6.14 TANK HILL

GENERAL DESCRIPTION AND LOCATION

Tank Hill is a 2.9-acre Natural Area located in central San Francisco on Twin Peaks Boulevard near Golden Gate Park (Figure 1-1). Tank Hill is named for the Clarendon Heights Water Tank built on this spot in 1894 by the Spring Valley Water Company to store drinking water pumped from Laguna Honda (Gaar, no date). Tank Hill became City property in 1930 when Spring Valley was acquired and became the property of the San Francisco Water Department (Gaar, no date). Today, all that remains of the water tank is the concrete foundation pad in the southern portion of the Natural Area (Figure 6.14-1). Tank Hill is a grassy knoll rich in local plant species. Public access to the site is provided by a wooden stairway from Twin Peaks Boulevard and a retained-earth stairway from the end of Belgrave Street.

Tank Hill has high natural resource and recreational values that include: diverse native grassland plant community; high levels of recreational use; outstanding City views; populations of sensitive plants; and suitable habitat for a variety of bird species and special-status species of butterflies.

GEOLOGY, HYDROLOGY AND TRAILS

This Natural Area is almost entirely underlain by Franciscan chert bedrock, including the areas mapped as “thin rocky soil over bedrock” (Figure 6.14-2). Around the tank pad, and extending south to an outcrop above Twin Peaks Boulevard, the Franciscan bedrock is an altered volcanic rock called “greenstone” (mostly buried). The northwest corner of the Natural Area consists of a thin layer of slope debris overlying Franciscan “mélange,” a fault-sheared bedrock mixture of sandstone, chert, claystone, and shale. The bedrock slopes on the east and north sides are very steep, nearly 1:1 (horizontal:vertical), and ancient landslide scarps form most of the hillsides. Shallow soil slips and slope raveling are common, as can be seen from the debris deposits at the base of the slopes. An area of steep, weathered, and eroded chert is exposed on the southeast slope of the hill above Twin Peaks Boulevard.

There is no surface water at the site. Drainage of the area is by overland flow. Some rainfall percolates into fissures in the rock, but runoff generally is rapid. Natural runoff-formed furrows on the slopes are not eroded extensively where there is ground cover, but gullies have developed in the eroded chert slope area and are developing on other exposed slopes.

A relatively well-defined network of designated and social earthen trails has developed throughout the accessible areas of the park. Extensive foot traffic has worn most of the trails through the thin soil to the underlying bedrock. Runoff channeled along some of these trails increases erosion, as is apparent at the upper edges of the slopes and on the faces of the hillsides. The retained-earth steps from Belgrave Street are a good example of the use of logs to reduce erosion along a heavily used hillside trail.

VEGETATION

The vegetation at Tank Hill was classified into eight series (Table 6.14-1; Figure 6.14-3). These series are within four sub-formations: approximately 55 percent of the area is grassland; 19 percent is forest; 17 percent is scrub; and 9 percent is classified as "other" (developed, bare ground, and rock outcroppings). Only one series, osoberry scrub, is dominated by native species.

Forest

Two forest series were mapped within the Natural Area at Tank Hill. The non-native blue gum series (0.52 acres) is the most abundant of the two. A small patch of mixed exotic forest occurs in the northeast corner of the Natural Area.

Grassland and Scrub

Of the three scrub series that were mapped at Tank Hill, French broom scrub (0.43 acres) accounts for 93 percent of the scrub series present in the area. The only native scrub series is the small native osoberry scrub on the hill's western side. One grassland series, 1.55 acres of wild oat grassland, was mapped within the Natural Area at Tank Hill. While the grasslands are dominated by non-native species, surprisingly over half of the species present in the grassland were native (37 of the 60 species).

Other

Two series were mapped as "other" habitats at Tank Hill: developed and rock outcrops. The rock outcrops (0.18 acres) account for the largest portion of this sub-series. The developed area is the concrete tank pad for which the Natural Area is named.

