6.3 GLEN CANYON PARK AND O'SHAUGHNESSY HOLLOW

GENERAL DESCRIPTION AND LOCATION

Glen Canyon Park and O'Shaughnessy Hollow are south of Twin Peaks in an area formally referred to as the San Miguel Hills. Glen Canyon Park is an approximately 70 acre park that is situated between the Diamond Heights and Mira Loma neighborhoods. Of this, approximately 60 acres are designated as Natural Area. O'Shaughnessy Boulevard separates the two Natural Areas with Glen Canyon Park to the east and O'Shaughnessy Hollow to the west (Figure 6.3-1). O'Shaughnessy is 3.6 acre Natural Area. Elevations in Glen Canyon Park range from approximately 225 feet above sea level at the south end of the park to 575 feet above sea level at the north end and along the east rim of the canyon. Elevations in O'Shaughnessy Hollow range from approximately 325 to 550 feet above sea level, rising from south to north along the Boulevard and to the west rim of the canyon. The bottom of the canyon, where Islais Creek flows, is irregular but moderate in slope, dropping 350 feet over a distance of about 1 mile. The walls of the canyon are extremely steep, with many slopes approaching a length-to-height ratio of 1:1 (100 percent).

Current recreational use of Glen Canyon is high. Primary public access to Glen Canon Park is through the Glen Park Recreation Area at the southern end of Glen Canyon Park off Elk and Bosworth streets. However, there are several less developed access points around the perimeter of the canyon, primarily off Turquoise Way on the east and from the School of the Arts on the north. Access to O'Shaughnessy Hollow is limited but possible by social trails from residential streets to the west, specifically DelVale Avenue. Recreational facilities in Glen Canyon Park include the Silver Tree Day Camp, a community recreation center, ball fields, playgrounds, a ropes course, and formal and informal trails. There are no developed areas within O'Shaughnessy Hollow.

Recently, efforts have been made both at the community level and through the San Francisco Recreation and Park Department to restore areas of Glen Canyon. These efforts include the removal of invasive species, erosion control projects, stream restoration, trail improvements, and the installation of native plants (Holzman 2001a; Holzman 2000b). In the November of 2004, over 21 eucalyptus trees were removed from along Islais Creek and the area re-vegetated with native riparian plants as part of a creek restoration project. This project, as well as cape ivy management, creek and erosion control, and trail rehabilitation were conducted as part of a Natural Areas Capital Improvement project.

The diverse array of habitats and sensitive species combined with neighborhood interest and support of these parks, has made Glen Canyon Park and O'Shaughnessy Hollow extremely valuable to the people of San Francisco. Specific values associated with these Natural Areas include: high levels of recreational trail use; outstanding views; interpretive signs and ample opportunity for educational use; one of two last free-flowing creeks in the City; some of the City's largest and most impressive and accessible rock outcrops; excellent forage and nesting habitat for a variety of resident and migratory bird species; extensive grasslands providing habitat for butterflies and other insects; dense willow thickets offering protection for resident and migratory birds; red-tailed hawk and great-horned owl nesting sites and foraging areas; suitable habitat for special-status species of butterflies; important habitat for native plants; populations of sensitive plant and animal species; and extensive urban forest.

GEOLOGY, HYDROLOGY, AND TRAILS

Most of Glen Canyon Park and O'Shaughnessy Hollow are underlain by Franciscan chert (Figure 6.3-2). This is a hard grayish red silicon rock similar to quartz that occurs in layers. It is very resistant to weathering and relatively stable even in steep slopes. Shale layers less than an inch thick are interbedded with the chert layers at wide intervals. The shale weathers faster than the chert, causing lines of indentation in the faces of the outcrops. Franciscan sandstone with interbedded shale is less common in these two parks. This rock unit is dark gray in its fresh condition (rarely seen), but weathers easily to yellowish brown and yellowish gray. It forms a residual soil that is difficult to distinguish from the slope debris that accumulates on bedrock hillsides as a product of exposure to rain and wind. Both rock types generally are covered by thin, rubbly soil in the steeper areas of the parks, or by substantially deeper layers of eroded slope debris and/or artificial fill in the flatter areas. Large blocks or knobs of chert outcrop occur near the northwest and northeast rims of the canyon, as well as along O'Shaughnessy Boulevard (Figure 6.3-2). One area of Franciscan greenstone is mapped along the southwestern boundary of the park (Figure 6.3-2). This is an altered volcanic rock that weathers very easily. In fresh cuts (none are visible in the park) the rock is grayish olive and hard. It weathers to a firm to soft material that is yellowish orange to light brown, making it difficult to distinguish from massive sandstone. Like the sandstone, it has a rubbley surface that appears similar to accumulated slope debris. Because the Franciscan greenstone is slightly different in chemical make-up from the sandstone, shale or chert, it historically supported different plant species. For example, Franciscan manzanita (*Arctostaphyles hookeri* ssp *franciscana*) was reported from the greenstone on Mt. Davidson in 1923 (CNDDB 2005). This species has never been reported from Glen Canyon Park or O'Shaughnessy Hollow.

Because of urban development, the watershed of Islais Creek has been reduced by as much as 80 percent from its historical extent and is now limited to Glen Canyon Park. Overland flow

within the park and some hillside seeps feed the creek, but also bring down substantial amounts of eroded material that add to the sediment in the creek. Thickets of willow in the creek have stabilized some of this sediment and allowed wetland plants to establish, which, in turn, allow the accumulation of more sediment. Because of the reduced stream-flow, these sediment accumulations are not removed naturally, leading to periodic flooding during heavy rains. Also due to the reduced amount and velocity of flows, the open water channel that once characterized the creek is gone and has been replaced by willow thickets.

The trail system in Glen Canyon is a mixture of roads, boardwalks, primary and secondary trials. In all, there are about 23,000 feet of trails within the Natural Areas at Glen Canyon. The high level of use that this Natural Area receives has resulted in the formation of many social trails. In fact, Glen Canyon Park is criss-crossed by approximately 3,700 feet of social trails, many of which are eroding to some extent (Figure 6.3-2). The trails that lead directly up and down the face of the slope are especially prone to erosion because they channel runoff that normally would drain away as sheet flow. In addition, the vegetation and much of the thin rubbly soil have been scraped from the bedrock along these trails by park users. Heavy vegetative cover in other areas, such as the west wall of O'Shaughnessy Hollow, has prevented the formation of trails and aided in the reduction of slope erosion. Some of these trail related erosion problems have been address through the Glen Canyon Capital Project improvements in 2004 and 2005.

VEGETATION

Combined vegetation types within the Natural Areas of Glen Canyon Park and O'Shaughnessy Hollow were classified into 25 series representing five subformations (Table 6.3-1; Figure 6.3-3). In Glen Canyon Park, forest (29 percent), scrub (39 percent) and grasslands (23 percent) are the dominant vegetation subformations. The mosaic and "other" (rock outcrops, ornamental vegetation, and developed areas) subformations accounted for 3 and 5 percent, respectively, of the Glen Canyon Natural Area. The Natural Area at O'Shaughnessy Hollow is dominated by scrub (67 percent) and grasslands (22 percent). Rock outcrops formations accounted for 10 percent of the Natural Area at O'Shaughnessy Hollow. Few tree-dominated areas exist in O'Shaughnessy Hollow. There are no developed areas within O'Shaughnessy Hollow.

Forest

Of the five forest series mapped at Glen Canyon Park, four are dominated by non-native (invasive) trees including blue gum, cypress, mixed exotic and pine and account for over 17 acres. Forests dominate the fill slopes below O'Shaughnessy Boulevard, on the southwestern

side of the canyon. Two small areas containing coast live oak, probably planted, occur near Islais Creek in the northern portion of the park.

Scrub

Glen Canyon Park supports six scrub series, five of which have a high native species composition. Point data collected within the non-willow scrub series at Glen Canyon Park indicate that 52 of 86 species of plants were native. However, invasive species actually cover the most ground (53 percent). Within the willow scrub, invasive species actually provide more cover (64 percent) than natives (36 percent). Willow scrub (10.03 acres) is associated with the tributaries of Islais Creek. Poison oak scrub (5.40 acres), California sagebrush scrub (0.11 acres), California blackberry scrub (1.12 acres), and coyote brush scrub (1.49 acres) are significant components of the canyon's western slopes. The only invasive series mapped was French broom scrub, which covers 5.52 acres mostly along the edges of roads and boundaries with developed areas.

The three scrub series mapped at O'Shaughnessy Hollow are mostly native dominated. While not as species-rich as Glen Canyon, native species accounted for 35 of the 40 plant species observed and almost all the cover (99 percent). The native coyote brush and poison oak scrub series cover 1.89 and 0.21 acres, respectively. The invasive French broom scrub, located mostly around the edges of the open space, covers 0.77 acres.

Mosaic

Two of the three mosaic habitats found within Glen Canyon Park are in the northern portion of the park near the rock outcrops. The third is located in the midst of an annual grassland on the eastern slope. Each of these series supports important native shrub components, such as coyote brush (*Baccharis pilularis*), bee plant (*Scrophularia californica*), and California blackberry (*Rubus ursinus*) intermixed with invasive weeds and grasses.

Herbaceous - Grassland

The grasslands in Glen Canyon Park are located primarily on the eastern slopes and are dominated by invasive species. Specifically, the wild oat grassland covers over 12.53 acres of land. The only series to have a dominant native component is purple needlegrass prairie (0.40 acres) found in two locations in the central and northern portions of the park. However, point data revealed that native species account for 42 percent of the coverage within the grasslands, indicating that natives remain an important component even within the invasive grasslands.

