

Draft Environmental Assessment

# Strawberry Canyon

The Regents of the University of California

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**FEMA**

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## Acronyms

BMPs	best management practices
BO	Biological Opinion
CDFG	California Department of Fish and Game
CFR	Code of Federal Regulations
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CRLF	California red-legged frog
EA	Environmental Assessment
EO	Executive Order
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FSBR	Field Station for Behavioral Research
GCR	General Conformity Rule
HCN	Hills Conservation Network
LBNL	Lawrence Berkeley National Laboratory
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO <sub>2</sub>	nitrogen dioxide
O <sub>3</sub>	ozone
PDM	Pre-Disaster Mitigation
PM <sub>10</sub>	particulate matter less than 10 micrometers in diameter
SHPO	State Historic Preservation Officer
SO <sub>2</sub>	sulfur dioxide
UC	Regents of the University of California
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOCs	volatile organic compounds

The Regents of the University of California (UC) have applied, through the State of California Governor's Office of Emergency Services, to the Federal Emergency Management Agency (FEMA) for funding under the Pre-Disaster Mitigation (PDM) Program to complete a vegetation management project. The PDM Program was authorized by Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Title 42 of United States Code Part 5133, as amended by Section 102 of the Disaster Mitigation Act of 2000 (Public Law 106-390, 114 Statutes 1552), to assist states and communities to implement sustained, pre-disaster, natural-hazard mitigation programs to reduce overall risk to the population and structures, while also reducing reliance on funding from actual disaster declarations.

FEMA has prepared this Environmental Assessment (EA) to evaluate the impacts of the UC PDM Program project. The EA has been prepared according to the requirements of the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations implementing NEPA (Title 40 of the Code of Federal Regulations [CFR] Parts 1500–1508), and FEMA's implementing regulations (44 CFR Part 10).

The EA process provides steps and procedures to evaluate the potential environmental, social, and economic impacts of a Proposed Action and alternatives as well as an opportunity for the public and local, state, and other federal agencies to provide input and/or comment through scoping studies and a public comment period. These potential impacts are measured by their context and intensity, as defined in the Council on Environmental Quality regulations.

The PDM Program assists states and communities to implement sustained, pre-disaster, natural-hazard mitigation programs to reduce overall risk to the population and structures, while also reducing reliance on funding from actual disaster declarations. Therefore, the purpose of the action is to provide PDM Program funding to UC.

The University of California, Berkeley, manages land within the East Bay Hills, which cross Alameda and Contra Costa counties in California. Between 1905 and 1993, 16 major wildfires occurred in the East Bay Hills. These fires burned over 14,000 acres, destroyed 3,500 homes, and killed 25 people. The 1923 Berkeley Fire destroyed 568 homes; the 1991 Tunnel Fire destroyed approximately 3,400 residences. The East Bay Hills' hot and dry summers, wind-conducive topography, flammable vegetation, dense development, and limited fire-fighting access contribute to making the area a substantial regional fire danger. Based on the California Department of Forestry and Fire Protection's (2007) fire severity mapping of State Responsibility Areas, the East Bay Hills lie in a "Very High" threat area for wildfires, the most severe rating in the system.

Strawberry Canyon is located within the East Bay Hills in the City of Oakland, near the City of Berkeley border, Alameda County, near the Contra Costa County border, and on property owned by UC. UC determined that a portion of Strawberry Canyon, because of its dense canopy of eucalyptus trees, is currently at high risk to produce or conduct a devastating wildfire. This area is approximately 58 acres in size and lies on a south-facing slope near the City of Berkeley. The project area is upwind of City of Berkeley neighborhoods, which would be at risk from wildfires emerging within or moving through Strawberry Canyon. The massive 1923 Berkeley Fire burned a significant portion of Strawberry Canyon. Strawberry Canyon is also near the site of, and displays similar fire risk conditions to, the catastrophic 1991 Tunnel Fire that resulted in the highest destruction of California homes per acre. The nature of the fuel load present in the East Bay Hills, coupled with the extreme fire conditions that exist on Red Flag days, have resulted in extremely fast-moving wildland fires, particularly when pushed by high winds. The 1991 Tunnel Fire moved 1.5 miles within 15 to 30 minutes of ignition. Although the center of the project area is approximately 1,500 feet from residences, under typical climate patterns, it is upwind of developed areas and therefore threatens these developed areas from wildfires emerging within or moving through the project area. The 1923 Berkeley Fire traveled more than 1 mile before it reached residential neighborhoods, where it then burned 568 homes in approximately 2 hours. Further, portions of the project area are as close as 50 feet from residences.

As shown on Figure 1, the project area is bounded by Grizzly Peak Boulevard to the north, City of Berkeley neighborhoods to the west, and the Lawrence Berkeley National Laboratory (LBNL) to the south. A fenced animal research facility called the Field Station for Behavioral Research (FSBR) is located within the eastern project area. Several fire trails and paved private and public roadways cross through the project area. Private paved roadways cross through the FSBR. The fire trails are unimproved dirt roads of approximately 12-foot width. The paved roadways carry low to moderate vehicular traffic. Two ephemeral creeks, which join in confluence near LBNL, run through the project area.

The dense, nonnative eucalyptus forests that are typical of this area create highly productive fuel loads for fires, with year-round shedding of leaves, small branches, and bark. Eucalyptus is

particularly dangerous because it produces large amounts of fire brands and embers that are blown by the wind, sometimes several miles ahead of the flame front. Secondary spot fires and roof ignitions from these firebrands substantially increase fire range and values at risk. The site was logged in 1974-75, after the eucalyptus trees were damaged by a freeze in the winter of 1972-73. Much, but not all, of the site was logged again in 1989-90. However, eucalyptus trees can grow up to 15 feet a year.

According to UC, Strawberry Canyon is the site of frequent vehicle fires along Grizzly Peak Boulevard's turnouts. These fires typically involve stolen automobiles, which are presumably ignited by thieves to obscure evidence or for other reasons. The UC Police Department received regular reports of homeless activity, including illegal campfires, in Strawberry Canyon, and a student was cited last year for building a bonfire in a roadside turnout. While Strawberry Canyon has not suffered a major wildfire in more than 80 years, the suppression of fires has led to an extreme accumulation of highly flammable vegetation. A future wildfire, if ignited during extreme fire weather, could become a disastrous firestorm, similar to the 1991 Tunnel Fire. Therefore, action is needed to reduce the existing risk of fire in Strawberry Canyon and the damage it could cause to the nearby City of Berkeley and the UC campus.

UC evaluated several alternatives for reducing the fire hazard in and around Strawberry Canyon. UC's criterion for the proposed project was that it implements a component of the 2020 Long Range Development Plan (University of California, Berkeley 2005a). Based on this plan, UC intends to manage the hill campus landscape to reduce fire and flood risk and restore native vegetation and hydrology patterns in a manner influenced by site-specific conditions such as vegetation type, accessibility, and proximity to roads and structures. Goals established in the 2020 Long Range Development Plan include the following:

- Reducing fuel load by removing dead material, reducing plant density, and favoring species with lower fuel content
- Reducing horizontal spread by reducing fine fuel material and by separating dense clusters of vegetation with areas of lower fuel load
- Reducing vertical fire spread by increasing separation of understory and crown fuels

Pursuant to the 2020 Long Range Development Plan, whenever feasible, fuel management practices should include the selective replacement of high-hazard introduced species with native species, for example, the restoration of native grassland and oak-bay woodland through the eradication of invasive exotics (e.g., broom, acacia, pampas grass) and the replacement of aged Monterey pines and second growth eucalyptus. Such conversions must be planned with care, however, to avoid substantial disruptive impacts to faunal habitats.

Based on the purpose and need for action and UC's criterion, three alternatives were considered in this EA:

- Alternative 1: No Action
- Alternative 2: Proposed Action
- Alternative 3: Modified Methods

### **3.1 ALTERNATIVES NOT CARRIED FORWARD**

To reduce the fire hazard in and around Strawberry Canyon, UC considered clearing vegetation only along roadsides and around structures, developing enhanced building codes, enforcing fire codes more strictly, and increasing fire patrols on Diablo wind days. However, UC determined that these methods would not meet the purpose and need. UC reasoned that if a firestorm originated in the adjacent forests and grows into the canopy, homes would be lost even if they had fire-resistant roofs and siding. Likewise, clearing vegetation only around roads and structures would not be sufficient to stop a wildfire because of the region's layout. Historically, firestorms in the East Bay Hills have generated so much heat and moved with such speed that they consume entire neighborhoods. UC believes that it would be better to reduce the potential intensity of the fire by the removal of the vegetative fuel that would feed it, instead of trying to control the damage from a fire that is already burning intensely.

UC evaluated fire mitigation strategies utilized by East Bay Regional Parks District, including controlled burning and use of California Department of Forestry and Fire Protection corrections department labor. UC does not have an internal fire department. Thus, conducting prescribed burns is impractical for UC. UC has a policy that precludes use of any form of indentured labor

in its acquisition of goods or in contracts. Thus, neither of these strategies could be followed by UC.

## 3.2 ALTERNATIVES CARRIED FORWARD

### 3.2.1 Alternative 1: No Action

NEPA requires the inclusion of a No Action Alternative in the environmental analysis and documentation. The No Action Alternative is defined as maintaining the status quo with no FEMA funding for any alternative action. The No Action Alternative would involve no treatment of vegetation within the project area. The existing fire hazard to residents and structures surrounding Strawberry Canyon would remain under the No Action Alternative. Economic losses from fire damage would occur in addition to the threat to public health and safety posed by a firestorm. Loss of native flora and fauna and their associated habitats would occur in the event of a wildfire, along with loss of topsoil due to erosion, and sedimentation of local streams.

### 3.2.2 Alternative 2: Proposed Action

The objective of the Proposed Action is to reduce the vegetative fuel for a fire that might occur in Strawberry Canyon. The Proposed Action would consist of the selective removal of exotic vegetation such as eucalyptus (*Eucalyptus globulus* and *E. camaldulensis*), Monterey pine (*Pinus radiata*), and acacia (*Acacia* sp.) from within approximately 58 acres of Strawberry Canyon. The vegetation management strategy of this project is to allow the forest to convert from the existing eucalyptus-dominated, exotic canopy to a native forest of California bay laurel (*Umbellularia californica*), oak (*Quercus* sp.), big-leaf maple (*Acer macrophyllum*), California buckeye (*Aesculus californica*), California hazelnut (*Corylus cornuta*), and other native tree and shrub species that currently exist beneath the canopy. The native species produce either considerably less fuel load or are most fuel-productive well before the peak of the regional fire season. During project implementation, the native understory would be protected while removing the exotic trees.

The project would remove approximately 10,000 stems of eucalyptus, pine, and acacia trees. The trees would be cut by hand fellers and the mechanized feller-buncher. Hand felling involves a pair of workers using chain saws and wedges to directionally fell the tree in a manner that allows easy processing. The feller-buncher is a tracked vehicle, with a self-leveling cab, that mechanically grasps the standing tree, cuts it with a hydraulically powered chain saw, and lifts the tree into bunches for skidding. The feller-buncher is limited to slopes less than approximately 45 percent. Hand fellers would cut trees growing within 50 feet of streams and along steep slopes.

To prevent resprouting, an herbicide solution would be applied by a qualified licensed pest control applicator to the cambium layer of the freshly cut tree stump within a few minutes of felling. The herbicide mixture would likely consist of a combination of Garlon<sup>®</sup> 4 (triclopyr) and Stalker<sup>®</sup> (imazapyr) in a solution of esterified seed oil, water, and marking dye. A typical tree requires 1 to 2 ounces of diluted solution.

Felled trees up to approximately 24 inches diameter at breast height would be hauled by rubber-tired or tracked skidders along paths, called skid trails, to landings within the project area. Nine landings exist adjacent to fire trails or paved roads within the project area. Equipment would be staged, fueled, and maintained at these landings while contractors are mobilized. Additional landings may be created when the distance from a tree patch to an existing landing exceeds 600 feet. However, all material stockpiling and staging areas would be located within project right-of-ways in nonsensitive areas or at designated disturbed/developed areas. Where possible, landings and skid trails from previous loggings would be used instead of constructing new ones. The project may also employ the use of a high-lead cable system to retrieve logs to the landing without the use of rubber-tired or tracked skidders.

At the landings, trees would be chipped using a grapple fed chipper or a tracked chipper. The whole trees would be fed into the chippers and pulled through the masticating blades by means of a conveyor belt and feed wheel. Alternatively, the tracked chipper may be driven to downed trees on gentle slopes. The wood chips from the chippers are expected to be 1 to 4 inches in size and would be scattered within the project area. Retained chips would not exceed a depth of 24 inches, and the average depth of retained chips would range from 8 to 12 inches to maximize the distribution of retained biomass. Evaluations of other UC vegetation management project sites have shown that normal aerobic decomposition processes occur with retained chips up to 24 inches in depth. The chips also have the benefit of suppressing weeds and reducing sprouting of latent eucalyptus seeds (Hills Emergency Forum 2007). Where appropriate, retained chips would be used to create sediment traps. A greater depth of chips used for the sediment trap increases both the length of time that the traps function and the amount of sediment retained from deposition into watercourses. Chips spread over uneven terrain (such as in natural depressions or around stumps) may also have a greater depth when the finished surface is raked to follow the general contour of the slope. Chips would also be used to create skid roads. This practice is used in lieu of cutting into the soil, as the mechanical skidders can travel atop the level chip bed, thus avoiding excavation and soil disturbance. When the chips decompose over 3 to 5 years, the contour of the slope reappears as it existed prior to logging, with less evidence of skid road creation and a more natural appearing landscape.