Sensitive Plant Species

Five of the species designated as sensitive for this management plan have been recently observed on Tank Hill (Table 6.14-2). Stonecrop (*Sedum spathulifolium*) occurs within the rock outcrops of Tank Hill. This species is designated as sensitive because it is a larval host plant for the San Bruno elfin butterfly (*Incisalia mossii bayensis*), a federally endangered species found to the south of San Francisco on San Bruno Mountain. Farewell-to-spring (*Clarkia rubicunda*) can also be found in three relatively large areas on Tank Hill (Figure 6.14-4). Both of these species were introduced here from nearby sources along Graystone Terrace. The third and forth species, Johnny-jump-up (*Viola pedunculata*) and muilla (*Muilla maritima*), are found in the central portion of the park north of the tank pad. Johnny-jump-up is considered a sensitive species within San Francisco because it is one of the larval host plants for the San Francisco silverspot butterfly (*Speyeria callippe callippe*), a federally endangered species. The fifth species, western choke cherry (*Prunus virginiana*), is found in a very small area on the eastern edge of the rock outcropping above Twin Peaks Boulevard. The California Natural Diversity Data Base (CNDDB) does not report the occurrence of any sensitive plant species at Tank Hill (CNDDB 2005).

Invasive Plant Species

Five vegetation series dominated by non-native species account for approximately 90 percent of the land cover at Tank Hill. Wild oat grassland (1.55 acres) accounts for the largest vegetation series within the area. French broom scrub (0.43 acres) and blue gum forest (0.52 acres) are the next-largest areas of invasive vegetation. There are also small areas of non-native mixed exotic forest and Himalayan blackberry scrub within the area. Other invasive species that occur within the Natural Area include ehrharta grass (*Ehrharta erecta*), Bermuda buttercup (*Oxalis pes-caprae)*, and sheep sorrel (*Rumex acetosella*).

WILDLIFE

Birds

The habitat of Tank Hill provides foraging, nesting, and roosting habitat for a wide variety of species. Habitat for smaller birds (passerines) is available in the scrub habitat throughout the area. Marginal foraging habitat for raptors species is present in the grasslands of Tank Hill. Because the tree canopy is relatively sparse, Tank Hill nesting habitat for raptors is marginal, but red-tailed hawks (*Buteo jamaicensis*) do nest within the Natural Area. Pygmy nuthatch (*Sitta pygmaea*) nest in the trees at Tank Hill, while the Pacific-slope flycatcher (*Empidonax difficilis*) nest in scrub habitats. Both of these species and red-tailed hawks are sensitive species. The CNDDB does not report the occurrence of any special-status species of birds at Tank Hill (CNDDB 2005).

Mammals, Reptiles, and Amphibians

To date, no surveys have been conducted on Tank Hill for mammals, reptiles, or amphibians; however, common small mammals such as the California meadow vole (*Microtus californicus*) and pocket gopher (*Thomomys bottae*) are expected to occur on Tank Hill. In addition, larger mammals such as raccoons, striped skunks, and Virginia opossum are typical of urbanized parks in general and are expected to occur within Tank Hill. Visitors to Tank Hill have reported sighting western terrestrail garter snake (*Thamnophis elegans)* and western fence lizard *(Sceloporus occidentalis).*

Invertebrates

<u>Sensitive Invertebrate Species</u>

At least three special-status species of butterflies potentially occur within the City of San Francisco: mission blue butterfly (*Icaricia icarioides missionensis*), San Bruno elfin butterfly, and bay checkerspot butterfly (*Euphydryas editha bayensis*). Stonecrop is a larval host plant for the San Bruno elfin butterfly and currently occurs on Tank Hill, indicating that suitable habitat may exist for this species. Similarly, the populations of Johnny-jump-up may provide suitable habitat for the San Francisco silverspot butterfly. Larval host plants for the mission blue and bay

checkerspot butterflies are relatively common (various lupines, plantain), owl's clover, etc.) (Garth and Tilden 1986).

MANAGEMENT AREAS

Management Areas (MAs) at Tank Hill fall into three general categories: the grassland and rock outcrops which support the most sensitive species (generally within MA-1a areas); the less sensitive MA-2 areas which act as buffers around some MA-1a areas; the MA-3 areas which include the tree-dominated habitats and steep slopes in the southern portion of the Natural Area (Figure 6.2-5). The following text presents issues and recommended management actions by Management Area.

