrease of the non-Hispanic White population (57% to 41%). Monrovia's increase in residents (from 4% to 11%) identifying as Asian/Pacific Islander is consistent the growing Asian population throughout the San Gabriel Valley.

The 2010 Census documents that Monrovia was home to 13,762 households, an increase of over 500 households since 1990. The City had an average household size of 2.65 persons and an average family size of 3.24 persons. The City's average household size is slightly less than the Los Angeles County average household size of 2.98. Families continue to comprise the majority of the households in Monrovia, and have remained relatively similar in proportion from 66 to

³[http://www.cityofmonrovia.org/sites/default/files/fileattachments/community_development/page/1335/housing element_2014_adopied.pdf](http://www.cityofmonrovia.org/sites/default/files/fileattachments/community_development/page/1335/housing_element_2014_adopied.pdf)

67 percent over the past two decades, just slightly lower than the 68 percent families Countywide. Families without children evidenced the largest change, comprising of 37 percent of households in 2010 compared to 34 percent in 1990, an increase of over 400 families without children. In contrast, single person households remained steady at 26 percent of households over the two decades. The decline in families with children, combined with the decline in young adults and increasing middle age and senior populations, suggests that Monrovia's households are aging in place.

Seasonal Population Trends

The residential population of Monrovia is stable throughout the year, however there are marked seasonal use patterns for Monrovia Canyon Park and Trask Boy Scouts Camp, both within the CWPP Project Area. These facilities experience increased day- and overnight use during the summer months between June and September.

6.7. Housing and Land Use

The following information comes from the Land Use Element and the Housing Element, portions of the Monrovia General Plan, maintained at the City Clerk's office at 415 South Ivy, or accessible online at:

<http://www.cityofmonrovia.org/communitydevelopment/page/general-plan>

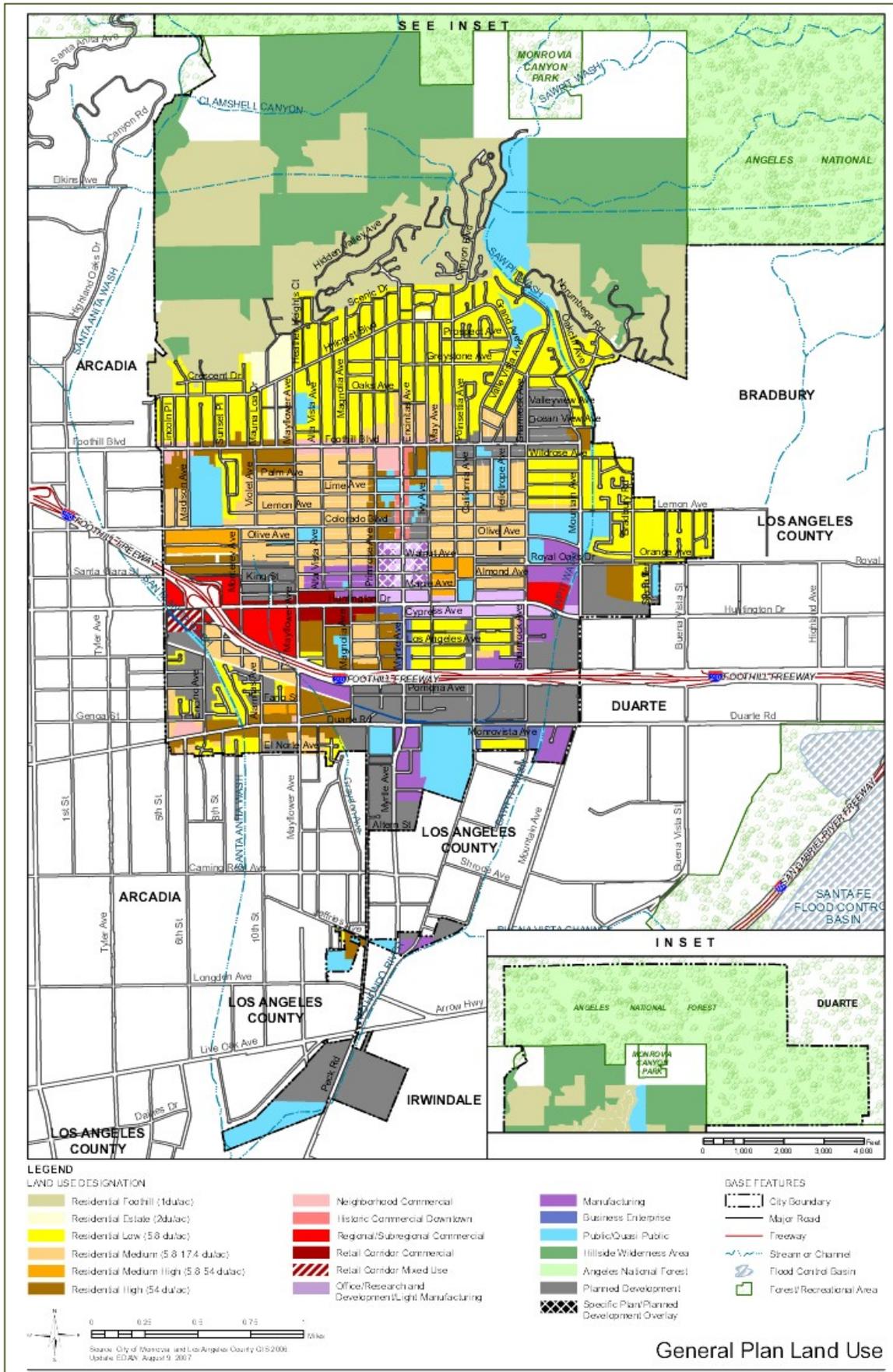
6.7.1. Land Use Goals and Objectives

The Land Use Element of the Monrovia General Plan establishes land use policy and land use patterns intended to govern growth in the City until 2030. The Land Use Element was adopted 01/15/2008 and most recently updated 3/2014⁴.

The Land Use Element designates future land use patterns and specifies the appropriate density and intensity of development. The Land Use Element is the central element of the General Plan, and the goals and policies it contains have a common link to the other elements. The Land Use Policy Map provides a graphic depiction of the General Plan's development policies and indicates the land use designations for which relevant goals and policies have been developed.

4

http://www.cityofmonrovia.org/sites/default/files/fileattachments/community_development/page/1616/1_land_use_element_2013.pdf



Today, Monrovia is an ethnically and socio-economically diverse city. It has 13,750 households and an average household income of \$45,000 dollars. Its population is growing about 1 percent per year, and the current estimated 2007 population is 39,309. The local economy remains prosperous, providing the city with moderate revenue growth. Annual sales tax growth is a respectable 2 to 3 percent, while the property tax is rising 3 to 5 percent. Revenue growth is bolstered by new retail businesses and by the creation of new office space on the city’s high-tech corridor along Huntington Drive. Monrovia is largely built out so residential construction consists mainly of the conversion of one or two-lot home sites into planned unit developments of four to 12 detached units.

Monrovia is passionate about preserving the hillsides and historic neighborhoods. In 2000, an overwhelming 77 percent of Monrovia citizens voted to impose a tax generating \$10 million to purchase the hillsides to create the Hillside Wilderness Preserve. Monrovia has used those revenues as matching funds to obtain state money, and the preserve is to be completed in the next few years. With regards to historic preservation, in 2005, the Monrovia City Council passed an ordinance requiring the review of pre-1940 homes prior to the demolition of the unit. The purpose of the ordinance was to protect the City’s historic homes which many feel define Monrovia.

This Land Use Element has been developed to build upon the success of the past 30 years. It will establish land use policy and land use patterns that will govern growth in the City until 2030. This Element designates future land use patterns and specifies the appropriate density and intensity of development. The Land Use Element is the central element of the General Plan, and the goals and policies it contains have a common link to the other elements. The Land Use Policy Map provides a graphic depiction of the General Plan's development policies and indicates the land use designations for which relevant goals and policies have been developed.

Zoning

Zones within CWPP Project Area:

Zones within the CWPP Project Area		
RF	Residential Foothill	Areas designated with this use classification generally have relatively steep slopes or are environmentally sensitive, allowing residential development at only very low densities. This designation allows the construction of a maximum of one dwelling unit per acre of land.
RE	Residential Real Estate	The Estate Residential land use classification allows for large lot single-family dwellings. This designation allows for 2 dwelling units per acre of land.
RL	Low Density Residential	This land use classification is intended for application to areas that are or are to be developed primarily with single family dwellings. This designation allows for the construction of a maximum of 5.8 dwelling units per acre of land. Other uses such as parks, schools, and churches which are determined to be compatible with and oriented toward serving the needs of low density detached single family neighborhoods shall also be allowed.

Community Facility Designation

Community Facility Designations	
Recreation	This designation is intended for City-owned areas used for public parks and other public recreational facilities.
Angeles National Forest	This designation is assigned to all property, both publicly and privately owned, within the boundaries of the Angeles National Forest.
Public / Quasi Public	This land use classification is intended for application to all public uses such as schools, and government offices and facilities, as well as quasi-governmental offices and facilities such as those for the telephone company and other utilities.

Open Space Designations

Open Space Designations	
Hillside Wilderness Preserve	This classification is designated for preserving open space left in its natural state including preservation of endangered habitats and species, wildlife habitats, and wildlife corridors; open space for passive recreation uses such as hiking and nature studies; utility easements and reservoirs; and nature centers and educational facilities.
Hillside Recreation	This classification is designated for public wilderness parks and private recreational camp facilities. Recreational uses such as hiking and riding trails, nature centers, educational and incidental facilities associated with outdoor recreation are permitted. Monrovia Canyon Park, Arcadia Wilderness Park, and Trask Boy Scout Camp are currently within this designation.
ANF	Angeles National Forest

Specific Plan areas within CWPP Project Area

- ✓ Peck Road Specific Plan.
- ✓ Gold Hills Specific Plan.
- ✓ Cloverleaf Canyon Specific Plan.
- ✓ Norumbega Specific Plan.
- ✓ Madison Specific Plan.

Hillside Development

Hillside Development Permit: The hillside development permit procedure is intended to protect the integrity and character of established neighborhoods and minimize potential environmental impacts of new construction on infill hillside lots. The Planning Commission grants hillside development permits.

The following criteria must be met before a hillside development permit is granted:

- ✓ Project provides adequate roadway access for the emergency ingress and egress.
- ✓ Project provides adequate water, sewer, gas, telephone and electrical utilities.
- ✓ Project preserves the natural character of the foothills, taking special care to protect environmentally sensitive and valuable ecosystems.
- ✓ Project utilizes current good practices of design, architecture, landscape architecture, civil engineering, and hillside land planning to develop a project that is sensitive to the environment and compatible with the surrounding neighborhood.
- ✓ Project provides safety with respect to fire, earthquake faults, drainage, and erosion control.
- ✓ Project preserves mature trees, rare plant and animal species, riparian ecosystems, significant natural features and prominent ridgelines.
- ✓ Site is physically suitable for the development.
- ✓ The proposed development of the lot is consistent with existing development in the area.

6.7.2. Housing⁵

The purpose of the Housing Element is to achieve an adequate supply of safe, affordable housing for all economic segments of the community, including individuals with special housing needs. This Housing Element is the comprehensive statement by the City of Monrovia of its current and future housing needs and contains the City's goals, policies and programs related to housing issues, including preserving and improving existing housing and encouraging the development of housing opportunities for all Monrovia residents. Of the mandated General Plan Elements, the Housing Element is the only one that is required to be updated on a specific schedule. In order to address a community's changing housing needs, Housing Elements are to be updated every five to eight years. The Housing Element is also subject to review by the State Department of Housing and Community Development (HCD). Monrovia's Housing Element was originally adopted in 1976. Subsequent Elements were adopted in 1981, 1993 and 2003 with Monrovia's most recent Housing Element covering the period 2008-2014. Pursuant to the update cycle for jurisdictions within the Southern California Association of Governments (SCAG) region, this Housing Element update covers the 8 year, 2014-2021 planning period.

Housing

Many varieties of single-family homes, condominium complexes and multi-family rental units are found throughout Monrovia. Architectural styles range from vintage Victorian homes to modern designs.

5

http://www.cityofmonrovia.org/sites/default/files/fileattachments/community_development/page/1335/housing_element_2014_adopted.pdf

Median resident age: 33.7 years
Median household income: \$45,375 (year 2000)
Median house value: \$229,600 (year 2000)
Housing units: 13,944
Average household size: 2.68

HOUSEHOLDS

Total: 13,242
Family households: 8,749
With persons under 18: 4,784
Avg persons per household: 2.68
Avg persons per family: 3.23

HOUSING & CONSTRUCTION

Housing units, 1990 Total: 13,944
Single family units: 7,578
Owner occupied units: 6,223
Renter occupied units: 7,019
Median value, single family home: \$234,900
Median rent: \$590
New privately owned housing units Authorized by building permit
1991: 53
1992: 102
1993: 45

Code Enforcement/Neighborhood Preservation Program

Monrovia's Code Enforcement program focuses on bringing substandard housing units into compliance with City codes, remove or rehabilitate units that pose threats to the health and safety of its residents, and prevent deterioration of the City's housing stock. The program provides for systematic inspections to complaints citywide. Additionally, the program takes a holistic approach to code enforcement by focusing not only on problems with individual properties, but also looks at neighborhoods and the community as a whole. Due to the current workload and staffing levels, cases are generally opened based on citizen complaints; however, a Code Enforcement Officer may also initiate an investigation. The program strives to educate the owners about property maintenance as well as to correct code violations. Property owners are also given information about the City's available assistance programs for property rehabilitation. The Code Enforcement Services Section works closely with the Building and Planning Divisions providing a multi-disciplinary approach to solving problems.

6.8. Public Lands Management

The CWPP Project Area and Ember Protection Zone encompass private, public and quasi-public land within the jurisdictional boundaries of the City of Monrovia. Several areas are also subject to agreements with adjacent jurisdictions. These are the United States Forest Service, the County of Los Angeles, and the City of Arcadia.

U.S. Forest Service

The U.S. Forest Service and the City of Monrovia share a common property boundary that extends the entire length of the northern limits of the Project Area. Portions of the Angeles National Forest extend into what many consider part of Canyon Park. These areas include the popular Waterfall and the Ben Overturff Trail, which leads to Twin Springs and the historic Deer Park Resort. Access to the Ben Overturff Trail is provided from Monrovia Canyon Park via the Sawpit Canyon Fire Road. The trail staging area for the Ben Overturff Trail, the Sawpit Canyon Fire Road, and the Deer Park Resort are all located on former City property that was purchased by the Trust for Public Lands and then dedicated to the U.S. Forest Service. In exchange for the property, the City received funds that were used to develop facilities within Canyon Park.

L.A. County

Los Angeles County owns several flood control facilities and their associated parcels within the CWPP Project Area. These are:

- Ruby (Lower) Debris Basin
- Oakglade Debris Basin
- Sawpit Debris Basin
- Sawpit Sediment Placement Site
- Sawpit Dam
- Sawpit Wash Flood Control Channel

In addition, L.A. County owns the Big Santa Anita Dam facility bordering the Project Area on the west and partially controls access via the Lower Clamshell Truck Trail.

City of Arcadia

The City of Arcadia's Arcadia Wilderness Area borders the project area in the northwest corner and partially controls access via the Lower Clamshell Truck Trail.

Cooperative Fire Protection Agreements

Sawpit Canyon Fire Road, Lower Clamshell Motorway, and the fire station at the terminus of Cloverleaf Drive are maintained under joint use agreements between the U.S. Forest Service, the Consolidated Fire Protection District of Los Angeles County, and the City for fire management purposes. Since 1990, the U.S. Forest Service, the Consolidated Fire District of Los Angeles County and the cities of Monrovia, Arcadia, and Sierra Madre have provided reciprocal fire-fighting assistance through cooperative Fire Protection Agreements. Monrovia's cooperative fire protection agreements are further discussed in Chapter 7.

6.8.1. Municipal Parks and Open Space

The CWPP Project Area includes the roughly 1400 acres comprising the Monrovia Hillside Wilderness Area and Hillside Recreation Area, which include Monrovia Canyon Park and Trask Boy Scouts Camp. Fire management for these areas is currently addressed in the Monrovia Local Hazard Mitigation Plan (2005, updated 2012) and in the Monrovia General Plan – Safety Element. This CWPP will extend and provide focused planning to the existing planning documents.

6.8.2. Other Public Lands

The service access path to the Sawpit Wash Flood Control Channel, which is owned by Los Angeles County, is open to the public as an unimproved recreational trail maintained by the City of Monrovia for a length of approximately 1.5 miles between Lemon Ave. and the Sawpit Debris Basin. Fire management of the Sawpit Wash Flood Control Channel is incorporated into the Los Angeles County Local Hazard Mitigation Plan (2005, updated 2012).

Fire Protection Organizations

7.	Fire Protection Resources	2
7.1.	Monrovia Fire Department	2
7.2.	Wildfire Suppression Resources and Agreements.....	6
7.3.	Emergency Planning and Operations.....	10
7.4.	Wildfire Prevention.....	15

7. Fire Protection Resources

7.1. Monrovia Fire Department

The Monrovia Fire Department (MFD) provides fire protection services within the City of Monrovia.

The Monrovia Fire Department is a full-service professional department providing fire suppression activities, emergency medical services, fire prevention and public education assistance to all constituents living, working or visiting our City. Emergency calls vary from year to year, but average approximately 3,500 per year. The MFD operates two fire stations within the city at 141 East Lemon Avenue (Fire Station #1) and 2055 South Myrtle Avenue (Fire Station #2). The MFD is staffed by 41 suppression personnel, one full-time and two part-time prevention staff members and one administrative staff member provide assistance through six-essential divisions:

Administration

The Fire Administration Division is tasked with the overall effectiveness and efficiency of the Monrovia Fire Department. Consisting of the Fire Chief and the Administrative Secretary, the Fire Administrative Division is responsible for the management and coordination of all activities within the department. Included in this program are budget coordination and management, personnel and payroll administration, planning and organizational development. Administration supports each division within the department to provide the most effective service level within available resources.

Disaster Preparedness

The Disaster Preparedness Division is responsible for the development and maintenance of citywide disaster plan that coordinates the resources necessary, including State and Federal resources, to manage local disaster incidents impacting Monrovia. The primary purpose of the Disaster Preparedness Division is to support and improve the ability of the City and its residents to prepare, respond and recover from disasters, both natural and man-made.

The City complies with the federal Disaster Mitigation Act of 2000 by preparing and updating its Local Hazard Mitigation Plan (LHMP). The current LHMP was updated in 2014.

Fire Suppression

The Fire Suppression Division includes those activities that are most traditional to the fire service. Suppression personnel respond to fire, flood, medical, hazardous material and extrication incidents while also providing non-emergency public assistance. This division includes activities related to fire prevention, equipment plan reviews and inspections, pre-fire planning, training, apparatus maintenance and communication support.

Emergency Medical Services

The Emergency Medical Services (EMS) Division provides pre-hospital basic life support (BLS) and advanced life support (ALS) emergency medical care and patient stabilization, while assisting with patient transportation to medical facilities as necessary. Quickly becoming the most widely utilized service within the Fire Department, the EMS Division is positioned to provide efficient, effective life safety support while meeting continuing education mandates of quality assurance from all EMS personnel.

Fire Prevention

The Fire Prevention Division is tasked with one of the most important aspects in the fire service – reducing the likelihood of fires and fire related injuries while mitigating the potential severity of those events that do occur. Fire prevention activities include inspections of buildings and premises for code compliance; fire sprinkler and hood equipment plan reviews; fire investigation; preparing and revising laws and codes; safety and fire prevention public education; and enforcement of fire regulations.

Hazardous Materials

The Hazardous Materials Division is designed to comply with the mandates of the State Legislature for administering agencies of the hazardous materials disclosure program. The Division is designed to be self-sufficient and derives revenues through the requirements of the business compliance. The Fire Prevention Bureau monitors hazardous material storage and disclosure information and assists with the development of business and area plans.

There were 3,328 incidents in Monrovia during fiscal year 2012-13. The Monrovia Fire Department was dispatched to an additional 404 incidents in other jurisdictions. At least two units are dispatched to most incidents. When an emergency call comes in, the dispatcher determines and enters the most appropriate and descriptive type code into the Computer Assisted Dispatch (CAD) system. Each type code falls within a category: Fire, Medical, Service, or Other. The table below shows how many incidents were entered into the CAD system for Monrovia for each type code in these categories during FY2012-13, along with the percent of incidents in that category for the year. Of the 111 type codes listed below, the three most frequent incident types were Fall - Minor (11.3% of Medical incidents), Shortness of Breath (10.1% of Medical incidents), and Fire Alarm (51.6% of Fire incidents).