Considerable evidence exists for the efficacy of the Proposed Action. Transforming eucalyptus biomass into chips and retaining the chips on site (1) arrange the horizontal and vertical spacing of vegetation to prevent fire from spreading easily and (2) increase the moisture content of the vegetation, thus reducing the flammability of the fuel. Finally, converting eucalyptus to native forests reduces the total fuel volume. According to Beall (1996), “chipping is another recycling method gaining widespread acceptance as a means of handling dead and green biomass and using the material as a cover to control undesirable flashy fuels.” Beall lists the California Department of Transportation, the City of Santa Barbara, and the City and the County of Los Angeles as government agencies using chipped biomass to mitigate against wildfires. More locally, East Bay Regional Parks District also includes chipped biomass retention in some of its fire mitigation projects. According to the Hills Emergency Forum (2007), the practice of retaining chips on site results in “more benign fire behavior, lower heat output, and improved fire-fighter safety,” in the event of a wildland fire. Finally, Shelly (2006) notes that retaining biomass on site during urban logging is the most cost-effective method of fire mitigation and suggests that this activity is both “prudent and effective.”

Larger trees (greater than 24 inches diameter at breast height) would be lopped and scattered after felling. The lop-and-scatter method would also be used when it is impractical to skid a tree to the chipper, such as when trees are growing at a substantial distance from the main grove, or when trees are either up or down a steep slope. In these cases, the downed tree would be cut by chain saws such that all portions of the tree would come into contact with the ground or within 24 inches of it. Typically, the tops are extensively cut and the main trunk is cut into 20- to 30-foot lengths. Some logs would be placed so that they help control sediment and erosion or support wildlife habitat.

The objective is to leave all downed material on site. However, if the site yields an excessive amount of large tree trunks, some material may be relocated to an adjacent portion of the hillside, or shipped for reuse as fuel, paper pulp, or horse bedding.

The project duration is anticipated to be 24 to 36 months, with 20 to 40 weeks of actual vegetation removal work. In general, work would be conducted during the months of August through November, to avoid the wet season and avian nesting and fledging season. Skidding would not be performed when the ground is wet. Cutting would begin along the northern project area, and would proceed southward over time. Work contracts may be issued for more than one contiguous area, for example, 5-acre portions of cutting adjacent to Grizzly Peak Boulevard in the first year. Subsequent cut blocks would be contiguous to those already completed, each with a clear path to the extant landing areas.

The project may involve the closure of Centennial Drive for a few hours at a time to allow the cutting and skidding of trees that grow close to the roadway.

All cut tree stumps would receive semiannual follow-up treatment of herbicides (Garlon<sup>®</sup> 4, Stalker<sup>®</sup>, RoundUp<sup>®</sup>, Rodeo<sup>®</sup>) on any emerging stump sprouts, to ensure the permanent elimination of eucalyptus from the project area. Eucalyptus seedlings emerging from the latent seed stock present in the project area would be managed over time to prevent recolonization of the invasive species. Follow-up treatments would include the application of RoundUp<sup>®</sup> or Rodeo<sup>®</sup> (glyphosphate), Garlon<sup>®</sup> 4, or Stalker<sup>®</sup> to resprouts and seedlings, the application of basal bark, and/or the recutting of sprouts and treatment to the cut surfaces. Follow-up efforts required for successful eradication of all eucalyptus resprouts and seedlings are anticipated to be 7 to 10 years.

### **3.2.3 Alternative 3: Modified Methods**

For this alternative, vegetation removal would occur in the same area as described for the Proposed Action. The types of vegetation selected for removal and preservation would also be the same as for the Proposed Action. However, this alternative would attempt to remove 70 percent of the exotic species, instead of the complete eradication that is the aim of the Proposed Action. In addition, this alternative would involve less skidding and chipping than the Proposed Action. Only those trees that are felled near roads and trails would be skidded and chipped. The remainder of the felled trees would be treated using the lop-and-scatter method as described for the Proposed Action. The chemical treatment specifications would be the same as under the Proposed Action. Alternative 3 would result in a reduction of wildfire risk compared to the No Action Alternative but would fall short of the results anticipated under the Proposed Action.

The analysis in this section focuses on those resource areas where some level of impact may result, including biological resources; geology, seismicity, and soils; water resources; air quality; cultural resources; visual resources; socioeconomics and safety; public services; land use and planning; transportation; and noise. No other resource areas that would require further evaluation pursuant to NEPA were identified.

As a result of FEMA’s analysis, this section provides a description of the existing conditions, the potential impacts of each alternative, and mitigation measures or best management practices (BMPs) that would be applied to avoid or minimize those impacts. The 2020 Long Range Development Plan and the corresponding Environmental Impact Report (University of California, Berkeley 2005b) also describe best management practices and mitigation measures to be employed in the planning, implementation, and maintenance of the project. The BMPs and mitigation measures from these documents have been incorporated into this section, as appropriate. UC’s Failure to fully and accurately comply with all BMPs, avoidance and minimization measures, and mitigation described in this EA could jeopardize UC’s receipt of federal funding.

#### 4.1 BIOLOGICAL RESOURCES

The Endangered Species Act of 1973 establishes a federal program to conserve, protect, and restore threatened and endangered plants and animals and their habitats. Section 7 of the Endangered Species Act specifically charges federal agencies with the responsibility of using their authority to conserve threatened and endangered species. All federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction of critical habitat for these species.

##### 4.1.1 Vegetation and Wildlife

The Strawberry Canyon project area consists of three major vegetation communities. The most abundant vegetation type is the blue gum eucalyptus (*Eucalyptus globulus*) and California bay laurel (*Umbellularia californica*). Also, a few moderately sized patches are dominated by coyote brush (*Baccharis pilularis*), and one small patch of introduced herbaceous species. Table 1 presents the total acreages for the vegetation communities identified in the project area.

**Table 1  
Total Acreages for the Vegetation Communities  
Identified in the Project Area**

Vegetation Communities	Acres
Blue gum eucalyptus – California bay laurel	40.8
Disturbed	9.5
Introduced herbaceous	5.7
Coyote brush	2.3
Total	58.3

#### ***4.1.1.1 Blue Gum Eucalyptus-California Bay Laurel***

The blue gum eucalyptus alliance is dominated by the nonnative blue gum eucalyptus trees. These trees in the project area are mature reaching above 50 feet tall and provide a dense canopy cover throughout most of the project area. Scattered among the eucalyptus trees are several California bay laurel, coast live oak (*Quercus agrifolia*), blue elderberry (*Sambucus mexicana*), and a few nonnative pine and acacia trees. The understory is lightly vegetated and consists of a mix of introduced herbaceous species, grassland species, and common woodland understory species. Introduced herbaceous species are scattered sparsely throughout the project area and are characterized by black mustard (*Brassica nigra*), prickly wild lettuce (*Lactuca serriola*), bristly ox-tongue (*Picris echioides*), and Italian thistle (*Carduus pycnocephalus*). Some of the common woodland understory species include poison oak (*Toxicodendron diversilobum*), California blackberry (*Rubus ursinus*), mugwort (*Artemisia douglasiana*), and bush monkey flower (*Mimulus aurantiacus*). Native and nonnative grasses are very minimal and scattered sparsely in the understory of the eucalyptus grove, in patches of openings in the grove, and along the edges of the grove. Native grasses include purple needle grass (*Nassella pulchra*) and California brome (*Bromus carinatus*). Nonnative grasses include smilo grass (*Piptatherum millaceum*), Bermuda grass (*Cynodon dactylon*), panic veldtgrass (*Ehrharta erecta*), annual blue grass (*Poa annua*), and rescue grass (*Bromus catharticus*).

A small drainage lies in the southern project area, and at the lower end of the drainage is located a small patch of freshwater wetland species including umbrella sedge (*Cyperus eragrostis*), common rush (*Juncus patens*), vervain (*Verbena lasiostachya*), and curly doc (*Rumex crispus*).

#### ***4.1.1.2 Coyote Brush***

Coyote brush occurs in four small polygons in the project area (Figure 2). These four areas are interspersed among buildings, disturbed areas, and eucalyptus stands. Coyote brush is often mixed with introduced herbaceous species including Italian thistle, black mustard, and slender wild oat (*Avena barbata*). In two areas coyote brush is mixed with another subdominant species. Coyote brush mixed with poison oak is located in open areas of the eucalyptus grove near the central project area. Coyote brush and Harding grass (*Phalaris aquatica*) are dominant along a south-facing hill on the northeastern edge of the project area outside of the eucalyptus grove, near the FSB.

#### ***4.1.1.3 Introduced Herbaceous***

Several small patches of introduced herbaceous species are scattered throughout the project area. Nonnative herbaceous species that are common in these areas include Italian thistle, black mustard, smilo grass, bristly ox-tongue, and prickly wild lettuce.

#### ***4.1.1.4 Disturbed***

Disturbed areas include roads, parking lots, and buildings associated with UC within the project area. Disturbed areas cover a moderate amount of the northern project area.

#### 4.1.1.5 Wildlife

The project area provides habitat for many common wildlife species. Several resident and migratory bird species inhabit or seasonally utilize eucalyptus forests in this area to forage and breed. Such species include raptors such as the sharp-shinned hawk (*Accipiter striatus*) that occasionally nest in the canyons (Remsen 1978) and horned owls (*Bubo virginianus*), which have been found to occasionally roost and forage in eucalyptus groves (University of California, Berkeley 2005b). The eucalyptus grove in the project area also provides habitat for song birds such as the English sparrow (*Passer domesticus*), golden crown sparrow (*Zonotrichia atricapilla*), song sparrow (*Melospiza melodia*), gold finch (*Carduelis tristis*), brown towhee (*Pipilo fuscus*), and American robin (*Turdus migratorius*) (University of California, Berkeley 1987). Other bird species within the scrub habitat include Steller's jay (*Cyanocitta stelleri*), western scrub jay (*Aphelocoma californica*), and mourning doves (*Zenaida macroura*) (The Gull 2007).

In general, the sparse tree understory of eucalyptus forests offers poor wildlife habitat because of the lack of food sources from the eucalyptus grove (University of California, Berkeley 1996). Regardless, sightings of large mammals grazing the area, such as mule deer (*Odocoileus hemionus*) and Columbian blacktail deer (*Odocoileus hemionus columbianus*), and mountain lions (*Felis concolor*) have been observed on rare occasions (City of Berkeley 2001). Smaller wildlife known to be abundant in the grove include fox squirrels (*Sciurus niger*) and the scarce slender salamanders (*Batrachoseps pacificus*). Furthermore, known for their preference of trees at the edge of clearings along urban streets and city parks, the hoary bat (*Lasiurus cinereus*) has also made a home in the eucalyptus groves located near the University of California, Berkeley campus, as they use the area to hibernate during the winter (Bettleheim 2007).

#### 4.1.2 Special-Status Species

Information concerning threatened, endangered, proposed, or candidate species that may occur in the project area was requested from the U.S. Fish and Wildlife Service (USFWS) Sacramento Field Office for five U.S. Geological Survey 7.5-minute quadrangles surrounding the project area: Oakland West, Richmond, Briones Valley, Oakland East, and San Leandro. In addition, the California Department of Fish and Game's (CDFG's) California Natural Diversity Database was searched for known occurrences of listed, proposed, or candidate species within those five 7.5-minute quadrangles. A literature review was conducted to identify habitat requirements and distribution of these species. Special-status species that were assessed for presence in the project area are presented in Appendix A.

As a result of the field and background review, FEMA determined that the project area provides habitat suitable for two federally listed species under USFWS' jurisdiction. Habitats that are potentially suitable for the Alameda whipsnake (*Masticophis lateralis euryxantus*) and California red-legged frog (CRLF) (*Rana aurora draytonii*) are present in the project vicinity. These species are discussed in more detail below.

### 4.1.3 Alternative 1: No Action

Under the No Action Alternative, UC would not conduct vegetation management activities in the project area. Wildlife and their habitats in and around the project area could be adversely affected should a wildfire occur. Native plant and wildlife species would not benefit from the selective reduction of nonnative vegetation.

Because no action would be taken, this alternative would have little potential to directly impact common plant or wildlife species or proposed or listed threatened and endangered species in the project area. However, the potential for losses of common and federally listed species due to wildfire would remain. Future uncontrolled wildfires could result in adverse impacts to common, as well as proposed or listed threatened and endangered, species through the loss of habitat and/or the mortality, morbidity, or injury of individuals.