Grasslands in O'Shaughnessy Hollow are situated primarily about the rock outcrops above O'Shaughnessy Boulevard and are composed mostly of rattlesnake grass grassland (0.76 acres). One small area of native grassland, reedgrass prairie (0.01 acres) is also found in O'Shaughnessy Hollow.

Other

Other important natural features in the Natural Areas at Glen Canyon Park and O'Shaughnessy Hollow are the numerous rock outcrops. Some of the City's largest rock outcrops are in Glen Canyon Park and O'Shaughnessy Hollow. Rock outcrops account for 1.30 acres in Glen Canyon Park and 0.43 acres in O'Shaughnessy Hollow. These rocky areas are typically rich in native plants and provide important basking sites for lizards and other animals.

Sensitive Plant Species

A total of 19 sensitive plants occur in O'Shaughnessy Hollow and Glen Canyon. The California Natural Diversity Data Base (CNDDB 2005) reports the occurrence of one sensitive plant species at the Glen Canyon Park/O'Shaughnessy Hollow area. Vegetation mapping conducted as part of this project found an 13 of these species (Figure 6.3-4). As reported in the CNDDB, San Francisco gumplant (*Grindelia hirsutula* var *maritima*) was observed at the head of Glen Canyon in 1957. This is the present location of McAteer High School. This species has also been observed on the eastern grassy slopes of Glen Canyon Park and above the cliffs in O'Shaughnessy Hollow in 1988 (Wood 1996). Both of these populations are presumed to be extant although vegetation mapping conducted for this project did not locate any individuals. Leaf daisy (*Erigeron foliosus* var *foliosus*) occurs on the western edge of a Franciscan coastal scrub habitat in Glen Canyon Park, just below O'Shaughnessy Boulevard. Red columbine (*Aquilegia formosa*) can be found in a moist area of coyote bush scrub above O'Shaughnessy Hollow and have been reintroduced as part of restoration areas to several pools along Islais Creek in Glen Canyon Park. A small patch of Pacific reed grass (*Calamagrostis nutkaensis*) is located in the extreme northwestern corner of O'Shaughnessy Hollow. Yellow-eyed grass (*Sisyrinchium californicum*) can be found along the boardwalk area at Glen Canyon Park and in other marshy areas along Islais Creek. This is the only known population within San Francisco (WESCO 1993a). Climbing bedstraw (*Gallium porrigens*) is found on the northern side of O'Shaughnessy Hollow. Silk tassel bush (*Garrya elliptica*) is found within the California blackberry scrub of Glen Canyon. Spiny redberry (*Rhamnus crocea*) occurs in association with a single rock outcrop on the western side of Glen Canyon. Alumroot (*Heuchera micrantha*) occurs at O'Shaughnessy Hollow at the base of the rock outcrop. Purple Owl's Clover (*Castilleja exserta*) is found within the annual grasslands on the upper

slopes of Glen Canyon near Berkeley Way. Bitter cherry (*Prunus emarginata*) occurs within the poison oak scrub south of the Silver Tree Day Camp.

The other two species considered sensitive for this report are broadleaf stonecrop (*Sedum spathulifolium*) in O'Shaughnessy Hollow and Johnny-jump-up (*Viola pedunculata*) in Glen Canyon Park (Craib and Cartier 1999). The stonecrop is located along the edges of Franciscan coastal scrub habitats (Figure 6.3-4). The Johnny-jump-up is in the annual grasslands of Glen Canyon Park (Figure 6.3-4). These plants are important larval host and food sources for the San Bruno elfin butterfly (*Incisialia mossii bayensis*) and the silverspot butterfly (*Speyeria* spp), respectively. Because both of these butterflies are Federally listed under the Endangered Species Act, these plants are important species to consider when managing these parks.

Invasive Plant Species

Invasive vegetation cover accounts for approximately 74 percent (42.14 acres) of the vegetated area mapped at Glen Canyon Park. Invasive non-native blue gum forest and wild oat grassland series account for approximately 15.36 and 12.53 acres each. Other relatively large areas are covered with French broom scrub and mixed exotic forest. Invasive vegetation cover accounts for over 67 percent (2.11 acres) of the vegetated areas within the O'Shaughnessy Hollow Natural Area. European annual grasses, French broom, and mixed exotic forest are the most prevalent.

In general, French broom scrub occurs along the periphery of both Natural Areas. The invasive forests tend to be more well distributed through the southern half of Glen Canyon Park, but are limited to the edges of O'Shaughnessy Hollow. The understory of the blue gum eucalyptus is variable; some areas have almost no understory while other areas support some scrub vegetation. Near the forest interface with coastal scrub communities (presumably the most recently invaded area), the understory contains some native shrubs such as osoberry. In the older forests, most understory plants are weedy and native plants have difficulty growing. The invasive grasslands are found primarily on the western-facing slope of Glen Canyon Park and in the southern half of O'Shaughnessy Hollow. Himalayan blackberry occurs as a primary understory component of the willow scrub along Islais Creek.

WILDLIFE

Birds

The complex mix of habitats at Glen Canyon Park and O'Shaughnessy Hollow provides excellent forage and nesting habitat for a variety of species (Appendix C). Sixty-seven species

of birds have been documented as occurring in Glen Canyon Park (WESCO 1993a). Of these, 14 species have been confirmed or are suspected of breeding within the park (WESCO 1993a). The grasslands provide foraging habitat for sparrows and flycatchers that may nest in nearby scrub and willow thickets. Coastal scrub provides habitat for species like California towhee (*Pipilo fuscus*), spotted towhee (*Pipilo maculatus*), Western scrub-jay (*Aphelocoma californica*), and white-crowned sparrows (*Zonotrichia leucophrys*). The trees within Glen Canyon provide roosting and potentially nesting sites for American crow (*Corvus brachyrhynchos*) and raptors such as those noted below.

Sensitive Bird Species and Important Bird Habitat

Nineteen locally sensitive species are found in Glen Canyon Park; of which 11 are known to breed (Table 6.3-2). The blue gum forest in Glen Canyon Park provides one of the few known nesting locations of red-tailed hawks (*Buteo jamaicensis*) and great horned owls (*Bubo virginianus*) within the City of San Francisco (Figure 6.3-4). The extensive grasslands provide ample foraging habitat for both species. Riparian thickets and associated wetlands provide breeding habitat for smaller passerines (songbirds) including neo-tropical migrants like Wilson's warbler (*Wilsonia pusilla*). Because of similarity of habitats and proximity, the bird species distribution at O'Shaughnessy Hollow is expected to be similar to the scrub-dominated areas of Glen Canyon.

Ten main areas of important bird habitat have been designated at Glen Canyon (Figure 6.3-4). The first three of these follows the willow riparian thickets along Islais Creek. These areas provide abundant nesting and roosting habitat for a variety of resident and migratory birds including Wilson's warbler (*Wilsonia pusilla*), Hutton's vireo (*Vireo huttoni*), and nesting Bullock's orioles (*Icterus bullockii*). The urban forest to the west of this area, between O'Shaughnessy Blvd and Islais Creek, provide nesting habitat for raptors and owls as mentioned, but also for band-tailed pigeon (*Columba fasciata*) and olive-sided flycatcher (*Contopus cooperii*). The nearby blackberry scrub habitats also provide shelter and food sources for species such as the white-crowned sparrow and towhees. The rock outcrop areas and associated scrub provide habitat for California quail (*Callipepla californica*) but none have been recently recorded from Glen Canyon. Pygmy nuthatch (*Sitta pygmaea*) are known to nest in the blue gum forest below the intersection of Sussex and Elk streets. The oaks growing within the grassland of Glen Canyon provide important habitat for resident and migrant insectivorous birds.

Mammals

As many as 16 species of mammals have been reported from Glen Canyon Park (Appendix C) (WESCO 1993a). Several of these species, including California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), brush rabbit (*Sylvilagus bachmani*), and California meadow vole (*Microtus californicus*), are important prey items for the red-tail hawks. Larger mammals found in Glen Canyon Park, including raccoons (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and striped skunk (*Mephitis mephitis*), are typical of urbanized parks in general. Free-roaming cats are relatively common. The mammals found within O'Shaughnessy Hollow are likely similar to those of Glen Canyon Park. However, limited grasslands and the overall smaller size in comparison to Glen Canyon Park may limit the species diversity in this Natural Area.

Reptiles/Amphibians

Six species of reptile and three species of amphibians have been reported from Glen Canyon Park (WESCO 1993a). Of these, only the non-native red-eared slider (*Trachemys scripta*) is believed to be no longer present (WESCO 1993a). Surveys by EIP biologists and volunteers on March 29, 1999, resulted in the capture of 17 California slender salamanders (*Batrachoseps attenuatus*); no other species of amphibians or reptiles were observed during this survey. Other amphibians likely found within Glen Canyon Park but not observed during field efforts include Western toad (*Bufo boreas*), arboreal salamander (*Aneides hardii*) (WESCO 1993a), northern alligator lizard (*Gerrhonotus multicarniatus*), and western fence lizard (*Sceloporus occidentalis*). No known populations or occurrences of sensitive reptiles or amphibians have been documented on Glen Canyon Park or O'Shaughnessy Hollow.