Table 7-1 Monrovia Fire Department Incidents by Type FY2012-13¹

FIRE			SERVICE			MEDICAL		
INCIDENT TYPE	# INCIDENTS	% OF FIRE CALLS	INCIDENT TYPE	# INCIDENTS	% OF SERVICE CALLS	INCIDENT TYPE	# INCIDENTS	% OF MEDICAL CALLS
APARTMENT HOUSE FIRE	6	1.6%	ANIMAL RESCUE/ ASSIST	5	2.6%	ABDOMINAL PAIN - ALS	16	0.6%
APPLIANCE FIRE - MAJOR	5	1.3%	ARCING WIRES	5	2.6%	ABDOMINAL PAIN - BLS	56	2.0%
BRUSH FIRE	2	0.5%	BIOHAZARD INVESTIGATION	1	0.5%	ALLERGIC REACTION	21	0.8%
CARBON MONOXIDE ALARM	18	4.7%	BROKEN GAS MAIN	2	1.0%	ALTERED LEVEL OF CONSCIOUSNESS	75	2.7%
ELECTRICAL FIRE	5	1.3%	BROKEN WATER MAIN	8	4.2%	ANIMAL/STINGS - ALS	3	0.1%
ELECTRICAL VAULT FIRE	1	0.3%	CHEMICAL OUTSIDE	4	2.1%	ANIMAL/STINGS - BLS	10	0.4%
EXPLOSIVES/BOMB THREAT/SCARE	2	0.5%	DAMAGE INVESTIGATION	1	0.5%	ASSAULT VICTIM	79	2.9%
FIRE ALARM	199	51.6%	ELEVATOR RESCUE	10	5.2%	ASSIST THE INVALID	109	4.0%
FIRE ALARM RESET	2	0.5%	FLOWING/GUSHING/SHEARED HYDRANT	6	3.1%	BACK PAIN	39	1.4%
FIRE NOW OUT	7	1.8%	FUEL SPILL	3	1.6%	BLOOD PRESSURE PROBLEM	23	0.8%
GARAGE FIRE	3	0.8%	INVESTIGATE A HAZARDOUS COND	22	11.5%	BURN INJURY	2	0.1%
HOUSE FIRE	8	2.1%	INVESTIGATE A MUDSLIDE	1	0.5%	CHEST PAINS - HEART ATTACK	169	6.1%
ILLEGAL BURNING	10	2.6%	MAJOR FLOODED CONDITION	3	1.6%	CVA-NEUROLOGIC	33	1.2%
MISC OUTSIDE FIRE	7	1.8%	MALFUNCTION	6	3.1%	DIABETIC PROBLEM	52	1.9%
REFUSE FIRE	10	2.6%	MINOR FLOODING	7	3.6%	ELECTRICAL SHOCK INJURY	2	0.1%
SMOKE IN A STRUCTURE	12	3.1%	MISC RESPONSE ENGINE & TRUCK	2	1.0%	EMER MEDICAL SVC ON THE FWY	11	0.4%
SMOKE IN THE AREA	36	9.3%	MISC RESPONSE FOR 1 ENGINE	6	3.1%	EMS CALL -- NO DETAILS	23	0.8%
STRUCTURE FIRE	8	2.1%	MISC. ODOR INVESTIGATION	9	4.7%	EXPOSURE	2	0.1%
TRANSFORMER/STREET LIGHT FIRE	12	3.1%	MISC. RESPONSE FOR A TRUCK	2	1.0%	FALL MAJOR	38	1.4%
UNKNOWN TYPE FIRE	1	0.3%	ODOR OF NATURAL GAS INSIDE	5	2.6%	FALL MINOR	310	11.3%
VEGETATION FIRE	7	1.8%	ODOR OF NATURAL GAS OUTSIDE	13	6.8%			
VEGETATION FIRE ON THE FWY	1	0.3%	ONE STORY ROOF CHECK	3	1.6%			
VEHICLE FIRE	12	3.1%	PD ASSIST/STAND-BY	1	0.5%			
VEHICLE FIRE ON THE FREEWAY	11	2.8%	PERSON LOCKED IN - LOCKED OUT	8	4.2%			
WATER TENDER REQUEST	1	0.3%	PUBLIC ASSIST	8	4.2%			
			ROOF CHECK 2 STORIES & ABOVE	2	1.0%			
			WIRES DOWN	49	25.5%			

MEDICAL (cont.)		
INCIDENT TYPE	# INCIDENTS	% OF MEDICAL CALLS
G.I. BLEED	21	0.8%
GUNSHOT WOUND	3	0.1%
HEAD PAIN	12	0.4%
HEART PROBLEM	52	1.9%
INGESTION-POISONING-INHALATION	32	1.2%
INJURY TC WITH FUEL SPILL	1	<0.1%
MEDICAL ALARM	27	1.0%
MINOR TRAUMA	92	3.3%
MISC MEDICAL	184	6.7%
MOUNTAIN RESCUE	3	0.1%
NOSE BLEED NON-TRAUMATIC	3	0.1%
OBSTETRIC/S/GYNECOLOGICAL	20	0.7%
OVERDOSE	39	1.4%
PEDIATRIC 0-36 MONTHS	38	1.4%
PERSON CHOKING	9	0.3%
PERSON DIZZY	55	2.0%
PERSON DOWN	73	2.7%
PERSON HANGING	2	0.1%
PERSON IN SEIZURE	86	3.1%
PERSON NOT BREATHING	38	1.4%
PERSON SICK	27	1.0%
PERSON STABBED	2	0.1%
PERSON THREATENING TO JUMP	2	0.1%
PERSON UNCONSCIOUS-UNRESPONSIVE	128	4.7%
PSYCHIATRIC	51	1.9%
RESCUE	2	0.1%
RESCUE ON THE FWY	10	0.4%
SEVERE TRAUMA	13	0.5%
SHORTNESS OF BREATH	278	10.1%
SYNCOPE/FAINTED NOW CONS	53	1.9%
TRAFFIC COLLISION	174	6.3%
TRAFFIC COLLISION ON THE FWY	66	2.4%
TRAFFIC COLLISION W/BICYCLE	17	0.6%
TRAFFIC COLLISION W/MOTORCYCLE	8	0.3%
TRAFFIC COLLISION W/PEDESTRIAN	20	0.7%
TRAFFIC COLLISION-RESCUE	8	0.3%
UNKNOWN MEDICAL	27	1.0%
VEHICLE INTO A STRUCTURE	2	0.1%

¹ Verdugo Fire Communications Center Annual Report 2012-2013;
<http://www.verdugofire.org/pdf/verdugoannualreports/VerdugoAnnualReportFY2012-13.pdf>

Table 7-2 Monrovia Fire Department Incidents by Month²

Monrovia Incidents by Month and Category

CATEGORY	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	TOTAL	PERCENT
FIRE	34	35	27	27	37	39	48	21	37	21	29	31	386	11.5%
MEDICAL	218	226	247	236	248	251	247	191	234	222	220	209	2,749	81.5%
SERVICE	12	22	16	8	21	14	12	12	11	22	23	19	192	5.7%
OTHER	1	0	0	0	0	0	0	0	0	0	0	0	1	0.0%
OVS*	4	4	2	3	4	4	5	2	2	2	8	3	43	1.3%
TOTAL	269	287	292	274	310	308	312	226	284	267	280	262	3,371	

Table 7-3 Monrovia Fire Department Incidents – 13 Year History³

Monrovia Incidents: 13 Fiscal Year History

	2000-1	2001-2	2002-3	2003-4	2004-5	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13
FIRE	621	597	491	461	504	510	523	501	479	462	492	488	386
MEDICAL	2,244	2,309	2,314	2,443	2,449	2,384	2,480	2,462	2,467	2,494	2,357	2,657	2,749
SERVICE	252	257	265	216	244	238	218	224	186	184	178	266	192
OTHER	2	4	47	7	0	1	3	1	0	0	1	1	1
OVS*	28	47	55	56	47	36	49	58	50	41	30	29	43
TOTAL	3,147	3,214	3,172	3,183	3,244	3,169	3,273	3,246	3,182	3,181	3,058	3,441	3,371

*OVS = Responses Outside the Verdugo System

As discussed below, the City of Monrovia’s fire fighting capabilities are supplemented through cooperative mutual aid agreements with several other fire fighting agencies. Such agencies would provide aid to the City of Monrovia in the event of a wildfire, as necessary.

Monrovia Community Emergency Response Team (CERT)

Monrovia CERT is a volunteer disaster response group under the auspices of the Monrovia Fire Department. Since 2006 over 80 residents have completed the 20-hour Basic training. The team currently consists of approximately 30 members. Members must either live or work in the City of Monrovia, and complete Basic training, and the City’s volunteer application process. All CERT members report up through the chain of command consisting of a Volunteer Coordinator from the Team and a CERT Coordinator from MFD, managed by a Fire Captain.

Monrovia CERT members have been trained in emergency preparedness, fire safety, triage, disaster medicine, light search and rescue, disaster psychology, terrorism, and CERT organization. Additionally members can take advanced training in National Incident Management System (NIMS), Traffic and Crowd Management, Firefighter Rehab, Flood Response, CPR, and Wilderness/Remote First Aid. CERT members are each equipped with a backpack containing essential safety gear.

² Verdugo Fire Communications Center Annual Report 2012-2013;
<http://www.verdugofire.org/pdf/verdugoannualreports/VerdugoAnnualReportFY2012-13.pdf>

³ Verdugo Fire Communications Center Annual Report 2012-2013;
<http://www.verdugofire.org/pdf/verdugoannualreports/VerdugoAnnualReportFY2012-13.pdf>

Monrovia CERT's main task is to augment the City's emergency response personnel in the event of a catastrophic disaster, however CERT contributes in other ways. Monrovia CERT staffs Emergency Preparedness/Education booths, patrols parades, conducts fire patrols, conduct welfare checks for the elderly and disabled, assists at CWPP public meetings, and provides event staff for the Fountain to Falls race. Members have responded to the December 2010 windstorm, numerous heat emergencies, and assisted with sandbagging and Ready Set Go evacuation packet distribution for the March 2014 Debris Flow event.

7.2. Wildfire Suppression Resources and Agreements

7.2.1. Cooperative Fire Management Agreements

Large wildfires do not respect political or property boundaries. Accordingly, in California response to large scale fires is addressed through mutual aid agreements at the federal, state, and local levels of government. Day - to - day mutual aid for initial attack, as well as a statewide mutual - aid system of fire disasters, is the basis of this cooperation and coordination. The ability to rapidly mobilize, effectively deploy, and support large numbers of specialized firefighting resources is essential in coping with large multiple fires.

Monrovia shares a coordinated fire response with eleven communities including: Monrovia, Arcadia, San Marino, Sierra Madre, Monterey Park, Pasadena, South Pasadena, Glendale, Alhambra, San Gabriel and Burbank. These 11 communities comprise what is known as "Operational Area C", being one of several operational areas A-G comprising Southern California, as designated the state Office of Emergency Services, (OES).

Fire response in Area C is coordinated through the City of Glendale Fire Department, utilizing a dispatch center known as "Verdugo Fire Communications Center". Monrovia joined the Verdugo Center July 1, 1999. Area C covers approximately 126 square miles of Los Angeles County, as shown in the following map⁴:

⁴ Verdugo Fire Communications Center; "Verdugo Fire Communications Center History", <http://www.verdugofire.org/historyofunifiedresponse.asp>, as access 7/12/14.

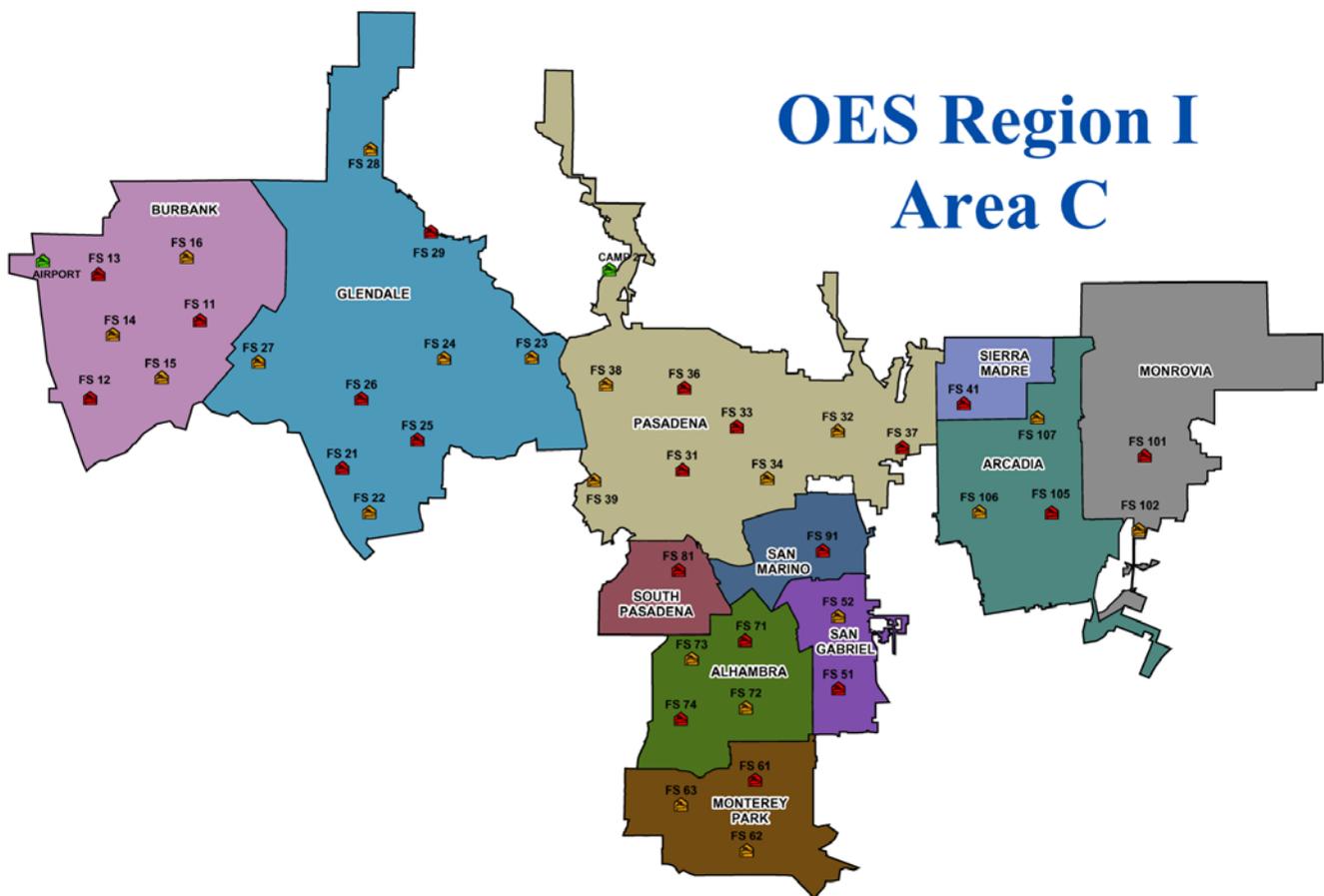


Figure 7-1 Area C Map

Verdugo Fire Communications Center is the regional emergency dispatch facility serving Area C, plus Montebello and the Burbank-Glendale-Pasadena Airport Authority Fire Department.

Verdugo is located at Fire Station 21 at 421 Oak Street in Glendale, California. The facility was built in 1994 and serves a combined population of over 825,000 residents, covering an area of 134 square miles. There are 44 fire stations with over 180 emergency response vehicles. In the most recent fiscal year, Verdugo handled 156,951 calls and dispatched 70,170 incidents.

Dialing 9-1-1 in any of the cities served by Verdugo Fire Communications Center connects a caller to local police or to CHP dispatchers (for those calling near freeway cell sites), who determine the nature of the emergency and transfer fire and paramedic calls to Verdugo.

When an emergency call is received by Verdugo, a dispatcher enters the pertinent details into the computer and these are immediately transmitted via radio to whichever fire station is being dispatched. Emergency personnel are on the road within a minute or two of receiving the radio call and remain in constant radio contact with the communications center as additional details are received.

Each of the 11 cities in Area C has its own fire department, and 10 of these cities share fire/rescue dispatch services provided by the Verdugo Fire Communications Center in Glendale. Verdugo Fire Communications is jointly owned by the cities of Burbank, Glendale and Pasadena and provides fire/rescue dispatch services to the other cities on a contract basis.

There is tremendous variability in fire department resources available to each city. Many of the smaller cities lack the funding, equipment, personnel and other resources to handle a major incident, making them dependent on the goodwill of neighboring jurisdictions to assist during crises. For example, some cities have no ladder trucks and must rely on neighboring agencies to assist when such apparatus are needed. Others may lack an air utility, USAR, hazmat unit or water tender.

Assistance provided by other jurisdictions is often negotiated and formalized as mutual aid or automatic aid agreements. Mutual aid refers to assistance that may be requested after local resources have exceeded their capacity. It can include such personnel, equipment, material and supplies as are customarily used within the sending party's jurisdiction. In contrast, automatic aid requires no formal request for deployment. It usually involves certain units or types of units within a specified area or district; the appropriate units are automatically dispatched to an incident under circumstances detailed in the agreement.

Both types of agreements generally stipulate that none of the participating fire agencies, in rendering aid to another jurisdiction, will be obligated to reduce their own resources to the extent that a situation is created that might be detrimental to its citizens. Table 7-4 shows the primary front-line resources available within Area C.

Table 7-4 – Unified Response – Area Ca Resources

Unified Response - Area C Resources

Area C Resources								
City	Engines	Trucks	Air Utilities	Water Tenders	USAR	HAZMAT	Stations	Ambulances
Alhambra	4	1	0	0	1	0	4	2
Arcadia	3	1	1	0	0.5	0	3	2
Burbank	6	2	0	1	0	1	6	3
Glendale	9	3	1	2	1	1	9	4
Monrovia	2	1	0	1	0.5	0	2	1 (PM Squad)
Monterey Park	3	1	0	0	0.5	0	3	2
Pasadena	8	2	0	0	1	0	8	4
San Gabriel	2	0	0	0	0.5	0	2	1
San Marino	1	0	0	0	0	0	1	1
Sierra Madre	1	0	0	1	0	0	1	1
South Pasadena	1	0	1	0	0	0	1	1
Subtotals	40	11	3	5	5	2	40	22

Since 1990, the U.S. Forest Service, the Consolidated Fire District of Los Angeles County and the cities of Arcadia and Sierra Madre have provided fire - fighting assistance to the City of Monrovia through a cooperative Fire Protection Agreement. These agencies are collectively referred to as the Foothill Fire Departments. These fire fighting departments have defined jurisdiction areas and boundaries, initial response resources for wildfire protection, Initial Action Zones (IAZ) that designate mutual areas where fire would pose a threat to adjoining jurisdictions, and Special Areas Assistance such as roadless wilderness areas and other modified suppression action areas requiring fire response. To keep these agreements, the Foothill Fire Departments attend formal meetings, conduct informal consultations, review the conditions of the agreements, and agree on actions to implement the agreement(s) on an annual basis.

From the City's acquisition of the hillside property in 2000 until 2010, maintenance of the Lower Clamshell Motorway was achieved by means of annual grading of the road. This was performed by equipment operators from Los Angeles County Fire Department, by cooperative agreement with the City of Monrovia. The practice was halted

in 2010 due to concerns for a population of federally-endangered Braunton's milkvetch. The critical habitat for this plant overlaps a portion of the road. The California Department of Fish and Wildlife (CaF&W; formerly Fish and Game) has jurisdiction over issues relating to protection of endangered species, such as the Braunton's milkvetch. CaF&W has provided input in the past regarding management of the Monrovia population of this plant, and of the Lower Clamshell Motorway (correspondence included in Appendix A-1), and will need to be involved in any future determinations regarding repair and maintenance of this road.

7.2.2. Monrovia Fire Protection Areas and Agencies

Within land known as Federal Responsibility Area (FRA), federal agencies have primary responsibility for fire protection. FRAs are defined based on land ownership. Federal agencies (United States Forest Service) have responsibility to provide wildland resource fire protection on all FRA lands adjacent to City of Monrovia. This includes the financial responsibility of preventing and suppressing fires. To more efficiently provide protection over a more contiguous land base, the Federal agencies trade protection areas with the California Department of Forestry and Fire Protection (CAL FIRE); these lands are balanced within the state. The resulting lands are called State Direct Protection Areas or Federal Direct Protection Areas. The lands that are swapped for the purpose of efficient wildland fire protection in the State of California are reviewed every five years among the signatory parties (USFS, NPS, BLM, and CAL FIRE) to what is known as the Cooperative Fire Protection Agreement or the "5-Party Agreement."

State Responsibility Area (SRA) lands are defined based on land ownership, population density, and land use. CAL FIRE determines SRA lands per the guidelines established by the State Board of Forestry and Fire Protection. CAL FIRE has a legal responsibility to provide wildland resource fire protection on all SRA lands, including the financial responsibility of preventing and suppressing fires. Lands in incorporated cities or surrounded by federal land are excluded from SRA lands. For example, CAL FIRE does not have responsibility for densely populated areas or agricultural lands. To more efficiently provide protection over a more contiguous land base, CAL FIRE swaps protection areas with other agencies, with the resulting lands being called CAL FIRE Direct Protection Areas.

Local fire districts and municipal fire departments are responsible for providing structure protection on SRA lands. They are also responsible for providing all fire protection on Local Responsibility Area (LRA) lands. LRA lands are not the responsibility of federal or state agencies.

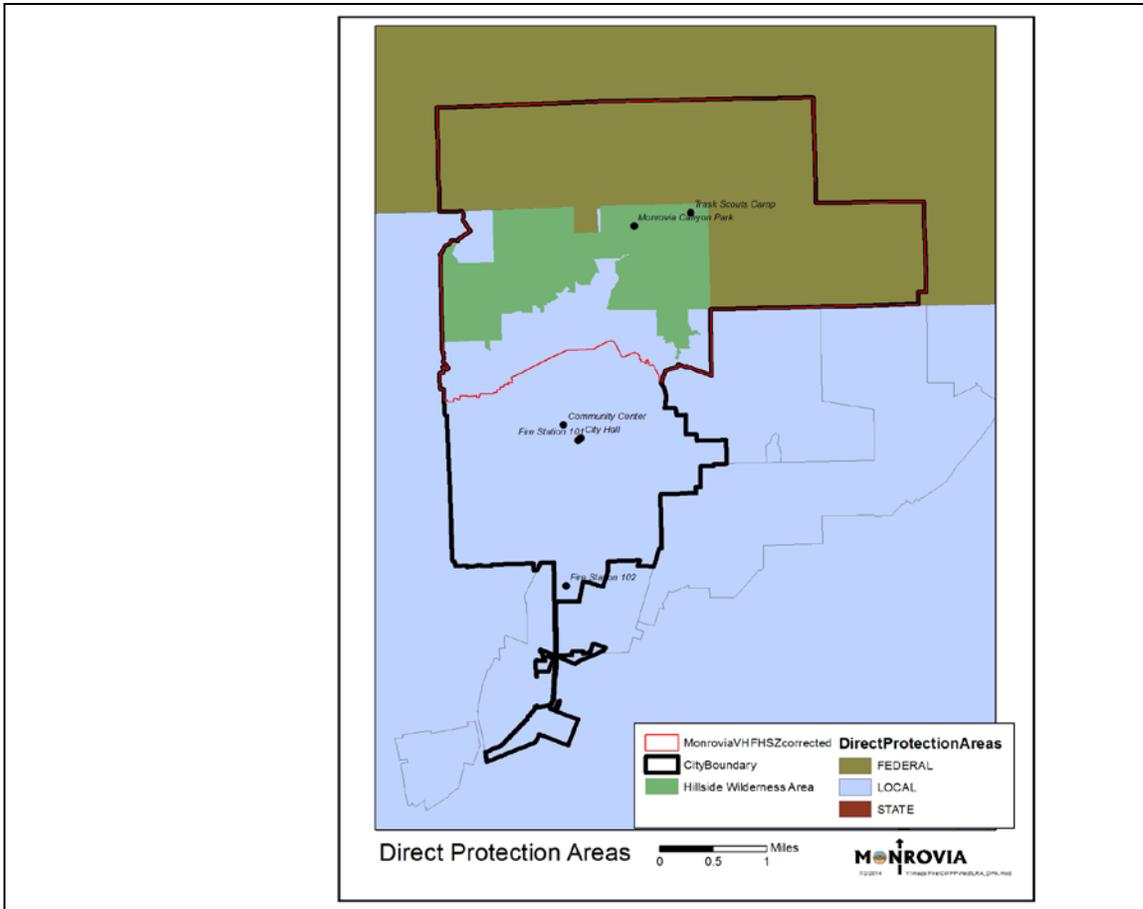


Figure 7-2 Monrovia Local, State, and Federal Responsibility Area Map

7.3. Emergency Planning and Operations

7.3.1. Incident Command System (ICS)

The National Incident Management System (NIMS) was established by FEMA and includes the Incident Command System (ICS). NIMS is used as the standard for emergency management by all public agencies in the United States for both planned and emergency events. When an incident occurs, incident stabilization activities (e.g. firefighting, damage assessment, property conservation) may be underway at the scene of the incident. Others assigned to support incident stabilization, business continuity or crisis communications activities report to the emergency operations center (EOC) to:

- Acquire, allocate, and track resources.
- Manage and share information.
- Establish response priorities among incidents.
- Provide legal and financial support.
- Liaison with other jurisdictions and other levels of government.