### 4.1.4 Alternative 2: Proposed Action

#### 4.1.4.1 *Vegetation and Wildlife*

Implementation of the Proposed Action would result in the removal of exotic vegetation and the long-term introduction of native vegetation. In the long term this impact would be beneficial to biological resources. In the short term, common wildlife species would be displaced by the direct removal of invasive plant species and affected indirectly by noise associated with the proposed activities. Because the project area is minute (58 acres) compared to the total undeveloped land in the East Bay Hills (at least 150,000 acres), most displaced wildlife (especially avian species) would be expected to find suitable habitat nearby, though some mortality, morbidity, and injury of common wildlife species may occur. Measures to protect special-status wildlife species described below would also avoid or minimize short-term, adverse impacts to common wildlife species. In the long term, the native vegetation expected to occupy the project area would provide improved habitat for the existing wildlife and provide habitat for a greater diversity of wildlife.

Retaining chips, large boles, mulch, and duff on site would provide habitat for wildlife immediately following vegetation clearing. Retaining chips on site also reduces the reemergence of eucalyptus trees from latent seed stock. This activity minimizes the amount of herbicide that would be required to suppress future growth of eucalyptus.

UC would, to the full feasible extent, avoid the disturbance or removal of nests of raptors and other special-status bird species, including migratory birds, when in active use. A pre-activity nesting survey for loggerhead shrike, raptors, or migratory birds, covering a 100-yard perimeter of the project area, would be conducted during the months of March through July prior to project commencement. The survey would be conducted by a qualified biologist no more than 30 days prior to initiation of disturbance to potential nesting habitat. If any of these species are found within the survey area, activities in the area would not commence or would continue only after the nests are protected by an adequate setback approved by a qualified biologist. To the full feasible extent, the nest location would be preserved and alteration would only be allowed if a qualified biologist verifies that birds have either not begun egg-laying and incubation or that the juveniles from those nests are foraging independently and capable of survival. A pre-activity

survey would not be required if activities commence during the nonnesting season (i.e., August through February). Implementation of these measures would ensure UC's compliance with the Migratory Bird Treaty Act.

UC would, to the full feasible extent, avoid the remote potential for direct mortality of special-status bats and destruction of maternal roosts. A pre-activity roosting survey for special-status bat species covering the project area would be conducted during the months of March through August prior to commencement of the project. The survey would be conducted by a qualified biologist no more than 30 days prior to initiation of disturbance to potential roosting habitat. If any maternal roosts are detected during the months of March through August, activities would not commence or would continue only after the roost is protected by an adequate setback approved by a qualified biologist. To the full feasible extent, the maternal roost location would be preserved, and alteration would only be allowed if a qualified biologist verifies that bats have completed rearing young, that the juveniles are foraging independently and capable of survival, and bats have been subsequently passively excluded from the roost location. A pre-activity survey would not be required if activities commence outside the maternal roosting season (September through February).

#### *4.1.4.2 Special-Status Species*

The following sections evaluate the potential direct and indirect effects on the Alameda whipsnake and CRLF that could result from implementation of the Proposed Action.

##### *Direct Effects*

The project area provides 2.3 acres of coyote brush. Coyote brush is typically considered habitat suitable to support the Alameda whipsnake. The Alameda whipsnake is also known to utilize areas within 500 feet of suitable habitat, including bay-oak woodland and grassland. However, the four areas dominated by coyote brush in the project area are remnants of potential habitat for this species, and they are disjunct from any large tracts of suitable habitat for the Alameda whipsnake. These areas are also surrounded by research buildings, dirt roads, disturbed areas, and eucalyptus stands. Therefore, Alameda whipsnakes are unlikely to occur in these small patches of marginal habitat.

CRLF prefer dense, shrubby, or emergent riparian vegetation closely associated with deep, still, or slow-moving water. However, individuals have also been found in ephemeral creeks and drainages and in ponds that may or may not have riparian vegetation. Two ephemeral creeks run through the project area, but do not hold water for very long due to the steep slope of the terrain. The closest record of a CRLF to the project area is approximately 3.1 miles southeast and is located at Thornhill Pond, near Berkeley (CDFG 2005). The habitat at this location consists of a pond, and the project area does not have any ponds or any other habitat suitable for breeding of CRLF. Therefore, it is unlikely that CRLF occur in the project area because no suitable breeding habitat exists in the vicinity.

Although it is unlikely that the proposed vegetation removal activities in areas dominated by the blue gum eucalyptus-California bay laurel vegetation type could displace or kill Alameda whipsnakes or CRLF, there is a small potential that this could occur. The activities that are

likely to affect whipsnakes and CRLF, if they are present, include felling and dragging trees. Mortality, displacement, or loss of habitat is considered “take” under the federal Endangered Species Act.

As part of the Proposed Action, all cut tree stumps would receive semiannual follow-up treatment of herbicides (Garlon<sup>®</sup> 4, Stalker<sup>®</sup>, RoundUp<sup>®</sup>, Rodeo<sup>®</sup>) on any emerging stump sprouts to ensure the permanent elimination of eucalyptus from the project area. The use of these herbicides is not expected to directly affect Alameda whipsnakes or CRLF. All of these herbicides are approved by the U.S. Department of Agriculture (2003) and the main active ingredient is glyphosate, which is considered to be very safe for use in terrestrial habitats. The herbicide would be applied by a licensed applicator in accordance with the manufacturer’s specifications and the regulations of the California Department of Pesticide Regulation during implementation of the Proposed Action. Herbicides would not be applied directly to water or to plants within 50 feet of standing water or an ephemeral stream or swale. No foliar herbicide application would occur, and herbicides would not be applied by spraying.

Glyphosate (RoundUp<sup>®</sup>, Rodeo<sup>®</sup>) is strongly absorbed by the soil, but has little potential for leaching into the groundwater (U.S. Department of Agriculture 2003). RoundUp<sup>®</sup> dissolves easily in water, and therefore, should not be applied directly to any bodies of water. Rodeo<sup>®</sup> is specifically formulated for forest applications in and around aquatic sites. Glyphosate does not bioaccumulate in aquatic life, including fish (U.S. Department of Agriculture 2003). The U.S. Environmental Protection Agency (USEPA 1993) does not expect that most endangered terrestrial or aquatic organisms would be affected by the registered uses of glyphosate.

Triclopyr-based products, such as Garlon<sup>®</sup> 4, have little, if any, impact on terrestrial and aquatic animals or on ecosystems in which the animals live (Dow Agrosiences, undated). Studies to determine the effects of imazapyr-based products, such as Stalker<sup>®</sup>, indicate that imazapyr does not bioaccumulate in fish tissues (BASF, undated). The Stalker<sup>®</sup> herbicide features exceptionally low mammalian toxicity (BASF, undated).

### *Indirect Effects*

The Proposed Action would remove nonnative species, such as eucalyptus trees and acacias, and promote the growth of native species. Therefore, the Proposed Action would indirectly provide beneficial effects to the Alameda whipsnake by promoting native habitats over the long term. Critical habitat for the Alameda whipsnake would not be adversely affected by the Proposed Action, but would rather benefit from vegetation management over the long term.

According to the *Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay* (USFWS 2002), the project area is located within Recovery Unit 6 (Caldecott Tunnel Corridor). This Recovery Unit connects Tilden-Briones and the Oakland-Las Trampas populations and crosses Alameda and Contra Costa counties.

In the Draft Recovery Plan for the Alameda whipsnake, fire suppression and the existence of nonnative vegetation are identified as threats to this species. Fire suppression activities allow the buildup of fuel, which directly affects the Alameda whipsnake by exacerbating the intensity of wildfires if they occur (USFWS 2002). The Proposed Action would remove the fuel load in those areas and, therefore, would benefit the survival of Alameda whipsnakes in the project

vicinity. In the Draft Recovery Plan for this species, the USFWS recommends the implementation of land management plans to address eucalyptus encroachment into chaparral/scrub habitats and fuels management (USFWS 2002). The Proposed Action is consistent with this recommendation.

#### *4.1.4.3 Avoidance and Minimization Measures*

UC would be responsible for implementing the following measures to avoid and minimize any potential direct effects on the Alameda whipsnake and CRLF, although these species are unlikely to occur during project implementation:

- Prior to project implementation, the locations of sensitive areas, including Alameda whipsnake habitat, wetlands, and native trees to be retained would be clearly indicated on project plans. These plans would be submitted to the USFWS for review prior to project implementation.
- UC's project manager or his/her designee would be directly responsible for implementing these avoidance and minimization measures and would be the point of contact for the project. UC's project manager or his/her designee would maintain a copy of the USFWS Biological Opinion (BO) (Appendix B) on site whenever earthmoving and/or fuel reduction activities are taking place. The names and telephone numbers of the project manager or his/her designee would be provided to USFWS at least 7 working days prior to project implementation. Prior to project implementation, the project manager would submit a letter to USFWS verifying that he/she possesses a copy of the BO and has read the Conservation Measures in the BO.
- At least 20 working days prior to the date that the project is initiated in the field, UC would submit the name(s) and credentials of biologists/monitors who would serve as the on-site biological monitors and on-call biologists to USFWS for review and approval. The biological monitor(s) must have demonstrated knowledge of the biology, ecology, and field experience identifying Alameda whipsnakes and CRLF. The on-call biologist(s) must have demonstrated knowledge of the biology, ecology, and field experience capturing and handling Alameda whipsnakes and CRLF. No project activities would begin until UC has received written approval from USFWS that the biologist(s) and monitor(s) are qualified to conduct the work.
- The USFWS-approved biological monitor(s) would be on site during all activities that may result in the take of CRLF and/or Alameda whipsnake. The potential for take would be determined by the USFWS and CDFG, or in their absence, the USFWS-approved biological monitor. Prior to approval, the USFWS-approved biologist(s) must submit a letter to USFWS verifying that they possess a copy of the BO and understand the Terms and Conditions of the BO. The USFWS-approved biologist(s) would keep a copy of the BO in their possession when on site.
- The USFWS-approved biologist(s) and/or biological monitor(s) would be given the authority through communication with the project manager or his/her designee to stop any work that may result in take of CRLF, Alameda whipsnake, and/or other listed species. If the USFWS-approved biologist(s) or biological monitor exercises this authority, the USFWS and CDFG

would be notified by telephone and electronic mail within 1 working day. The USFWS contact is Chris Nagano, Deputy Assistant Field Supervisor, Endangered Species Program at the Sacramento Fish and Wildlife Office at telephone (916) 414-6600 and email [chris\\_nagano@fws.gov](mailto:chris_nagano@fws.gov).

- The USFWS-approved monitor(s) would be on site to monitor the initial vegetation removal and/or ground-disturbing activities. The USFWS-approved biological monitor(s) would perform a clearance survey for listed species immediately prior to the initial ground disturbance. Safety permitting, the USFWS-approved biological monitor(s) would also investigate areas of disturbed soil for signs of listed species within 30 minutes following the initial disturbance of that given area. The USFWS-approved biological monitor(s) would be responsible for inspecting the project area for Alameda whipsnakes and CRLF before activities begin each day by checking under standing equipment before it is moved and checking any debris piles.
- If the USFWS-approved biological monitor(s) observes either of the two listed species in the work area, he/she would stop work and call the on-call biologist(s) to move the CRLF to a safe location within walking distance of the location where it was found or, if possible, the CRLF or Alameda whipsnake would be allowed to disperse on its own. The biological monitor(s) would not trap, handle, or move either of these two listed animals. The individual animal would be monitored by the USFWS-approved biologist(s) and/or biological monitor(s) until it has been determined that it is not imperiled by predators or other dangers. Neither of these two listed species would be moved to laboratories, holding facilities, or other facilities without the written authorization of the USFWS and CDFG.
- The USFWS-approved on-call biologist(s) may use nets or his/her bare hands to capture CRLF at the project area. The USFWS-approved biologist(s) would not use soaps, oils, creams, lotions, repellents, or solvents of any sort on his/her hands within 2 hours before and during periods when he/she is capturing and relocating either of the two listed species. The USFWS-approved biologist(s) would limit the duration of handling and captivity of individuals of the listed amphibian. While in captivity, CRLF individuals would be kept in a cool, moist, aerated environment, such as a bucket containing a damp sponge. Containers used for holding or transporting adults of the amphibian would not contain any standing water. The Alameda whipsnake would be placed in a pillowcase or similar container for transport to the release site.
- The USFWS-approved biologist(s) and/or biological monitor would take precautions to prevent introduction of amphibian diseases to the project area by disinfecting equipment and clothing as described within the *Revised Guidance on Site Assessment and Field Surveys for the California Red-Legged Frog* (USFWS 2005). This item is available at the USFWS Sacramento office website (<http://www.fws.gov/sacramento/es/protocol.htm>).
- An employee education program on the Alameda whipsnake and CRLF would be completed prior to the date of initial groundbreaking or vegetation clearing (whichever date comes first) at the project area. The program would consist of a brief presentation by the USFWS-approved biologist(s) to explain endangered species issues to all contractors, their employees, and agency personnel involved in the vegetation clearing and earthmoving portions of the project. The program would include a description of the Alameda whipsnake

and CRLF and their habitat needs, an explanation of the status of these species and their protection under the Endangered Species Act, associated consequences of noncompliance with the BO, and a description of the measures being taken to reduce effects to these species during project implementation. Documentation of the training, including original sign-in sheets, would be submitted to USFWS within 10 working days of the completion of the class.