Invertebrates

Sensitive Invertebrate Species

A population of San Francisco forktail damselfly (*Ischnura gemina*) was discovered in an asphalt channel along the northeastern edge of Glen Canyon Park in 1979 (WESCO 1993a). The population at that time was estimated at 350 individuals. Habitat modifications and degradation led to the disappearance of this species from Glen Canyon Park by 1989 (WESCO 1993a). In spring 1996, studies to characterize the site and assess its suitability for reintroduction of the damselfly were conducted (Hannon and TechKnosis 1997). Following removal of vegetation from within and near the channel, 244 individual damselflies (collected near Highway 101 in the City of San Bruno) were reintroduced on June 11, June 18, and July 3, 1996 (Hannon and TechKnosis 1997). Freshly emerged individuals were observed in mid-July, followed by another group in mid-September, indicating that the damselflies had

reproduced successfully. Additional observations in March 1997 indicated that the population had survived the winter (Hannon and TechKnosis 1997). Since then, the population has varied in size. The encroachment of vegetation in the channel, which creates conditions that may make it difficult for the damselfly to survive, may have contributed to its decline (Anonymous no date). No forktail damselflies were observed in two visits to Glen Canyon in 1999 (Hafernik 1999).

As of 1992, 34 species of butterflies had been reported in Glen Canyon Park and an additional seven species may have historically occurred there (WESCO 1993a). Of the 24 species observed during surveys conducted in 1992, several need areas of native habitat for survival and reproduction. Most of the butterflies observed were likely resident and breeding within the Glen Canyon Park (WESCO 1993a). Additionally, historic records indicate that the Federally endangered mission blue butterfly and bay checkerspot butterfly were once found in Glen Canyon Park. Host plants for these species still persist here, but neither butterfly species has been observed in recent years.

MANAGEMENT AREAS

Management areas (MA) have been defined for both Glen Canyon Park and O'Shaughnessy Hollow Natural Areas (Figure 6.3-4). In general, the MA-1 areas are high concentrations of native plants within the grasslands or sensitive species. The bulk of the scrub-covered western slopes and the riparian corridor in Glen Canyon Park have been designated as MA-2, indicating that these areas are important habitats but less sensitive to disturbance. Other MA-2 areas are designated to provide buffers around the grassland MA-1 areas on the eastern slope. Areas designated MA-3 within Glen Canyon Park include areas covered with urban forest, the invasive annual grassland in the extreme northern corner and a corridor along the gravel access road. At O'Shaughnessy Hollow, the MA-1 areas include sensitive plant species habitat, while the MA-2 areas support a mix of native-dominated scrub and grassland habitats.

ISSUES AND RECOMMENDATIONS

Several conservation and recreation-related issues have been identified for Glen Canyon Park and O'Shaughnessy Hollow. Recommendations developed for each of these issues will guide restoration, enhancement, and maintenance work. In the following discussion, system-wide issues and recommendations (GR-1 for example, see Chapter 5) that apply to both Natural Areas are presented first within each topic area, followed by site-specific issues and recommendations. Site-specific recommendations are keyed to the Management Area in which they should occur.

Management recommendations from previous planning efforts for Glen Canyon Park, specifically Master Plan Recommendations for Glen Canyon Park, were reviewed and incorporated where appropriate (WESCO 1993b).

VISION - Implementation of management recommendations at Glen Canyon Park and O'Shaughnessy Hollow would not change significantly the overall look of the park and would result in:

- protection and enhancement of native grassland and scrub communities;
- increased and more sustainable populations of sensitive plants;
- enhanced creek riparian corridor with greater plant and structural diversity;
- preservation and enhancement of existing pools in the creek;
- improved health and diversity of the urban forest,
- improved health of San Francisco Bay by decreasing sediment loading and erosion into Islais Creek;
- improved foraging, nesting, and sheltering habitat for resident and migratory birds;
- improved public access and views on designated trails;
- increased educational use with interpretive signage; and
- improved soil stabilization and erosion control in creek and watershed.

Implementation of the following issues will lead to substantial improvements to Islais Creek, which in turn would benefit wildlife, perhaps even allowing the re-establishment of sensitive aquatic species. Eventually, the native grasslands may resemble those of other nearby areas such as those used in the reference site analysis on San Bruno Mountain. Creation of a formalized trail will allow access throughout Glen Canyon, an action that will facilitate the high levels of recreational use while helping to maintaining habitat values and minimize erosion and direct impacts to sensitive resources.

Vegetation

Issues relating to vegetation management at Glen Canyon Park and O'Shaughnessy Hollow revolve around the protection of sensitive species and habitats, typically through the control of invasive plants (GR-1), management of sensitive species and vegetation series of limited distribution (GR-2), and long-term management of the grasslands (GR-3). Management of the urban forests at Glen Canyon will follow the general urban forest management practices (GR-14). In addition to these general recommendations, the following site-specific issues should be addressed.

Issue GC/OH-1: Glen Canyon Park and O'Shaughnessy Hollow both support relatively extensive populations of sensitive plants that may diminish or disappear due to habitat loss and invasive species. Some of these are found growing in areas that are incredibly sensitive to human-generated disturbance like wetlands, the rock outcroppings, and hillside. In the wetland, riparian, and grassland habitats invasive plants threaten to over-run these natives or alter habitats to such a degree (through shading or overcrowding) that the sensitive species are in danger of extinction within these Natural Areas.

***Recommendation GC/OH-1a*:** Woody and herbaceous invasive plants such as Japanese honeysuckle, mustard, fennel, radish, Bermuda buttercup (*Oxalis pes-carprae)*, bur clover, velvet grass, English ivy, Himalayan blackberry, Cape ivy, cotoneaster, sheep sorrel in all MA-1 and MA-2 areas shall be reduced (see also Figure 6.2-5). Invasive tree species will be prevented from becoming established in all MA-1 and MA-2 areas. Understory plants in MA-3 urban forests may also be reduced in order to improve tree health and wildlife habitat (see Urban Forest Recommendations in GR-14). Within MA-3a, some invasive plants may remain in place as nectar and larval food plants for wildlife. However, they shall be monitored to ensure that they are not encroaching on sensitive habitats, and managed accordingly.

***Recommendation GC/OH-1b*:** In MA-1 and MA-2 areas where invasive plants have been removed, revegetate using appropriate native plants. Enhance and diversify existing grasslands and coastal scrub habitat (MA1b-g, MA-2b, MA-2e, MA-2f, MA-1h, and MA-2g) areas as appropriate. Along Islais Creek maintain a willow riparian habitat, but with gaps that allow sunlight to reach pools along the creek channel (MA-2a and MA-2d). Using diversity, cover, and density targets generated from reference sites within and around San Francisco, plant native grassland, creek, riparian and scrub species (see Appendix B). In MA-3 areas plant the understory and forest gaps in accordance with the recommendations of the Urban Forest Management Plan (GR-14).

***Recommendation GC/OH-1c*:** In order to prevent extinction of existing rare or uncommon plant species at Glen Canyon Park and O'Shaughnessy Hollow, and the localized extinction of sensitive species in San Francisco, augment existing populations by direct seeding or planting in all MA-1 and MA-2 areas as appropriate. Species to consider include, but are not limited, to yellow-eyed grass, silk tassel bush, farewell-to-spring (*Clarkia rubicunda*), false Solomon's seal (*Smilacina* spp), and red columbine.

***Recommendation GC/OH-1d*:** In order to reduce the potential for local extinction of sensitive species in San Francisco, consider reintroduction of the following sensitive species Iris-leaf rush (*Juncus xiphiodes*) (MA-1a and MA-2a), coffee fern (*Pellaea andromedaefolia*) (MA-1c and MA-1h), star lily (*Zigadenus fremontii*) (MA-1d, MA-1e, MA-1g, and MA-1h), California saxifrage (*Saxifraga californica*) (MA-1d, MA-1e, and MA-1h), coast larkspur (*Delphinium decorum*) (MA-1d and MA-1h), common muilla (*Muilla maritima*) (MA-1e), and blue violet (MA-1e and MA-1h)

***Recommendation GC/OH-1e*:** In order to enhance the sensitive species habitat that persists in and along Islais Creek, at the forest-grassland ecotone, and in the urban forest understory, invasive blue gum eucalyptus trees will be removed in select areas. Approximately 120, of an overall 6,000 trees in Glen Canyon Park would be removed in MA-1 and MA-2 areas (Appendix F). Not all trees in MA-1 and MA-2 areas will be removed. Some scattered large individuals will remain in order to minimize large scale disturbance and disruption to wildlife. In MA-1g and MA-2e areas an average of 50-100 square feet of basal area per acre will be retained. Eucalyptus seedlings and saplings will not be allowed to establish in all MA-1 and MA-2 areas. The short and long-term impacts of tree removal is discussed in Appendix F. Urban forest management (MA-3 areas) is not considered here, please see GR-14. Below is a description of where tree removal would occur (see also Figure 6.2-5):

- Within the wet meadow (MA-1a) willows that surround this area shall be trimmed and removed as necessary to preserve this very sensitive wetland habitat.
- Remove approximately 10 eucalyptus trees within MA-1g to help protect and preserve the native grassland. The majority of the eucalyptus trees within this Management Area will remain in place.
- Remove willows as needed to improve drainage along the asphalt-lined ditch and improve drainage and decrease erosion in area MA-2d. This action will also allow more sunlight to reach the ditch, an action that could improve habitat for the San Francisco fork-tailed damselfly.
- Remove approximately 100 smaller eucalyptus trees from the slope between O'Shaughnessy Blvd and the Silver Tree Day Camp (MA-2e) to increase light penetration to the forest floor. This action will help shrubs and understory vegetation to survive, thereby creating a more diverse forest structure.
- Remove approximately 10 eucalyptus trees from Islais Creek channel (MA-2a), some large trees remain to provide nesting and perching habitat for raptors and some large structural forest elements.