The relationship between the Incident Command activities and the EOC is illustrated by the following diagram:



The command structure of Monrovia’s ICS is illustrated in the chart below. The ICS structure is meant to expand and contract as the scope of the incident requires. For small-scale incidents, only the incident commander may be assigned.

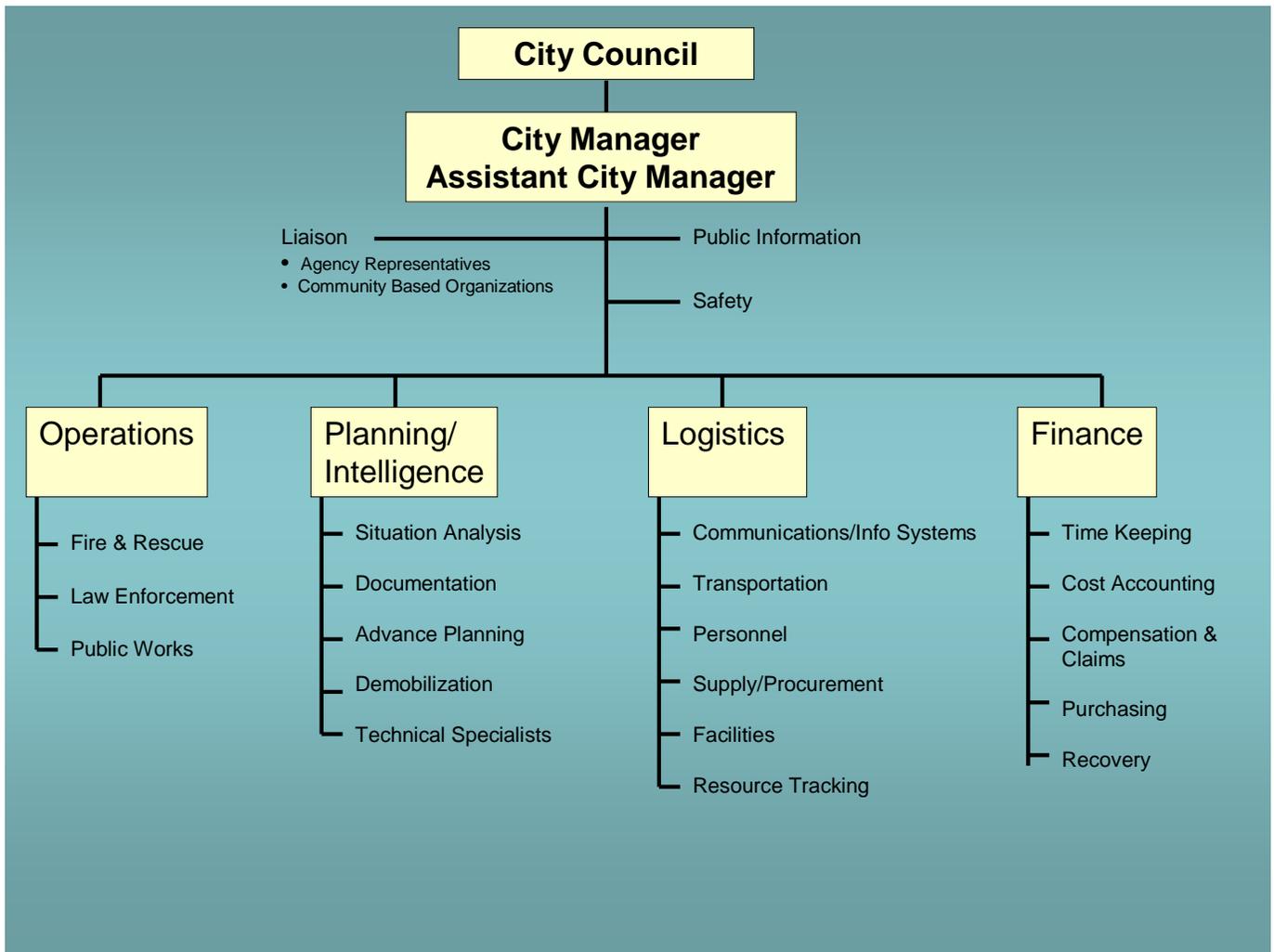


Figure 7-3 Incident Command Structure

Monrovia's EOC is located at 140 E. Lime Ave., and serves as the town's central communications hub during a major incident or disaster.

Monrovia's EOC has been activated three times between 2011 and the date of this writing in June, 2014:

Monrovia Emergency Operations Center Activations:

12/1/11 Windstorm Event
4/20/13 Madison Fire
2/27/14 Madison Debris and Mudslide Event

Monrovia Fire Department Emergency Contacts

Monrovia Police Department	626-256-8000
Monrovia Fire Department	626-256-8181
Verdugo Dispatch	818-548-3312
Monrovia Public Works	626-705-7119
Animal Control	626-962-3577
Red Cross	800-540-2000
Edison	800-655-4555
California Highway Patrol	818-888-0980
Poison Control	800-222-1222
Caltrans	626-357-2403
Monrovia Unified School District	626-417-2000
Canyon Early Learning	626-471-2001
Clifton Middle School	626-471-2600
Bradoaks Elementary	626-471-2100
Santa Fe Middle School	626-471-2700
Mayflower Elementary	626-471-2200
Monrovia High School	626-471-2800
Monroe Elementary	626-471-2300
Canyon Oaks High School	626-471-3000
Plymouth Elementary	626-471-2400
Mountain Park Elementary	626-471-3014
Wild Rose Elementary	626-471-2500
Monrovia Community Adult School	626-471-3035
L.A. County Health Hazmat	323-890-4045
L.A. County Fish & Game	858-467-4201
Environmental Protection Agency	202-272-0167
FEMA	800-621-3362
City of Duarte	626-357-7931
City of Arcadia	626-574-5400
City of Sierra Madre	626-355-7135
City of Bradbury	626-358-3218

All City staff and CERT volunteers with a role in emergency management operations (this comprises over half of City of Monrovia staff members, both full- and part-time) are required to complete the following training certified by the Federal Emergency Management Authority (FEMA):

IS-700 -- National Incident Management System (NIMS) an Introduction

ICS-100 – Introduction to the Incident Command System

7.3.2. Evacuation Plan

MFD’s plan for evacuation of hillside residents due to wildfire or other emergency involves coordination among many departments and agencies, as well as the residents, as can be seen in the following organization chart:

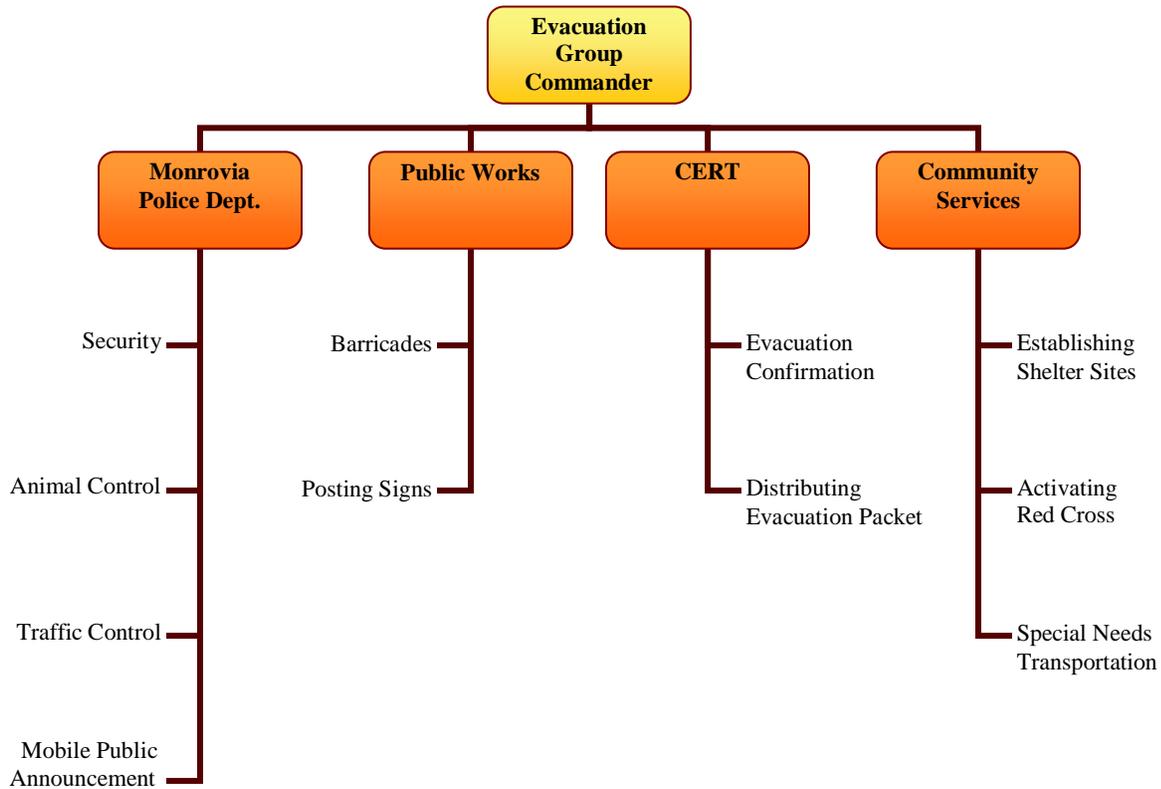


Figure 7-4 Monrovia Evacuation Incident Command Organizational Chart

In order to facilitate the most safe and rapid exit of residents from the threatened area, and deployment of safety personnel into the area, the following map has been developed:

Control District (SGVMVCD)⁵, due to potential hazards of mosquito and rodent infestation (see Chapter 8 for details of the associated risks identified by SGVMVCD).

7.3.3. Ready Set Go! Program

The Monrovia Fire Department has adopted the national Ready, Set, Go Program to facilitate communication between residents and the fire service. Under this program, residents are urged to prepare their homes and families (“ready”), remain alert to developing hazardous situations (“set”) and evacuate early (“go”). MFD has devoted resources into this program for outreach and education to residents, development of our evacuation operational plan, and training and equipping of City staff and CERT volunteers.

7.4. Wildfire Prevention

7.4.1. Defensible Space

Monrovia’s municipal code (MMC 8.14) establishes enforceable requirements for defensible space around all buildings and defines our city’s VHFHSZ.

Under MMC 8.14, two defensible space zones are established around each structure in the VHFHSZ:

Zone 1 – first 30’ from structure

Zone 2 – 30’ to 200’ from structure

The relevant sections of 8.14 are included in Appendix A-1.

To enforce the defensible space code, the Fire Chief sends out a reminder letter each spring to every residence within the VHFHSZ. Property inspections are done by the engine companies using an inspection/notification form (Figure 7-6). Out-of-compliance properties receive a warning notice and the property is reinspected approximately two weeks later. If the Fire Chief deems that the condition is an imminent hazard, he may begin abatement procedures immediately. The non-compliant homeowner may accrue fines, fees and liens against the property. Over ¾ of the residences pass on the initial inspection, and all but a few percent pass after reinspection.

⁵ San Gabriel Valley Mosquito and Vector Control District; 1145 N. Azusa Canyon Road, West Covina, CA 91700; (626)814-9466; district@sgvmosquito.org

Figure 7-6 Monrovia Fire Department Brush Compliance Inspection Report Form



**MONROVIA FIRE DEPARTMENT
BRUSH COMPLIANCE INSPECTION REPORT**
Office: (626) 256-8109 • Fax: (626) 256-8112

WARNING NOTICE
 FINAL NOTICE

Inspection Address		Parcel Number	
Owner Name		Phone	
Owner Address			
Inspector	Date	Re-inspection Date	
Received by Owner/Occupant	Signature	Completed	
Zone 1- First 30' from a structure, Zone 2 -30' to 200' from a structure. Additional definitions are found on the back of this form			
Violation	MMC Section	Municipal Code Violation Description	Numbers correspond to the violation description to the left
1.	§ 8.14.030 A (1)	Existing natural vegetation shall be eradicated or removed in Zone 1.	
2.	§ 8.14.030 B (1)	Ornamental vegetation shall be maintained in such a manner that they do not form a means of transmitting fire and shall be maintained a minimum of ten feet from buildings and structures in Zone 1.	
3.	§ 8.14.030 D (1)	Firewood, manure, compost and other similar combustible materials shall not be placed or stored in Zone 1.	
4.	§ 8.14.040 E	All cut vegetation shall promptly be removed from property and legally disposed of.	
5.	§ 8.14.030 (2)	Natural vegetation and grass shall be maintained at a maximum height of eighteen inches and a minimum height of three inches in Zone 2 at all times.	
6.	§ 8.14.040 D	All combustible growth and flammable vegetation shall, in all areas of the city, be removed within ten feet on each side of every roadway and combustible fence, whether public or private.	
7.	§ 8.14.020	Tree limbs and branches shall be maintained in all zones to allow for an unobstructed vertical clearance of not less than 13 feet 6 inches along roadways to allow for emergency vehicle access.	
8.	§ 8.14.020	Trees shall be maintained free of dead and dying limbs at all times and shall be trimmed and maintained at least five feet above the ground at all times.	
9.	§ 8.14.040	All trees and other vegetation in all areas of the city shall be a minimum distance of five feet away from the roof-line of any building, and five feet from the top of any structure.	
10.	§ 8.14.040	All roof surfaces in all areas of the city shall be kept free of leaves and needles and other vegetative or combustible matter at all times.	
11.	§ 8.14.030 A (2)	Natural vegetation consisting of shrub-like plants in Zone 2 shall have a separation distance between each such plant that is equal to three times the diameter of the largest shrub (e.g. a 10' Sumac specimen needs 30' of clearance from other shrub- like vegetation).	
12.	§ 8.12.030 (10)	Public nuisances prohibited on vacant lots.	
13.	§ 8.14.030 A (2)	Residential buildings shall have approved building numbers clearly visible from the street of contrasting color and at least six inches in height.	
Narrative Identified by violation number			

***NOTICE:** Upon reinspection, if the above conditions are not met, an **\$86** reinspection fee will be charged and your property may be subject to an **administrative fine** beginning at **\$1,000** per violation.

White - Station Yellow - Mail Pink - Property

7.4.2. Public Education

MFD has maintained a strong program of public fire safety education. During the course of this CWPP, every meeting and event has had a component of public education. Following is a list of public education activities that have been carried out:

Table 7-5 Public Education – CWPP Process

CWPP MEETINGS: PUBLIC EDUCATION COMPONENT				
Date	Meeting	Location	Public Education Content	Speaker
12-Sep-12	Advisory Group	Fire Station 101	Wildfire Behavior	MFD
22-Oct-12	Public Workshop	City Council Chambers	CWPP Process	J Lopez-LA County Fire
07-Nov-12	Advisory Group	Fire Station 101	Chaparral and Wildfire	MFD
05-Dec-12	Advisory Group	Fire Station 101	Protecting Biological Resources	D. Cooper, Biologist
21-Feb-13	Stakeholders Meeting	City Council Chambers	CWPP Process	MFD
25-Feb-13	Public Workshop	City Council Chambers	Vegetation Management Sustainable and Firesafe (S.A.F.E. Landscaping)	S Drill-UCCE Cooperative Extension
06-Mar-13	Advisory Group	Fire Station 101	CWPP Conservation Principals	MFD
03-Apr-13	Advisory Group	Fire Station 101	Structure Vulnerability	MFD
29-Apr-13	Home Ignition Zone Tour	Private Homes	Structure Hardening	P Durland-Stonecreek Fire
29-Apr-13	Public Workshop	City Council Chambers	Structure Hardening	P Durland-Stonecreek Fire
22-May-13	Advisory Group	Fire Station 101	Madison Fire	MFD
20-Jun-13	Neighborhood Meeting	Private Home	Ready, Set, Go	MFD
23-Jun-13	Neighborhood Meeting	Maryknoll Sisters' Retirement Home	Ready, Set, Go	MFD
24-Jun-13	Neighborhood Meeting	Monrovia Canyon Park Conference Center	Ready, Set, Go	MFD
26-Jun-13	Neighborhood Meeting	Fire Station 101	Ready, Set, Go	MFD
09-Oct-13	Advisory Group	Fire Station 101	Home Ignition Research Results	MFD
20-Nov-13	Monrovia Historic Preservation Group	Private Home	Ember Vulnerability of Historic Homes	MFD
06-Nov-13	Advisory Group	Fire Station 101	Flood Hazards After Fires	MFD
23-Jan-14	Advisory Group	Fire Station 101	Colby Fire	MFD
19-Feb-14	Advisory Group	Fire Station 101	n/a	MFD

7.4.3. Grant Programs and Partnerships

The department has implemented a number of successful prior and ongoing grant-funded programs in the Wildland Urban Interface:

- Obtained funding through competitive grants from the California Firesafe Council for significant fuel reduction, fire planning and public outreach programs (07USF9677, 07UFS9811, 08UFS0057, 09UFS0144, 10USFS0544 2007–2012, 13USFS0066 2013-2013):
 - Chipper Program
 - Goat-assisted Fuel Reduction
 - Hazardous Tree Removals
 - Fuel modification program
- Obtained FEMA funding for hazard mitigation planning
- Obtained additional CFSC funding (10USFS0544 and 13 USFS0066) for public outreach/education in applying Home Ignition Zone risk assessment principals, implementing the Ready, Set, Go wildfire readiness program and initiating this CWPP.
- Collaboration between Fire Department and Monrovia Wilderness Preserve with Rio Hondo Fire Academy and the Los Angeles County Weed Management Area for invasive weed management projects
- Inventoried 1500 VHFHSZ homes for key elements of wildfire survivability, with assistance from Rio Hondo cadets

Monrovia has aggressively pursued grant funding to support our wildfire mitigation efforts, including the development of this CWPP. We have been very fortunate to have been granted over \$600,000 in federal grant funding over the last 8 years from the California Fire Safe Council (CFSC). We currently have a \$118,678 budget to work with in our our current “Monrovia Ready Set Go” grant. Each grant is listed in Table 7-1 below, and briefly described in the sections following.

Table 7-6 California Fire Safe Council Grant History

Grant Number	Initial Funding Year	Name	Total Grant Amount	City In-Kind Match	Status
07UFS9811	2006	Fire Wise Goat Assisted Fuel Reduction Program	\$51,000	\$5,100	complete
07UFS9677	2006	Firewise Fuel Reduction Program	\$45,000	\$5,000	complete
08UFS0057	2008	Firewise Fuel Reduction Program	\$67,500	\$7,500	complete
09UFS0144	2009	Firewise Fuel Reduction Program	\$67,500	\$22,500	complete
10UFS0544	2010	Fuel Reduction/CWPP Program	\$327,565	\$42,855	complete
13UFS0066	2013	Monrovia Ready Set Go	\$118,678	\$121,799	open
TOTAL			\$677,243	\$204,754	

Fire Wise Goat Assisted Fuel Reduction Program 2006

This grant enabled the clearing of rugged, heavy vegetation at the Monrovia-Bradbury border utilizing goats. The grant funds went to pay the goat contractor, and the matching funds represented Fire Department staff in-kind labor in coordinating and overseeing the project.

Fire Wise Fuel Reduction Programs 2006, 2008 and 2009

These grants supported the Chipper Program, which provided for disposal of brush for residents in the Fire Zone. The grant funds went to pay the disposal contractor, and the matching funds represented Fire Department staff in-kind labor in coordinating and overseeing the project.

Fuel Reduction/CWPP Program 2010

This multi-faceted grant provided for continuation of the Chipper Program, fuel reduction, including tree removal, initiation of the CWPP process with public education outreach, a series of neighborhood workshops on Assessing Hazards in the Home Ignition Zone, and Phase I of Monrovia's Ready, Set, Go Program. The grant funds went to pay for tree removal, brush clearance and brush disposal contractors; for the workshop presentation; printing and mailing of the Ready, Set, Go brochure, and a portion of the staff time required for project implementation. The matching funds represented Fire Department staff in-kind labor in managing the project.

Our tree removal program was a notable success of the project. In this program we addressed legacy hazards related to the unfortunate tree planting choices of an earlier century: species such as the fan palms, gum eucalyptus and drought-sensitive conifers had been introduced to Monrovia landscapes. Although the initial cost to safely remove a mature tree in critical locations is very high, the benefit in hazard reduction is both significant and permanent. The grant support for this program enabled us to make the investment in long-term hazard reduction that would not otherwise have been feasible. In all, we removed over 200 fire-hazardous trees.

Whenever possible, we avoided tree removals during the bird nesting season, as demanded both by law and our community's environmental values. This impacted about six months out of the year. The few removals performed within nesting season required a nesting bird survey, which incurred additional costs (roughly 10% of the tree removal expense) but, in fact, nesting birds were not a factor impeding any of our tree removal projects. Although these nest protection measures added an additional scheduling challenge, they also provided added value to the project in promoting the community's environmental values and engaging Monrovia residents, who were extremely supportive, in discussions of sustainability elements of fire safety.

The planning portion of our project included the introduction of our Ready, Set, Go! program with the publication of a brochure mailed to over 1400 fire hazard zone residences. This task went forward smoothly and faced no particular challenges. The Ready, Set, Go! program will be further developed and implemented under our new grant funding.