- If any fuel reduction personnel or other personnel find what they believe may be one of the listed species, the following protocol would be implemented:
  - Work or activities that may result in injury, death, harm, harassment, or capture of the individual animal would immediately cease.
  - The project manager and the USFWS-approved biological monitor and biologist would be immediately notified.
  - The USFWS-approved biologist would immediately notify the USFWS and/or CDFG by telephone.
  - The USFWS-approved biologist would move the CRLF to a safe location within walking distance of the location where it was found; if possible, the CRLF or Alameda whipsnake would be allowed to disperse on its own. The individual would be monitored by the USFWS-approved biologist until it has been determined that it is not imperiled by predators or other dangers. Neither of these two listed species would be moved to laboratories, holding facilities, or other facilities without the written authorization of the USFWS and CDFG.
- To avoid injury or death of the Alameda whipsnake and/or CRLF, no firearms would be allowed on the project area except for those carried by authorized security personnel, or local, state, or federal law enforcement officials.
- Plastic monofilament netting (e.g., erosion-control matting) or similar material would not be used in the project area because CRLF and Alameda whipsnakes may become entangled or trapped in it. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.
- The USFWS-approved biological monitor(s) would monitor all project activities. The biologist(s) would be given the authority to stop any work that may result in the take of listed species and would be allowed sufficient time to contact the USFWS-approved on-call biologist to move the animals from the site before work activities begin or resume. The individuals would be relocated to suitable habitat that would not be affected by project activities. Only individuals of the listed species that are at risk of injury or death by project activities would be moved by the USFWS-approved biologist(s); any others would be left undisturbed.
- If the USFWS-approved biological monitor and/or biologist(s) exercises stop authority, the USFWS and CDFG would be notified by telephone and electronic mail within 1 working day. The USFWS-approved monitor/biologist would be the contact for any employee or contractor who might inadvertently kill or injure a CRLF and/or Alameda whipsnake; or anyone who finds a dead, injured, or entrapped individual of these two listed species. The USFWS-approved monitor(s)/biologist(s) would possess a working cellular telephone whose

number would be provided to the USFWS and CDFG. Sensitive habitat areas would be identified and delineated with high visibility, temporary, orange-colored fence at least 4 feet in height, flagging, or other type of barrier. These areas contain core habitat and primary constituent elements for the Alameda whipsnake and riparian habitat for the CRLF. Such fencing would be inspected by the USFWS-approved biological monitor and maintained daily until completion of the project. The fencing would be removed only when all construction equipment is removed from the site. No project activities would occur outside the delineated project area.

- Native understory plant species would be protected to the extent practical.
- UC would identify and limit to the maximum extent possible all access roads and skid trails. These areas would avoid scrub habitat, primary constituent elements for the critical habitat of the Alameda whipsnake, and stream and riparian habitats. The plans for these roads and trails would be submitted to USFWS for review.
- All material stockpiling and staging areas would be located within designated disturbed/developed areas that are outside of sensitive habitat areas as determined by the USFWS-approved biologist(s), CDFG, and/or the USFWS. Locations and methods of vegetation disposal within the project area would be submitted to USFWS for review and approval.
- Vehicle and equipment refueling and lubrication would only be permitted in designated disturbed/developed areas where accidental spills can be immediately contained. All project-related equipment would be regularly maintained to avoid fluid leaks (e.g., gasoline, diesel fuel, hydraulic fluid). All leaking fluid would be stopped or captured in a container until such time that the equipment can be immediately moved off site and repaired. UC would create a containment zone at each refueling point, employing a 45-millimeter ethylene propylene diene monomer liner and berm or similar product to assure that prophylactic containment would be established prior to refueling or equipment maintenance involving fluids. On-site equipment would be parked in these containment areas when not in use. A plan would be prepared for immediate containment and cleanup of hazardous material spills within or adjacent to each site.
- Project-related vehicles would observe a 15-mile-per-hour speed limit in all project areas, except on city or county roads and state and federal highways. Off-road traffic outside of designated project areas would be prohibited.
- To avoid or minimize attracting predators of the CRLF and Alameda whipsnake, all food-related trash items, such as wrappers, cans, bottles, and food scraps, would be disposed of in a securely covered container. These containers would be emptied and debris removed from the project area at the end of each workday. All project-related debris, such as extra logs, equipment, or fuel-reduction-related materials, would be removed from the work site upon completion of the project.
- BMPs, as identified by the San Francisco Bay Regional Water Quality Control Board, would be implemented to control erosion during and after vegetation removal.
- The spread or introduction of exotic plant species would be reduced by minimizing disturbance to areas during and following fuel reduction treatments. During the course of

post-treatment monitoring, each site would be inspected for the presence of newly established populations of threatened and endangered species as a result of the fuel reduction prescriptions. Additionally, each area would be inspected for evidence of severe erosion as a result of the vegetation management. If severe erosion is occurring at a site, only native plant seeds or stock would be used for erosion control, unless otherwise approved by USFWS. If necessary, fencing, signs, maintenance, access control, vegetation management, exotic species control, or any other commonly used erosion control technique may be used to promote the ecological health of the sites.

- Stump application of Garlon<sup>®</sup> 4, Stalker<sup>®</sup>, or RoundUp<sup>®</sup> would be conducted by a qualified licensed pest control applicator. No herbicide spraying or foliar application would occur. Herbicides would not be applied directly to water or to plants within 50 feet of standing water or an ephemeral stream.

As a condition of the FEMA grant, UC would be responsible for incorporating the avoidance and minimization measures into project design and implementation.

No adverse indirect effects are anticipated. Therefore, no measures are proposed to avoid or minimize indirect effects.

Implementation of the proposed avoidance and minimization measures would reduce the potential of the Proposed Action to adversely affect the Alameda whipsnake and CRLF. In addition, the Proposed Action is likely to have substantial beneficial effects to the Alameda whipsnake over the long term by promoting native habitats more conducive to the Alameda whipsnake and by reducing the fuel load and risk of intense wildfire. Therefore, FEMA determined that the Proposed Action is not likely to adversely affect, directly or indirectly, the Alameda whipsnake or CRLF.

FEMA prepared a Biological Assessment for the Proposed Action and requested informal consultation with the USFWS on April 25, 2006. By letter of July 24, 2006, USFWS did not concur with FEMA's determination that the Proposed Action is not likely to adversely affect the Alameda whipsnake or CRLF. FEMA and USFWS then entered into formal consultation and exchanged information about the affected species, the Proposed Action, and proposed avoidance and minimization measures. In a BO dated August 3, 2007, USFWS concluded that the Proposed Action is not likely to jeopardize the continued existence of the Alameda whipsnake or CRLF and would not result in the destruction or modification of critical habitat designated for the Alameda whipsnake (Appendix B). In the BO, the USFWS issued an incidental take statement and stipulated the implementation of all avoidance and minimization measures summarized above. Upon reviewing the BO, UC appealed for a substitution to one of the stipulations regarding refueling vehicles. FEMA requested an amendment to the BO on November 2, 2007. USFWS provided an amendment to the BO for this stipulation on December 17, 2007 (Appendix B). A copy of the BO and amendment would remain on site during project activities.

#### 4.1.5 Alternative 3: Modified Methods

The actions that would cause impacts to biological resources under Alternative 3 are similar to those described under the Proposed Action, but would happen to a lesser extent because 70

percent of the vegetation proposed in Alternative 2 would be removed. Similar impacts and avoidance and minimization measures as described in Alternative 2 would apply to Alternative 3. In the event this alternative were selected, FEMA would notify USFWS to confirm that the BO would apply to Alternative 3.

## 4.2 GEOLOGY, SEISMICITY, AND SOILS

### 4.2.1 Geology

The project area is located along the western part of the Berkeley Hills, along the foothill of San Pablo Ridge. Grizzly Peak is located north of the project area and has an elevation of 1,754 feet (535 meters). The Berkeley Hills lie on the outskirts of the Mount Diablo Mountain Range, a geologic formation that runs from the northwest to the southeast, along the eastern margins of San Francisco Bay. The Mount Diablo Mountain Range is part of the Central Coast Range, which forms part of the western “wall” of the Central Valley. The range averages 3,000 to 4,000 feet with the elevations in the project area ranging from 1,080 to 1,440 feet.

Geologic deposits in the project area consist primarily of the Cretaceous age Great Valley Group with a relatively small area of Jurassic age keratophyre and ophiolite at the western end of Strawberry Canyon (Graymer 2000). The Great Valley Group is moderately to highly susceptible to landslides and soil erosion (Springer et al. 1992).

The Great Valley Group was deposited on submarine fans that occupied a basin adjacent to the Franciscan trench. The depositional mechanism was turbidity currents that laid down alternating sequences of sandstone, siltstone, and claystone. In areas of high current energy, the deposits were largely sandstone. The lithology was dominated by claystone and siltstone in low energy areas. Areas underlain by Great Valley claystone and siltstone are prone to landsliding and soil creep. Areas underlain primarily by sandstone are relatively more stable but may be susceptible to rock falls and landslides where the strata are at an unfavorable orientation.

### 4.2.2 Seismicity

Strawberry Canyon lies in a region of high seismicity. The entire area would experience strong ground shaking in the event of an earthquake. Low-lying areas underlain by soft soils would tend to have more intense shaking than areas underlain by bedrock. However, strong ground shaking is a significant hazard throughout the region. Strong ground shaking can trigger landslides on hillsides and cause liquefaction of saturated granular soils. According to the Seismic Hazard Zones official map, the project area is an area of historic occurrences of earthquake-induced landslides and liquefaction (California Geological Survey 2003).

The major underlying fault in the Berkeley Hills is the Hayward Fault. The Hayward Fault trends northwest to southeast along the base of the Berkeley Hills and is a branch of the San Andreas Fault System. It has the potential to produce an earthquake of approximately magnitude 7.5 on the Richter scale. Traces of the Wildcat Fault, also part of the San Andreas system, lie west of the project area at the base of the Berkeley Hills, but no evidence exists that the fault is active in this area. Shorter, apparently inactive, subsidiary faults also transect the relatively flat land west of the project area.

The San Andreas Fault zone, which has potential for a magnitude 8.3 earthquake, lies about 20 miles (32 kilometers) west of the project area, offshore beyond the Golden Gate. The Calaveras Fault, another branch of the San Andreas, lies about 15 miles (24 kilometers) east of the site. For an earthquake of any given magnitude, the Hayward Fault would produce the most intense ground shaking at Strawberry Canyon because of its proximity. The Working Group on Earthquake Probabilities (1999) calculated a 70 percent probability of one or more major earthquakes on one or more of the regional faults by the year 2030.

### 4.2.3 Soils

The project area contains several soil types that are underlain by metasedimentary rock. Bedrock is generally found 1 to 4 feet below ground surface. The project area is mostly located on hillsides and near the tops of ridges where the erosion hazard is characterized as high to very high because of the shallow soils and steep slopes (Soil Conservation Service 1977, 1981). The soils generally have between 75 and 100 percent vegetative cover including grasses, forbs, shrubs, trees, and leaf litter.

The most extensive soil types in the project area include the Gilroy clay loam and Maymen loam. Both of these soils are generally shallow to bedrock and have moderate infiltration rates (runoff occurs during prolonged or shorter, intense precipitation events). The Gilroy clay loam is more susceptible to compaction than loamy or sandy soils. Other surficial geologic units in the project area that soils have formed in or that may be exposed at the surface include artificial fill, colluvium (a loose deposit of rock debris), and landslide deposits.

Unstable soils and geologic conditions have historically resulted from vegetation removal associated with wildfires, timber harvesting, mining, and grading as part of road building and site development. Depending on local topographic, geologic, and hydrological conditions, precipitation events can worsen unstable conditions, resulting in increased surface erosion, landslides, and mudslides.

### 4.2.4 Alternative 1: No Action

Under the No Action Alternative, the impacts to soils and geology within the project area would remain the same as existing conditions. However, the area would continue to be susceptible to surface erosion, compaction, landslides, and mudslides triggered by slope instability due to removal of vegetation by fire and by heavy equipment associated with fire fighting.

### 4.2.5 Alternative 2: Proposed Action

#### 4.2.5.1 *Geology & Seismicity*

The Proposed Action would reduce the potential for a catastrophic wildfire to occur in the future. Under the Proposed Action, the potential for rockfalls, landslides, and debris flows triggered by seismic events is slightly greater than under the current conditions of the No Action Alternative due to the removal of vegetation and movement of heavy equipment on hill slopes. However, implementation of the Proposed Action would substantially decrease the potential for slope instability (e.g., landslides, debris flows, rockfalls) caused by a wildfire. The mitigation

measures (below) that would be implemented to reduce impacts to soils would also reduce the potential for slope instability under the Proposed Action.