Issue GC/OH-2: Islais Creek is one of the last free-flowing creeks within the City of San Francisco. For this reason alone, it is important to protect and maintain the creek.

Unrestored portions of the creek within MA-2a have dense willow growth, weedy understories, and low species diversity because of changes in creek hydrology and increased willow growth and invasive species. This limits the amount of sunlight reaching the water surface, increases sediment deposition, and decreases the amount of suitable habitat for wildlife. Other areas are relatively urbanized with steep sides, limited vegetation, and little wildlife value.

> ***Recommendation GC/OH-2a*:** To improve wildlife habitat, and botanical diversity, sections of the willow overstory within the riparian corridor shall be thinned and invasive plants in the understory shall be reduced. Target a willow canopy cover of approximately 70 percent where feasible. In openings, revegetate with appropriate low-growing riparian species. At the willow edge and under more dense canopy favor plants tthat will improve structure and food sources such as coffee berry (*rhamnus californica*), twin berry (*Lonicera involucrata*) and pink flowering current (*Ribes sanguineum* var. *sanguineum*).

> ***Recommendation GC/OH-2b*:** The canopy closure and in channel vegetation have combined to eliminate open water habitat within Islais Creek. This type of habitat is important for a variety of wildlife species and shall be preserved. Regular vegetation maintenance shall be conducted within these areas to keep the willows from encroaching (see also GC/OH-2a). When feasible, new pool habitat shall be created within the willow thickets. Additionally, it may be necessary to install instream structures to promote scour of the channel and create stable pool habitat. Wing-walls made from local logs may be anchored into the bank to redirect streamflow and maintain pools (see WESCO 1993b for details). Other examples of scour-creating structures can be found in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al. 1993). Annual monitoring and management activities may be required to limit willow encroachment and ensure success.

Issue GC/OH-3: The rock outcrops in Glen Canyon Park and O'Shaughnessy Hollow support sensitive plant species such as broadleaf stonecrop and red columbine. These species are at risk from ongoing human activities, especially rock climbing. Use of these areas has created an area of trampled rock and earth at the base of each outcrop. The erosion cause by these social trails is increasing sedimentation in Islais Creek (GC/OH-9).

> ***Recommendation GC/OH-3a*:** The most effective way to preserve and protect these sensitive habitats and decrease erosion is to prevent access. Implementation of GR-11 will result in the closure of social trails leading to the northwestern outcrop in Glen Canyon Park and prohibit rock-climbing activities in this area (MA-1c). Rock

climbing shall be allowed on rocks in MA-3c as described in the Glen Canyon Park Master Plan Recommendations (WESCO 1993b). Additionally, social trails in O'Shaughnessy Hollow will be closed to protect sensitive species and reduce erosion (MA-1h).

Wildlife

Wildlife issues at Glen Canyon Park and O'Shaughnessy Hollow involve protection and enhancement of habitat, including food sources and shelter. Improvements to native plant habitats including Islais Creek, the grasslands and scrub communities will benefit wildlife (GC/OH-1 and 2). Vegetation management during the breeding season can impact nesting birds (GR-4), however, vegetation management can lead to creation and preservation of important foraging areas (GR-5) while also providing materials to create artificial habitat for ground-dwelling birds, small mammals, and reptiles (GR-9). Artificial nesting structures may benefit some species, especially cavity nesters like titmice, chickadees, and woodpeckers (GR-6). Maintaining some invasive weeds and increasing native food plants for beneficial insects (e.g., butterflies) will improve habitat for these species (GR-10). Finally, reduction in predation pressures will benefit all animals within the Natural Area (GR-7). In addition to these general recommendations, the following site-specific issues should be addressed.

Birds

Issue GC/OH-4: There are two special-status avian species documented at Glen Canyon Park: nesting red-tailed hawks and great horned owl (Figure 6.3-4). Both of these species obtain the bulk of their prey within the grasslands of GCP. These grasslands are threatened by invasion of trees and shrubs that would alter the habitat and therefore reduce the foraging area for these birds. Vegetation management activities that could affect other species are addressed in Issue GR-4.

***Recommendation GC/OH-4a*:** Tree removal shall not be conducted within 500 feet of the location of the existing red-tailed hawk or great horned owl nest while the nest is in use, approximately January 1st through June 15th (MA-3a). The continued use of this nest shall be documented annually. If the birds move, an effort shall be made to locate the new nesting site. The same buffer would apply to any other nesting locations.

Recommendation GC/OH-4b: Grassland habitat at Glen Canyon Park and O'Shaughnessy Hollow shall be preserved and protected from invasive plants that would convert it to scrub or forest habitats. Conversion to grassland-scrub mosaic type of habitats may be acceptable but should be carefully planned and monitored. This type of habitat would be expected to support a larger prey base thereby offsetting the loss of

grasslands. This will be generally accomplished through implementation of Recommendation GC/OH-1a-d (MA1b-g, MA-2b, 2e, 2f, OSH MA-1, and OSH MA-2).

Issue GC/OH-5: Native scrub habitats are limited in distribution and complexity within Glen Canyon and O'Shaughnessy Hollow. Although Glen Canyon supports a relatively dense stand of willows along the creek, the habitat complexity of these areas is relatively low and the tree canopy completely covers the creek in some locations. Other areas are largely French broom scrub, a habitat with little wildlife value.

***Recommendation GC/OH-5a*:** To help improve the coastal scrub habitats and therefore wildlife areas, increase the patch size of coastal scrub by removing invasive species that border these areas and allowing natural recruitment into the newly opened areas (MA-1f, MA-2b-c, and MA-2g). Care should be taken to avoid the conversion of rich grasslands to scrub.

***Recommendation GC/OH-5b*:** Increase the structural diversity of these habitats by installing native plants that are different in height at maturity from the existing habitats (MA-1f, MA-2a-c, and MA-2g). For example, planting twinberry or elderberry within the willow patches would enhance structural and food diversity.

***Recommendation GC/OH-5c*:** Manage for open pools as discussed in Recommendations GC/OH-2a-b and GC/OH-7e. To prevent wildlife disturbance, these pools shall not be accessible to the general public.

Issue GC/OH-6: Currently, dense willow thickets limit the amount of pool habitat available in Islais Creek. Pools provide areas for amphibians to live and breed. Some work has already been done to create pools and open the canopy, providing light to the creek.

***Recommendation GC/OH-6a*:** Open pools shall be created as discussed in Recommendations GC/OH-2 and take the requirements of amphibians into consideration (MA-2a). Breeding pools for frogs and salamanders need to be deep enough and have enough structural elements to provide basking areas, attachment sites for eggs, and cover for adults and tadpoles from predators.

Invertebrates

Issue GC/OH-7: Glen Canyon Park supported a population of San Francisco forktail damselfly as recently as 1997. This reintroduced population now appears to have been locally

extirpated (Hatermile 1999). Habitat degradation may have caused both extinctions. The following recommendations are based on Hafernik's (1999) survey of the site.

Recommendation GC/OH-7a: Establish the status of forktail damselfly in Glen Canyon Park. Conduct surveys at the appropriate season and time of day to document the presence or absence of this species (MA-2a and MA-2d)

***Recommendation GC/OH-7b*:** If forktail damselflies are not observed in the area within the next five years consider a reintroduction effort (MA-2a and 2d). Reintroductions shall be conducted under the supervision of a qualified professional familiar with this species and take results of previous efforts into account.

***Recommendation GC/OH-7c*:** If damselflies occur or are reintroduces, remove and trim vegetation along the edges of the asphalt channel (located in the northeast corner of the park), especially on the west side (MA-2d). The goal is to produce a wide, low margin of short-growing vegetation at the edge of the channel that would allow perching within sight of the water.

***Recommendation GC/OH-7d*:** If damselflies occur or are reintroduces, willows in the margins of the asphalt channel shall be removed. Willows to the east of the channel shall be trimmed to prevent them from shading the water (MA-2d).

***Recommendation GC/OH-7e*:** If damselflies occur or are reintroduces, continue to control the aquatic vegetation within the channel twice a year, once in spring and again in the fall (MA-2d). Vegetation shall be removed from half the channel at a time. Vegetation within and adjacent to ponds along Islais Creek shall be removed and trimmed on the same schedule (MA-2a). This will ensure enough open water and emergent vegetation for egg-layers.

***Recommendation GC/OH-7f*:** New pools created in Islais Creek shall take the damselfly into account during the design and implementation of this work (MA-2a). Elements shall include open water that receives direct sunlight, open margins with sparse vegetation, and access to nearby foraging areas.

Issue GC/OH-8: Mission blue butterflies have historically occurred in Glen Canyon Park host plants for this butterfly still persist here. Grasslands may provide potential breeding and foraging habitat for this Federally-listed endangered species. Twin Peaks, where a population of mission blues exist, is approximately a half mile north, making natural recolonization of Glen Canyon a realistic possibility.