The project also included the initiation of this Community Wildfire Protection Plan (CWPP). The CWPP is being developed in the context of a Resource Management Plan (RMP) for Monrovia's 1400-acre Hillside Wilderness Preserve adjoining the hillside neighborhoods. CWPP progress was impacted as an effect of the community's process of revision of the RMP. Early in 2012 a new RMP was adopted with a final EIR, allowing us to relaunch the CWPP process in earnest after a delay of almost 2 years. Meanwhile, the project generated over 100 online newsletter articles on topics in hazard mitigation such as firewise landscaping; a series of neighborhood Home Ignition Zone workshops and several public events, such a firewise landscaping booth. These efforts laid a solid groundwork for successful involvement of the community in the CWPP process.

Our project has undertaken to chart a new course in environmentally sustainable fire hazard reduction for our wildland interface areas. This direction has been dictated not only by the need to protect the natural resources of the adjacent HWP, but also to promote our community's strong environmental values and achieve long-term cost-effective solutions. Residents have shown great support for this direction and we have incorporated it into every

aspect of the project. One example is in the fuel reduction work that we have carried out on the City-owned lots adjacent to hillside neighborhoods. These areas are characterized principally by a mixture of chaparral and urban fuels. In these areas we have dealt with problems of invasive species and habitat degradation. Our research has shown us that the fire science community has not yet reached consensus on the best way to deal with these problems and achieve hazard mitigation in chaparral and similar shrublands. Therefore, we have undertaken our fuel reduction with special care and planning, which has involved the training of volunteers and paid crews, in order to avoid doing unintentional harm. We are learning to be more discriminating in what to cut and what to leave, timing of work, and avoidance of spreading weeds. These Best Management Practices will be continually developed. We believe our approach is quite unique within our community.

In performing this project we helped many property owners achieve compliance with the hazardous vegetation ordinance, and decreased the need for fines and abatement actions by over 50 percent.

Following is a summary of the fuel reduction work carried out under this grant:

TREE REMOVALS. Performed following biological surveys.

Resident trees	130 trees (eucalyptus, palm, pine, other)
City trees	88 trees (eucalyptus & palm)
Total	218 trees

CHIPPER PROGRAM -- Resident brush piles removed

2010	68 households	2,048 cubic yards
2011	45 households	1,325 cubic yards

ACCESS ROAD CLEARANCE

May, 2010	Upper Cloverleaf Reservoir Access Road 0.5 mile
June, 2010	VHFHSZ streets
July, 2011	Trask Road 1.5 miles
July, 2011	VHFHSZ streets
October, 2011	N. Alta Vista to W. Scenic 0.6 mile

WEED REMOVAL AND BRUSH THINNING

Area	Acres	Dates	Crew
Highland	3	8/10; 11/10; 4/11; 3/12; 8/12; monthly 9/12-4/13	Rio Hondo cadets; contractor; Canyon Park volunteers and staff
Upper Cloverleaf Water Tank and Road	0.3	5/10; 4/11; 8/12	Rio Hondo cadets 2010; contractor 2011, 2012
S103	3	4/11; 5/11; 8/12	Contractor; Rio Hondo cadets(5/11)
Sleepy Hollow	3.2	4/11; 8/12	contractor
Hidden Valley	1.3	4/11	Contractor
Grand Ave. Park	1	4/11; 2/12	Contractor
Ruby Canyon Debris Basin	2.5	11/11 – 1/12	LAFCo-contracted camp crew

Area	2010	2011	2012
Highland	August (weed abatement); November (heavy fuel reduction)	April	March ; August -- additional clearance
Upper Cloverleaf Water Tank & Road	May (weeds and heavy fuels - Rio Hondo cadets)	April	August
S103 (Cloverleaf)	April (tree removals/Rio Hondo cadets); July (weed abatement)	April (heavy fuels); May (weeds/Rio Hondo cadets)	August
Sleepy Hollow	n/a	April (heavy fuel reduction)	August
Hidden Valley	n/a	April (heavy fuel reduction)	n/a
Grand Ave. Park upper ravine & hillsides	n/a	April (heavy fuel reduction)	February (heavy fuel reduction)
Ruby Canyon Debris Basin	n/a	November – begin heavy fuel reduction (LAFCo)	Jan. – complete heavy fuel reduction (LAFCo)

Monrovia Ready Set Go 2013

This grant is currently open. There are two components to this grant program: Urban Forestry and Evacuation Planning/Public Outreach. Under the Urban Forestry component, approximately \$30,000 has been set aside for removal of fire-hazardous City trees and another \$30,000 will be available as a matching amount to help fire zone residents remove fire-hazardous trees on their properties. Public information products on firewise landscaping are also being prepared as part of this component. Under Evacuation Planning and Public Outreach we are able to provide for CERT preparations and public information on evacuation preparation.



This page intentionally left blank.

Risk Assessment: Identifying and Evaluating Assets at Risk

8.	Risk Assessment: Identifying and Evaluating Assets at Risk	2
8.1.	Assets at Risk in Monrovia’s Wildland Urban Interface	2
8.2.	Assessing Risks in Monrovia’s Wildland Urban Interface	5
8.2.1.	Community-Identified Hazard Assessment:	9

8. Risk Assessment: Identifying and Evaluating Assets at Risk

A fundamental part of any fire plan is identifying what you might lose in a wildfire, known as assets or values¹ at risk.

8.1. Assets at Risk in Monrovia’s Wildland Urban Interface

As detailed in Chapter 2, the community was asked to identify and prioritize these assets in a series of meetings. The top three assets were rated as the most highly-valued, and the remaining assets that were identified are considered to be highly-valued as well. The results are listed in Table 8-1.

Table 8-1 COMMUNITY-IDENTIFIED ASSETS AT RISK FROM WILDFIRE

Top 3 Assets	Other Assets
People: Residents and Firefighters	Businesses
Homes	Vehicles
Utility Infrastructure (water, power and communication)	Plant Life (native and endangered)
	Evacuation Routes
	Pets and Livestock
	Wildlife
	Recreational Facilities
	Watershed
	Viewshed
	Roads
	Slope Stability / debris basins
	Grant / Regulatory Compliance

¹ The California Fire Plan calls these “assets” at risk. Others may call them “values” at risk. They usually refer to the same.

Following neighborhood meetings, assets were further broken down by Planning Unit, listed in Tables 8-2a through 8-2f, as follows:

Table 8-2a Assets, Planning Unit 1: Fire Zone West

300+ homes
Residential streets
Upper Cloverleaf Reservoir
Upper Highland Ave. (access road to reservoir)
Hillside Wilderness Preserve (portion)
Private water tank(s) at 333 Madison
The Monrovia 'M'

Table 8-2b Assets, Planning Unit 2: Fire Zone West-Central

400+ homes
Residential streets
Hillside Wilderness Preserve (portion)
Cloverleaf Reservoir
Lower Clamshell Motorway
Lower Clamshell Truck Trail (segment)
Upper Cloverleaf Dr.
3 isolated homes on Upper Cloverleaf Dr.
Historic Luxe property on Upper Cloverleaf Dr.
Fire Station #3 600 Cloverleaf
Clamshell Canyon/stream
Ruby Canyon/stream
Private water system serving home(s) on Upper Cloverleaf
Critical habitat of endangered plant species Braunton's Milkvetch
Uncommon native plants/vegetation (Plummer's Mariposa Lily, Engelmann Oak)
Sycamore riparian habitat
Hidden Valley debris basin
2 emergency access gates from Gold Hill (Alta Vista/Hidden Valley and Alta Vista/Briarcliff)

Table 8-2c Assets, Planning Unit 1: Fire Zone East-Central

300+ homes
Residential streets
Emerson Tank
Canyon Park Reservoir
Oakglade Reservoir
Ridgeside Reservoir & Electrical Panel 715 Ridgeside Drive
Monrovia Canyon Park (facilities and trails)
Hillside Wilderness Preserve (portion)
Trask Boy Scout Camp (facilities and trails)
Ridgeside Debris Basin

Sawpit Fire Road
Sawpit Dam and residences
Sawpit Debris Basin
Helipad 44B
Spanish Canyon
Ruby Debris Basin

Table 8-2d Assets, Planning Unit 1: Fire Zone East

400+ homes
2 Isolated inholding homes in 700 block of Norumbega
Residential streets
Norumbega Reservoir
Hillside Wilderness Preserve (portion)
Norumbega Debris Basin
Maryknoll Home
Grand Avenue Park
Valmont Spreading Grounds
Sawpit Flood Channel
Unimproved flood channel Trail
Sycamore riparian habitat

Table 8-2e Assets, Planning Unit 6: Ember Protection Zone

3,000+ homes
Schools, churches and businesses
Residential streets
May Reservoir
Radford Reservoir
Mountain Reservoir
Monrovia High School
Mayflower School

Table 8-2f Assets, Planning Unit 6: Safety Zone

4,000+ Homes
Schools, churches and businesses
Residential streets
Foothill Freeway
Gold Line commuter rail facilities (under construction)
City Hall 415 S. Ivy Street
City Hall Annex 200 Lime Ave
Police Station 140 East Lime Street
Police Evidence Room
Fire Station #1 141 East Lemon Ave

Fire Station #2 2055 South Myrtle Ave
Fire Station #2 Storage Building
Library 321 South Myrtle Ave
Community Center 119 West Palm
Community Center EIC Container 119 West Palm
City Yard Main Building 600 South Mountain
City Yard Garage 600 South Mountain
Recreation Park Museum 742 Lemon
Recreation Park Museum Storage, Garage 742 Lemon
Recreation Park Restroom #2-5, Tennis Courts 742 Lemon
Boy's & Girl's Club
Well Pumphouse #4 2610 South California
Well Pumphouse #5 2620 South California
Booster 4-4, 4-5 601 North Cloverleaf
Myrtle Water Yard No 1-3 Booster Bldg. Pump House 2655 South Myrtle
Myrtle Water Yard Storage Shed 2655 South Myrtle Ave
Myrtle Water Yard Well Pumphouse #2 2655 South Myrtle Av
Mountain Avenue Reservoir Boosters 2-1, 2-2, 2-3, 2-4 510 South Mountain
Telephone System City Wide System
Mary Wilcox Facility Recreation Park 843 East Olive Ave

8.2. Assessing Risks in Monrovia's Wildland Urban Interface

Throughout the San Gabriel Mountains foothills, the risk of wildfire is high. All residents who live here share this risk, and the responsibility to minimize it. The following factors contribute to risk:

- Assets at risk from wildfire
- Fire hazard severity
- Risk of wildfire occurrence
- Structural ignitability and urban fuels (home ignition zone factors)
- Evacuation vulnerability
- Fire protection support

Assets at Risk

Assets (or values) at risk include anything that could be lost in a wildfire. Life safety was rated by the Monrovia community as the highest value. Homes and utility infrastructure also rated the highest priority, just after life safety.

The community explicitly listed the safety of firefighters along with that of residents and visitors, stressing the community's belief that we should not risk lives to protect material property. This is inherent in Monrovia's adoption of the Ready, Set, Go program, detailed in Chapter 5.

Numerous other community assets were identified, and those are listed in Table 8-1. The community attaches a very high value to the safety of pets and livestock, as well as natural assets, wildlife, habitat, recreational values, and other assets without well-defined monetary values. High values are also placed on community infrastructure, particularly where it impacts on safety, such as evacuation and emergency access routes, slope stability and flood protection.

Economic assets, such as businesses, streets, and vehicles, and cultural and aesthetic assets, such as Monrovia's historic homes, and beautiful views are included. Finally, our community's ability to satisfy our legal and contractual obligations (such as environmental regulations) is viewed as an asset to be protected.

Fire Hazard Severity

Fire hazard is a measure of the likelihood of an area burning and how it burns (e.g. intensity, speed, and embers produced). Planning Units 1-4 are all in the zone classified as "Very High Fire Hazard Severity Zone" by CalFire. The fire hazard zoning ratings are based only on fire hazard, as discussed in Chapter 3, without considering the value at risk,.

CalFire did not rate fire hazard in urban fuels, such as those found in Planning Units 5 and 6. Planning Unit 5 is designated as the Ember Protection Zone in this CWPP because of the community's concern for the hazard of ember attack in a large wildfire event, given the ability of embers to travel at great distances from the front of a fire. In a large wildfire event, particularly one in which structure-to-structure ignition is occurring, neighborhoods in Planning Unit 5 could become subject to evacuation. In that event, houses vulnerable to ember entry would be particularly at risk. Wildfire hazard in Planning Unit 6 is assumed to be low, thus that area is designated for emergency staging and evacuation.

Risk of Wildfire Occurrence

"Risk of wildfire occurrence" refers to the possibility of a wildfire occurring. Based on the frequency and variety of human-caused ignitions, and the resultant extensive fire history of the San Gabriel Mountains, the risk of wildfire occurrence in the San Gabriel foothills is generally considered to be high.

Figure 3-10a displays the wildfire history of Monrovia from 1900 to 2002, showing areas with overlapping fire perimeters in progressively darker shades of orange as the same area burned repeatedly. As that figure shows, almost all of the Project Area burned at least once during that time period, and almost half of the area burned at least twice, with several small areas showing as many as four overlapping burns. For example, a location near the south end of the Sawpit Dam was within the perimeters of the following fires:

- Hastings Ranch Fire 9/7/1917
- Monrovia Peak Fire 12/27/1953
- Unnamed Fire 10/2/1958
- Stable Fire 11/15/1980

Most other portions of the Project Area experienced fewer than four fires. Note that the map includes only the large wildfire incidents from CalFire's database. It does not include small starts of 1-2 acres that were suppressed quickly – historical data on these small incidents is not available. With this understanding, the previous fire history of the Project Area can be used as an indicator of the likelihood of a given area burning. Fire frequency may change due to many factors, including human factors and climate change.

Structural Ignitability and Urban Fuels

Structural ignitability means the ability of structures, especially homes, to burn. It is generally tied to the age of a given development (or structure), with newer developments built to the current or recent WUI building codes generally are less ignitable. Older wooden homes generally have higher structural ignitability than newer homes, unless they have been retrofitted to current WUI building standards.

"Urban fuels" in this risk assessment generally refers to anything that can burn—including ornamental vegetation—that is surrounding a structure, and often directly adjacent to and including homes. The presence of urban fuels in the

home ignition zone within Monrovia is one of the most relevant factors determining whether or not a structure will burn, distinct from the structural ignitability of the house itself.

The complete range from low to very high structural ignitability and impact of urban fuels may be found throughout Monrovia, and could not be accurately represented at the coarse scale of this CWPP. Homeowners and neighborhood groups such as homeowners' associations are encouraged to use the resources in Chapter 5 to conduct a risk assessment of their own properties, focusing on structural ignitability and urban fuels in the Home Ignition Zone, to determine where improvements will be most helpful. A detailed risk assessment is a requirement for a neighborhood to attain Firewise Community designation, and this process is encouraged.

Evacuation Vulnerability

A critical factor in the Monrovia foothills is the ability for residents and their animals to safely evacuate. Given the steep topography and patterns of population density, some portions of the existing road infrastructure is marginally adequate under normal conditions. The access roads to the isolated homes and structures of Upper Cloverleaf, Monrovia Canyon Park, Trask Camp, Hidden Valley and Norumbega Road are examples of narrow, winding roads with a high evacuation vulnerability.

Even generally adequate access routes may become congested when many people attempt to leave at once, particularly if emergency vehicles are attempting to enter at the same time. Hence, early evacuation significantly increases residents' ability to leave safely, while also reducing road congestion. Later evacuations limit travel routes and safe destinations.

Fire Protection Support

Fire protection support is based on adequate water supply and pressure and the ease of fire engine access to homes, which in turn is dependent on sufficient defensible space around structures and timely evacuations by local residents. The Monrovia Fire Department and our mutual aid partners have a high capability of providing fire protection if these four factors are present:

- Water
- Access
- Defensible space
- Timely evacuation by residents

Water supply and pressure are provided for all but a few facilities by fire hydrants supplied by Monrovia's municipal water system. The facilities that are not fully supplied by that system are:

- Three residences on Upper Cloverleaf
- Trask Boy Scout Camp

The above facilities have private water systems, so the adequacy of firefighting water supply to these facilities is unknown.

Access is related to the fire codes at the time of development, the steep and windy terrain, and the high potential for road blockage, as discussed above, under evacuation vulnerability.

Adequate defensible space allows firefighters the ability to protect a home safely. Defensible space must be maintained by the individual property owner – approximately 1500 individuals in the case of Monrovia's wildland-urban interface. This large number results in a significant level of variability in the adequacy of defensible space over

the Project Area. Basic requirements for defensible space are codified by municipal regulations (MMC 8.14, included in A-1), enforced by annual inspections conducted by the Fire Department.. These code requirements have resulted in a significant improvement in defensible space over the years, and Monrovia currently achieves compliance.

However, properties may fall out of compliance in between inspection cycles, resulting in homes temporarily without adequate defensible space. With Southern California's fire season getting longer and less predictable, this situation may become increasingly risky. Furthermore, given the variety of properties, city code cannot cover all situations. Research on defensible space evolves more quickly than code. Each year, scientific research, based on study of losses during wildfires, further develops and improves its models of effective defensible space, so it is important for the city and residents to keep educated and motivated. A sustainable annual approach to defensible space maintenance provides a year-round level of safety, compared with annual inspection and enforcement actions, which are costly and slow, compared to the voluntary actions of an informed and motivated community.

Timely evacuation allows firefighters to focus solely on structure protection, and is a tenet of the Ready, Set, Go program that has been adopted by the Monrovia Fire Department.

During the April, 2012 Madison Fire, which burned within the Project Area, residents of threatened homes were ordered to evacuate via the city's community notification calling system. Compliance with the evacuation order was good but not universal. Not all residents subscribe to the principals of Ready, Set, Go, choosing to stay home. Some residents were confused about what route they were supposed to use to evacuate and others were unsure about whether evacuation was voluntary or mandatory, and where they and their pets were directed to go. For the most part, those residents who had prepared thoroughly, including making arrangements for their pets, evacuated readily. However, the fact that residents were not allowed to come and go caused some residents to be concerned.

The Monrovia Fire Department has an operational evacuation plan that addresses communication issues, and the city has adopted a public safety message alert system, called Nixle.

Anyone can register with Nixle for free. There are two ways to do this:

Website www.nixle.com and follow online sign-up links

Text to 888-777, and put in zipcode when prompted

Subscribers also can choose which public safety agencies they want to receive messages from. The default for 91016 subscribers includes Monrovia Fire, Monrovia Police, LA County Sheriff, and some others. Subscribers have the option to receive the messages by email, text or voice to their cell phone. Residents, whether they subscribe to Nixle or not, will continue to receive emergency voice alerts on their home phones. These preferences can be changed at any time, and subscribers can opt out at any time as well. As of this writing, some residents have registered with Nixle, but the system has not yet been widely adopted by Monrovia residents.

8.2.1. Community-Identified Hazard Assessment^{2,3}

The following general hazards (Table 8-3) were identified by participants in the community meetings detailed in Chapter 2:

Table 8-3 Community-Identified General Wildfire Hazards

Top 3 Concerns:

- Negligence (covering a variety of issues, such as campfires, power tool use, vehicles, etc.)
- Vegetation issues
- Power lines

Other Concerns:

- Arson
- Campfires
- Fire arms
- Fireworks
- Illegal dumping
- Improper storage
- Mylar balloons
- Power tools
- Smoking
- Vehicles
- Weather/lightning

In addition, post-fire erosion was listed as a significant concern, resulting from wildfire.

A small number of specific hazards were identified within the individual planning units. Planning Units 1-4 were included. The following specific hazards (Tables 8-4a - d) were identified by participants in the community and neighborhood meetings, or via written or emailed comments, as detailed in Chapter 2:

Table 8-4a Specific Hazards, Planning Unit 1: Fire Zone West

Abandoned property at 917 Crescent

Firefighter access to properties in 300-block of Madison

Visitor management at Highland access to HWP

Table 8-4b Specific Hazards, Planning Unit 2: Fire Zone West-Central

Wildfire exposure to homes of Hidden Valley neighborhood from adjacent wildlands

Table 8-4c Specific Hazards, Planning Unit 3: Fire Zone East-Central

Ability to open emergency gate between Briarcliff and Sutter Creek

Ignitions resulting from “partying” on Lower Clamshell Motorway

Vegetation/brush at the hairpin turn at the north end of Ridgeside

² Hazards are the potential fuel that can start a fire, while risks are the potential for the fuel to ignite.

³ These comments, risks, and hazards are made by meeting participants.

Repair and long-term maintenance of the Lower Clamshell Motorway while protected the endangered Braunton's milkvetch

Table 8-4d Specific Hazards, Planning Unit 4: Fire Zone East

Lack of evacuation route from easternmost parts of Norumbega eastbound into Bradbury

Concerns about evacuation of horses from Bradbury properties adjacent to Monrovia

Unpruned or improperly pruned oaks on the 600-800 blocks of Norumbega

Oaks impinging on powerlines along rear of Oakcliff parcels, adjacent to County flood channel

Vegetation on County side of fenceline along rear of Oakcliff parcels, adjacent to flood channel

Monrovia Fire Safe Action Plan

9.	Monrovia Fire Safe Action Plan	2
9.1.	Summary of Objectives.....	2
9.2.	Community-Identified Potential Projects	3
9.3.	Existing Projects and Actions	4
9.4.	Proposed Actions	6
9.4.1.	Building Sustainability.....	6
9.4.2.	Defensible Space Code and Process	8
9.4.3.	Public Education and Engagement	12
9.4.4.	Firewise Communities	13
9.4.5.	CERT Involvement	14
9.4.6.	Ready, Set, Go!	16
9.4.7.	Emergency Access Routes	18
9.4.8.	SAFE Landscaping/Urban Forestry	20
9.4.9.	Vegetation Modification on Public Land.....	23
9.4.10.	Visitor Management on Public Land	24
9.4.11.	Wildland-Urban Interface Planning.....	25
9.4.12.	Post-Fire Planning.....	25
9.5.	Prioritized Fuel Reduction	27
9.6.	Designation of Wildland-Urban Interface Areas	31
9.7.	Action Plan Summary	32

9. Monrovia Fire Safe Action Plan

9.1. Summary of Objectives

In this section, we describe proposed actions that the City of Monrovia can undertake to meet the objectives of this CWPP, as set out in Chapter 1:

- To identify priority projects to reduce risks and hazards from wildfire while protecting environmental stewardship values in Monrovia's wildland-urban interface (WUI), including the voter-designated Hillside Wilderness Area, adjacent developed areas, critical infrastructure, recreational resources, and included private in-holdings. Goals are to be achieved principally through prioritization and implementation of fuel hazard reduction, building sustainability, community education, and fire-suppression projects and activities.
- To provide an adaptable guidance document for future actions of the City of Monrovia and the Monrovia Fire Department working with local, county, state and federal resources.
- To examine current practices and recommend improvements in wildfire mitigation, preparedness, response and recovery
- To develop best management practices (BMPs) for vegetation management and building sustainability
- To provide community priorities and direction for stewardship-based fuel reduction on city-managed open space lands.
- To provide fire safety educational information to residents of Monrovia.
- To provide a positive balance among fire prevention, stewardship, and wildlife protection.
- To coordinate fire protection strategies across property boundaries.
- To integrate private land management goals with community needs and expectations for fire safety.
- Finally, this document is being written as a Community Wildfire Protection Plan, in order to meet the requirements of future National Fire Plan(s) and other government funding sources, and to provide community direction for local land management within the planning area.