ISSUES AND RECOMMENDATIONS

Several conservation and recreation-related issues have been identified for Tank Hill. 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 the entire Natural Area at Tank Hill 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.

Site Improvements – Implementation of management recommendations at Tank Hill would not change significantly the overall look of the park and would result in:

- increased and more sustainable populations of sensitive plants;
- beautification of some park entry points with designed native plant gardens;
- improved wildlife habitat;
- increased habitat diversity through installation of native scrub and trees; and
- improved access on designated trails.

Recommendations at Tank Hill will lead to the restoration of complex scrub-grassland mosaics that will support sensitive plants, provide shelter for locally sensitive bird species, and generally increase the biodiversity of San Francisco.

Vegetation

Issues relating to vegetation management at Tank Hill involve the protection of sensitive species and habitats, typically through the control of invasive plants (GR-1) and management of sensitive species and vegetation series of limited distribution (GR-2). No trees are to be removed at Tank Hill. Issues relating to the general safety of visitors and surrounding homes, fire hazards posed by vegetation and trees, and illicit activities must be considered during management of the Natural Areas (GR-13). In addition to these general recommendations, the following site-specific issue should be addressed.

Issue TK-1: Tank Hill supports a diverse array of sensitive plant species and rich native grassland and rock outcrop communities. As with many Natural Areas, habitat loss and invasive vegetation such as blue gum forest and French broom scrub threaten the long-term survival of these species and could lead to the localized extinction of sensitive plant species.

***Recommendation TK-1a*:** To help protect and preserve these populations of sensitive species, within all MA-1 and MA-2 areas, reduce and contain invasive woody and herbaceous species such as radish, invasive annual grasses, French broom (*Genista monspessulana*), English ivy (*Hedera helix*), Himalayan blackberry (*Rubus discolor*), sheep sorrel, and Bermuda buttercup. Within the MA-3 areas, some invasive plants such as radish (*Raphanus sativus*), sweet fennel (*Foeniculum vulgare*), and plantain that are important nectar, seed, and larval habitat for wildlife shall be allowed to persist. These areas shall be carefully monitored to prevent the spread of invasive species.

***Recommendation TK-1b*:** Consider augmenting populations of sensitive plant species within MA-1a such as Johnny-jump-up, muilla, stonecrop, and western choke cherry. Augmentation of western choke cherry populations should also be considered within MA-2a.

***Recommendation TK-1c*:** In MA-1a and MA-2a consider the reintroduction of sensitive species such as alumroot (*Heuchera micrantha*), meadow white (*Cerastium arvense*), and Islais cherry (*Prunus ilicifolia).*

***Recommendation TK-1d*:** In MA-1 and MA-2 areas where invasive plants have been removed, revegetate with appropriate native plants (Appendix B). To maintain the grassland and sensitive plant species that are currently found within the MA-1a areas, plant species that are native to grasslands and rock outcrops. The adjacent areas shall be maintained and enhanced as a coastal scrub-grassland mosaic (MA-2a) or native scrub communities (MA-2b and MA-2c). Installation of native oaks at the edge of MA-2b, will help increase structural diversity of the Natural Area. The grasslands of MA-3a shall also be maintained. The existing multi-storied mixed forest and scrub habitat found within MA-3b should be enhanced with native plants such as oaks, cherry, and buckeye, while preserving openings between trees to maintain the views from Tank Hill. The existing row of trees that screens views of neighboring homes should be maintained and enhanced with native trees as appropriate (MA-3c). At park entrances, modify the selection and placement of plants to create designated native plan gardens (MA-3a, MA-3b, MA-3c, and MA-2a).

***Recommendation TK-1e*:** Within all Management Areas, except the urban forest in MA-3b, prevent establishment of invasive tree species. All of the approximately 50 trees will remain in the Natural Areas. For safety reasons, large trees shall be prevented from becoming established on the steep unstable slopes above Twin Peaks Boulevard within MA-3b.

Wildlife

Wildlife issues at Tank Hill involve protection and enhancement of habitat, including food sources and shelter. Vegetation management during the breeding season can impact nesting birds (GR-4), however, vegetation management also can provide materials to create artificial habitat for ground-dwelling birds, small mammals, and reptiles (GR-9) and increase habitat for insects (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 issue should be addressed.