Recommendation GC/OH-8a: Conduct an annual evaluation of the populations of sensitive butterflies within the park, focusing on the east grasslands where host plants occur (MA-1b and MA-1e).

Recommendation GC/OH-8a: Install larval host plants and nectar sources as part of revegetation efforts (MA-1b and MA-1e).

Soils, Erosion, and Public Use

The erosion and soil issues at Glen Canyon Park and O'Shaughnessy Hollow generally relate to the trail system and public use. An extensive network of formal and social trails wind through management areas at Glen Canyon Park (Figure 6.2-5). This plan proposes to improve and maintain 15,000 linear-feet of trail, retain an additional 4,300 linear-feet of unimproved trails and close approximately 3,700 linear-feet of social trails in this Natural Area. The issue of erosion and habitat impacts related to creation and use of social trails is addressed through implementation of GR-11 and GR-12 (Section 5). Interpretive signs regarding the ecosystem of Glen Canyon Park and O'Shaughnessy Hollow should also be considered (GR-13).

Issue GC/OH-9: Sections of the Islais Creek loop trail are muddy during the winter months. Pedestrian traffic on these trails is increasing sedimentation in the creek and is affecting existing sensitive wetlands and associated species. To the north of the Silver Tree Day Camp, a boardwalk keeps pedestrians out of most of the wetland habitat (MA-1a). However, off-leash pets routinely cut through the wetland causing damage to this resource and threatening the sensitive species found there.

***Recommendation GC/OH-9a*:** Monitor dog impact to wetland and (MA-1g) Islais Creek channel, which are considered a sensitive habitat area (GR-8c). Install signage at appropriate locations to inform Natural Area users about the damage associated with off-trail use of wetlands and about on-leash and on-trail restrictions in the Natural Area. If Natural Area users and dogs stay on trails, no further access restriction or fencing would be required, however, if signage and education are ineffective, permanent barriers such as low rustic fencing (Appendix H) may be required at select locations to keep dogs out of the creek channel and wetlands. Installation of permanent fencing is not desirable and would be a last resort to prevent damage. The creek channel (from bank to bank) is approximately 1.8 acres. If trailside fencing is required it would only be used in locations where vegetation does not already provide a physical barrier. It is estimated that less than 3 percent of the trail edges may need fencing.

***Recommendation GC/OH-9b*:** Install boardwalks in wet marshy locations along the Islais Creek loop trail to prevent damage to existing resources and increased sedimentation in the creek (MA-2a).[1]

Recommendation GC/OH-9c: Trim willows along formalized trails to allow ease of access, thereby limiting the perceived need to create new trails (MA-2a).

Issue GC/OH-10: Islais Creek is an important resource for local wildlife, plants, and the recreational users of Glen Canyon Park. However, the quality of habitat within this creek is degrading as a result of sediment input from upland sources including the adjacent gravel access road and social trails. Additionally, unstable creek banks contribute to the sediment load. Among other effects, creek sedimentation reduces pool habitat, alters the composition of aquatic insects that can live in the creek and contributes to pollution in San Francisco Bay. Some of these issues have been addressed through implementation of the Glen Canyon Capital Project.

***Recommendation GC/OH-10a*:** To help minimize the input of sediment from the gravel access road, fill existing gullies with gravel (MA-3a and 3b). Paving of the road has been considered as a part of the Glen Canyon Capital Improvement Project (currently on hold). Paving the access road would drastically reduce the sediment input to the creek. Use permeable paving if possible. If paving is not feasible, the road shall be outsloped the next time it is graded or resurfaced. In this technique, the side of the road closest to the creek is lower than the other side of the road. When properly constructed, an outsloped road would not present a hydrologic barrier and would allow uniform flow of runoff from the hillside across the road to the creek. This eliminates ponding at the toe of the slope (important for slope stability) and reduces the likelihood of gullying in the road (important in controlling sedimentation). The surface shall be compacted road base or gravel. When the road is graded, existing culverts shall be evaluated (adequate size and condition) and replaced as necessary. Finally, if resources are limited, continue to maintain water diversion points (water bars) along the road to conduct water to the creek in multiple places, thereby reducing the velocity and magnitude of water on the road at any one time.

***Recommendation GC/OH-10b*:** When evaluating and formalizing the trail network at GCP, those social trails that are immediately adjacent to or crossing the creek shall be closed and re-vegetated as per GR-11. For creek crossings that will remain in use, install bridges (MA-2a and MA-3a-b). Bridges are the most environmentally friendly

[1] No funds are currently available for this capital project.

approach to formalize these crossings. If bridges are infeasible, the streambanks shall be stabilized with well-designed steps that lead to stepping-stones that cross the creek.

Recommendation GC/OH-10c: Maintain existing sediment dam or consider installation of new sediment traps on the lower reach of the creek. These features can be very effective at reducing instream sediment loads, but must be maintained. The existing sediment dam above the recreation center is in disrepair. Water running over the dam is undercutting the dam's foundation and compromising its structure. The soil behind the dam should be excavated and the dam should be either relined and repaired or reconstructed (Hydroconsult 2005).

Recommendation GC/OH-10d: The bank of Islais Creek immediately below Silver Tree Day Camp is steep, unstable and eroding into the creek. Temporary measures including the installation of erosion control blankets, seeding, and recontouring installed as a part of the recent Capital Project is helping reduce the erosion problem. However, a longer term solution should be considered to stabilize the slope of the trail.

Table 6.3-1. Vegetation series mapped at Glen Canyon Park and O'Shaughnessy Hollow.

	Vegetation Series	Glen Canyon	O'Shaughnessy Hollow	Total Acreage
Forest	blue gum forest	15.36	--	15.36
	cypress forest	0.16	--	0.16
	mixed exotic forest	0.87	0.02	0.89
	pine forest	0.72	--	0.72
	coast live oak forest*	0.11	--	0.11
	Subtotal	**17.22**	**0.02**	**17.25**
Scrub	California sagebrush scrub*	0.11	--	0.11
	California blackberry scrub*	1.12	--	1.12
	coyote brush scrub*	1.49	1.89	3.38
	poison oak scrub*	5.40	0.21	5.60
	French broom scrub	5.52	0.77	6.30
	willow scrub*	10.03	--	10.03
	Subtotal	**23.67**	**2.87**	**26.54**
Mosaic	bee plant/California blackberry mosaic*	0.00	--	0.00
	wild oat/Coyote brush mosaic*	0.83	--	0.83
	exotic herb/Coyote brush mosaic*	1.02	--	1.02
	Subtotal	**1.85**	**0.00**	**1.85**
Grassland	Italian ryegrass grassland	0.14	--	0.14
	rattlesnake grass grassland	--	0.76	0.76
	wild oat grassland	12.53	--	12.53
	wild oat/rattlesnake grass grassland	--	0.18	0.18
	purple needlegrass prairie*	0.40	--	0.40
	reedgrass prairie*	--	0.01	0.01
	Subtotal	**13.07**	**0.94**	**14.02**
Other Herbaceaous	giant pea	0.03	--	0.03
	wild radish	0.87	--	0.87
	Subtotal	**0.90**	**0.00**	**0.90**
Other	rock outcrop	1.30	0.43	1.72
	ornamental	0.31	--	0.31
	developed	1.67	--	1.67
	Subtotal	**3.27**	**0.43**	**3.70**
Grand Total		**59.99**	**4.26**	**64.25**

* Indicates vegetation type with a significant native species component.
Shaded cells indicate acreages of less than 0.005 acres.

Table 6.3-2. Sensitive species known to occur at Glen Canyon Park and O'Shaughnessy Hollow.

Species	Common Name	Status Federal, State, CNPS	Occurrance Status
ANIMALS			
Carduelis tristis	American Goldfinch	LS	Presently occurs
Columba fasciata	Band-tailed Pigeon	LS	Presently breeds
Hirundo rustica	Barn Swallow	LS	Presently breeds
Bubo virginianus	Great Horned Owl	LS	Presently breeds
Icterus cucullatus	Hooded Oriole	LS	Presently breeds
Carduelis psaltria	Lesser Goldfinch	LS	Presently breeds
Vermivora celata	Orange-crowned Warbler	LS	Presently occurs, potential breeder
Empidonax difficilis	Pacific-slope Flycatcher	LS	Presently occurs
Carpodacus purpureus	Purple Finch	LS	Presently breeds
Sitta pygmaea	Pygmy Nuthatch	LS	Presently breeds
Sitta canadensis	Red-breasted Nuthatch	LS	Presently occurs
Buteo lineatus	Red-shouldered Hawk	LS	Presently breeds
Buteo jamaicensis	Red-tailed Hawk	LS	Presently breeds
Cyanocitta stelleri	Steller's Jay	LS	Presently occurs
Catharus ustulatus	Swainson's Thrush	LS	Presently breeds
Tachycineta bicolor	Tree Swallow	LS	Presently breeds
Tachycineta thalassina	Violet-green Swallow	LS	Presently occurs
Aeronautes saxatalis	White-throated Swift	LS	Presently occurs
Wilsonia pusilla	Wilson's Warbler	LS	Presently occurs
Euphydryas editha bayensis	Bay Checkerspot Butterfly	FT	Historic records only.
Icaricia icarioides missionensis	Mission Blue Butterfly	FE	Historic records only.
Ischnura gemina	San Francisco Forktail Damselfly		Reintroduced in 1996 Not observed in 1999
PLANTS			
Aquilegia formosa	Red Columbine	LS	Presently occurs in Glen Canyon Park
Arabis blepharophylla	Coast rock cress	CNPS List 4	Presently occurs
Grindelia hirsutula var. maritima	San Francisco gumplant	FSC, CNPS List 1B	Believed extant. Not observed since 1988.
Calamagrostis nutkaensis	Pacific Reedgrass	LS	Presently occurs.
Castilleja exserta	Owl's Clover	LS	Presently occurs in Glen Canyon Park
Rosa gymnocarpa	Wood Rose	LS	Presently occurs at O'Shaughnessy Hollow
Erigeron foliosus var. *foliosus*	Leafy Daisy	LS	Presently occurs in O'Shaughnessey Hollow
Gallium porrigens	Climbing Bedstraw	LS	Presently occurs in O'Shaughnessy Hollow

Table 6.3-2. Sensitive species known to occur at Glen Canyon Park and O'Shaughnessy Hollow.