As this CWPP exists in a broader context of municipal and county planning, we have found that the wildfire mitigation strategies proposed in this CWPP also support broader community goals, as stated in the following policy documents:

City of Monrovia Strategic Plan FY 2012-2013

Monrovia Local Hazard Mitigation Plan (LHMP)

Monrovia Hillside Wilderness and Hillside Recreation Area Resource Management Plan (RMP)

City of Monrovia General Plan and Zoning designations

Monrovia Environmental Accords

9.2. Community-Identified Potential Projects¹

During the course of development of this CWPP, the community has proposed a wide range of actions, programs and strategies to meet the above objectives. The proposed strategies listed below were generated at the stakeholders' meeting on February 21, 2013, the community meetings on February 25 and April 29, 2013, and the neighborhood meetings on June 20, 23, 25 and 26, 2013; and at one of the ten open Advisory Committee meetings between September 2012 and February 2014. Additionally, written comments were received from residents and other stakeholders, as detailed in Chapter 2. The suggested mitigation strategies are summarized below under the categories of vegetation management, structure hardening, public education, and policy actions and other strategies:

COMMUNITY PROPOSED MITIGATION STRATEGIES

Vegetation Management

- Suggested plant list (plant palette) with maintenance and best management practices for fire resistance. Example Top 10 natives
- Very selective vegetation removal in the Wilderness Preserve using best management practices to sustain wildlife/habitat
- Address responsibility for vegetation management for homes that back up to public land
- Address overgrown brush issues at abandoned properties
- Prepare a post-fire recovery plan
- Address rare plants/natural communities, sensitive wildlife, and special status species
- Comply with Migratory Bird Treaty Act and other environmental and water protection laws and regulations
- Prevent species type conversion
- Conserve landscape age class diversity
- Provide protection to workers when doing work – concerns with vector-borne diseases

Structure Hardening

- Mills House Act structures and Ember Zone. How do we keep historic values and reduce structural ignitability at the same time? (Example: deep/open eaves, wood siding and wood roofs are fire-unsafe characteristics of some historic homes.)
- Look into fire retardant/resistant paint product
- Promote use of dual pane windows
- Remove all wood roofs
- Brush clearance around the house
- Gutters cleaning: education, assistance and technical/policy changes
- Motivate residents by means of training sessions and neighbor-to-neighbor "block parties"
- Raise public awareness
- Address residents' denial of hazard and/or procrastination and/or feeling overwhelmed
- Address residents' concerns with cost of retrofits

¹ These comments, and others identified at community meetings, are suggestions made by meeting participants. By listing them here we do not take a position on the statement. They are listed solely to demonstrate community concerns.

Public Education

- Web
- Offer classes/workshops on firesafe practices (e.g. how to create defensible space)
- Schools – focus at 5th grade level; investigate funding source
- Promote residents to undertake Master Naturalist Program from Univ. of Calif. Extension
- Directly talking to Garden Club and other groups
- Target local nurseries; (e.g. Armstrong's) to promote firesafe plant choices and best management practices for landscaping
- Create programs for KGEM

Policy Actions and Other Strategies

- Address problems with legal requirements for historic preservation when it is not most firesafe
- Address hazards and disturbances relating to post-fire movement of wildlife
- Mitigate hazards related to careless or malicious visitors to Wilderness Preserve
- Map critical electrical facilities/ address homeland security concerns
- Work with Edison regarding problem poles, trees and maintain relationship with Edison for incident response
- Train public and CERT on response to downed powerlines
- Address evacuees' dilemma when attempting to return to remove second car.

9.3. Existing Projects and Actions

This CWPP builds on previous and ongoing projects conducted by the City of Monrovia and other organizations. Prior and ongoing projects conducted by the City of Monrovia were described in Chapter 7 and are included in the table below, along with relevant projects by other agencies.

Table 9-1 shows the existing projects that were identified as being undertaken to further the goals of this plan.

Table 9-1. Existing Projects (Ongoing and Recent)						
Organization	Project Name	Type of Project	Project Description	Funding	Start Date	Finish Date
City of Monrovia	Monrovia Ready Set Go	Fuels Management, Planning and Public Education	Removal of hazardous City and residential trees in Fire Zone; Evacuation planning; public education/outreach regarding evacuation and Ready, Set, Go program.	CA FSC Grant	2012	2015
City of Monrovia	Fuel Reduction/ CWPP Project	Fuels Management, Planning and Public Education	Removal of hazardous City and residential trees in Fire Zone; residential chipper program; weed abatement; wildfire mitigation planning; public education/outreach regarding the Home Ignition Zone and Firewise Landscaping.	CA FSC Grant	2010	2012
City of Monrovia	Maintenance of Lower Clamshell Motorway	Fuels Management; infrastructure maintenance	Annual grading of 3-mile long Lower Clamshell Motorway	Cooperative agreement with LA County Fire	Unknown	2010 (halted due to concern for endangered species)
City of Monrovia	Phos-Chek application	Fuels Management	Application of fire retardant Phos-Chek along roads in Fire Zone	Unknown	Unknown	Halted due to concern for environmental impact
City of Bradbury	City of Bradbury Fire Hazard Reduction Plan, Stage 2	Education, Fuel Treatment	Details not available	CA FSC Grant	2014	
United States Forest Service	Trask Camp	Fuels Management	Hazardous fuels reduction around the Camp Trask boy scout camp. Thinning, brush cutting, chipping, Pruning of trees.	Federal Hazardous Fuels, WFHF	2012	2013; future maintenance TBD
United States Forest Service	Angeles National Forest Defensible Space Project	Fuels Management	Expanding Hazard Reduction for landowners with habitable structures within 200 feet of the forest boundary. Project will establish defensible space around structures to the extent necessary to comply with state and county fire codes. Web Link: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=35149		2014	2024
United States Forest Service	Sawpit Canyon Road	Fuels Management	Vegetative manipulation of 110 acres by hand thinning and chipping to provide defensible space around the road system		2015	2016

9.4. Proposed Actions

In the course of community meetings, a list of twelve (12) program areas was developed, within which a total of over fifty (50) potential actions were proposed. These are summarized in Table 9-4 in Section 9.7. The program areas are:

1. Building Sustainability
2. Defensible Space Code and Process
3. Public Engagement and Education
4. Firewise Communities
5. CERT Involvement
6. Ready, Set, Go! Program
7. Emergency Access Routes
8. SAFE Landscapes and Urban Forestry
9. Vegetation Modification on Public Land
10. Visitor Management on Public Land
11. Wildland-Urban Interface Planning
12. Post-Fire Planning

These proposed programs, their goals and the proposed actions under each are described in Sections 9.4.1 through 9.4.12, following.

9.4.1. Building Sustainability

Recent fire science has shown that the most important step to prevent loss is "hardening" of the home, particularly against ember attack. Research shows that homes with a non-combustible roof and clearance of at least 30 to 60 feet have an 85-95% chance of survival in a wildfire.² This proposed program builds on the Hazard Assessment and Home Ignition Zone programs described in Section 9.3 above

The goal of actions under this program is to encourage homeowners to mitigate the risk of wildfire losses by building, retrofitting and maintaining roofs, eaves, vent openings, windows, decks and other attachments up to fire safe standards promulgated by NFPA and CA WUI code, as detailed in Chapter 5. Awareness of the impact of urban fuels – such as stored items – is also a target of this program. Both the Fire Zone and the Ember Zone would be targeted for projects to enhance building sustainability, especially ember awareness. Public education would be the principal strategy, with the possibility of some public policy actions as well. The following four specific actions were proposed:

² Foote, Ethan. (August 2004). "Wildland-Urban Interface Ignition-Resistant Building Construction Recommendations." Community Wildfire Protection Plan Workshops. California Fire Alliance and the California Fire Safe Council.

9.4.1.1. Home Ignition Zone Education Campaign

Implement a public information/engagement campaign focusing on key elements of hardened homes, as detailed in Chapter 5 of this CWPP.

Stress the message that effective changes can be simple and low-cost.

Implementation of this proposed action could take a wide variety of forms and levels of effort. Some tasks could include the following: Utilize existing video footage obtained during the previous grant-funded programs with Stone Creek Fire, described in Section 9.3, above, to create one or more videos for the public. Evaluate the suitability of existing informational products, such as printed materials and video content available at low or no cost from the NFPA and the Firewise Program, and Monrovia's existing Ready, Set, Go Program brochure. If warranted, develop additional new materials. Various media could be used, including the City website, KGEM, and direct mail. Utilize the existing mailing list for the Fire Zone, used to distribute the annual brush letter. Develop a mailing list for the Ember Zone. Actions may be coordinated with Fire Wise Community and Public Engagement programs described in subsequent sections.

9.4.1.2. Wood Shake Roofs

Reach out to owners of remaining wood shake roofs in the Fire Zone and Ember Zone to upgrade to fire rated roofs.

Building codes now severely restrict the use of wood shakes in new home construction or when re-roofing because wood shake roofs have been a significant cause of home loss in wildfires. However, the majority of Monrovia homes were built several decades or more ago, and may retain wood shake roofs at present, which would increase risks from WUI fires, and other types of fires. The extent of this problem has been partially quantified: in 2010, students from Rio Hondo Fire Academy assisted in surveying the 1500 homes in Monrovia's VHFHSZ and their findings showed only one home in the VHFHSZ with a confirmed wood shake roof. That survey did not cover garages and other accessory buildings, nor did it survey homes within the Ember Zone, so the full extent of the problem in Monrovia is not known.

Implementation of this proposed action could range from providing general public information, to surveying for at-risk roofs and engaging in targeted outreach.

9.4.1.3. Landmarked Properties

Provide advice or other assistance to owners of landmarked properties regarding historical restoration alternatives for fire safety.

The Monrovia Historic Preservation Commission (HPC) has a proactive historic preservation program, in concert with the Monrovia Historic Preservation Group (MOHPG), to preserve structures and neighborhoods with cultural significance. The process includes landmarking the home and can proceed to completing a 10-year contract under the Mills Act. The agreement requires the owner of the property to undertake specific restoration tasks specified in the contract and to properly maintain the landmark. In exchange for this commitment, the property owner may benefit from a reduction in property taxes. Once a property is designated a historic landmark, all changes to the exterior of structures on the property are subject to the approval of a Certificate of Appropriateness by the Historic Preservation Commission. The restoration commitment is an opportunity to improve fire safety, but it could potentially create challenges for owners to balance authenticity and safety. There are currently 157 potentially landmarked homes City-wide, and, within the Fire Zone and Ember Zone combined, at least 40 current Mills Act homes. To the extent that the Mills Act contract can provide for firesafe alternatives in the choice of materials for restoration or other hazard mitigation, the City may promote these choices and provide advice and assistance to owners to facilitate selection. MOHPG and MFD have already collaborated on a presentation (currently on the MOHPG website).

Implementation of this proposed action could involve enhanced MFD involvement with MOHPG and signaling a willingness to HPC to provide advice on fire safety priorities and alternatives.

9.4.1.4. Hardened Home Recognition

Consider City designation of "hardened home" recognition for homes built or retrofitted to high wildfire safety standard.

Current building codes dictate standards for new construction in Monrovia's VHFHSZ, while this proposed action envisions an incentive – in the form of official recognition – for existing owners to retrofit or for new owners to build to standards that exceed their legal requirements.

Implementation of this proposed action would involve adopting a standard or set of standards, developing an application and renewal procedure, conducting on-site reviews and maintaining records.

9.4.2. Defensible Space Code and Process

New Federal and State guidelines, developments in fire science, and the trend toward longer and longer fire seasons, point to a need to regularly examine our defensible space program. The goal of actions under this program is to determine and promote best practices for Monrovia's defensible space within the VHFHSZ to maximize cost-effectiveness, hazard mitigation and environmental stewardship via policy and procedural changes. This program builds on research conducted in the course of preparing this CWPP and fuel reduction carried out under a previous grant, in cooperation with the Los Angeles County Department of Public Works. The following eight (8) specific actions were proposed:

9.4.2.1. Adapting to Climate Change

Due to changing climate, consider modifications to the brush inspection program that will promote year-round resident compliance with defensible space requirements.

Fire scientists have noted a trend toward longer and longer "fire seasons.

In previous decades, severe fire conditions, including extreme heat, low humidity, dry vegetation and Santa Ana winds, were generally only experienced from late summer until the first significant rains of late autumn, with vegetation remaining moist and fire hazard remaining low throughout the spring and early summer. As a result, Monrovia, like many communities, found it most cost-effective for staff and residents alike to enforce defensible space requirements by means of annual brush clearance inspections conducted during the spring of each year, with a compliance deadline established in early summer (July 1st for Monrovia).

However, due to changing environmental conditions, we are experiencing low fuel moisture and hazardous fire weather increasingly throughout the year. To avoid being caught unprepared for unseasonable fires, residents need to be strongly encouraged to maintain compliance with defensible space year-round. To avoid starting fires while doing brush clearance, we also wish to motivate residents to time their brush clearance work based on safe work conditions (avoiding hot or windy days) rather than at the last minute to meet a deadline. Chapter 4 of this CWPP includes a recommended calendar for the different types of jobs that can be done safely and effectively in each month to maintain a safe landscape in every season, never letting the vegetation get out of hand, and avoiding the spring rush.

Implementation of this proposed action by Monrovia would involve considering changes to our enforcement program for defensible space. Potential changes could take many forms – earlier deadlines, more frequent or random inspections, a rotating inspection schedule, etc. This proposed action can be coordinated with related public education actions described under Sections 9.4.3 and 9.4.8.

9.4.2.2. Defensible Space Zones

Consider modifying municipal code Chapter 8.14 to subdivide Monrovia’s defensible space Zones 1 and 2 to provide for stricter requirements 0-5’ from home and ease or eliminate requirements beyond 100’ distance.

Recent fire science findings have shown that “donut-style” brush clearance is not effective – that is, leaving combustible fuels adjacent to your house, while clearing a “moat” of bare ground away from it does not protect the home from fire and may subject it to greater hazard from ember attack and from erosion. Furthermore, experiments have shown that beyond a distance of about 100’, even very intense fires produce insufficient radiant heat to ignite a structure, except under unusual circumstances. Therefore, residents are now being urged to prioritize the areas close to their home rather than focusing on more distant areas. Fire scientists with the Institute for Business and Home Safety delineate the following defensible space zones:

- ! 0 to 5’ from the house – The most critical zone – should be entirely free of combustible material
- ✓ 5 to 30’ from the house – should be lean and green so ignition is very unlikely, and any combustion would be limited in extent and size.
- ✓ 30 to 100’ from the house -- vegetation should be managed to prevent large crown fires
- ? 100 to 200’ from the house – vegetation may need management if warranted by extreme site characteristics

Monrovia’s current code for the VHFHSZ delineates Zone 1 as 0-30’ and Zone 2 as 30-200’ from the home. Consideration may be given to subdividing Zone 1 to provide stricter standards for the zone from 0-5’. At the same time, consideration may be given to subdividing Zone 2, enabling the Fire Chief to ease restrictions for the area outside of the 100’ circle. Changes of the kind described above would not jeopardize Monrovia’s compliance with California state law, which only requires defensible space within 100 feet of the home, or to the property line, so Monrovia’s requirements would remain at least as strict as the State of California’s.

By shifting residents’ focus away from the “donut” and toward the area closest to their house, we can help them use their time and money most effectively. This is particularly true because each time we double the distance from the house, we nearly quadruple the total area that must be covered, and accordingly we quadruple the time, effort and cost to maintain that area. For example, for a 2,500 square foot home, while a 100’ “bubble” around the house comprises about 47,000 square feet (about 1 acre), a 200’ bubble comprises a zone measuring over 150,000 square feet, or over 3 1/2 acres in size. The approximate sizes of the different zones around a typical house are shown in the following table:

Table 9-2. Defensible Space Areal Extent

Distance from house	Square feet of clearance area	Area in acres
5 feet	327	0.01
30 feet	7,003	0.16
100 feet	46,587	1.07
200 feet	156,543	3.59

Implementation of this proposed action by the City would involve preparing recommendations for changes to the municipal code relating to defensible space zones.

9.4.2.3. Man-Made Fuels

Consider strengthening provisions of MMC 8.14 to specify reduction of man-made fuels as well as vegetative ones.

The process of fire does not distinguish whether a fuel is natural, such as a dead branch, or man-made, such as a pile of old magazines. Combustible man-made items that have been observed within the defensible space zone of Monrovia homes include paper and cardboard items, fabric, lumber, unused construction materials, tires, furniture, trellises, awnings, plastic items and car parts. Many residents are unaware of the potential hazard associated with these types of fuels, although storage of man-made combustible items can constitute a significant hazard, depending on the amount of material and how close it is to vulnerable structures. Specific language added to MMC 8.14 and associated enforcement in the course of defensible space inspections could help remedy this situation.

Implementation of this proposed action would involve preparing recommendations for changes to the municipal code relating to man-made fuels.

9.4.2.4. Vegetation Modification Standards

Review, and update as necessary, municipal code language to support recommended landscaping practice as presented in this CWPP.

Best management practices for firesafe and sustainable residential vegetation management are presented in Chapter 4 of this CWPP, based on recent work by the University of California Cooperative Extension. This work presents a shift in focus from prior decades in which particular types or species of vegetation were considered inherently fire-hazardous and residents were advised or required to eradicate such vegetation. By contrast, current recommendations highlight the maintenance of the vegetation, which is now understood to be more important than its species or type when it comes to fire safety. We recognize that all plants are combustible to some degree, and that any vegetation can be hazardous if overgrown, unhealthy or inadequately maintained. Proper spacing, location, care and maintenance is required for all vegetation in a home's defensible space. Furthermore, vegetation serves other vital functions, including hillside stability. Monrovia Municipal Code Chapter 8.14, which establishes requirements for defensible space compliance to prevent hazardous vegetation, currently distinguishes between natural and ornamental vegetation and calls for the removal of the former. The City may be able to make modifications in this chapter to distinguish instead between properly-maintained and improperly-maintained vegetation, and to more clearly promote the maintenance of safe vegetation on hillsides.

Implementation of this proposed action would involve preparing recommendations for changes to the municipal code relating to hazardous vegetation.

9.4.2.5. Vacant Lots

Continue to enforce brush clearance requirements on vacant lots.

In Monrovia, maintenance of defensible space around a home is considered to be a benefit to that home, and, accordingly, the resident's responsibility does not necessarily end at the property line if the required defensible space zone crosses that line. Residents who closely border undeveloped land have the situation in which they share responsibility with the owner of the undeveloped land, for that portion of the home's defensible space. The landowner may discharge their responsibility either by performing the work or allowing the resident to enter the property to perform the work. Generally speaking, when the only access is via the resident's parcel, it is practical for the landowner to allow the resident to perform the work, and Monrovia has seen few problems with this system when both properties are within Monrovia jurisdiction. (Situations crossing jurisdictional lines are addressed in Section 9.4.2.5, following). However, the owner of the vacant land is expected to do the work if they can readily access the portion of the land that requires work, and to date, all such landowners have complied after receiving notice from the Fire Department. Notifying the owner of a vacant parcel requires researching the owner's name and mailing address.

Because this can be time-consuming, staff has created a database of owners' contact information, which is updated when the Department learns of an ownership change.

A special situation may arise where the vacant land is City-owned property within the Hillside Wilderness Preserve. This situation is addressed in Section 9.4.9.2.

Implementation of this proposed action would involve continuing the current practices described above regarding brush clearance on vacant parcels within the VHFHSZ.

9.4.2.6. Neighboring Jurisdictions

Maintain relationships and contacts with officials in bordering jurisdictions (Arcadia, Bradbury, LA County, USFS) and assist residents where necessary to help them comply with defensible space requirements in overlapping areas.

As mentioned above, defensible space does not stop at jurisdictional lines. Monrovia Fire Department personnel have needed to call on contacts in the Los Angeles County Department of Public Works, the Cities of Arcadia and Bradbury and the United States Forest Service Angeles National Forest when needed to cooperate to achieve fire safety. These calls have been most successful when made in the context of ongoing projects – for example, when grant funding gave Monrovia the opportunity to help clear hazardous vegetation for a resident bordering County Flood Control property, we discussed the project with the County, targeted vegetation that was of mutual concern, and the County facilitated the work by giving access to our contractor.

Implementation of this proposed action would involve continuing to seek out opportunities to collaborate with neighboring jurisdictions.

9.4.2.7. Updated Orientation for Defensible Space Inspection Personnel

Update inspection personnel as defensible space policy or practice evolve.

Defensible space inspections are carried out by the personnel of the Monrovia Fire Department's engine companies, numbering 36 firefighters and paramedics, under the direction of the Fire Marshall and with the assistance of other Prevention Bureau staff. Personnel conducting inspections apply the relevant sections of municipal code augmented by their experience fighting fires and their knowledge of fire behavior. In addition, when out in neighborhoods, these firefighters and paramedics also perform a key role in public education whenever they encounter a resident or deal with a question or concern regarding wildfire safety.

As the code and implementation practices have not changed for several years, there has not been a need to provide additional training or orientation. However, as this CWPP proposes modifications to Monrovia's defensible space program, it will be necessary to update the staff on these changes.

Implementation of this proposed action would involve providing orientation materials and meetings for Fire Department personnel to explain any changes in the City's defensible space program.

9.4.2.8. Foreclosed Properties

Support the Community Development Department program of code compliance on foreclosed and abandoned properties.