Issue TK-2: There is relatively little habitat for small birds at Tank Hill. The scrub series present are either very small or do not provide much wildlife habitat (e.g., French broom). In a small Natural Area such as this, improvements in cover and available food sources can have dramatic effects on bird species.

> ***Recommendation TK-2a:*** Following control of invasive vegetation, install native scrub series to replace this habitat (all MA-2 and MA-3). Plant to create a mosaic of grassland and scrub habitats that are most useful for small birds. Plant native scrub species using diversity, cover, and density targets generated from reference sites within and around San Francisco (see Appendix B). Planting plans should be modified to include native trees in the transition area between eucalyptus trees and scrub-grassland mosaic in order to help increase the habitat and structural diversity.

Soils, Erosion, and Public Use

The erosion and soil issues at Tank Hill generally relate to the trail system and public use. A network of designated (1,261 linear feet) and social trails (1,411 linear feet) wind through all Management Areas at Tank Hill (Figure 6.14-5). The existing network of designated trails has been delineated by short rustic wooden fences and will be maintained. The social are proposed for closure. The issue of erosion and habitat impacts related to social trails is addressed through implementation of GR-11 and GR-12. Interpretive signs regarding the ecosystem of Tank Hill should also be considered (GR-14). Implementation of these general recommendations will address all the soils, erosion, and public use issues at Tank Hill and therefore, no site-specific recommendations are made.

Table 6.14-1. Vegetation series mapped at Tank Hill.

	Vegetation Series	Total Acreage
Forest	blue gum forest	0.52
	mixed exotic forest	0.01
	Subtotal	**0.53**
Scrub	osoberry scrub*	0.01
	French broom scrub	0.43
	Himalayan blackberry scrub	0.02
	Subtotal	**0.46**
Grassland	wild oat grassland	**1.55**
Other	developed	0.07
	rock outcrop	0.18
	Subtotal	**0.25**
Grand Total		**2.80**

* Indicates vegetation type is dominated by native species.

Table 6.14-2. Sensitive species historically and presently known to occur at Tank Hill.

Species	Common Name	Status Federal, State, CNPS	Occurrence Status
ANIMALS			
Empidonax difficilis	Pacific-slope Flycatcher	LS	Presently breeds
Sitta pygmaea	Pygmy Nuthatch	LS	Presently breeds
Buteo jamaicensis	Red-tailed Hawk	LS	Presently breeds
PLANTS			
Clarkia rubicunda	Farewell-to-spring	-	Presently occurs.
Muilla maritima	Muilla	LS	Presently occurs
Prunus virginiana var. *demissa*	Western Choke Cherry	LS	Presently occurs
Sedum spathulifolium	Broadleaf Stonecrop	-	Larval food plant for San Bruno elfin butterfly, presently occurs.
Viola pedunculata	Johnny-Jump-Up	-	Larval food plant for San Francisco silverspot butterfly, presently occurs.

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

LS Locally Significant.

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 7, 2005.