Species	Common Name	Status Federal, State, CNPS	Occurrance Status
Garrya elliptica	Silk Tassel Bush	LS	Presently found in Glen Canyon
Heuchera micrantha	Alumroot	LS	Presently occurs at Glen Canyon Park and O'Shaughnessy Hollow
Lithophragma heterophylla	Prarie Star, Woodland Star	LS	Presently occurs in Glen Canyon Park
Pellaea andromedifolia	Coffee Fern	LS	Presently occurs at Glen Canyon
Prunus emarginata	Bitter Cherry	LS	Presently occurs at Glen Canyon Park
Rhamnus crocea	Spiny Redberry	LS	Presently occurs at Glen Canyon
Sisyrinchium californicum	Yellow-eyed grass	LS	Occurs in Glen Canyon wetlands. Only populaiton within SF (wesco 1993)
Sedum spathulifolium	Broadleaf Stonecrop		Larval food plant for San Bruno elfin butterfly, presently occurs in both parks.
Viola adunca	Blue Violet	LS	Presently occurs at Glen Canyon Park and O'Shaugnessy
Viola pedunculata	Johnny-jump-up		Presently occurs
Woodwardia fimbriata	Giant Chain Fern	LS	Presently occurs at Glen Canyon

Status Key:

Federal Status

FE Endangered. Species in danger of extinction throughout all or significant portion of its range.

FT Threatened. Species likely to become endangered within foreseeable future throughout all or a significant portion of its range.

FPE Proposed for listing as endangered.

FC Candidate for listing as endangered. Candidate information now available indicates that listing may be appropriate with supporting data currently on file.

FSC Species of Concern. Former Category 2 Candidate for listing as endangered.

FPD Proposed de-listing.

California State Status

SE Endangered. Species whose continued existence in California is jeopardized.

ST Threatened. Species, although not presently threatened with extinction, that is likely to become endangered in the foreseeable future.

SSC Species of Concern.

SFP State Fully Protected under Sections 3511 and 4700 of the Fish and Game Code.

Sens Considered a sensitive species by the California Department of Forestry.

California Native Plant Society

1A Plants presumed extinct in California

1B Plants that are rare or endangered in California and elsewhere.

2 Plants that are endangered in California, but more common elsewhere.

3 Plants about which more information is needed.

4 Plants of limited distribution (a watch list).

LS Locally Significant.

Golden Gate Audubon Society

SLC Species of Local Concern

EIP ASSOCIATES

Source: Aerial photography San Francisco Department of Public Works, 2002, Orthophoto - San Francisco - 1-foot resolution, 2001; property boundary data derived by San Francisco Recreation and Park Department (RPD) 2005 from data provided by San Francisco Department of Telecommunications and Information Services, 2002; natural area boundary data created by San Francisco State University Institute for GISc from information provided by RPD's Natural Areas Program (NAP), 2005; contour lines provided by San Francisco Department of Conservation; all data are California State Plane Zone III, NAD 83.

Created by Debra Dwyer, San Francisco State University Institute for GISc, May 5, 2002, revised June 10, 2005.

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PUBLIC DRAFT

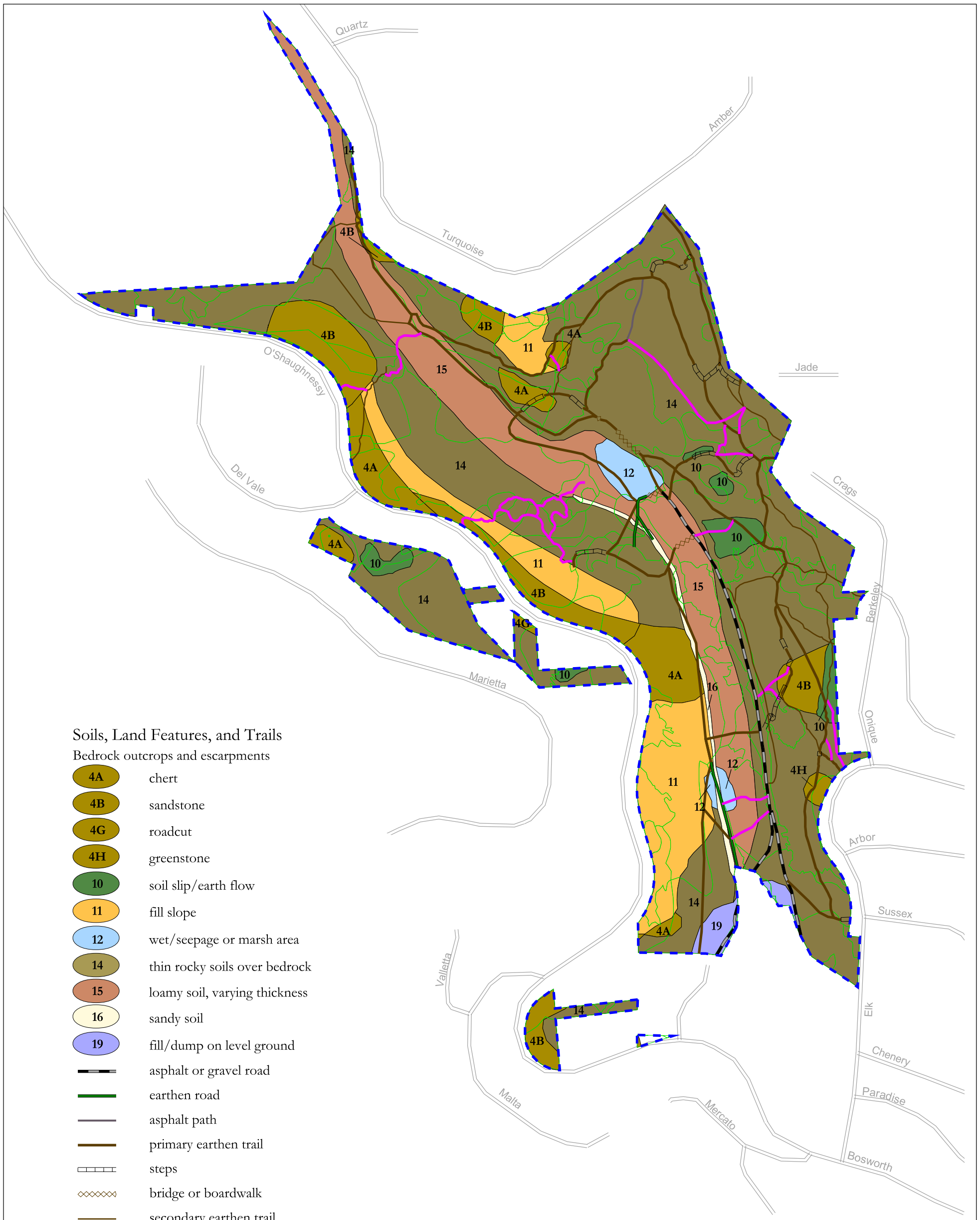
FIGURE 6.3 - 1

AERIAL PHOTOGRAPH, PROPERTY BOUNDARIES, AND NATURAL AREAS

Glen Canyon Park and O'Shaughnessy Hollow

Significant Natural Resource Areas Management Plan

San Francisco, California



Soils, Land Features, and Trails

Bedrock outcrops and escarpments

- 4A chert
- 4B sandstone
- 4G roadcut
- 4H greenstone
- 10 soil slip/earth flow
- 11 fill slope
- 12 wet/seepage or marsh area
- 14 thin rocky soils over bedrock
- 15 loamy soil, varying thickness
- 16 sandy soil
- 19 fill/dump on level ground
- asphalt or gravel road
- earthen road
- asphalt path
- primary earthen trail
- steps
- bridge or boardwalk
- secondary earthen trail
- closed trail
- Natural Area boundary
- vegetation series boundary

EIP ASSOCIATES

Source: Soils and land features data collected by EIP Associates, 1999-2002; trail data collected by San Francisco Recreation and Park Department Natural Areas Program (NAP) 2005, digitized by San Francisco State Institute for GISc; vegetation data collected by NAP, San Francisco State University Biology Department and EIP Associates, 1999- 2000; data layers digitized by Geotopo, Inc., 2000; edited and corrected by SFSUIGIS, 2000 - 2002; natural area boundary created by SFSUIGIS based on a determination by NAP, 2005; streets data excerpted from ArcView StreetMap 2000, copyright 1998-2000, Environmental Systems Research Institute, Inc., (ESRI).

Created December 3, 2002 , revised June 4, 2005 by Debra Dwyer, San Francisco State University Institute for GISc.