#### 4.2.5.2 Soils

Under the Proposed Action, potential impacts to soils include:

- Increased water and wind erosion of soils denuded of vegetation by logging equipment and/or vehicle traffic, especially along skid roads
- Compaction of soils by logging equipment or hand crews
- An increased risk of shallow landslides or debris flows triggered by precipitation from areas where the ground surface has been disturbed and/or vegetation removed
- The potential for incidental introduction of herbicide into soils at sites where herbicides are used to control regeneration of eucalyptus sprouts

UC would be responsible for developing and implementing an erosion control plan for all sites proposed for vegetation removal that would include BMPs to minimize soil loss and sedimentation. BMPs such as mulch or weed-free straw may be used to provide groundcover where soils have been exposed at the surface without effective vegetation coverage. Other BMPs to prevent erosion include minimizing the construction of new skid trails; keeping foot and vehicular traffic on designated landings, trails, roads, and staging areas to the extent possible; and leaving shredded, cut, and lopped material on site. Soil erosion and the potential for debris flows would also be reduced by leaving the tree stumps/root systems in place until vegetation becomes reestablished in the logged areas. Placing a deep bed of chips in areas around stumps would permit the mechanical skidders to travel atop the chip bed, avoiding excavation and soil disturbance that would be otherwise required by removing the stumps. UC would also apply the campus Stormwater Pollution Prevention Specifications, which include by reference the *Manual of Standards for Erosion and Sediment Control* (Association of Bay Area Governments 1995).

To minimize compaction, all access, staging, log skidding, and stockpiling areas associated with both logging and hand-clearing practices would occur on existing roads or trails to the maximum extent possible. The construction of new skid trails would be limited to the minimum number and minimum width necessary for removal of logs. New skid trails would be located on firm, well-drained soils and grades less than 15 percent, where possible, to minimize erosion and runoff. Where steep grades are unavoidable, grade-breaking techniques and soil-stabilization practices would be implemented along the new skid trails.

Heavy equipment would not operate on slopes steeper than 65 percent, and would not operate on slopes steeper than 50 percent in areas that are unstable. If such areas are unavoidable, specific measures would be developed as situations arise to minimize the effect of operations on slope instability. Tractors would not operate on skid roads or slopes that are so steep as to require the use of the blade for braking.

To avoid incidental introduction into project area soils, herbicide would only be applied by hand by a licensed contractor during the dry season (i.e., August to November).

#### 4.2.6 Alternative 3: Modified Methods

The actions that would cause impacts to soils under Alternative 3 are similar to those described under the Proposed Action, but would happen to a lesser extent because vegetation removal would be 30 percent less. Therefore, a smaller area of potential erosion and compaction would occur. The same measures and BMPs that are described in the Proposed Action would be used to prevent erosion and sedimentation, debris flows, landslides, and compaction to soils under this alternative.

### 4.3 WATER RESOURCES

#### 4.3.1 Hydrology and Water Quality

Average annual precipitation in the project area is approximately 25 inches. Due to the steep topography of the Berkeley Hills, much of the precipitation is transformed into surface-water runoff. The site has two unnamed ephemeral creeks running through it, which join in confluence near the LBNL south of the project area. The creeks begin as captured runoff from Grizzly Peak Boulevard and are contained in aboveground flumes over portions of the FSBP site. Strawberry Creek is approximately 1,800 feet from the project area's closest boundary.

##### *4.3.1.1 Alternative 1: No Action*

Under the No Action Alternative, UC would not undertake vegetation management activities within Strawberry Canyon. No direct impacts to water resources or water quality would occur. However, in the event of a future wildfire, ash, sediment, and burned and unburned vegetation debris would wash into Strawberry Creek, potentially affecting water quality. Hydrology would not be impacted by the No Action Alternative.

##### *4.3.1.2 Alternative 2: Proposed Action*

The Proposed Action would reduce the potential for a catastrophic wildfire to occur in the future. A large-scale wildfire could cause substantial soil erosion and ash deposition into Strawberry Creek and drainages within the project area. With the threat of a wildfire decreased, long-term beneficial indirect impacts to local water resources would be expected.

Potential impacts to water resources under the Proposed Action include increased sedimentation downstream of cleared areas through the removal of protective groundcover and incidental introduction of herbicide into local drainages and/or water basins. Erosion associated with logging, including the use and creation of skid trails and vehicular/equipment traffic, would potentially impact water resources in the form of increased sedimentation downstream of the project area.

To minimize the impacts associated with the Proposed Action, UC would prepare an erosion control plan. The erosion control plan would include erosion control BMPs such as mulch or straw wattles placed on cleared slopes to reduce erosion and sediment movement. In addition, project sites in the vicinity of storm drains would require the installation of storm drain protection prior to the onset of vegetation management activities. UC would also apply the

campus Stormwater Pollution Prevention Specifications, which include by reference the *Manual of Standards for Erosion and Sediment Control* (Association of Bay Area Governments 1995). UC would prepare a hydrologic modification analysis and incorporate a plan to prevent increases of flow from the project area, preventing downstream flooding and substantial siltation and erosion.

To minimize incidental or secondary introduction of herbicide into area drainages or groundwater aquifers, herbicide would only be applied to stumps and resprouts by hand during dry weather and low wind conditions.

Trees growing within 50 feet of a drainage channel would be felled by hand-fellers perpendicular to the ephemeral drainage instead of cleared using mechanical equipment. These trees would be processed by a skidder if the skidder could safely handle the stems at a 50-foot distance from the drainage. If the tree could not be safely handled by mechanized means at a safe distance, the trees would be lopped and scattered by hand fellers. Any drainage with running or standing water would not be crossed by mechanical equipment while water is present. Crossing would not occur until the drainage completely dries out.

Proper road drainage would be included during construction of access roads and skid trails to disperse water and minimize erosion on the road or skid trail surface. The following mitigation measures could be used to reduce impacts to water quality during road construction:

- Road drainage ditches would not drain directly into watercourses.
- Long, continuous grades would be minimized to prevent the buildup of runoff in drainage ditches; where long grades cannot be avoided, close spacing of waterbars, dips, or chutes would be utilized to maximize cross-drainage.
- Soil or deleterious material would not be deposited into or pushed through any watercourse.
- Temporary drainage crossings would be completely removed before winter rains.
- All roads would be adequately and routinely maintained to prevent problems such as washouts, slumping, clogged or bent culverts, and erosion.
- Retained chips would be used to create sediment traps.

Upon abandonment of an access road or skid trail, all refuse and unstable fill material would be removed and the road banks restored to original contours and revegetated, or permanent water bars would be installed.

Chips would be used in sediment trap structures to increase the length of time that the trap functions and the amount of sediment prevented from entering watercourses. In addition to wood chips, large boles, mulch, and duff would also be retained on site to reduce sedimentation.

#### ***4.3.1.3 Alternative 3: Modified Methods***

The actions that would cause impacts to water resources under Alternative 3 are similar to those described under the Proposed Action, but would happen to a lesser extent because vegetation removal would be 30 percent less. Therefore, a smaller area of potential erosion and compaction

would occur. The same measures and BMPs that are described in the Proposed Action would be used to reduce impacts to water quality.

Potential beneficial impacts of Alternative 3 are similar to those described under the Proposed Action. Alternative 3 would also provide long-term beneficial impacts to local water resources.

#### **4.3.2 Executive Order 11988: Floodplain Management**

Executive Order (EO) 11988, Floodplain Management, requires federal agencies to avoid, to the extent possible, the short- and long-term adverse impacts associated with the occupancy and modification of floodplains. FEMA's regulations for complying with EO 11988 are found at 44 CFR Part 9, Floodplain Management and Protection of Wetlands.

FEMA identifies flood hazard areas throughout the United States and its territories by producing Flood Insurance Rate Maps (FIRMs). Strawberry Canyon is located on FIRM Panel Number 065048 0010 B. This FIRM Panel is not printed, and the area that it represents has been labeled Flood Zone C, an area of moderate or minimal hazard from the principal source of flood in the area. Therefore, the project area is not located within a FEMA-designated floodplain.

##### ***4.3.2.1 Alternative 1: No Action***

Maintaining the status quo would not impact a 100-year floodplain.

##### ***4.3.2.2 Alternative 2: Proposed Action***

The proposed project area is not located within a 100-year floodplain. The proposed project does not have the potential to directly or indirectly impact a 100-year floodplain. Therefore, the Proposed Action would comply with EO 11988.

##### ***4.3.2.3 Alternative 3: Modified Methods***

The proposed project area is not located within a 100-year floodplain. Alternative 3 does not have the potential to directly or indirectly impact a 100-year floodplain. Therefore, Alternative 3 would comply with EO 11988.

#### **4.3.3 Executive Order 11990: Protection of Wetlands**

EO 11990 requires federal agencies to take action to minimize the destruction or modification of wetlands by considering both direct and indirect impacts to wetlands that may result from federally funded actions. FEMA's regulations for complying with EO 11990 are found at 44 CFR Part 9, Floodplain Management and Protection of Wetlands.

An approximately 0.002-acre area associated with a small drainage in the southern project area may be considered a jurisdictional, riverine wetland. This area has a few freshwater wetland species and seasonally contains water. The seasonal water source may have created hydric soil conditions.

#### *4.3.3.1 Alternative 1: No Action*

Maintaining the status quo would not directly impact wetlands in the project vicinity. In the event of a catastrophic wildfire, burned vegetation and eroded soils could fill wetlands.

#### *4.3.3.2 Alternative 2: Proposed Action*

In compliance with EO 11990, FEMA considered the Proposed Action's impacts to wetlands. FEMA applies the Eight-Step Decision-Making Process to ensure that it funds projects that are consistent with EO 11990. The NEPA compliance process involves essentially the same basic decision-making process to meet its objectives as the Eight-Step Decision-Making Process. Therefore, the Eight-Step Decision-Making Process has been applied through implementation of the NEPA process.

Prior to project implementation, the location of the wetland would be clearly indicated on project plans. The USFWS-approved biologist would delineated the wetland and a 10-foot-radius buffer with high visibility, temporary, orange-colored fence at least 4 feet in height, flagging, or other type of barrier. No work would occur within the delineated area. Herbicides would not be applied to plants within 50 feet of the wetland. Implementation of these measures would avoid impacts to wetlands.

FEMA published an Initial Public Notice at the declaration of the disaster. FEMA would ensure publication of a Final Public Notice in compliance with EO 11990 before implementation of the Proposed Action. The Proposed Action would comply with EO 11990.

#### *4.3.3.3 Alternative 3: Modified Methods*

Under Alternative 3, impacts to wetlands would be avoided and compliance with EO 11990 would be met as described for the Proposed Action.

## **4.4 AIR QUALITY**

The Clean Air Act is a comprehensive federal law that regulates air emissions from area, stationary, and mobile sources. It authorizes the USEPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment. The NAAQS include standards for the following five criteria pollutants: nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), and particulate matter less than 10 micrometers in diameter (PM<sub>10</sub>). In addition, new NAAQS for O<sub>3</sub> and particulate matter less than 2.5 micrometers in diameter have been proposed but not yet implemented. Areas where the monitored concentration of a pollutant exceeds the NAAQS are classified as being in nonattainment for that pollutant. If the monitored concentration is below the NAAQS, the area is classified as being in attainment.

The study area for the proposed project is within the jurisdiction of the Bay Area Air Quality Management District and is unclassified or classified as being in attainment of all federal standards except for O<sub>3</sub> (California Air Resources Board 2006).

Prior to approval of any federal action, the General Conformity Rule (GCR) (Title 40 CFR Part 51.853) requires that the responsible federal agency of an undertaking make a determination of conformity with the State Implementation Plan. Each action must be reviewed to determine whether it qualifies for an exemption listed in the GCR, results in emissions that are below specific emissions thresholds, or would produce emissions above the threshold applicable to the specific area that then would require a conformity analysis.

Forests both emit and sequester carbon dioxide (CO<sub>2</sub>), a greenhouse gas linked to climate change. Carbon is sequestered from the atmosphere in trees as they grow and at the end of their life, if the tree falls naturally, that carbon is partially deposited into soils and partially released to the atmosphere during decay. This is part of the natural carbon cycle in which carbon is captured and released through the atmosphere, oceans, and terrestrial systems. When a tree's life cycle is interrupted, such as by harvesting or burning, the net change in carbon emission versus carbon sequestration depends on what occurs to the tree (e.g., being removed from site, left on site, being combusted) and what is the future land use (e.g., replacement of vegetation, development).

#### 4.4.1 Alternative 1: No Action

Under the No Action Alternative, no pollutant emissions would directly impact air quality. However, in the event of a wildfire, the resulting smoke would cause temporary adverse impacts to air quality. Smoke from a fire consists of CO<sub>2</sub>, water vapor, particulates (some of which contain volatile organic compounds [VOCs]), and CO. The amount of carbon and particulates emitted during a major firestorm would be substantial. In addition, exhaust from support vehicles used in fighting the wildfire would cause a slight, temporary increase in CO<sub>2</sub>, PM<sub>10</sub>, CO, NO<sub>2</sub>, SO<sub>2</sub>, and O<sub>3</sub> precursors. Soils exposed by a wildfire would increase PM<sub>10</sub> levels through wind erosion. Finally, reconstruction of damaged structures would result in substantial emissions of CO<sub>2</sub>, PM<sub>10</sub>, CO, NO<sub>2</sub>, SO<sub>2</sub>, and O<sub>3</sub> from the production of construction materials (e.g., lumber, metal, cement) and the equipment involved in the construction process.