The Community Development Department tracks abandoned and foreclosed properties city-wide and works with the owners to ensure that those properties do not become public nuisances or hazards. Often the first indication that a property is neglected is that the landscape maintenance ceases and concerned neighbors contact the Fire Department. By working together, the two departments can quickly determine what the property status is, how to contact the person responsible for the property, and what immediate hazards need to be remedied, and can determine which department can best follow through to bring about compliance.

Implementation of this proposed action would involve the Fire Department and Community Development Departments continuing to exchange information and collaborate on abatement of fire-related hazards.

9.4.3. Public Education and Engagement

Studies of risk mitigation behavior show that residents' knowledge of the risk, acceptance of individual responsibility, and belief in their own efficacy to mitigate hazards are the main drivers to changing behavior. The goals of actions under this program are to enhance Monrovia residents' engagement in and understanding of wildfire risk and mitigation based on this CWPP. This program would apply City-wide. It builds upon previous and ongoing public education campaigns, including the educational portion of each meeting which was held during this CWPP process. Former and ongoing public education campaigns, including grant funding, are detailed in Section 9.3 above. Three (3) specific actions were proposed:

9.4.3.1. CWPP-Based Information Products

Develop and distribute public information products such as brochures, website, video and media content, based on key themes from this CWPP.

This CWPP was developed to provide interested readers with the opportunity to probe topics in depth and access authoritative and scholarly sources and to provide a sufficient level of detail needed to form the basis for important community choices. To provide broad appeal and accessibility to the information contained, a different kind of product or products is needed.

Implementation of this proposed action could be undertaken at various levels of effort, and could include different types of media, including brochures, flyers, articles, web content, video and live presentations. Distribution of products can be done via the City website, online and print news media, KGEM, direct mail, meetings of cooperating organizations (MOHPG, Monrovia Garden Club, etc.), tabling at existing events (such as the Friday Fair, Smart Gardening Workshops, Fire Service Day, etc.), and special workshops and events.

9.4.3.2. Sponsored Events

Seek funding or sponsorship for public events, workshops, training opportunities or neighborhood block parties to promote wildfire preparedness.

In addition to the existing public events that provide an outreach opportunity, targeted Fire Safety themed events can be most effective in reaching the desired audience. Associated costs may be partially offset by grant funding or sponsorship if obtainable. For example, under prior California Fire Safe Council grant funding, the Fire Department invited an expert on Building Sustainability to present a series of neighborhood workshops providing hands-on hazard

assessment practice to the participants. The success of such events depends on appealing to existing interests, and being able to compete for participants' time, and can be subject to unpredictable conditions, such as weather. Events do not need to be large in scope to be cost-effective, as long as the associated costs and effort are proportional.

Implementation of this proposed action would involve developing one or more proposals for public events and seeking sponsorship or grant funding to offset the costs.

9.4.3.3. KGEM

Partner with KGEM to promote firesafe messaging by means of new or existing video programming.

KGEM is Monrovia's community access television station and studio. Cable subscribers can tune in any time to scheduled programming, and selected content is available online via the KGEM website. Several CWPP public meetings have been videotaped and edited, but those shows are not currently readily available on the KGEM website. In addition, during several previous neighborhood workshops on Building Sustainability, KGEM videotaped, and the raw video footage is available in archives, awaiting editing into shows. Shows could be aired on KGEM, or made available on the KGEM or the City website.

Implementation of this proposed action could involve a range of tasks, including publicizing existing video content, editing existing footage into one or more shows, and proposing new shows.

9.4.4. Firewise Communities

The Firewise program is a national program with 950 currently-registered Firewise communities in the U.S. There are no Firewise communities within Monrovia. The closest Firewise community is Carbon Canyon, in the Chino Hills area. The national Firewise Communities program provides resources and incentives for grassroots neighborhood groups to collaboratively take responsibility for making their neighborhoods more fire safe. Thus, the program can overcome the main barriers to risk mitigation action - knowledge of risk, self-efficacy, locus of responsibility and lack of cooperation, in ways that actions by City government cannot achieve.

Firewise communities are typically the size of a homeowners' association. They are formed by groups of neighbors who share a common concern with fire hazard, who self-organize to attain and maintain certification from the national organization. The basis of the program is individual responsibility for taking action to mitigate risk from wildfire, principally by creating home and neighborhood environments that are resistant to wildfire. The advantages to the City are that neighbors will be effective at communicating Firewise messages, providing motivation and support for one another and cooperating to take risk mitigation actions, and will provide a model for visitors to the neighborhood. Firewise has a rich array of free information resources. A Firewise community must undertake at least one event per year and must expend at least \$2 per resident per year to maintain its status. The Firewise community receives recognition from the national program, and posts signage in the neighborhood. Becoming a Firewise Community would have inherent incentives for the members because it would facilitate cooperation and enhance safety, and it could save money due to pooling of resources and potentially by eligibility for grants.

Outreach to promote Firewise would be targeted principally for the fire zone, but could be aimed at Ember Zone residents as well. The establishment of one or more Firewise communities would not require sponsorship or approval by the MFD, however, there could be great benefit to overall Monrovia wildfire safety resulting from it. The local contact for the Firewise program is the California Firesafe Council.

The following three (3) specific actions were proposed:

9.4.4.1. Facilitate Grassroots Groups

Offer City technical or support services to facilitate the Firewise application process.

Although Firewise certification is a grassroots effort, there are some technical resources that are required for successful certification. The principal one of these is preparation of a community risk assessment, which requires a fire official, registered forester, or other subject-matter expert. MFD could provide this support.

Implementation of this proposed action would involve providing expert fire prevention advice to one or more groups of residents.

9.4.4.2. Publicize Firewise Program

Partner with California Fire Safe Council to publicize the Firewise program to Monrovia fire zone neighborhoods.

Because establishing a Firewise Community is a grassroots effort taken by a group of neighbors, the City cannot make it happen, only encourage and facilitate it. The initial effort must be to inform those fire zone residents who might be interested in organizing a group. One place to start would be with existing homeowner's associations. The local Firewise liaison is likely to have ideas about what has worked in the past, and willingness to provide materials and, possibly, hold meetings with interested groups. MFD advocacy of the program could help motivate residents to seriously consider the program.

Implementation of this proposed action would involve approaching the local Firewise Program liaison and homeowners associations in Monrovia's fire zone, and possible additional advocacy tasks.

9.4.4.3. Incentives for Firewise Communities

Consider offering incentives for Firewise certification or events.

The City could consider providing incentives to a Firewise Community organization. These incentives, if any, are yet to be determined based on feasibility and benefit to the City. The types of potential benefits to be researched could include use of City facilities, staff assistance, or waiver of certain permitting fees.

Implementation of this proposed action would involve researching potential incentives and determining their feasibility.

9.4.5. CERT Involvement

CERT is the Community Emergency Response Team. Monrovia's CERT comprises over 40 trained, committed and trusted community members who can be an effective force in spreading safety messaging. Monrovia's CERT volunteers are trained and equipped to fill critical roles for the Emergency Operations Center and to provide key support to Fire and Police officials. A part-time CERT Coordinator partners with a designated MFD official to administer the team. CERT volunteers have stepped up several times recently to collaborate on wildfire preparedness projects, such as Firewise Landscaping events, CWPP neighborhood meetings, and resident evacuation preparation.

The goal of actions under this program is to deepen the involvement of CERT with implementation of CWPP recommendations. This program builds on the current grant-funded Ready, Set, Go program, which is enabling staff and CERT volunteers to prepare, train and contribute to the ongoing evacuation planning.

Actions under this program apply City-wide. Three (3) specific actions were proposed:

9.4.5.1. In-House Training

Offer/facilitate training modules on wildfire protection to CERT volunteers.

Offering wildfire preparation training to CERT members would enhance the team's ability to provide a resource to the community. The Firewise Program, NFPA, and other sources offer free, high quality educational videos, online self-paced courses and printed materials on subjects such as Firewise Landscaping, Home Hardening, etc. These materials could be used privately by CERT volunteers, or MFD could facilitate one or more training opportunities for a group of CERT members, together with MFD staff, to view the videos, work through the online courses together, etc. The efficacy of the training would be significantly enhanced if it is made a part of a curriculum that would be outlined by MFD staff and the CERT Coordinator. This would enable each CERT member's wildfire preparedness training to be tracked.

Implementation of this proposed program would involve MFD staff and the CERT coordinator outlining the curriculum, assembling the materials, and facilitating one or more workshops for CERT participants.

9.4.5.2. Outside Training and Conferences

Apply for scholarship and grant funding to support outside training or conference attendance by CERT volunteers.

Enhancing opportunities for CERT members to network and learn from colleagues beyond the local team would be both a substantial step in volunteer staff development and a significant motivator for CERT members. Each year, there are several events within Los Angeles and vicinity that bring professionals in the field of WUI fire hazard and preparedness. Examples are the Southern California Regional Area Safety Taskforce (RAST) Fire Summit held each May in Diamond Bar, workshops offered by the California Fire Safe Council, certification classes offered by NFPA, and other events and training opportunities. Registration costs vary from free to several hundred dollars. Travel costs vary as well. Some organizations offer full or partial scholarships to volunteers for attendance, and grant funding also may be sought to cover travel and training costs.

Implementation of this proposed action would involve MFD or CERT personnel seeking out and publicizing relevant training opportunities, promoting and facilitating team member participation, and, possibly, applying for scholarships and grants.

9.4.5.3. CERT Coordinator

Provide office space for CERT Coordinator.

Monrovia's CERT Coordinator is an unpaid position, but is essential to the function of the team. The routine aspects of the position require at least 15 hours per week and involve almost daily interaction with MFD officials, training and event planning, and supervising the team's volunteers. During emergencies, the CERT Coordinator is a member of the EOC. These duties require substantial use of office equipment, filing space to maintain training, certification and performance files for each of the members of the team, and storage space for team supplies. Providing office space would substantially facilitate the CERT Coordinator's mission.

Implementation of this proposed action would require identifying a suitable available empty or shared desk, equipping it as needed, and providing the CERT Coordinator with a building access key card and a City email account.

9.4.6. Ready, Set, Go!

The Ready, Set, Go! (RSG) Program captures the essence of this CWPP's preparedness message for residents: be Ready by preparing your home and family, be Set by being aware when fire threatens, and then Go, evacuating early when a fire starts. The goal of actions under this program would be to promote and strengthen Monrovia's Ready, Set, Go Program. This program builds on the existing program implemented with the assistance of two grants from California Fire Safe Council. Under a former grant, we created and printed a 12-page magazine-style brochure and distributed copies to each home in the VHFHSZ. Under the current grant, we have promoted the program with public meetings, neighborhood outreach by CERT members, CERT training and evacuation planning. Actions under this program apply City-wide. Eight (8) specific actions were proposed under this program:

9.4.6.1. Evacuation FAQs

Develop a "FAQ on Evacuation" page on City website.

During emergencies public safety personnel do not have the luxury of answering all of residents' questions. In fact, personnel from many agencies outside of Monrovia may be involved in directing evacuations and responding to emergencies. For evacuations to run smoothly, public safety personnel need a high level of trust from the public. Public understanding of how evacuations are directed and how emergency operations are organized and carried out will help in building this trust. A simple Frequently Asked Questions page can go a long way toward this goal. The page would be posted on the City website, and could be printed and distributed with other relevant literature.

Implementation of this proposed action would involve developing and publishing a Frequently Asked Questions page regarding evacuations.

9.4.6.2. Pre-Fire Planning for Mountain Facilities

Prepare/update facility-specific pre-fire and evacuation plan for HWP and HRA and work with USFS and Boy Scouts to prepare similar plan for Trask..

Monrovia has a City-wide pre-fire and evacuation plan. Because of their geographic location, the facilities within the more mountainous areas would benefit by having their own specific pre-fire and evacuation plans to account for some of their unique conditions.

Implementation of this proposed action would involve the development of pre-fire and evacuation plans for the Hillside Wilderness Area, Canyon Park and Trask.

9.4.6.3. Operations 101

Add a public educational component "Operations 101" to raise awareness and understanding of emergency operations

"Operations 101" is a next step after preparing Evacuation FAQ's, described in Section 9.4.6.1. It would cover additional topics, such as how the EOC works, mutual aid agreements, etc. The format is yet to be determined – possible formats include a brief Powerpoint presentation for public outreach, an interview for radio, video or print media, or a school program.

Implementation of this proposed action would involve developing the presentation or arranging the interview, and presenting the material.

9.4.6.4. Evacuation Alerts

Develop public alert sign-up program for Monrovia residents.

The City has been working with providers to offer a public safety alert system that can utilize text, voicemail, email and the web to disseminate up to the minute information, such as evacuation alerts and emergency information, and that will also provide residents with links to further information about a given situation. Some residents already are registered and are receiving messages from Monrovia and affiliated safety agencies. However, the majority of Monrovia residents have not yet taken this step. Program components that may help encourage more sign-ups include the ability for City officials to quickly post relevant updated information online and link it to the alert system and well-trained “ambassadors” who can help residents sign up, especially for those residents who are not as comfortable with the technology, and outreach products that stress that sign-ups are free and can be cancelled or modified at any time.

Implementation of this proposed action would involve outreach to residents to help and encourage them to sign up for a public safety alert system.

9.4.6.5. CERT Evacuation Operations Training

Train and equip CERT volunteer staff for evacuation operations.

CERT is assigned specific roles during evacuations. A well-trained and equipped CERT can not only facilitate smooth evacuation operations, but also function as a liaison with residents and with emergency personnel unfamiliar with Monrovia.

Implementation of this proposed action would ensure that CERT training in evacuation procedures is ongoing.

9.4.6.6. Map Book

Maintain updated City grid detailed street maps.

CERT members use these detailed GIS-produced map books during routine patrols as well as emergencies, and they come in particularly useful when assisting emergency personnel unfamiliar with Monrovia. The maps are printed on paper in case of interrupted or spotty cell service, and for easier access at all times. Under current grant funding, CERT volunteers have been field-checking the maps for errors and missing data.

Implementation of this proposed action would involve continuing to provide map books to CERT volunteers and periodically correcting and updating them, using GIS.

9.4.6.7. Brochure Distribution

Continue distribution of Ready, Set, Go brochure.

Thanks to prior grant funding from the California Fire Safe Council, MFD created an appealing 12-page, magazine-style Ready, Set, Go! program brochure. We have a stock of 1,000 copies of the remaining after mailing out 1,500 copies to all residences in the VHFHSZ during 2012. The remaining number is ample for distribution at public events, public counters, and by request, but to do another mailing will require reprinting. That mailing could be targeted only to the VHFHSZ to replace lost or forgotten copies. Ideally, however, residents in the Ember Zone would be included, as the home hardening information is also highly relevant to them. The total number of homes in both the VHFHSZ and the Ember Zone is roughly 4,950. A mailing list for the Ember Zone has not yet been created, and would need to be created using GIS.

Implementation of this proposed action would involve creating a mailing list for the Ember Zone and printing and mailing out approximately 4,950 full-color brochures.

9.4.6.8. Linked Evacuation Information

Provide links to Ready, Set, Go information via the public safety alert system.

The most critical emergency information to provide to residents during an evacuation provides answers to questions such as where should I go? How do I know when I can go back home? Where can I take my pets? and similar questions. Providing one central information source would reduce the confusion that sometimes results from multiple, conflicting sources. This information should be up to date, accurate, online, and linked from the public safety alert system.

Implementation of this proposed action would involve ensuring that accurate, up to date emergency information is provided online and linked from the public safety alert system.

9.4.7. Emergency Access Routes

Life safety in case of wildfire and other emergencies requires ability for residents to evacuate readily at the same time as emergency equipment and personnel are entering. Much advance planning, as well as real-time traffic control, is involved in facilitating this process. It also depends on the condition of the streets and roads in the network. They must be in a good state of repair and clear, with adequate clearance under trees. Our emergency access network includes neighborhood streets, mountain roads, both paved and unpaved, and utility access roads. In cases where emergency access roads cross the critical habitat of endangered species, regulatory approval is required to meet Monrovia's legal and stewardship obligations.

This program includes elements of Public Education, Public Policy and Fuel Reduction and builds on the City's ongoing program of street, road and tree maintenance, including several prior and ongoing projects funded by the California Fire Safe Council.

The goal of actions under this program is to Maintain and improve emergency access and egress in the Wildland-Urban Interface.

Actions under this program apply City-wide. Four (4) specific actions were proposed:

9.4.7.1. Lower Clamshell Motorway

Develop a plan for maintenance and repair of the Lower Clamshell Motorway for emergency access and egress, which is protective of the endangered Braunton's Milkvetch.

The Lower Clamshell Motorway is an unpaved, gated mountain road that provides emergency egress to three (3) rural residences. Formerly, upkeep of the road was accomplished under contract with the Los Angeles County Fire Department, and involved the annual grading of the road. However, this practice was stopped in 2010 when the City became aware that the grading practice could be harmful to a stand of Braunton's Milkvetch, an endangered plant which is protected under the federal Endangered Species Act (ESA). The ESA is administered by the U. S. Fish and Wildlife Service (FWS). Several seasons of rains have caused the condition of the road to deteriorate, so that it is necessary to devise a new plan for repairing and maintaining the road that complies with our legal and environmental stewardship obligations. To achieve the latter, planning will be conducted in consultation with FWS.

Implementation of this proposed action would involve drawing up a plan for maintenance of the Lower Clamshell Motorway in consultation with the U.S. Fish and Wildlife Service to protect rare plants.

9.4.7.2. City Roads

Continue City road clearance program.

The Monrovia Public Works Department (PW) maintains Monrovia streets and street trees. Street tree maintenance includes regular pruning or trimming to maintain the required road clearance of 13' 6" to accommodate fire trucks. The street trees are on a grid trimming schedule to complete trimming of all City trees every few years. In addition, where public roads and utility access roads cross non-landscaped terrain of undetermined ownership, PW clears weeds and brush if they encroach along the roadside. These maintenance programs are critical to maintain emergency access in Monrovia. With grant funding in 2010-2012, MFD and PW were able to collaborate to perform this work.

Implementation of this proposed action would involve the Public Works department continuing its practice of maintaining street trees and road clearance.

9.4.7.3. Resident Access Clearance

Strengthen compliance with requirements for property owners' maintenance of 10' clearance on public and private roads.

Monrovia Municipal Code requires the property owner to clear hazardous vegetation to a width of 10 feet along the sides of all public and private roads. Full compliance with this requirement has not been achieved. Compliance may be hampered by residents' uncertainty regarding their responsibility and inspection personnel's inability to determine which resident is responsible, without a detailed parcel map to refer to, or where multiple parcels are affected.

Implementation of this proposed action would involve improving communication with residents regarding their responsibility and providing support to inspection personnel to more effectively enforce this requirement.

9.4.7.4. Street Tree Replacement

Continue street tree program to replace fire-hazardous high maintenance trees with safer trees.

The Monrovia Public Works Department (PW) maintains approximately 1,000 city trees in the VHFHSZ. Their maintenance of city trees is subject to the same fire safety requirements as residents. This includes removal of dead palm fronds, removal of dead or dying trees or portions of trees, providing adequate spacing between tree crowns, preventing crowding, providing adequate ground clearance and clearance above roads, infrastructure and houses, keeping tree trunks and limbs clean and well-spaced, and providing the tree's specific cultural requirements to stay in optimal health. In terms of fire safety, if a tree can be maintained in good health, at all times, up to these standards, it does not constitute a fire hazard. However, some tree species are difficult to maintain up to these standards, as discussed previously in Chapter 4. Where the tree's benefit is not sufficient to justify the cost of maintaining it up to safety standards, PW has undertaken a program to remove the tree and replace it with a tree that will provide greater benefits at less cost. With grant funding between 2010 and 2012, PW and MFD collaborated to remove many of these identified trees. PW has identified additional dead, dying or damaged trees as well as dozens of fan palms in the VHFHSZ that should be removed and replaced with more beneficial types.

Implementation of this proposed action would involve continuing the collaboration between MFD and PW to remove fire-hazardous street trees.

9.4.8. SAFE Landscaping/Urban Forestry

Following several housing booms in Southern California, suburban landscaping styles and materials have periodically been adapted from other climates and localities. As residents began to become aware of our region's wildfire hazards, some plants and practices have been introduced with the intention of reducing those hazards, some even being put forward as a panacea for wildfire and other hazards. Time and experience has shown many of these trends to be ineffective, and even detrimental to safety and the environment. However, outdated concepts in fire safe landscaping still hold sway. Fortunately, the state of the art continues to evolve to provide best practices, as promulgated by the University of California Cooperative Extension (UCCE) and related efforts.

The goal of actions under this program is to adapt to new and changing advice from experts in the field of SAFE (Sustainable and Fire Safe) Landscaping and to promote best management practices (BMPs) on residential properties and in the suburban landscape, including Urban Forestry. This program includes elements of Public Education, Public Policy and Fuel Reduction, and builds on a robust program of Firewise Landscaping public education and outreach, supported by former and current grants from the California Fire Safe Council beginning in 2010.

Actions under this program apply in the Fire Zone and Ember Zone. Eleven (11) specific actions were proposed:

9.4.8.1. Power Tools

Use policy changes, such as designation of an earlier brush compliance deadline, or public education/outreach to prevent property owners from using powered landscape tools in fire hazardous weather conditions.

The hazards associated with use of power tools for brush clearance were discussed under Section 9.4.2.1 above. Modifications in the City's defensible space enforcement program could assist in motivating residents to reduce their use of power tools during fire danger conditions.

Implementation of this proposed action would involve evaluating the defensible space enforcement program for potential changes in schedule, and conducting public outreach.

9.4.8.2. City Tree Removal

Continue to support Public Works' program to replace fire-hazardous and problem City trees.

The city's street tree removal program was discussed above in Section 9.4.7.3. To best facilitate this program, the City may seek grant funding for tree removal costs.

Implementation of this proposed action would involve researching and applying for grants to help fund the removal of fire-hazardous city trees.

9.4.8.3. Restore Weed-Infested Private Property

Encourage property owners to reverse the spread of weedy annual plants in favor of more firesafe landscaping and/or restored native vegetation.

In some residential landscapes, past fire clearance efforts have failed to leave sufficient natural vegetation, or replace removed vegetation, resulting in takeover by weedy annual plants, such as cheatgrass, mustards and thistles. These plants germinate, mature and die off early in the year, extending the fire season. No amount of irrigation, which is sometimes attempted by residents, will green them up, as annual growth and death is their pattern. Furthermore, these plants ignite easily and lack deep roots to help stabilize hillsides. Education and other means of encouragement would benefit Monrovia's fire safety by encouraging residents to reverse this trend.