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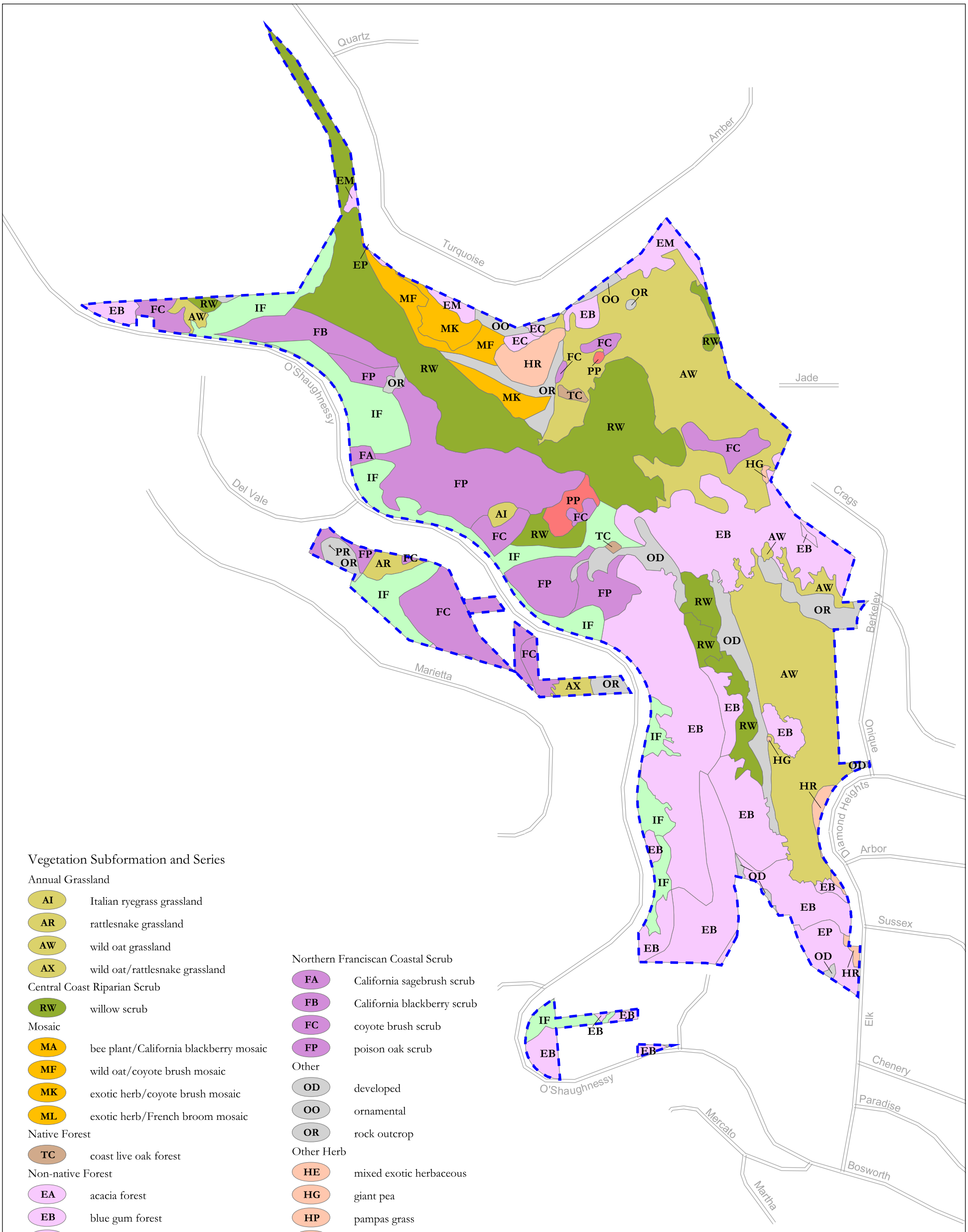
FIGURE 6.3 - 2

SOILS, LAND FEATURES, AND TRAILS

Glen Canyon Park and O'Shaughnessy Hollow

Significant Natural Resource Areas Management Plans

San Francisco, California



Vegetation Subformation and Series

Annual Grassland

- AI — Italian ryegrass grassland
- AR — rattlesnake grassland
- AW — wild oat grassland
- AX — wild oat/rattlesnake grassland

Central Coast Riparian Scrub

- RW — willow scrub

Mosaic

- MA — bee plant/California blackberry mosaic
- MF — wild oat/coyote brush mosaic
- MK — exotic herb/coyote brush mosaic
- ML — exotic herb/French broom mosaic

Native Forest

- TC — coast live oak forest

Non-native Forest

- EA — acacia forest
- EB — blue gum forest
- EC — cypress forest
- EM — mixed exotic forest
- EP — pine forest

Non-native Scrub

- IF — French broom scrub
- IH — Himalayan blackberry scrub

Northern Franciscan Coastal Scrub

- FA — California sagebrush scrub
- FB — California blackberry scrub
- FC — coyote brush scrub
- FP — poison oak scrub

Other

- OD — developed
- OO — ornamental
- OR — rock outcrop

Other Herb

- HE — mixed exotic herbaceous
- HG — giant pea
- HP — pampas grass
- HR — wild radish

Perennial Grassland

- PF — red fescue prairie
- PP — purple needlegrass prairie
- PR — reedgrass prairie

Natural Area boundary

EIP ASSOCIATES

Source: Vegetation data digitized by Geotopo, Inc. from data collected by San Francisco Recreation and Park Department Natural Areas Program (NAP), EIP Associates, and San Francisco State University Department of Biology, 1999-2000; vegetation shapefile edited by San Francisco State University Institute for GISc, 2000-2002; natural area boundary created by SFSUGIS from data provided by NAP, 2005; streets data excerpted from ArcView StreetMap 2000 Data, copyright 1998-2000, Environmental Systems Research Institute, Inc. (ESRI).

Created December 3, 2001, revised June 6, 2005 by D. Dwyer, San Francisco State University Institute for GISc.

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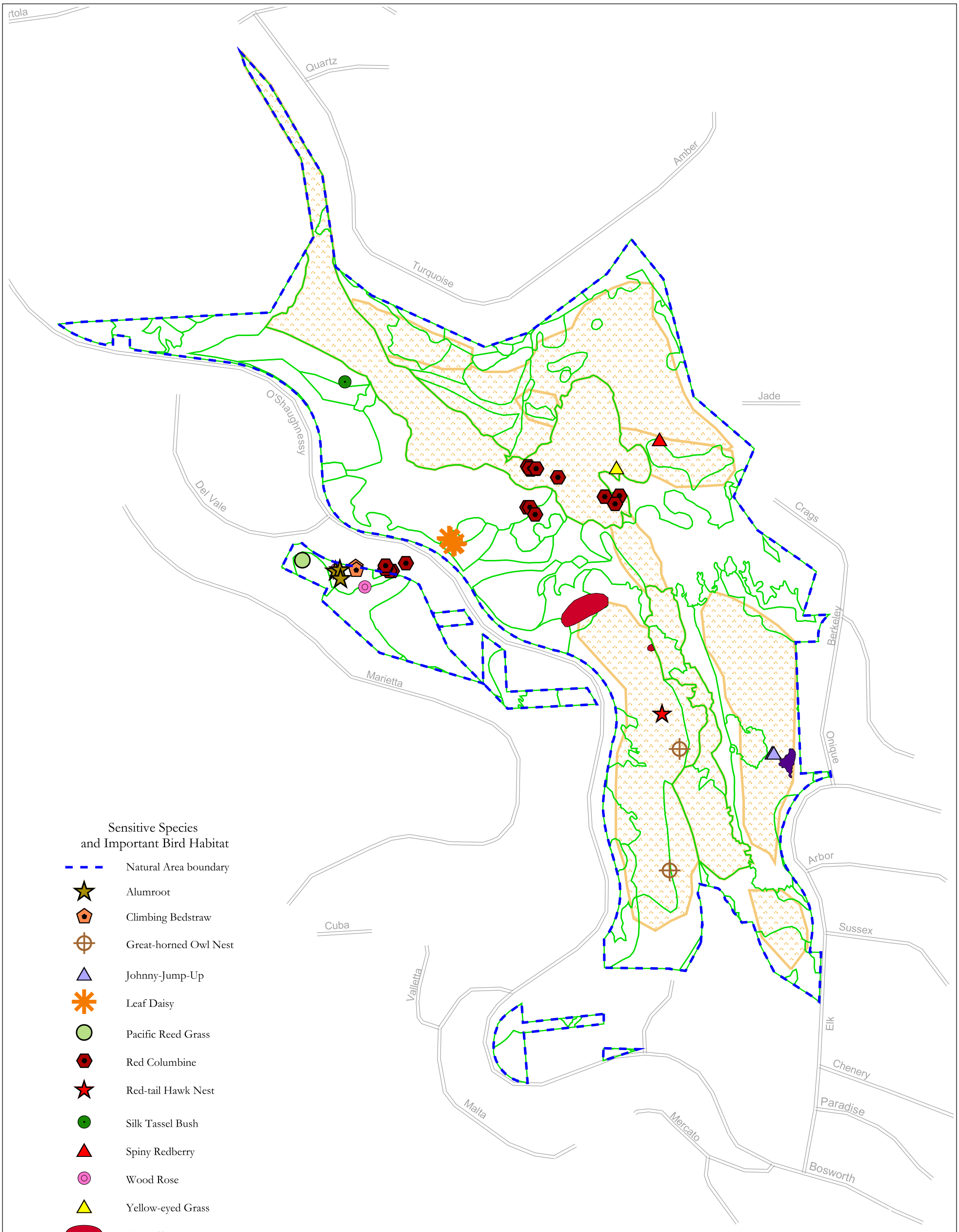
FIGURE 6.3 - 3
VEGETATION
Glen Canyon Park and O'Shaughnessy Hollow

Significant Natural Resource Areas Management Plans

San Francisco, California



EIP ASSOCIATES

Source: Sensitive species data collected by San Francisco Recreation and Parks Department Significant Natural Areas Program (NAP), 1998-2005; vegetation data collected by NAP, San Francisco State University Biology Department, and EIP Associates, 1999 - 2000; data layers digitized by Geotopo, Inc., 2000, edited and corrected by San Francisco State University Institute for GISc (SFSUGIS), 2000 - 2002; natural area boundary created by SFSUGIS based on a determination by NAP, 2005; streets data excerpted from ESRI's StreetMap 2000 data, copyright ESRI 1998-2000.