N

0 50 100

Feet

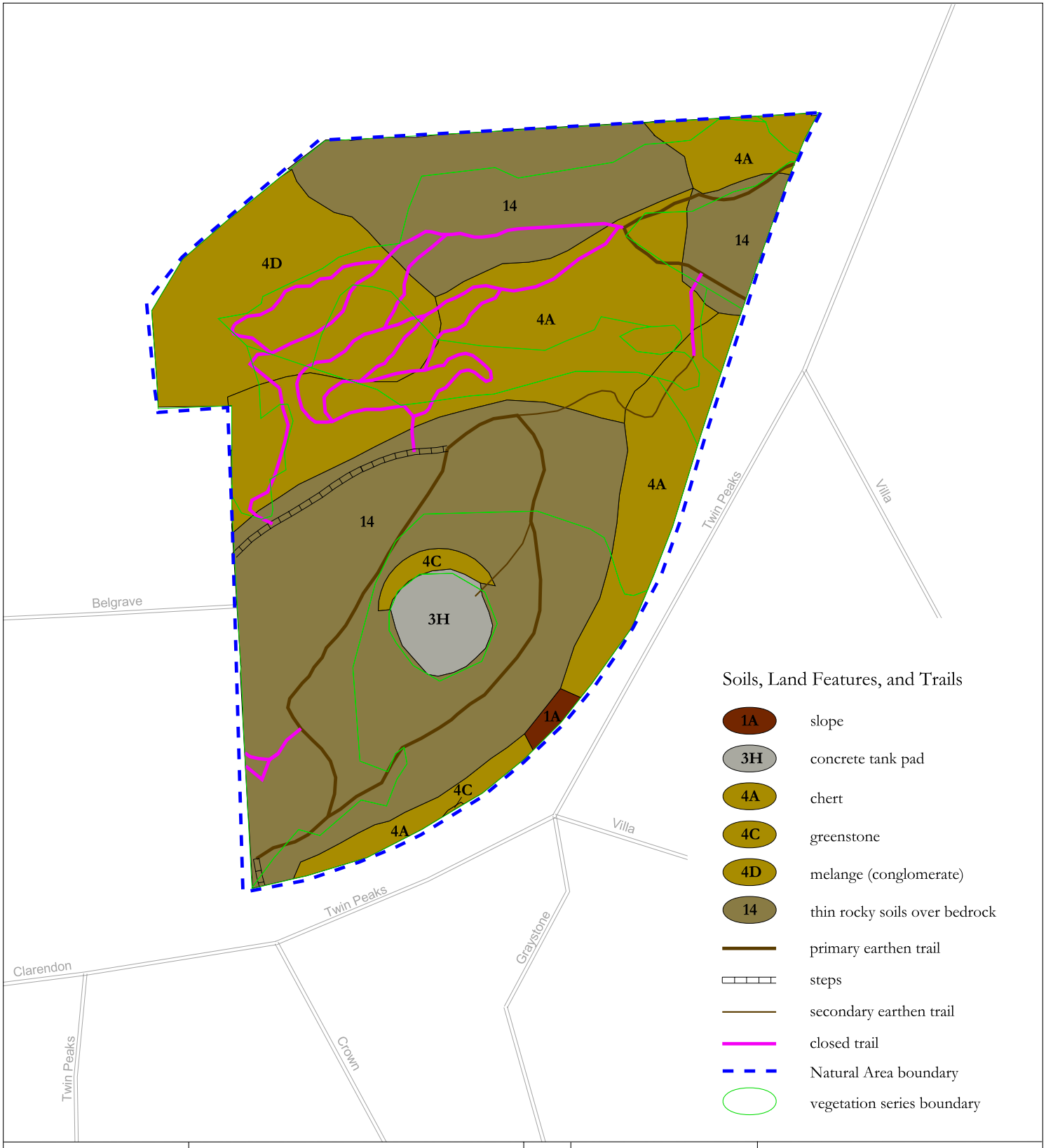
FIGURE 6.14 - 1

AERIAL PHOTOGRAPH, PROPERTY BOUNDARIES, AND NATURAL AREAS

Tank Hill

Significant Natural Resource Areas Management Plan

San Francisco, California



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

Created by D. Dwyer, San Francisco State University Institute for GISc, October 3, 2001, revised December 11, 2005.