#### 4.4.2 Alternative 2: Proposed Action

Impacts to air quality associated with the vegetation removal techniques under the Proposed Action would include a temporary increase in PM<sub>10</sub> from exposed soil and/or tree-felling and skidding activities as well as negligible increases of PM<sub>10</sub>, CO, NO<sub>2</sub>, SO<sub>2</sub>, and O<sub>3</sub> precursors from mechanical equipment exhaust. UC would implement the following BMPs to reduce fugitive dust emissions and emissions from mechanical equipment:

- All on-site unpaved roads and off-site unpaved access roads would be effectively stabilized of dust emissions using water or (nontoxic) chemical stabilizer/suppressant.
- When materials are transported off site, all material would be covered or at least 2 feet of freeboard space from the top of the container would be maintained.
- All land clearing, grubbing, land leveling, and grading would be effectively controlled of fugitive dust emissions utilizing application of water or by presoaking.

- All operations would limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets as necessary.
- Traffic speeds on unpaved roads would be limited to 15 miles per hour.
- Sandbags or other erosion control measures would be installed to prevent silt runoff to public roadways from sites over a 1-percent grade.
- Idling time of equipment would be minimized when not in use.
- To the extent that equipment is available and cost effective, contractors would be required to use alternate fuels and retrofit existing engines in equipment.
- To the extent practicable, operations of heavy-duty equipment would be managed to reduce emissions, including use of particulate traps.

Table 2 presents emissions of criteria pollutants based on one feller-buncher, two skidders, and two chippers operating for 1,600 hours per year. Emissions rates are from the South Coast Air Quality Management District and were developed from the California Air Resources Board off-road vehicle emissions model. The USEPA publishes significance criteria for emissions, which have been included for comparison.

**Table 2  
Emissions from Project Equipment**

Equipment	CO		NO <sub>x</sub>		PM <sub>10</sub>		SO <sub>x</sub>		VOCs	
	Emission Rate	Emissions	Emission Rate	Emissions	Emission Rate	Emissions	Emission Rate	Emissions	Emission Rate	Emissions
	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)
Feller-buncher	0.716	0.286	2.011	0.804	0.097	0.039	0.310	0.124	0.176	0.070
Skidders	0.716	0.573	2.011	1.609	0.097	0.078	0.310	0.248	0.176	0.141
Chippers	0.877	0.702	1.796	1.437	0.128	0.102	0.268	0.214	0.228	0.182
<b>Total</b>		<b>1.561</b>		<b>3.850</b>		<b>0.219</b>		<b>0.586</b>		<b>0.394</b>
USEPA Significance Level (tons/year)		<b>100</b>		<b>40</b>		<b>15</b>		<b>40</b>		<b>40</b>

Source: South Coast Air Quality Management District 2006.

Notes: Values for skidders and feller-bunchers were not available. The “off-highway tractors” category was used to obtain the emission factors for these pieces of equipment.

As shown in Table 2 above, emission levels are estimated to be well below the levels designated by the USEPA as significant. In addition, the total emissions of all criteria pollutants generated from these activities are estimated to be 6.6 tons per year, which is far below the 100 tons per year threshold levels of all criteria pollutants for GCR. Therefore, FEMA has determined that the Proposed Action would comply with the GCR; air quality impacts as a result of implementation of this alternative would be temporary and minimal.

No impacts to air quality are expected from herbicide use due to the small-scale, localized, hand-applied methods and the nonvolatile nature of the herbicide. Also, the particle size of the herbicide spray would cause it to sink, so it would not affect air quality.

Under the Proposed Action, trees would be removed, but the area would be reforested. Since no land use change would occur and the forest would be replaced, no net loss in land carbon sequestration capability would occur. Also, since the removed trees would be retained on site, a portion of the sequestered carbon would return to the soil and become available for the emergent native vegetation. Another benefit of retaining the biomass on site is that greenhouse gasses associated with fossil fuels would not be emitted as a result of transporting the materials to a disposal location.

The replacement forest of native species would have less biomass than the exotic eucalyptus-dominated forest and, in the event of a wildfire, would burn less frequently and in smaller conflagrations of lower intensity, resulting in a substantially lower release of carbon and particulates. These reduced wildfire characteristics would likely offset the reduction to atmospheric carbon represented by the reduced forest biomass and associated carbon sequestration potential. As described above, the fossil fuels and energy needed to rebuild structures lost to a wildfire would have an enormous cost in terms of the greenhouse gas emissions associated with construction and building material manufacturing. Reducing the risk and severity of wildfire through the proposed vegetation management activities minimizes the threat to property and greenhouse gas emissions associated with rebuilding.

#### **4.4.3 Alternative 3: Modified Methods**

Under Alternative 3, potential impacts to air quality would be similar to those described under the Proposed Action. These impacts include a temporary increase in PM<sub>10</sub> from exposed soil and negligible increases in CO<sub>2</sub>, PM<sub>10</sub>, CO, NO<sub>2</sub>, SO<sub>2</sub>, and O<sub>3</sub> precursors from mechanical equipment. To minimize the effects to air quality, UC would maintain properly tuned mechanical equipment, minimize idling time of support vehicles, and employ dust control measures, such as watering staging areas, as necessary. Impacts to air quality due to clearing activities would be slightly less under Alternative 3 than under the Proposed Action as activity levels would be reduced. As described for the Proposed Action, emissions from Alternative 3 would be below the threshold level for the GCR and this alternative would also comply with the GCR. However, the potential for negative impacts on air quality due to fires would be slightly higher than with the Proposed Action.

### **4.5 CULTURAL RESOURCES**

Consideration of impacts to cultural resources is mandated under Section 106 (Title 16 United States Code Section 470f) of the National Historic Preservation Act (NHPA) and implemented by 36 CFR Part 800. Requirements include identifying significant historic properties and districts that may be affected by a federal undertaking and mitigating adverse effects to those resources.

To identify previously recorded resources and develop a cultural and historical context for the project, a records search for archaeological and historical sites was conducted. The search yielded two prehistoric sites within a ¼-mile radius of the proposed project.

In addition, an archaeological survey of the project area was undertaken on December 6 and 9, 2005, by FEMA's archaeological consultant, URS Corporation. Surface visibility was variable within the area of potential effect, and no new sites were discovered during the survey.

Detailed results of the literature review and pedestrian survey are documented in *Final Cultural Resources Technical Report: Fire Mitigation, The Regents of the University of California, PDMC-PJ-09-CA-2005-003 & -011* (FEMA 2006).

#### 4.5.1 Alternative 1: No Action

Under this alternative, no federal undertaking would occur. Therefore, compliance with Section 106 of NHPA would not be required.

#### 4.5.2 Alternative 2: Proposed Action

Because the previously recorded prehistoric sites are beyond the limits of the project area, they would not be adversely affected by the proposed projects. No new sites were discovered during the archaeological survey of the area of potential effect. FEMA thus determined that no properties eligible for the National Register of Historic Places would be affected by the Proposed Action.

Pursuant to the revised implementing regulations of the NHPA, found at 36 CFR Part 800.4(a)(4), FEMA contacted the California Native American Heritage Commission (NAHC) on October 18, 2005, to request a review of its Sacred Lands File and to receive a list of the individuals and groups that the NAHC believes should be contacted regarding information or concerns related to the project areas. The NAHC responded on October 26, 2005, with negative results for its search of the Sacred Lands File. On December 13, 2005, URS Corporation transmitted an informational letter to the eight potentially interested parties identified by the NAHC. FEMA received no responses to the informational letter.

FEMA initiated consultation with the California State Historic Preservation Officer (SHPO) for the Proposed Action on March 8, 2006. Based on information provided by FEMA, the SHPO concurred on March 20, 2006, with FEMA's determination (Appendix C).

Prior to project activities, UC would notify contractors that they are required to watch for potential cultural resources and to notify UC immediately if any are found. If cultural resources are revealed during project activities, work in the discovery vicinity would be halted, and UC would take all reasonable measures to avoid or minimize harm to the discovered resource until FEMA further consults with the SHPO. UC would notify the California Governor's Office of Emergency Services and FEMA immediately of the discovery. In the event human or suspected human remains are discovered, UC would notify the Alameda County Coroner, who would determine whether the remains are subject to his or her authority. The coroner would notify the NAHC if the remains are Native American.

### 4.5.3 Alternative 3: Modified Methods

The impacts associated with Alternative 3 would be similar to those associated with the Proposed Action, with Alternative 3 resulting in less ground disturbance than the Proposed Action. Therefore, Alternative 3 is not expected to affect historic resources. Unanticipated discoveries would be treated as described for the Proposed Action. In the event this alternative were selected, FEMA would notify SHPO to confirm that its concurrence with FEMA's determination would apply to Alternative 3.

## 4.6 VISUAL RESOURCES

Scenic values have historically not had the same level of policy recognition as other environmental values. Nonetheless, a visual assessment was performed to identify, describe, and map visual resources that might be affected by the alternatives.

The project area is located on a south-facing slope in the East Bay Hills. The area is bounded by Grizzly Peak Boulevard to the north, City of Berkeley neighborhoods to the west, and the LBNL to the south. The FSBR is located within the eastern project area. Elevations in the project area range from 1,080 to 1,440 feet.

The vegetation within the project area is dominated by large stands of eucalyptus and California bay laurel trees. Coast live oak, blue elderberry, Monterey pine, acacia, coyote brush, and introduced herbaceous species are also present.

The visual quality within the project area is typical for the vicinity. Hilly landforms, vegetation cover, and suburban development are common within the regional landscape. The vegetation creates a dense medium texture of landcover and provides a visual continuity or flow of pattern. The most frequent view is of nearby hillsides, valleys, roads, and residences. Certain vista points offer excellent views of San Francisco, Oakland, the Marin Headlands, the Golden Gate, San Francisco Bay, and Mount Diablo. These vista points provide views of outstanding visual quality. However, these areas of outstanding visual quality are defined by the lack of vegetation and the exposure to vistas outside of the project area. At sunset, these views are of exceptionally high quality.

Viewer groups generally include recreational users (joggers, hikers, cyclists); travelers utilizing roadways (such as Grizzly Peak Boulevard); students and staff at the University of California, Berkeley; sightseers; and residents in the neighboring communities. Due to the hilly terrain and vegetation cover, the project viewshed is generally limited to a foreground view distance (about 0.25 mile or less) from trails, roads, and residences to and within the project area. Exceptions are areas devoid of vegetation and at sufficient elevation to allow distant views. These areas, such as Grizzly Peak Boulevard turn-offs, attract sightseers, who are especially common at sunset. Views from outside the project area looking in are generally limited by terrain, vegetation, and structures. Residential developments with a view of the area where vegetation removal would occur are limited.

#### 4.6.1 Alternative 1: No Action

Under the No Action Alternative, vegetation removal would not occur and the visual appearance of Strawberry Canyon would remain as it currently exists. The risk of wildfire would also remain. A fire would adversely affect views from surrounding neighborhoods, trails, and roadways. In the event of an uncontrolled wildfire, the resulting smoke would cause temporary, adverse impacts to visual resources. The footprint of an area burned by a wildfire would remain visibly black at least until the next growing season. A wildfire would also create openings in land cover and increase exposure to distant vistas.

#### 4.6.2 Alternative 2: Proposed Action

The Proposed Action would change the existing visual quality of the landscape. The vegetation is currently very dense, and the removal of large trees would decrease the volume of the vegetation, creating more openings in the land cover, in the short term. Viewers from roadways, trails, facilities, and residences in and around the project area would have increased exposure to more distant vistas. Most viewers would consider this a beneficial impact as the distant views of the greater San Francisco Bay area have a more exception visual quality than foreground views of the trees themselves.

Over several growing seasons, as fire-resistant native species such as oak trees grow, vegetation would fill in, and distant views would be diminished. In the long term, the visual quality would again be primarily limited to the foreground. However, the area would have a more complex visual pattern and dimensional shape because the eucalyptus-dominated forest would be replaced with California bay laurel, oak, big-leaf maple, California buckeye, and California hazelnut. Finally, chips would be raked over the finished surface to follow the natural contour of the slope. As the chips decompose, the contour of the slope would appear as it existed prior to tree removal.

#### 4.6.3 Alternative 3: Modified Methods

The impacts associated with Alternative 3 would be similar to those of the Proposed Action. However, this alternative would have less visual impact than the Proposed Action, as only 70 percent removal of exotic species would occur.

### 4.7 SOCIOECONOMICS AND SAFETY

The project area is located in Alameda County. According to Census 2000, the total population of Alameda County is 1,443,741, the median age is 34.5, 49.1 percent of the population is male, and 48.8 percent of the population considers itself one race and white. In addition, 20.4 percent considers itself one race and Asian, and 14.9 percent considers itself one race and black or African American (U.S. Bureau of the Census 2000).

The project area is located on a south-facing slope in the East Bay Hills. The area is bounded by Grizzly Peak Boulevard to the north, City of Berkeley neighborhoods to the west, and the LBNL to the south. The FSBR is located within the eastern project area.

**4.7.1 Executive Order 12898: Environmental Justice**

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations directs federal agencies to make achieving environmental justice part of their missions by identifying and addressing, as appropriate, disproportionately high adverse human health, environmental, economic, and social effects of its programs, policies, and activities on minority and low-income populations.