Created February 19, 2001, revised June 7, 2005 by Debra Dwyer, San Francisco State University Institute for GISc.

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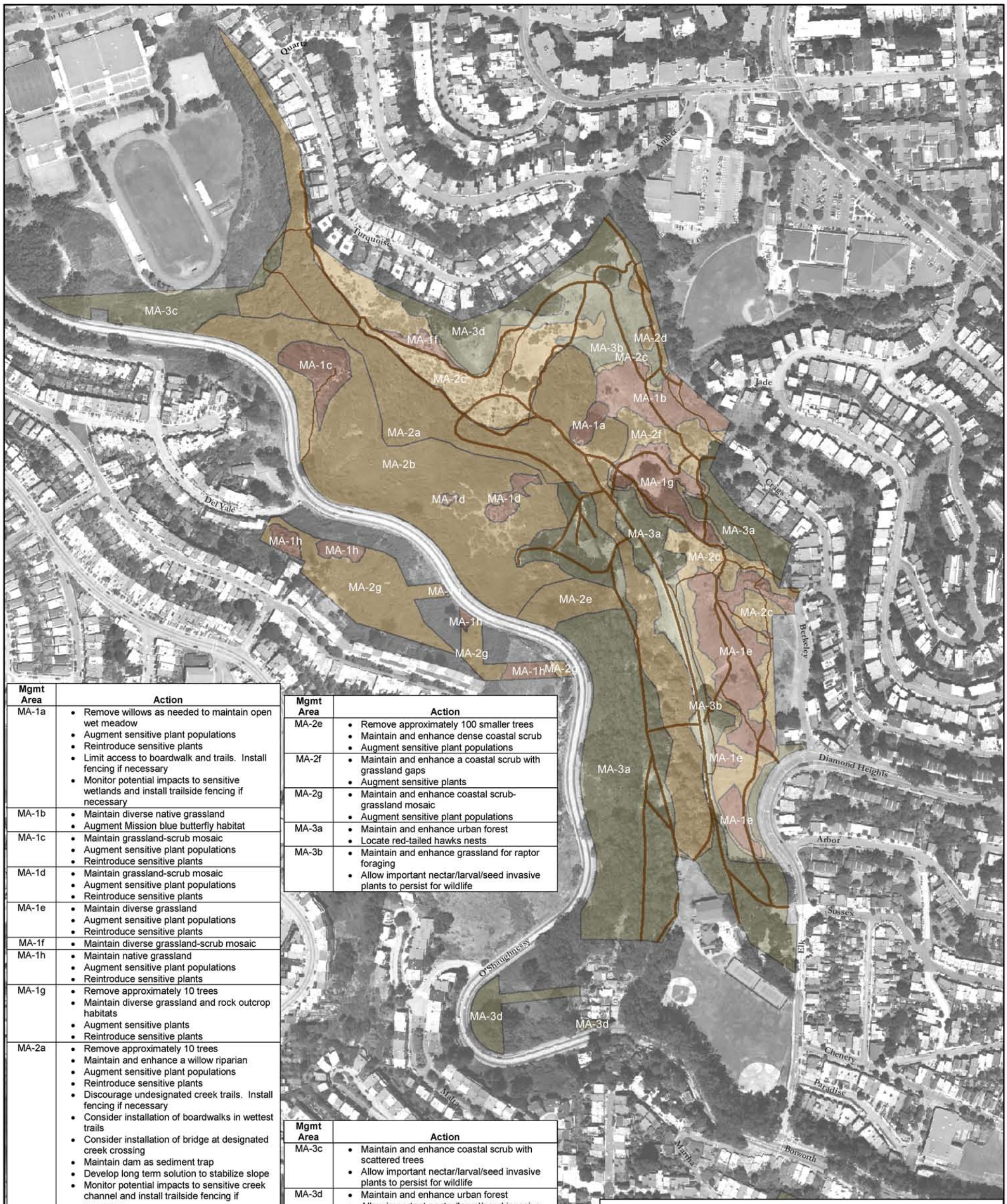
FIGURE 6.3-4

SENSITIVE SPECIES AND IMPORTANT BIRD HABITAT

Glen Canyon Park and O'Shaughnessy Hollow

Significant Natural Resource Areas Management Plans

San Francisco, California



Mgmt Area	Action
MA-1a	• Remove willows as needed to maintain open wet meadow • Augment sensitive plant populations • Reintroduce sensitive plants • Limit access to boardwalk and trails. Install fencing if necessary • Monitor potential impacts to sensitive wetlands and install trailside fencing if necessary
MA-1b	• Maintain diverse native grassland • Augment Mission blue butterfly habitat
MA-1c	• Maintain grassland-scrub mosaic • Augment sensitive plant populations • Reintroduce sensitive plants
MA-1d	• Maintain grassland-scrub mosaic • Augment sensitive plant populations • Reintroduce sensitive plants
MA-1e	• Maintain diverse grassland • Augment sensitive plant populations • Reintroduce sensitive plants
MA-1f	• Maintain diverse grassland-scrub mosaic
MA-1h	• Maintain native grassland • Augment sensitive plant populations • Reintroduce sensitive plants
MA-1g	• Remove approximately 10 trees • Maintain diverse grassland and rock outcrop habitats • Augment sensitive plants • Reintroduce sensitive plants
MA-2a	• Remove approximately 10 trees • Maintain and enhance a willow riparian • Augment sensitive plant populations • Reintroduce sensitive plants • Discourage undesignated creek trails. Install fencing if necessary • Consider installation of boardwalks in wettest trails • Consider installation of bridge at designated creek crossing • Maintain dam as sediment trap • Develop long term solution to stabilize slope • Monitor potential impacts to sensitive creek channel and install trailside fencing if necessary
MA-2b	• Maintain and enhance coastal scrub • Augment sensitive plant populations
MA-2c	• Maintain and enhance a diverse grassland habitat with scattered shrubs • Augment sensitive plant populations
MA-2d	• Remove willows as needed to improve drainage • Maintain and enhance willow scrub with open water for wildlife • Monitor potential impacts to sensitive wetlands and install trailside fencing if necessary

Mgmt Area	Action
MA-2e	• Remove approximately 100 smaller trees • Maintain and enhance dense coastal scrub • Augment sensitive plant populations
MA-2f	• Maintain and enhance a coastal scrub with grassland gaps • Augment sensitive plants
MA-2g	• Maintain and enhance coastal scrub-grassland mosaic • Augment sensitive plant populations
MA-3a	• Maintain and enhance urban forest • Locate red-tailed hawks nests
MA-3b	• Maintain and enhance grassland for raptor foraging • Allow important nectar/larval/seed invasive plants to persist for wildlife

Mgmt Area	Action
MA-3c	• Maintain and enhance coastal scrub with scattered trees • Allow important nectar/larval/seed invasive plants to persist for wildlife
MA-3d	• Maintain and enhance urban forest • Allow important nectar/larval/seed invasive plants to persist for wildlife

Natural Area Wide Management Actions

- Reduce and contain herbaceous and woody weeds
- No tree removal unless specified above
- Prevent recruitment of invasive trees unless specified above
- Total trails to remain: 19,590 linear-feet
- Provide access on designated trails only
- Social trails subject to closure
- Total trees to remove: 120; Total trees to remain: 5,880
- Implement erosion control as required (GR-12)
- Implement wildlife enhancements as appropriate

EIP ASSOCIATES

Source: Management areas and trails data collected by San Francisco Department of Recreation and Park Natural Areas Program (NAP), 2005; trails data digitized by San Francisco State University Institute for GISc (SFSUGIS), 2005; streets data excerpted from Environmental Systems Research Institute (ESRI), Inc.'s StreetMap 2000 data copyright ESRI 1998-2001; aerial photography San Francisco Department of Public Works, 2002, Orthophoto - San Francisco - 1-foot resolution - 2001; all data are in California State Plane Zone III projection, NAD 1983; map produced using ArcGIS 9.0 software by ESRI.

Map created May 28, 2005 by Debra Dwyer, San Francisco State University, Institute for Geographic Information Science (SFSUIGIS).

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FIGURE 6.3 - 5

MANAGEMENT AREAS AND TRAIL PLAN

Glen Canyon and O'Shaughnessy Hollow

Significant Natural Resource Areas Management Plan

San Francisco, California