N

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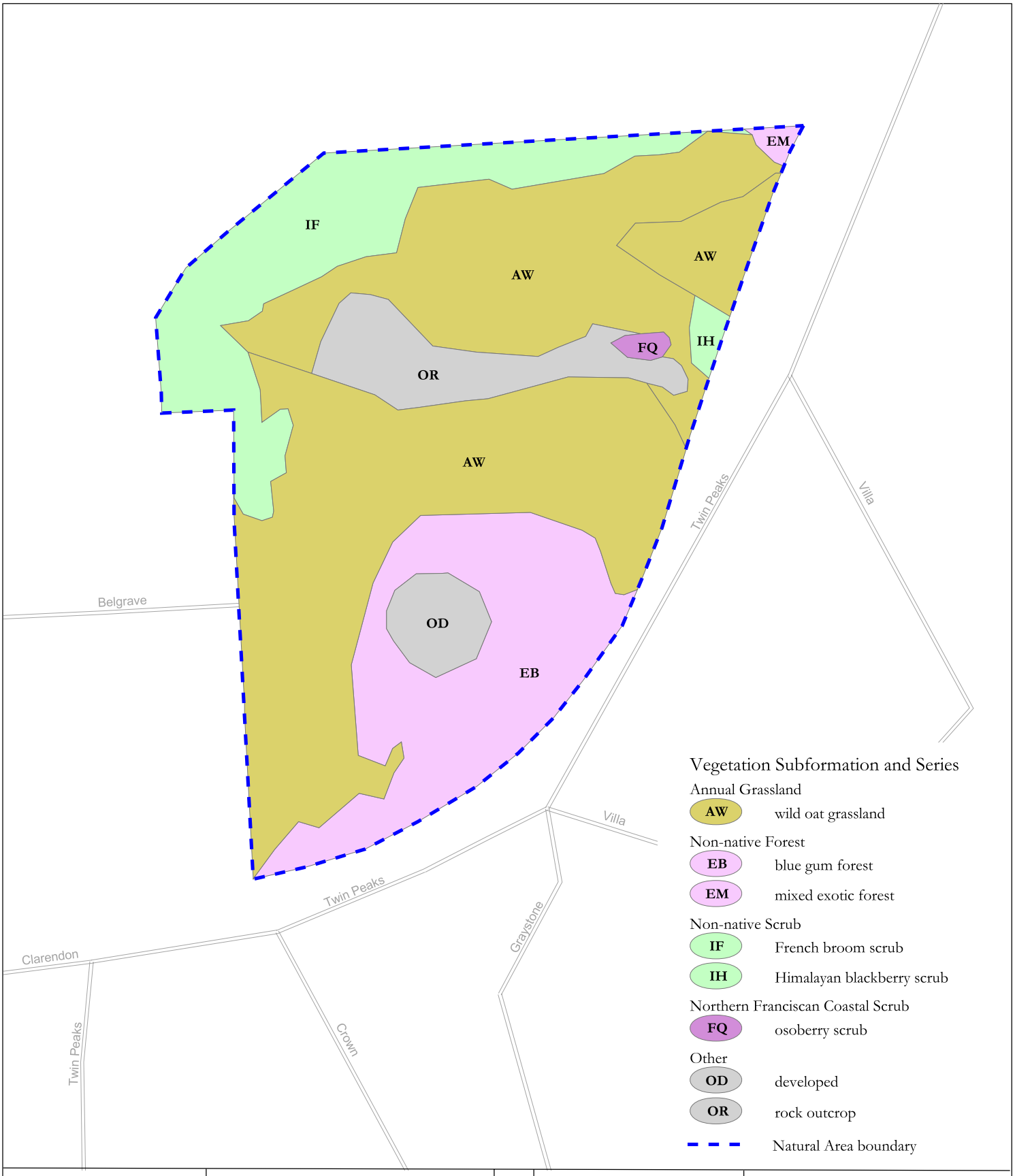
FIGURE 6.14 - 2
SOILS, LAND FEATURES, AND TRAILS
Tank Hill
Significant Natural Resource Areas Management Plan

San Francisco, California



EIP ASSOCIATES

Source: Vegetation data collected by San Francisco Department of Recreation and Parks Significant Natural Areas Program (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 Institute for GISc (SFSUGIS), 2000 - 2002; natural area boundary created by SFSUGIS from data provided by NAP, 2005; streets data excerpted from ArcView StreetMap 2000 data from Environmental Systems Research Institute, Inc., copyright 1998-2001.

Created by D. Dwyer, San Francisco State University Institute for GISc July 24, 2001, revised June 6, 2005.