Socioeconomic and demographic data for residents in the project vicinity were studied to determine if a disproportionate number (defined as greater than 50 percent) of minority or low-income persons have the potential to be affected by the proposed alternatives. A comparison of relevant environmental justice indicators is shown in Table 3. Review of these indicators was based on countywide information and census tract information. The majority of the project area is contained within Census Tract 4001, with small portions residing in Census Tracts 4216 and 4226.

Table 3 indicates that the proposed project area does not have a majority of low-income persons, disabled persons, elderly persons, or persons with limited English-speaking ability. However, Census Tract 4226, which contains a small portion of the project area, has a population that is greater than 50 percent minority race.

**Table 3  
Comparison of Environmental Justice Indicators**

<b>Indicator</b>	<b>Alameda County</b>	<b>Census Tract 4001</b>	<b>Census Tract 4216</b>	<b>Census Tract 4226</b>
Total Population	1,443,741	2,498	3,555	688
Nonwhite Persons	51.2 %	19.7 %	16.7 %	51.2 %
Persons of Hispanic Origin	19.0 %	3.9 %	3.0 %	7.8 %
Persons Over Age 5 who Speak English "Less Than Very Well"	17.7 %	1.9 %	3.2 %	10.6 %
Persons Aged 65 years and over	10.2 %	18.0 %	19.3 %	0.1 %
Disabled Persons *	18.3 %	6.2 %	6.1 %	4.9 %
Persons in Households with Public Assistance Income	4.2 %	0.6 %	0.5 %	0.0 %
Families with Income Below Poverty Level	7.7 %	0.7 %	3.6 %	0.0 %

\* Civilian noninstitutionalized persons aged 16 to 64 years.  
Source: U.S. Bureau of the Census 2000

**4.7.1.1 Alternative 1: No Action**

Under the No Action Alternative, vegetation removal would not occur, and the potential for wildfire would remain. Because no federal activity would occur, no requirement for compliance with EO 12898 exists.

**4.7.1.2 Alternative 2: Proposed Action**

As described above, most of the project vicinity does not have a disproportionate number of minority, low-income, disabled, or elderly persons, or persons with limited English-speaking ability. One census tract, which contains a small portion of the project area, demonstrates a greater than 50 percent minority population. However, most impacts from the Proposed Action would be beneficial. Reduction of fire hazard would minimize the potential damage to businesses and homes in the event of a fire. The implementation of the proposed project would provide a limited number of job opportunities to the community through the use of local logging contractors.

The project may involve the closure of Centennial Drive for a few hours at a time during project activities. However, adverse impacts, such as road closures and construction noise, would be temporary and mitigated as discussed in Sections 4.10 and 4.11. Measures would be taken to ensure the safety of the community during the implementation of the proposed project, as discussed in Section 4.7.3.

**4.7.1.3 Alternative 3: Modified Methods**

Under Alternative 3, impacts to socioeconomics would be similar to those described under the Proposed Action.

**4.7.2 Property Values**

The median value for specified owner-occupied units, as determined by Census 2000, is listed in Table 4.

**Table 4  
Comparison of Median Home Values**

<b>Indicator</b>	<b>Alameda County</b>	<b>Census Tract 4001</b>	<b>Census Tract 4216</b>	<b>Census Tract 4226</b>
Median Home Values	\$303,100	\$695,900	\$522,300	\$225,000

#### *4.7.2.1 Alternative 1: No Action*

Under the No Action Alternative, vegetation removal would not occur, and the potential for a catastrophic wildfire would remain high. A wildfire in the project area has the potential to reduce property values.

#### *4.7.2.2 Alternative 2: Proposed Action*

Implementation of the proposed project would result in a decreased risk of a catastrophic wildfire. Any adverse impacts due to vegetation management activities would be temporary. The Proposed Action is not expected to decrease property values. The Proposed Action would reduce the risk of property damage by fire.

#### *4.7.2.3 Alternative 3: Modified Methods*

Under Alternative 3, impacts to property values would be similar to those described under the Proposed Action.

### **4.7.3 Public Safety**

The East Bay Hills' hot and dry summers, wind-conducive topography, flammable vegetation, dense development, and limited fire-fighting access contribute to making the area a substantial regional fire danger. Between 1905 and 1993, 16 major wildfires occurred in the East Bay Hills, burning over 14,000 acres, destroying 3,500 homes, and killing 25 people. The project area is also near the site of, and displays similar fire risk conditions to, the catastrophic 1991 Tunnel Fire that resulted in the highest destruction of California homes per acre. Currently, a public safety threat exists for the residents, students, and facilities that exist in and around the project area.

#### *4.7.3.1 Alternative 1: No Action*

Under the No Action Alternative, vegetation removal would not occur, and the potential for wildfire would remain and continue to threaten the lives and safety of the public. In the event of an uncontrolled wildfire, the health and safety of people in the vicinity would be threatened.

#### *4.7.3.2 Alternative 2: Proposed Action*

Public safety in and around Strawberry Canyon would likely be improved by the removal of highly flammable vegetation across the 58-acre project area. In addition to promoting fire prevention, the removal of large trees in the project area could provide benefits to public safety. In the event of high winds, wind throw could cause breakage of branches or topple entire trees. The removal of large trees can reduce the potential damage associated with wind throw. The proposed project would also make the area more accessible to emergency vehicles in the event of a fire or other emergency within the project area.

To protect the health and safety of the community around the project area, the following measures would occur under the Proposed Action:

- The work areas and other public hazards would be barricaded and properly marked with warning signs.
- Trucks traveling through the area would maintain legal and safe speeds.
- Herbicides would be used according to the prescribed directions for the product by a licensed applicator.
- Soils would be swept off all public roads, including shoulders, at the end of each work day.

#### *4.7.3.3 Alternative 3: Modified Methods*

Under Alternative 3, impacts to public safety would be similar to those described under the Proposed Action.

## **4.8 PUBLIC SERVICES**

The proposed project area is owned by UC. Areas within Strawberry Canyon are open for the use and enjoyment of the general public. As such, they provide a unique public service for the residents of neighboring communities. Recreational opportunities within the project area include hiking, running, bicycling, nature study, and wildlife viewing along designated paved and dirt roads. Various sports and recreational programs are provided to all ages through the Strawberry Canyon Recreational Area east of the UC Memorial Stadium and west of the project area – some of these programs utilize lands within Strawberry Canyon. UC provides its own police service but relies on the Cities of Berkeley and Oakland and the County of Alameda for other emergency services (e.g., medical and fire). Centennial Drive is a paved public road that passes through Strawberry Canyon and is used for transportation, especially during morning and afternoon rush hours.

### **4.8.1 Alternative 1: No Action**

Under the No Action Alternative, no vegetation management activities would occur. Therefore, public services would not be directly affected. In the event of a future wildfire, Strawberry Canyon may be closed to all public and private transportation and recreational users for safety purposes. Recreational opportunities such as running and utilization by UC programs could be diminished for years after a wildfire. Emergency services would be called into action in the event of a wildfire, potentially putting at risk these resources.

### **4.8.2 Alternative 2: Proposed Action**

During implementation of the Proposed Action, portions of the project area would be closed and safeguarded using appropriate signage, temporary fencing, and/or flagging crews. Logging activities would be conducted by a licensed, professional tree service, and herbicide application would be conducted by licensed contractors or authorized, licensed staff. Centennial Drive would be closed during portions of the work to allow trees growing close to the road to be felled onto the pavement and skidded by means of the paved road. Because the road is owned by UC, permission for closure is readily attainable. The closure of Centennial Drive would typically happen for 5-hour periods between morning and afternoon rush hours. To ensure adequate access

for emergency vehicles when project activities would result in temporary land or roadway closures, UC would consult with the Berkeley and Oakland fire departments and the Alameda County Fire Department to evaluate alternative travel routes and temporary lane or roadway closures prior to the start of activities. UC would ensure that the selected alternative travel routes are not impeded by UC activities.

#### **4.8.3 Alternative 3: Modified Methods**

Under Alternative 3, impacts to public services would be similar to those described under the Proposed Action.

### **4.9 LAND USE AND PLANNING**

The project area is predominantly vegetated and undeveloped, with some land used for educational facilities, trails, and roads. The project area is owned and maintained by UC. Residential and other development are located in the project vicinity.

The majority of the project area is located in a “Research Area” according to the 2020 Long Range Development Plan (University of California, Berkeley 2005a). The northwest portion of the project area is designated as “Reserve Study Area.” The Research Area within the project area includes the FSBR. UC proposes “a modest amount of net new capacity” in the Research Area; however “this growth should be limited to future expansion of existing...programs and other programs that may benefit from a setting removed from the busy urban environs of the campus” (University of California, Berkeley 2005a). Reserve Study Areas are set aside for further study but UC has no plans to change land use or develop these areas before 2020. Within both Research Areas and Reserve Study Areas, UC has a policy to manage the landscape to reduce fire risk and restore native vegetation, such as by selective replacement of high-hazard, exotic species with native species (University of California, Berkeley 2005a).

#### **4.9.1 Alternative 1: No Action**

Under the No Action Alternative, no impacts to existing land ownership, jurisdiction, or land uses would occur.

#### **4.9.2 Alternative 2: Proposed Action**

Implementation of the Proposed Action would not introduce any new structures or access barriers, result in the displacement of people or facilities, disrupt the cohesion of a community, or otherwise modify the existing land use of the project area. The Proposed Action would comply with the 2020 Long Range Development Plan.

#### **4.9.3 Alternative 3: Modified Methods**

Under Alternative 3, no impacts would occur to Land Use and Planning, as described under the Proposed Action. Alternative 3 would also comply with the 2020 Long Range Development Plan.

## 4.10 TRANSPORTATION

Within California, a system of federal and state highways provides regional connections, and a network of local major and arterial roads provides internal circulation. No federal or state highways are located within or adjacent to the project area. Grizzly Peak Boulevard runs along the northern project area. Centennial Drive runs through the western project area. Fire trails within the area consist of unimproved dirt roads of approximately 12-foot width. Grizzly Peak Boulevard is a popular route for recreational bicyclists and motor bikers.

### 4.10.1 Alternative 1: No Action

Under the No Action Alternative, no permanent impacts would occur to transportation resources. Roads in and around the project area may be temporarily impeded by smoke, fire, and equipment in the event of a wildfire and potentially closed.

### 4.10.2 Alternative 2: Proposed Action

The Proposed Action may involve the closure of Centennial Drive for a few hours at a time, to allow the cutting and skidding of trees that grow close to the roadway. The inconvenience to commuters would be temporary and limited to low-flow periods. To the extent feasible, UC would maintain at least one unobstructed lane in both directions on campus roadways at all times. At any time only a single lane is available due to road closures, UC would provide a temporary traffic signal, signal carriers (i.e., flagpersons), or other appropriate traffic controls to allow travel in both directions. If activities require the complete closure of a roadway, UC would provide signage indicating alternative routes. In the case of Centennial Drive, any complete road closure would be limited to brief interruptions of traffic required by operations. Soil erosion onto Grizzly Peak Boulevard and Centennial Drive could be hazardous to bicyclists and motor bikers descending through the project area. UC would ensure that all soils on Grizzly Peak Boulevard and Centennial Drive would be swept off the road right-of-way, including shoulders, at the end of every work day.

### 4.10.3 Alternative 3: Modified Methods

Under Alternative 3, impacts to transportation would be similar to those described under the Proposed Action.

## 4.11 NOISE

Noise is federally regulated by the Noise Control Act of 1972. Although this act tasks the USEPA to prepare guidelines for acceptable ambient noise levels, it only charges those federal agencies that operate noise-producing facilities or equipment to implement noise standards. By nature of its mission, FEMA does not have statutes defining noise.

Some land uses are considered sensitive to noise. Noise-sensitive receptors are located at land uses associated with indoor and outdoor activities that may be subject to stress or significant interference from noise. They often include residential dwellings, mobile homes, hotels, motels, hospitals, nursing homes, educational facilities, and libraries. Sensitive receptors for this project would

include residences to the west, the LBNL to the south, and the FSBR facility located within the eastern project area. The primary noise source in the project area is vehicle traffic on Grizzly Peak Boulevard and Centennial Drive. Heating, ventilation, and air-conditioning equipment and industrial machinery associated with LBNL and FSBR facilities are secondary noise sources.

#### 4.11.1 Alternative 1: No Action

Under the No Action Alternative, noise would remain at current levels.

#### 4.11.2 Alternative 2: Proposed Action

Implementation of the Proposed Action would be expected to generate short-term, temporary increases in the ambient noise level immediately near the project area. The primary noise source would be the operation of equipment. Secondary sources would include vehicle traffic and human voices.