Implementation of this proposed action would involve public outreach regarding BMPs, and offering consultation assistance to restore weed-infested areas.

9.4.8.4. Landscape Worker Training

Consider partnering with the Public Works Department to undertake a training program for landscape workers that would promote SAFE landscaping BMPs, firesafe equipment practices and worker safety.

Many residents look to their landscape company as the authority on plant choice for their yard and trust them to know how to keep their plants healthy. However, landscape workers vary tremendously in knowledge and experience. Improperly trained workers may use improper techniques pruning valuable plants such as oaks, that may cause long term damage, not obvious for years. Landscape workers could be ambassadors for SAFE Landscaping. Few have the time for training, so the training offered would need to be around their busy schedule, and would need to offer additional incentives. One incentive could be that the City track their training and provide a certificate. The City would need to promote the value of the certificate so that residents preferred workers who had obtained it.

Implementation of this proposed action would involve developing a curriculum and a program of incentives and presenting bilingual training workshops.

9.4.8.5. Resident Hazardous Tree Replacement

Seek funding, and consider additional incentives, to assist residents to remove fire-hazardous trees and choose safer ones from plant palette.

Proper maintenance of landscape trees is often the biggest ticket item facing residents when complying with Monrovia's defensible space requirements. This is often caused by the tree being unsuited to the current use of the site – typically, because the tree is too big or grows too fast, or is not well-adapted to the local environment, or the resident is unable to maintain it safely, such as with the need to annually trim dead fronds from 100-foot tall palm trees. With prior grant funding, MFD assisted residents in the removal of over 100 fire-hazardous trees. A current grant-funded pilot project is underway to partially support tree removal by means of partial rebates. Equally important to the removal of hazardous trees is their replacement with better suited trees. For that reason, this CWPP includes a plant palette.

Implementation of this proposed action would involve seeking and applying for grants to assist residents in replacing fire-hazardous trees with better choices.

9.4.8.6. Hillside Development Plant Palette

Update and periodically review the Monrovia hillside development plant palette and the restricted plant list.

Monrovia's Hillside Development Standards for new construction includes a plant palette. Based on the recommendations in this CWPP, that palette could be substantially expanded. At the same time, fire scientists have learned that some popular landscape plants have previously unrecognized undesirable characteristics, and these should be removed from the palette.

Implementation of this proposed action would involve revising the Hillside Development Standards plant palette.

9.4.8.7. Partner Programs

Promote partner programs, such as WaterWise, Smart Gardening, Don't Plant a Pest, Plant Smart, Master Gardeners, etc.

The SAFE Landscaping BMPs in this CWPP overlap the programs of a number of other non-profit organizations, such as LA County's Smart Gardening program, the Invasive Plant Council's Don't Plant a Pest program, etc. Promotion of these programs can advance Monrovia's CWPP agenda.

Implementation of this proposed action would involve advocating for resident and volunteer participation in relevant partner programs via the City website and other means.

9.4.8.8. Club and Nursery Outreach

Reach out to Monrovia Garden Club and local nurseries.

The Monrovia Garden Club has shown interest in drought tolerant gardening, which is one of the BMPs in this CWPP. This club would be a very valuable ally in promotion of other BMPs, such as avoidance of invasive species. The club might have an interest in receiving a talk or presentation from the Fire Department regarding landscape BMPs.

Local nurseries stock some plants that are invasive or fire hazardous. We would like to urge them to stop doing that, or to flag them as not appropriate for the Fire Zone. However, we may be more successful helping them flag plants that are most beneficial in the Fire Zone.

Implementation of this proposed action would involve offering to give a talk to the Monrovia Garden Club and offering to local nurseries give a MFD stamp of approval to certain plants.

9.4.8.9. Demonstration Projects

Consider seeking funding for high-impact projects, such as development of a demonstration firesafe and WaterWise landscape and/or establishment of a Monrovia native plant nursery.

Demonstration projects, such as model firesafe gardens, can have a high impact on motivating action and change because it enables people to visualize the result that they might get. A Monrovia native plant nursery could provide nursery stock for SAFE Landscaping public outreach, and could provide materials for restoration projects.

Implementation of this proposed action would involve seeking grant opportunities and writing one or more proposals.

9.4.8.10. Waste Reduction

Collaborate with Public Works Department to reduce impact of green waste stream resulting from hillside defensible space yardwork.

Brush clearance generates green waste. Over the last several years, we have been advocating for modified landscape practices to reduce this green waste stream without compromising safety. The key is to plant slow-growing, low maintenance plants and discourage weeds from growing rather than having to cut the same ones year to year. Additional changes are spreading out yard work throughout the year so that composting and use of the green waste bins is more feasible. Also, the elimination of hard-to-compost plants, such as palms, helps. These changes are in line with PW's Smart Gardening program and their efforts to reduce Monrovia's waste stream.

Implementation of this proposed action would involve partnering with Public Works for their Smart Gardening and similar events.

9.4.8.11. Water Conservation

Collaborate with Public Works Department to encourage conservation of landscape water by employing SAFE landscape BMPs.

A SAFE landscape requires healthy plants that receive the amount of water that they need. This does not mean that the need to be watered a lot, and, in fact, a SAFE garden can be a completely drought tolerant one that is not irrigated at all. This is an important message to promote in public education campaigns, and with PW's Smart Gardening program and their efforts to reduce Monrovia's waste stream.

Implementation of this proposed action would involve partnering with Public Works for their Smart Gardening and similar events.

9.4.9. Vegetation Modification on Public Land

Previous land uses and brush clearance practices have converted vegetation on portions of City land to highly combustible weedy annuals or high fuel volume invasive plants, resulting in degraded habitat and high annual maintenance costs. Where possible, halting or reversing this trend via restoration or application of BMPs will reduce maintenance costs and enhance the land.

The goal of actions under this program is to continue to ensure adequate road clearances and defensible space buffers on City land, while seeking to reduce maintenance costs and optimize community benefits of the land. This program implements related portions of the RMP and builds on a work done with grant support from the California Fire Safe Council and substantial investment of staff and volunteer time from the Monrovia Community Services Department doing fuel reduction and invasive species eradication projects.

Actions under this program are Fuel Reduction projects and they apply in the Fire Zone to lands that are part of the Hillside Wilderness Preserve. Three (3) specific actions were proposed:

9.4.9.1. Fire Ecology Impacts

Assess potential changes to fire ecology due to invasive plants; develop vegetation modification or restoration plans consistent with RMP and BMPs.

It is not feasible to permanently eradicate all of the potentially fire-hazardous invasive plants within the HWP – some will require regular control indefinitely. But for those that are believed to have the greatest impact on fire regimes, it would be most cost-effective to eradicate them.

Implementation of this proposed action would involve identifying threats to fire regimes from invasive plants, prioritizing them, and developing plans to eradicate the greatest threats.

9.4.9.2. Vegetation Management Plans

Prepare site-specific vegetation modification/management plans for those areas within defensible space buffers or roadside clearance corridors overlapping HWP parcels. Seek voluntary cooperation from property owners to follow these plans and re-evaluate the program periodically.

Staff has noted that residents and City contractors are having to cut the same weeds year after year on about 60 acres of HWP land adjoining residential neighborhoods, and along roadsides. More cost-effective, as well as more beneficial to visitors and the environment, would be a landscape that is lower maintenance but at least as firesafe as a recently-weedwacked field. We would consider different restoration goals for these areas and evaluate their feasibility. As the responsibility for maintenance of defensible space in the areas impacting homes is shared between the resident and the City, we would have the alternative of taking care of the area in order to work toward the restoration goal, or of working with the resident to modify the area. The scope of this proposed action will vary, and possibly become reduced, should the City modify the residential defensible space zone limits, as discussed in 9.4.2.2.

Implementation of this proposed action would involve restoration planning for City-owned areas bordering homes and roads.

9.4.9.3. Weed Control Crew

Work with city staff, volunteers and outside agencies to control weeds.

Restoration ecologists find that persistent removal of weeds other invasive plants eventually results in the area being re-colonized by beneficial native plants, whether planting is done or not. City staff, volunteers and several outside volunteer organizations have done superb weed control work in Monrovia Canyon Park in the past, and can be mobilized to perform vital weed control work in the HWP.

Implementation of this proposed action would involve mobilizing crews to pull weeds and remove invasive plants in degraded areas of the HWP where the weeds are presenting a fire hazard.

9.4.10. Visitor Management on Public Land

While the majority of wildfires are started by equipment use, vehicles or powerlines, several damaging recent fires have been started by illegal campfires during windy conditions.

The goal of this program is to maintain a patrol presence on public lands within the fire zone, especially during windy conditions. This program builds on the existing daily patrol procedures of the Canyon Park Rangers and the special red flag patrols done by CERT volunteers.

Actions under this program apply in the Fire Zone. Two (2) specific actions were proposed:

9.4.10.1. Campfires

Continue to enforce no campfires rule in City parkland and trail corridors.

Signage at all the entry points to City parkland and trail corridors indicate that open burning is not allowed. Park Rangers routinely make sure this rule is obeyed during their patrols.

Implementation of this proposed action would involve continuing current patrol and enforcement procedures.

9.4.10.2. Patrols

Continue to partner with CERT to provide additional patrols during dry, windy conditions.

The Monrovia Fire Chief determines “red flag” days for the local area. These are typically when the local weather forecast is for dry, windy conditions. On red flag days, CERT members are dispatched in Fire Department vehicles to patrol hillside areas. This patrol is also ordered during July 4th weekend, to make sure that Monrovia’s ban on fireworks is obeyed.

Implementation of this proposed action would involve continuing current “red flag” CERT patrol procedures.

9.4.11. Wildland-Urban Interface Planning

Where homes in the WUI are built close to their property line, the resident may be required to manage vegetation on the neighboring property to comply with defensible space requirements. This may conflict with the neighbor's preferred management of that land, particularly when the encroachment is on public land intended for open space and wildlife habitat, which often would be more beneficial if not cleared or modified. MMC 8.14 requires defensible space around a home, which can comprise several acres of land.

The goal of the action under this program is to make providing for defensible space a required part of the design process for new developments.

This program builds on Monrovia’s Hillside Development Standards. One specific action was proposed:

9.4.11.1. Hillside Development Set-Back Requirement

Consider modifications to hillside development standards to strengthen slope and property-line set backs to accommodate defensible space, and encourage "hardened home" construction.

To accommodate the required amount of defensible space around a home, consider modifications to the Hillside Development Standards that would require homes to be set back from the property line sufficiently to accommodate this defensible space. Similarly, residents find it not feasible to clear and maintain safe vegetation on steep hillsides, and are not required to do so on slopes greater than 70% due to worker safety concerns. Consider requiring an adequate set-back from the top or bottom of a steep slope to mitigate the lack of vegetation management on the slope. Consider waiving some of these enhanced set-back requirements for homes constructed to a level of fire resistance exceeding requirements.

Implementation of this proposed action would involve researching potential modifications to the Monrovia Building Code for homes in the WUI.

9.4.12. Post-Fire Planning

Most experts agree that southern California communities should expect to experience wildfire, although no one can say how soon it will occur.

The goal of the actions under this program is to plan for short- and long-term stabilization and rehabilitation of burned areas in Monrovia. Five (5) specific actions were proposed:

9.4.12.1. Weed Infestations in Burn Areas

Develop long term program for monitoring of non native species in post fire areas; evaluate potential impacts to fire regime.

After an area has burned it is highly vulnerable to infestation by non-native plants. Expansion of the range of some of the non-native plants found in the Monrovia foothills would increase fire hazard. Post-fire activities should include regular monitoring for non-native species and, if they are determined to be infesting the area, an evaluation of their impact on the fire regime.

Implementation of this proposed action would involve establishing a policy that, after a brush fire, arrangements are made to periodically monitor the burned area for infestation by non-native plants.

9.4.12.2. Burn Area Access Control

Collaborate with Fire/Police/Community Services in restricting and monitoring access to post fire areas as dictated by public safety and resource protection concerns.

After an area has burned, it may become more susceptible to earth movement, which could endanger persons in the area. Other potential hazards are smoldering roots, weak tree limbs, unstable rocks, etc. Furthermore, the soil is very vulnerable to compaction and to damage of its structure if people disturb it. Finally, entry of the area by people is likely to introduce weed seeds, where the soil is bare. After an area has burned, it is generally best to leave it closed off to visitors for some time. Safety officials together with staff responsible for environmental oversight should make the determination of when an area can be reopened for visitors.

Implementation of this proposed action would involve establishing a procedure for restricting and monitoring access to burned areas.

9.4.12.3. Slope Stabilization

Review current literature on best practices for post-fire slope stabilization and protection and incorporate findings into next LHMP update or addendum.

After a hilly area has burned, the potential for erosion and earth movement is greater, and is an urgent concern of residents in the area that could be affected by mudflows. Various methods have been used to protect areas at risk from mudflows. Some of these methods may be ineffective or inappropriate for Monrovia hillsides.

Implementation of this proposed action would involve doing research and preparing a report on slope stabilization best practices.

9.4.12.4. Seed Bank

Consider partnering with Watershed Council to collect and store locally indigenous seed to provide for vegetation restoration programs in the event of fire.

The community often expresses a wish that a burned area be re-seeded. This procedure may be feasible and cost-effective in certain circumstances, however, re-seeding with introduced plant species is usually detrimental. Providing a bank of indigenous seeds for various areas of Monrovia's open space could be beneficial. In addition,

such a seed bank would be useful for restoration projects in areas not burned. The Council for Watershed Health is engaged in a project to collect and store native seeds from the area.

Implementation of this proposed action would involve determining seed collection protocols and securing a seed storage facility, with the assistance of the Watershed Council.

9.4.12.5. Sensitive Habitat

Identify areas of environmentally sensitive habitat that could be affected by wildfire, either adversely or beneficially, and examine measures to prevent damage, as an update or addendum to RMP.

The RMP identifies environmentally sensitive plants and animals and their habitat. Management of those areas could be improved by developing an understanding of how the sensitive species or area would be affected if the area were involved in a fire. This understanding would assist in wildfire preparation and in managing the area post-fire, were it to burn.

Implementation of this proposed action would involve doing research and preparing a report on the expected response to fire of certain environmentally-sensitive areas of the HWP.

9.4.13. Prioritized Fuel Reduction

An essential element of a CWPP under the Healthy Forests Restoration Act is to identify and prioritize areas for hazardous fuel reduction treatments and recommend the types and methods of treatment that will protect at-risk communities and essential infrastructure. This CWPP identifies fuel reduction treatments that are recommended within the defensible space zone of homes, roads and other infrastructure.

Fuel reduction treatments need to begin within the Home Ignition Zone (see Chapter 5) of at-risk properties and critical infrastructure, including emergency access routes. The combination of home construction modifications with effective defensible space is one of the best-known strategies to protect communities from wildfire. This CWPP does not proposed strategic landscape-level fuel treatments, which are generally ineffective in chaparral environments, although it does propose weed control in natural areas that have undergone disturbance, such as from fire, fire suppression or prevention efforts, or other man-made disturbances.

The following list (Table 9-3) includes the fuel-reduction projects that were prioritized for implementation. Projects were prioritized based on protection of maximum number of homes, critical infrastructure and recreation facilities. Figures 9-1 and 9-2 show the areal extent of these proposed projects. Figure 9-1 depicts the area where we propose considering fuel reduction projects for emergency access routes. Critical endangered plant habitat area along the Lower Clamshell Motorway is also indicated in this figure. Figure 9-2 depicts the area where public land overlaps the defensible space zones of homes and structures. The pink “bubbles” indicate a 200-foot radius around each home in which Monrovia residents are required by municipal code to provide defensible space.

Table 9-3. Proposed Fuel Reduction Projects

Value(s) at Risk	Project	Treatment goal*	Acres (Approx.)	Treatment Method	Agency/Landowner	Priority	Time Table
Lower Clamshell Motorway/ Braunton's Milkvetch Critical Habitat	Repair and Maintain Lower Clamshell Motorway pending U.S. F&WS approved plan	To repair current degraded condition, and as necessary to maintain road, grade 3 - mile long fire road. Requires U.S. F&WS approval due to critical habitat	5 acres	Mechanical: Biomass Removal, Hand pile; Machine pile.	City of Monrovia; consultation with U.S. F&WS	I	2014-15
Access Roads and Neighborhood Streets	City Road Clearance	Clear 3 miles of roadside of encroaching weeds	3 miles; 8 acres	Mechanical: Biomass Removal, Mowing, Thinning, Chipping	City of Monrovia	I	Annually ; ongoing
Access Roads and Neighborhood Streets	City Road Clearance – Street Tree Trimming	As needed for emergency vehicle access: Trim 1,000 City-owned street trees (as needed) on 14 miles of fire zone streets.	14 miles; 35 acres	Mechanical: Biomass Removal, Thinning, Chipping	City of Monrovia	I	As needed; ongoing
Access Roads, Neighborhood Streets	Street Tree Replacement	Remove identified fire-hazardous street trees and replace with safer trees along emergency access routes	60 trees; 15 acres	Mechanical: Tree felling and removal. Biological: replanting with beneficial species	City of Monrovia and US Forest Service	I	Ongoing
WUI Homes and Infrastructure adjacent to Hillside Wilderness Preserve	Manage Defensible Space Overlapping Public Lands	Remove annual weeds and other invasive plants and passively restore area to discourage weed growth	14 to 58 acres (100' to 200' clearance)	Mechanical: Biomass Removal, Mowing, hand pile, lop and scatter, thinning, chipping. Potentially – chemical per approved DPR procedure	City of Monrovia	I	Ongoing
Natural Ecosystems in areas impacted by Madison Fire	Post-Fire Weed Control – Madison Fire	As necessary, remove weed infestations encroaching on area burned in Madison Fire	129 acres	Mechanical: hand pile, lop and scatter, thinning – hand tools only; use protocols to avoid site contamination. Potentially – chemical per approved DPR procedure	City of Monrovia and private landowners	I	

Value(s) at Risk	Project	Treatment goal	Acres (Approx.)	Treatment Method*	Agency/ Landowner	Priority	Time Table
WUI Homes and Infrastructure adjacent to public lands	City Tree Removal	Remove identified fire-hazardous trees and replace with safer trees on public lands adjacent to homes and infrastructure	12 trees; 3 acres	Mechanical: Tree felling and removal. Biological: replanting with beneficial species	City of Monrovia and Los Angeles County	II	Ongoing
Residential Properties/Homes	Resident Hazardous Tree Replacement	Remove identified privately owned fire-hazardous trees and replace with safer trees	40 trees; 10 acres	Mechanical: Tree felling and removal. Biological: replanting with beneficial species	private	II	
Natural Ecosystems and Sensitive Habitat in Hillside Wilderness Preserve	Weed control	Remove weeds and other invasive plants that alter the fire ecology of areas of the Preserve	158 acres	Mechanical: Biomass Removal, Mowing, hand pile, lop and scatter, thinning, chipping. use protocols to avoid site contamination Potentially – chemical per approved DPR procedure	City of Monrovia	II	

*Proposed methods of treatment are detailed in Chapter 4.

Figure 9-1. Emergency Access Routes

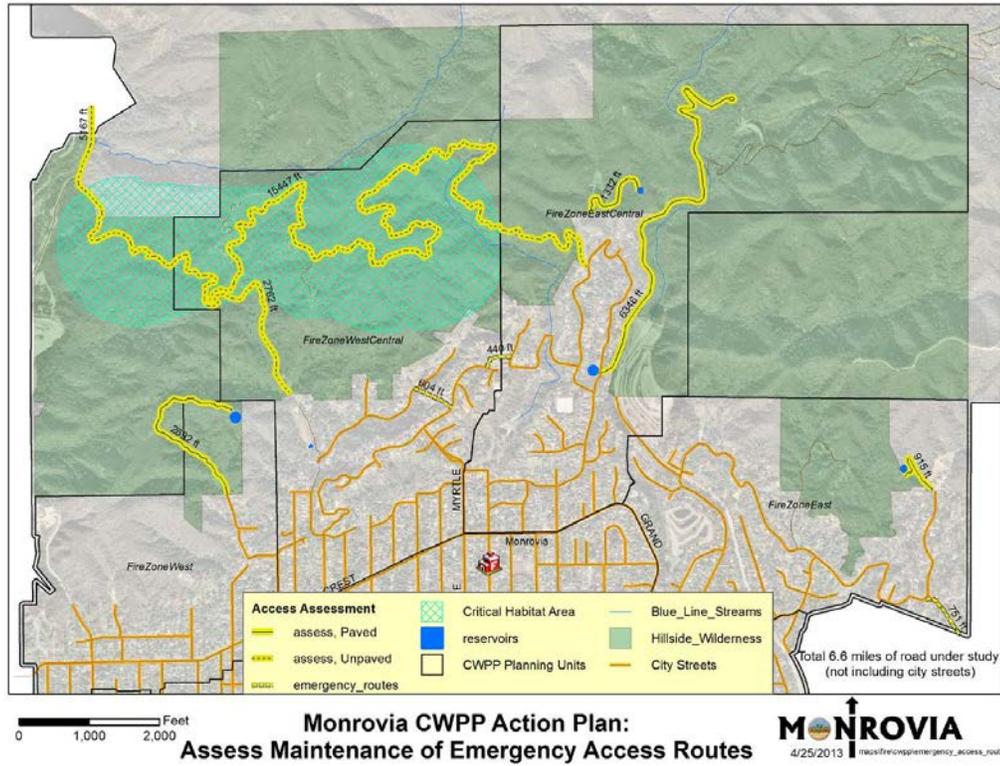
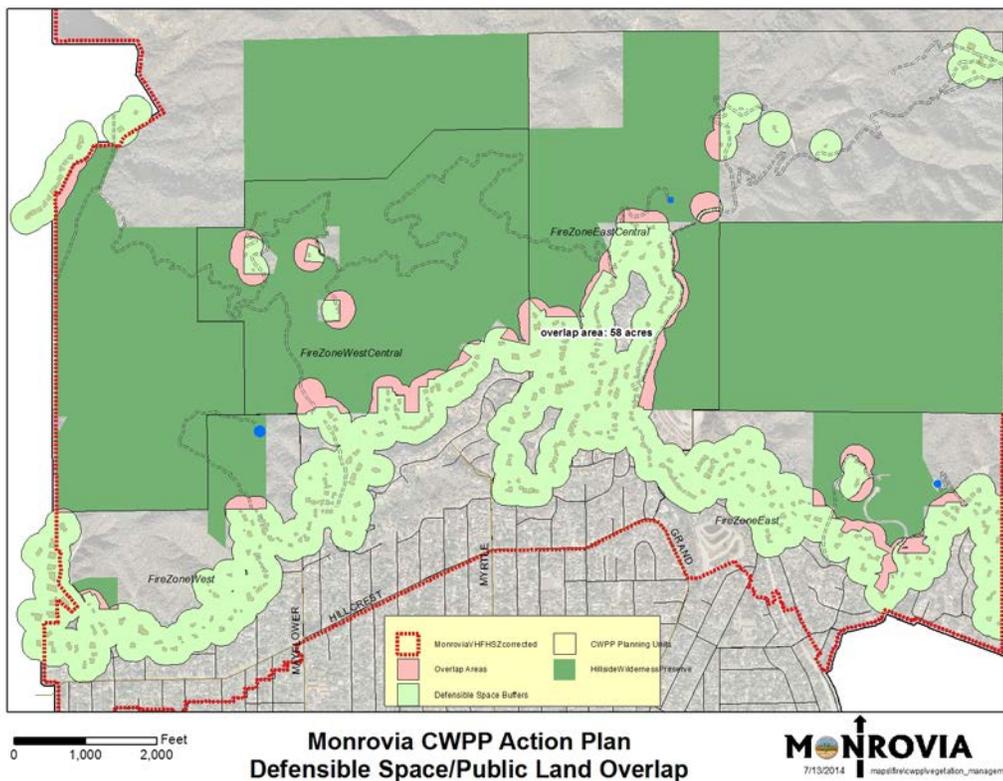


Figure 9-2. Defensible Space/ Public Land Overlap Zones



9.5. Designation of Wildland-Urban Interface Areas

The wildland-urban interface (WUI) is a general term describing the area where homes and wildland meet. It also has a federal definition as the “line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel as defined in the Federal Register.”³ It is within the WUI that specific federal management actions take place in order to reduce fuel risks based on guidelines established by the Healthy Forest Restoration Act (HFRA). According to HFRA, “the HFRA provides administrative procedures for hazardous-fuel-reduction projects on [USFS] and BLM lands in the WUIs of at-risk communities. The act encourages the development of Community Wildfire Protection Plans under which communities will designate their WUIs, where HFRA projects may take place.”⁴ At the same time, federal agencies are charged with developing WUI designations for the properties they manage.