The distance between the closest resident and the closest proposed landing site is approximately 200 feet. Activities and noise levels associated with the Proposed Action include cutting trees (63 to 66 decibels at 200 feet), skidding logs (62 to 66 decibels at 200 feet), and chipping logs (75 decibels at 200 feet) (California Department of Forestry and Fire Protection 2005; U.S. Department of the Army and U.S. Army Corps of Engineers 2004; USEPA 1971). For comparison, a person standing next to an operating dishwasher would be subject to approximately 62 to 66 decibels, and someone inside a car with the windows open and traveling 30 miles per hour would experience noise levels of approximately 72 to 76 decibels (Noise Pollution Clearinghouse 2007). All noise-producing equipment and vehicles using internal combustion engines would be equipped with properly operating mufflers and air-inlet silencers, where appropriate, that meet or exceed original factory specification. Idling time of vehicles and other equipment would be minimized when not in use. Clearing and chipping activity would be limited to the hours between 8 am and 5 pm and would only occur on weekdays. Finally, noise associated with project activities would move throughout the 58-acre project area, and no single noise-sensitive receptor would be subject to elevated project-related noise levels for more than a few days or weeks.

#### 4.11.3 Alternative 3: Modified Methods

Under Alternative 3, noise-associated impacts would be similar to those described under the Proposed Action.

### 4.12 CUMULATIVE IMPACTS

The Council on Environmental Quality defines a cumulative impact as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions...” (40 CFR Part 1508.7). The Proposed Action and Alternative 3 were reviewed for their potential to produce cumulative environmental impacts when conducted in conjunction with other past, current, or proposed projects in the project vicinity.

In an effort to manage vegetation and reduce the risk of wildfires in the East Bay Hills region, UC has treated approximately 59 acres of land in Claremont Canyon (southeast of the proposed project area) and approximately 50 acres on Chaparral Hill and along Frowning Ridge (north of the proposed project area). Other entities, such as East Bay Regional Park District, East Bay Municipal Utility District, City of Oakland, and Pacific Gas and Electric Company, have also conducted projects to remove eucalyptus/pine/acacia in the vicinity since 2000.

In the future, UC and the City of Oakland propose to treat another approximately 200 acres in the vicinity, through funding under the 2005 and 2006 FEMA PDM Programs. If successful, UC and the City of Oakland plan to conduct their proposed projects between 2008 and 2013. In addition, East Bay Regional Park District is proposing to treat 50 acres of land adjacent to the proposed Strawberry Canyon project area. East Bay landowners also continue to treat privately owned land in the region.

The Proposed Action and Alternative 3 are expected to result in minimal, adverse, short-term effects to biological resources, geology and soils, water quality, air quality, public safety, public services, transportation, and noise. UC would employ avoidance and minimization measures to further reduce these temporary impacts. Long-term impacts to all resources are expected to be beneficial or neutral. Therefore, the potential for the Proposed Action or Alternative 3 to create cumulative adverse impacts only exists in the short-term. Further, these short-term impacts would only accumulate if the projects occurred contemporarily. The only organized project expected to occur at the same time as the Proposed Action or Alternative 3 is a similar exotic-fuel-removal project proposed by UC on approximately 45 acres in Claremont Canyon. This project is being evaluated by FEMA and is subject to a NEPA review. Impacts from this Claremont Canyon project are expected to be similar to the Proposed Action and Alternative 3. Avoidance and minimization measures are expected to be employed similar to the Proposed Action and Alternative 3. Thus, minimal, short-term impacts from the Proposed Action or Alternative 3 are not expected to combine with minimal, short-term impacts from other projects in the vicinity to create substantial, adverse, cumulative impacts.

The overall cumulative impact of the past, current, and planned vegetation management projects would be the beneficial reduction in fire hazard and removal of invasive exotic tree species in over 350 acres of land in the East Bay Hills. The various proponents plan for native trees, shrubs, forbs, and grasses to replace the invasive species, producing an ecosystem that more closely resembles the ecosystem that existed in the area before the exotic forestation that occurred at the end of the 19th and beginning of the 20th centuries.

FEMA is the lead federal agency for conducting the NEPA compliance process for UC's vegetation management project. As the lead agency, FEMA is responsible for expediting the preparation and review of NEPA documents in a way that is responsive to the needs of UC faculty, staff, and students and East Bay Hills residents while meeting the spirit and intent of NEPA and complying with all NEPA provisions.

Prior to the release of the Draft EA, FEMA received comments on the Proposed Action from the Hills Conservation Network (HCN), a group representing residents in Berkeley and Oakland that are concerned about vegetation removal projects in the area. FEMA responded on July 26, 2007, and invited HCN to formally participate in the decision-making process under the public participation requirements of NEPA. The HCN responded with a second letter on August 10, 2007. FEMA met with members of HCN on October 12, 2007, to discuss the group's concerns in greater detail. FEMA also received letters from two private citizens and the Claremont Canyon Conservancy supporting the Proposed Action. Correspondence from these parties and FEMA are included in Appendix D.

UC and FEMA will circulate the Draft EA for a 2-week public comment period. The public will be notified of the Draft EA availability via the FEMA website, the UC website, direct mailings to known interested parties (Appendix E), and publication of a public notice in *The Oakland Tribune*. During the public comment period, FEMA will accept written comments on the Draft EA addressed to FEMA Region IX Environmental Officer, 1111 Broadway Street, Suite 1200, Oakland, California 94607. At the end of this period, FEMA will review the comments and consider them in the decision-making process before notifying the public of its final determination.

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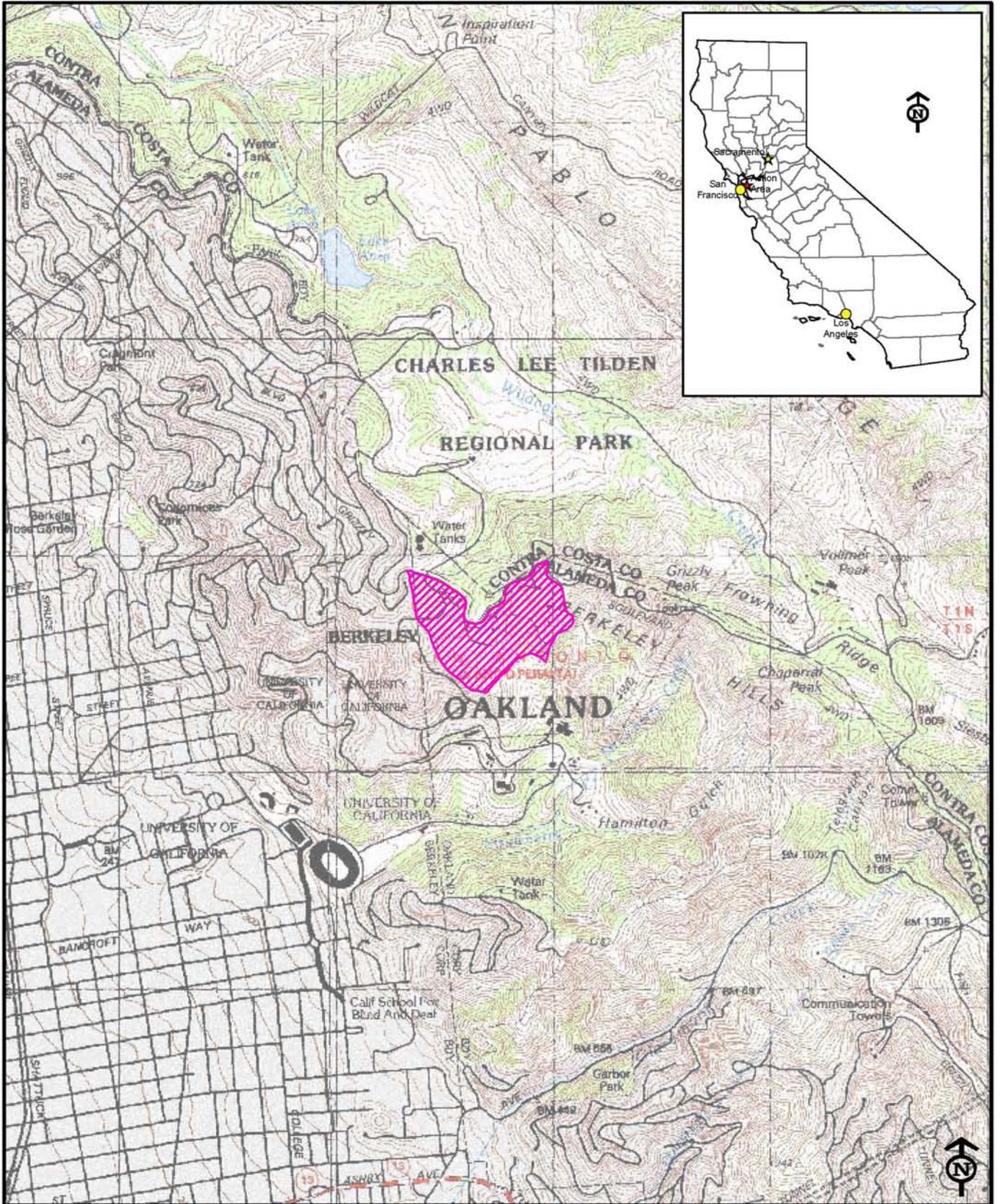
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## Figures

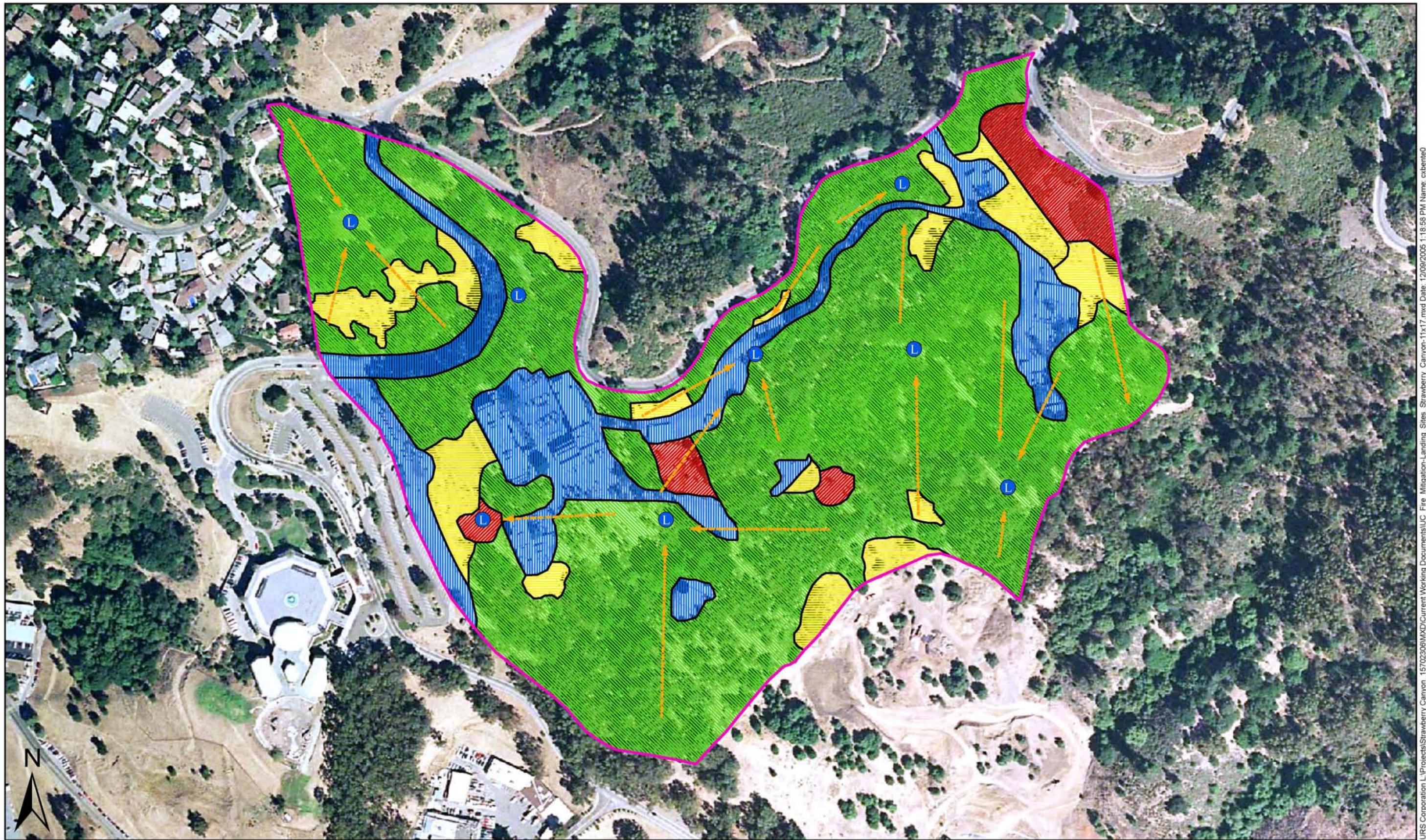


**Legend**  
 Action Area  
 Source: USGS 7.5-Minute Quadrangle DRG

**URS**  
 UC Fire Mitigation - Strawberry Canyon  
 15702306

Vicinity Map

Figure 1



- Skid Trail
- Landing Site
- Coyote Brush
- Disturbed
- Blue Gum Eucalyptus - California Bay Laurel
- Introduced Herbaceous



U.C. Fire Mitigation Project -  
Strawberry Canyon  
15702306

Vegetation Communities

Figure  
2