As per HFRA, this Plan proposes WUI designation for Monrovia. This designation was developed based on CAL FIRE’s designation of Fire Hazard Severity Zones, as discussed in Chapter 1, which takes account of issues of topography, landscape characteristics, access, fire threat designation, fire weather, etc. Projects in these designated areas should be prioritized for funding and implementation under the National Fire Plan. The following map (Figure 9-3) outlines the proposed WUI designation for Monrovia

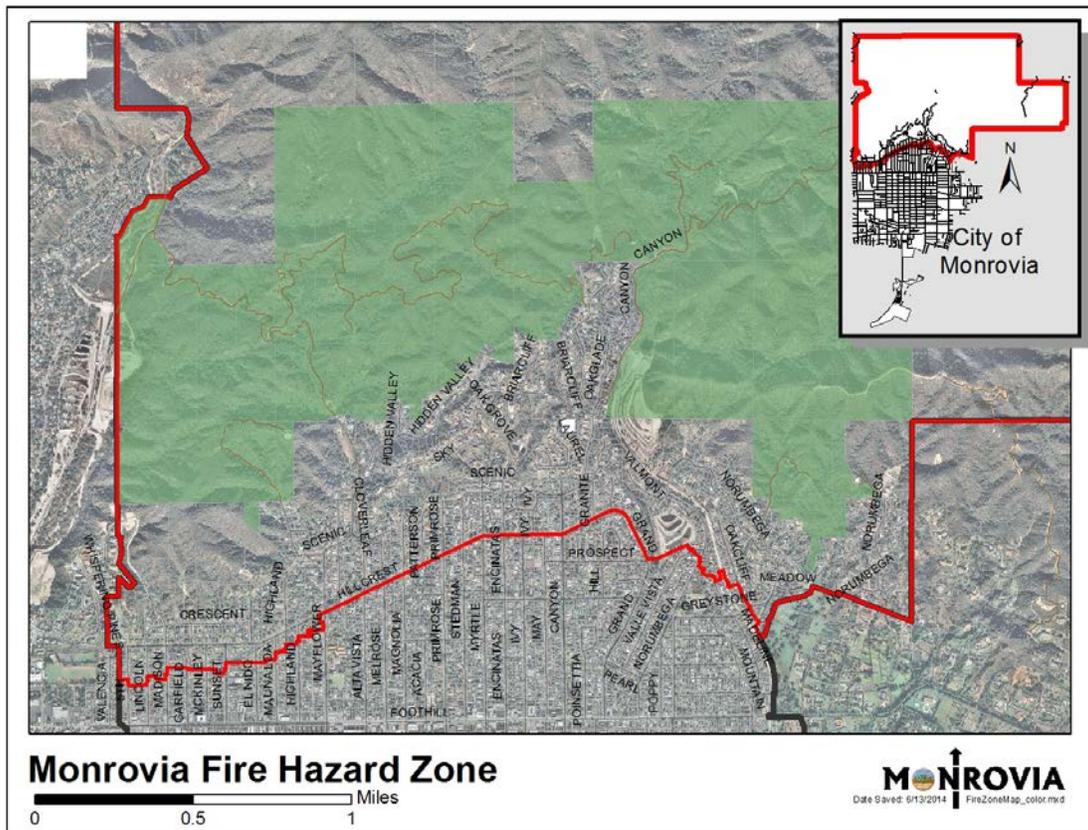


Figure 9-3. Monrovia Wildland-Urban Interface Designation Map

³ Federal Register (January 4, 2001), Vol. 66, No. 3, pp. 751–754, “Implementation Direction for Identifying and Prioritizing Hazardous Fuel Reduction in Wildland-Urban Interface/Intermix,” Region 5.

⁴ Healthy Forests Initiative and Healthy Forests Restoration Act (February 2004). Interim Field Guide, Title I, Wildland-Urban Interfaces Within or Adjacent to At-Risk Communities, FS-799.

9.6. Action Plan Summary

The proposed actions described in detail were prioritized with the input of members of the Advisory Group. The actions have been divided into two priorities – Tier I, which are the highest priority, and Tier II, which should be considered generally after implementation of corresponding Tier I actions. Implementation of these actions will follow a budgetary process where the costs are identified and presented to Council to determine availability of funding.

The following is the Wildfire Action Plan for Monrovia as identified through this fire planning process.

Program Area	Program Description	Task	Priority	Description
Building Sustainability -- Home Ignition Zone (HIZ)	<p>Encourage homeowners to mitigate the risk of wildfire losses by building, retrofitting and maintaining roofs, eaves, vent openings, windows and decks/attachments up to fire safe standards promulgated by NFPA and CA WUI code.</p> <p>RATIONALE: Recent fire science has shown that the most important step to prevent loss is "hardening" of the home, particularly against ember attack.</p>	Home Ignition Zone Education Campaign	I	Implement public information/ engagement campaign focussing on key elements of hardened homes, as described in this CWPP. (Cross-reference with Fire Wise Community and Public Engagement programs).
		Wood Shake Roofs	I	Reach out to owners of remaining wood shake roofs in FZ and EZ to upgrade to fire rated roofs.
		Landmarked Properties	II	Provide advice or other assistance to owners of landmarked properties regarding historical restoration alternatives for fire safety
		Hardened Home Recognition	II	Consider City designation of "hardened home" recognition for homes built or retrofitted to high wildfire safety standard.
Defensible Space Code and Process	<p>Determine best practices for Monrovia's defensible space with potential code amendments.</p> <p>RATIONALE: New Federal and State guidelines, developments in fire science, and the trend toward longer and longer fire seasons, point to a need to regularly examine our defensible space program</p>	Adapting to Climate Change	I	Due to changing climate, consider modifications to the program that will motivate residents to complete clearance before the end of winter and maintain it throughout the dry season.
		Defensible Space Zones	I	Consider subdividing defensible space zones per recommendations of the Institute for Business and Home Safety, to provide for stricter requirements 0-5' from home and ease or eliminate requirements beyond 100' distance, based on recent fire science findings.
		Man-Made Fuels	I	Consider expanding definition of fuels to include man-made fuels as well as vegetative fuels - re-title chapter accordingly.
		Vegetation Modification Standards	I	Review code for any conflicts with landscaping BMPs as presented in this CWPP.
		Vacant Lots	I	Continue to enforce brush clearance requirements on vacant lots.
		Neighboring Jurisdictions	II	Continue relationships and maintain contacts with officials in bordering jurisdictions (Arcadia, Bradbury, LA County, USFS) and assist residents where necessary to help them comply with defensible space requirements in overlapping areas.
		Updated Orientation	II	Update training of inspection staff as defensible space policy or practice evolve.
		Foreclosed Properties	II	Support Community Development Department program of code compliance on foreclosed and abandoned properties.

Program Area	Program Description	Task	Priority	Description
Public Engagement and Education	<p>Enhance Monrovia residents' engagement and understanding of wildfire risk and mitigation based on this CWPP.</p> <p>RATIONALE: Studies of risk mitigation behavior show that residents' knowledge of the risk, acceptance of individual responsibility, and belief in their own efficacy to mitigate hazards are the main drivers to changing behavior.</p>	CWPP-Based Information Products	I	Develop and distribute public information products such as brochures, website, video and media content, based on key themes from this CWPP.
		Sponsored Events	II	Seek funding or sponsorship for public events, workshops, training opportunities or neighborhood block parties to promote wildfire preparedness.
		KGEM	II	Partner with KGEM to promote firesafe messaging by means of new or existing video programming.
Firewise Communities (FW)	<p>Promote the establishment of Firewise Communities within Monrovia neighborhoods in the fire zone:</p> <p>RATIONALE: The national Firewise Communities program provides resources and incentives for grassroots neighborhood groups to collaboratively take responsibility for making their neighborhoods more fire safe. Thus, the program can overcome the main barriers to risk</p>	Facilitate Grassroots Groups	I	Offer City technical or support services to facilitate FW application process.
		Publicize Firewise	I	Partner with California Fire Safe Council to publicize program to Monrovia fire zone neighborhoods.
		Incentives for Firewise Communities	II	Consider offering incentives for FW certification or events.
CERT Involvement	<p>Deepen involvement of CERT with implementation of CWPP recommendations</p> <p>RATIONALE: Monrovia's CERT comprises over 40 trained, committed and trusted community members who can be an effective force in spreading safety messaging.</p>	In-House Training	I	Offer/facilitate training modules on wildfire protection to CERT volunteers
		Outside Training and Conferences	I	Apply for scholarship and grant funding to support outside training or conference attendance by CERT volunteers
		CERT Coordinator	II	Provide office space for CERT coordinator.

Program Area	Program Description	Task	Priority	Description
Ready, Set, Go! (RSG!)	<p>Promote and strengthen Ready, Set, Go Program.</p> <p>RATIONALE: The RSG program has been adopted by the Monrovia Fire Department to support our evacuation and preparation policies.</p>	Evacuation FAQs	I	Develop a "FAQ on Evacuation" page on City website
		Pre-Fire Planning for Mountain Facilities	I	Prepare/update facility-specific pre-fire and evacuation plan for HWP and HRA and work with USFS and Boy Scouts to prepare similar plan for Trask.
		Operations 101	I	Add a public educational component "Operations 101" to raise awareness and understanding of emergency operations, such as how the EOC works, mutual aid agreements, etc.
		Evacuation Alerts	I	Develop public alert sign-up program for Monrovia residents.
		CERT Evacuation Operations Training	I	Maintain training of CERT volunteer staff in evacuation operations
		Map Book	I	Maintain updated City grid detailed street maps
		Brochure Distribution	II	Continue distribution of Ready, Set, Go brochure via mail and public events.
		Linked Evacuation Information	II	Provide links to Ready, Set, Go information via public safety alert system.
Emergency Access Routes	<p>Maintain and improve emergency access and egress.</p> <p>RATIONALE: Life safety requires ability to evacuate readily; where emergency access crosses critical habitat of endangered species, regulatory approval is required to meet stewardship obligation.</p>	Lower Clamshell Motorway	I	Develop a plan for repair and maintenance of the Lower Clamshell Motorway for emergency access and egress, in consultation with Fish and Wildlife authorities, to assure environmental compliance regarding the endangered Braunton's Milkvetch.
		City Roads	I	Continue City road clearance program.
		Resident Access Clearance	I	Strengthen compliance with requirements for property owners' maintenance of 10' set-back on public and private roads
		Street Tree Replacement	I	Continue street tree program to replace fire-hazardous high maintenance trees with safer trees.

Program Area	Program Description	Task	Priority	Description
SAFE Landscape BMPs/Urban Forestry	<p>Adapt to new and changing advice from experts in field of SAFE (Sustainable and Fire Safe) Landscaping. Promote best management practices on residential properties and in the urban landscape</p> <p>RATIONALE: Outdated concepts in fire safe landscaping still hold sway, but the state of the art continues to evolve to provide best practices, as promulgated by the University of California Cooperative Extension and related programs.</p>	Power Tools	I	Use policy changes, such as designation of an earlier brush compliance deadline, or public education/outreach to prevent property owners from using powered landscape tools in fire hazardous weather conditions.
		City Tree Removal	I	Continue to support Public Works' program to replace fire-hazardous and problem City trees. Seek grant funding for tree removal costs.
		Restore Weed-Infested Property	I	Encourage property owners to reverse spread of weedy annual plants in favor of more firesafe landscaping and/or restored native vegetation.
		Landscape Worker Training	I	Consider partnering with the Public Works Department to undertake a training program for landscape workers that would promote SAFE landscaping BMPs, firesafe equipment practices and worker safety.
		Resident Hazardous Tree Replacement	II	Seek funding, and consider additional incentives, to assist residents to remove fire-hazardous trees and choose safer ones from plant palette.
		Hillside Development Plant Palette	II	Update and periodically review the Monrovia hillside development plant palette and the restricted plant list.
		Partner Programs	II	Promote partner programs, such as WaterWise, Smart Gardening, Don't Plant a Pest, Plant Smart, Master Gardeners, etc.
		Club and Nursery Outreach	II	Reach out to Monrovia Garden Club and local nurseries.
		Demonstration Projects	II	Consider seeking funding for high-impact projects, such as development of a demonstration firesafe and WaterWise landscape and/or establishment of a Monrovia native plant nursery.
		Waste Reduction	II	Collaborate with Public Works Department to reduce impact of green waste stream resulting from hillside defensible space yardwork.
Water Conservation	II	Collaborate with Public Works Department to encourage conservation of landscape water by employing SAFE landscape BMPs.		

Program Area	Program Description	Task	Priority	Description
Vegetation Modification on Public Land	<p>Maintain road clearances and defensible space buffers on City land, while seeking to reduce maintenance costs and optimize community benefits of the land.</p> <p>RATIONALE: Degraded habitat may result in high annual maintenance costs to deal with weeds. Where possible, halting or reversing this trend will reduce maintenance costs and enhance the land.</p>	Fire Ecology Impacts	I	Assess potential changes to fire ecology due to invasive plants; develop vegetation modification or restoration plans consistent with RMP and BMPs.
		Vegetation Management Plans	I	Prepare site-specific vegetation modification/management plans for those areas within defensible space buffers or roadside clearance corridors overlapping HWP parcels. Seek voluntary cooperation from property owners to follow these plans and re-evaluate
		Weed Control Crew	II	Work with city staff, volunteers and outside agencies to control weeds.
Visitor Management on Public Land	<p>Maintain a patrol presence on public lands within the fire zone, especially during windy conditions.</p> <p>RATIONALE: While the majority of wildfires are started by equipment use, vehicles or powerlines, several damaging recent fires have been started by illegal campfires during windy conditions.</p>	Campfires	I	Continue to enforce no campfires rule in City parkland and trail corridors.
		Patrols	I	Continue to partner with CERT to provide additional patrols during dry, windy conditions.
Wildland-Urban Interface (WUI) Planning	<p>Make providing for defensible space a required part of the design process for new developments.</p> <p>RATIONALE: Defensible space can encroach on other uses.</p>	Hillside Development Set-Back Requirement	I	Consider modifications to hillside development standards to strengthen slope and property-line set backs to accommodate defensible space, and encourage "hardened home" construction.

Program Area	Program Description	Task	Priority	Description
Post-Fire Planning	<p>Plan for short- and long-term stabilization and rehabilitation of burned areas in Monrovia.</p> <p>RATIONALE: Most experts agree that southern California communities should expect to experience wildfire, although no one can say how soon it will occur.</p>	Weed Infestations in Burn Areas	I	Develop long term program for monitoring of non native species in post fire areas; evaluate potential impacts to fire regime.
		Burn Area Access Control	I	Collaborate with Fire/Police/Community Services in restricting and monitoring access to post fire areas as dictated by public safety and resource protection concerns.
		Slope Stabilization	I	Review current literature on best practices for post-fire slope stabilization and protection and incorporate findings into next LHMP update or addendum.
		Seed Bank	II	Consider partnering with Watershed Council to collect and store locally indigenous seed to provide for vegetation restoration programs in the event of fire.
		Sensitive Habitat	II	Identify areas of environmentally sensitive habitat that could be affected by wildfire, either adversely or beneficially, and examine measures to prevent damage, as an update or addendum to RMP.

Facilitating Monrovia Fire Safety in the Long Term

10.	Facilitating Monrovia Fire Safety in the Long Term.....	2
10.1.	CWPP Review	2
10.1.1.	Strategic Planning and Projects	3
10.2.	Project Maintenance.....	4
10.3.	Updating This Plan	4
10.4.	Resources Needed to Support Ongoing Efforts	4

10. Facilitating Monrovia Fire Safety in the Long Term

In this section, we present a process for evaluating how well the Monrovia community has addressed the goals and objectives of this CWPP and for updating it as necessary.

The plan should be reviewed at least once per year, and updated at least once every five years.

10.1. CWPP Review

The Monrovia Fire Department is principally responsible for the implementation of this plan, as approved and directed by City Council. To support the Department in monitoring the progress of this plan, the Fire Chief will continue to request the service of the members of the Fire Chief's CWPP Advisory Group, which has played a vital role in the development of this plan. The Fire Chief will recruit additional members at his or her discretion, with City Council approval. The Advisory Group will meet periodically to review the plan's progress and recommend improvements in the plan's implementation. The Advisory Group may also recommend that the plan be updated more often than every five years, if significant changes have occurred.

Each review should address the following basic questions:

- Is the plan still relevant, i.e. have the findings regarding risks and hazards changed significantly due to changes in demographics, environmental changes, etc.?
- Which projects have been completed and which have not been completed? What resources were needed to complete the projects, and what benefits has the community received from these? Are the pending projects still needed? If so, what are the obstacles to completing them?
- Are there any additions that should be made to the plan – new concerns to address or new projects to propose?
- Are the risk mitigation methods proposed in this CWPP still the best, or are there new findings or methods in structure hardening, defensible space, public education or other advances that we should incorporate into our plan?

The Advisory Group will assist the Fire Chief in preparation of the plan update, as described in Section 10.3.

10.1.1. Strategic Planning and Projects

To track the prioritized action items presented in Chapter 9, the following form may be used:

Figure 1. Action Item Review Form¹

Action Item	Priority	Status	Accomplishments	Challenges	Partners Involved	Follow-up
Building Sustainability						
Defensible Space Code and Process						
Public Engagement and Education						
Firewise Communities						
CERT Involvement						
Ready, Set, Go						
Emergency Access Routes						
SAFE Landscape BMPs						
Vegetation Modification on Public Land						
Visitor Management on Public Land						
Wildland-Urban Interface Planning						
Post-Fire Planning						

¹ Adopted from Community Wildfire Protection Plan Evaluation Guide, Resource Innovations Institute for a Sustainable Environment University of Oregon, August, 2008 http://www.na.fs.fed.us/fire/cwpp/guidance/evaluation_guide.pdf.

10.2. Project Maintenance

Implementation of some of the projects proposed in this CWPP will likely necessitate the use of one-time funds, such as grant funds. Several related ongoing projects, as detailed in Chapter 9, are currently funded by grant monies, which will expire in time. Although the funding may be one-time, in some cases, the projects require follow-up or maintenance. For example, fuel treatments may require more or less frequent maintenance, as plants grow back. Public outreach or education campaigns often need periodic “boosters”. This factor must be considered and planned for. When applying for grants to fund the projects proposed in this CWPP, emphasis should be placed on those projects with long-term benefits, or ones that will require minimal follow-up or maintenance costs. Some examples of projects with long-term benefits are:

- ✓ Development of high-quality educational brochures, videos, etc.
- ✓ Facilitating neighborhood groups to organize a Firewise Community, which is self-sustaining.
- ✓ Replacement of weedy or fast-growing vegetation with lower-maintenance vegetation
- ✓ Training of staff and volunteers
- ✓ Retrofitting of homes with fire-resistant materials

10.3. Updating This Plan

No plan is ever permanent. This plan was written in 2014 based on current conditions and best available information. The field of fire safety is rapidly changing. It is likely that new developments will occur in the coming years. Therefore, we will update this plan at least every five years.

An electronic copy of this plan, in Adobe pdf format, will be available on the Monrovia Fire Department website. In addition, Office Depot will be requested to maintain an electronic copy of this plan, divided into several separate sections, which can be printed at the requester’s expense. Printed copies of this plan will be available for public review at the following locations:

- Monrovia Fire Station 1, 141 East Lemon Avenue
- Monrovia Fire Station 2, 2055 South Myrtle Avenue
- Monrovia Public Library, 321 S. Myrtle Avenue

10.4. Resources Needed to Support Ongoing Efforts

The resources used for the preparation of this plan, and for ongoing work with the Ready, Set, Go program and urban forestry programs have included staff from the Fire Department and other city departments; volunteer service from the CERT team and the members of the Fire Chief’s CWPP Advisory Group; expert speakers from the Los Angeles County Fire Department Forestry Division and the University of California Cooperative Extension; hosting of meetings by Monrovia residents and organizations; partial grant funding from the California Fire Safe Council and CalEMA; and input from numerous residents and stakeholders. In order to implement this plan, a similar level of commitment will be needed, with additional funding of specific programs, at a level to be determined.