N

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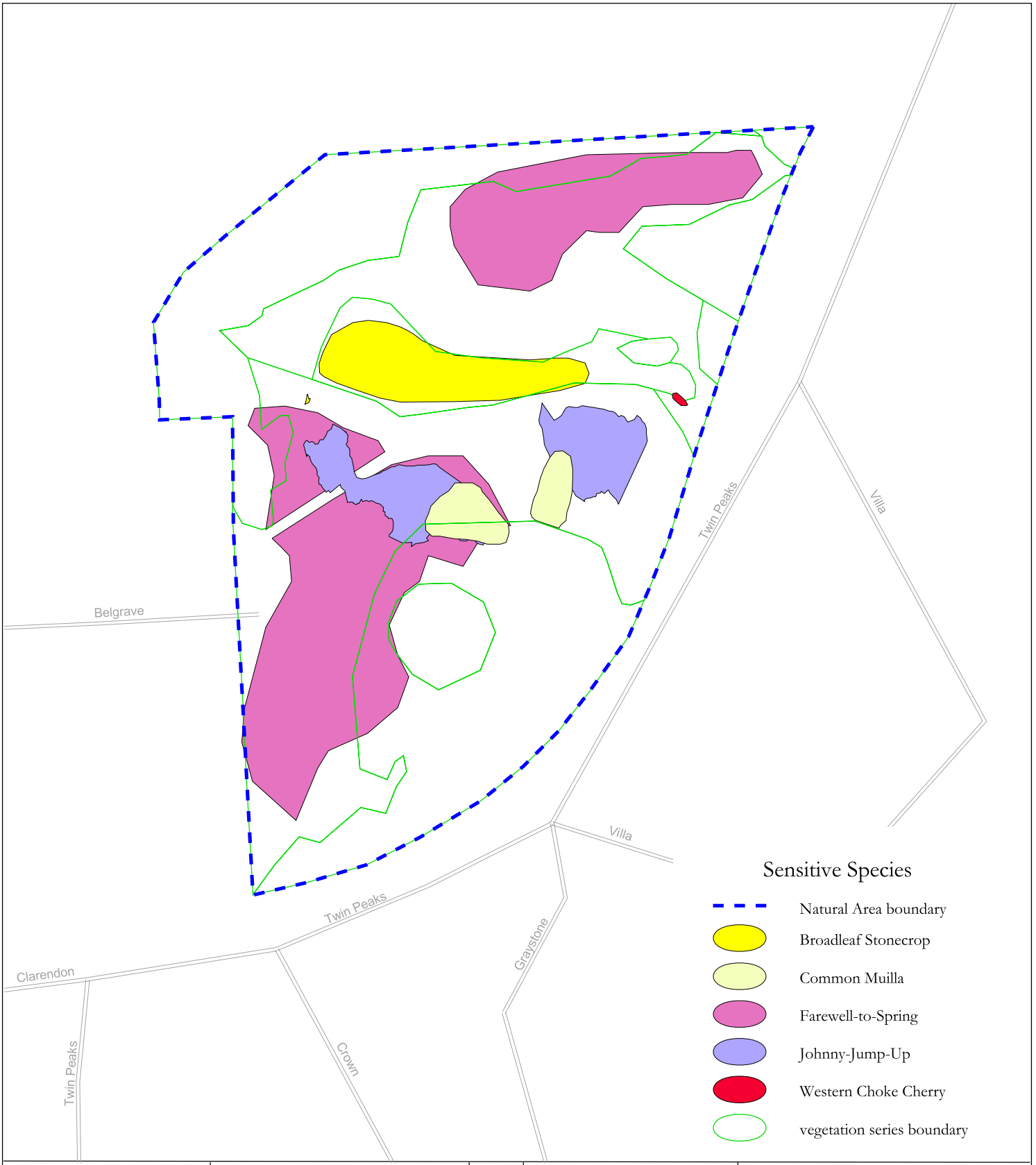
FIGURE 6.14 - 3
VEGETATION
Tank Hill
Significant Natural Resource Areas Management Plan
San Francisco, California



EIP ASSOCIATES

Source: Sensitive species data collected by San Francisco Department of Recreation and Parks Significant Natural Areas Program (NAP), 1998-2005; vegetation series 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 Multidisciplinary GIS Lab (SFSUGIS), 2000 - 2002; natural area boundary created by SFSUGIS from data provided by NAP, 2005.

Created by D. Dwyer, San Francisco State University Institute for GISc, September 4, 2001, revised May 22, 2005.

N

0 50 100
Feet

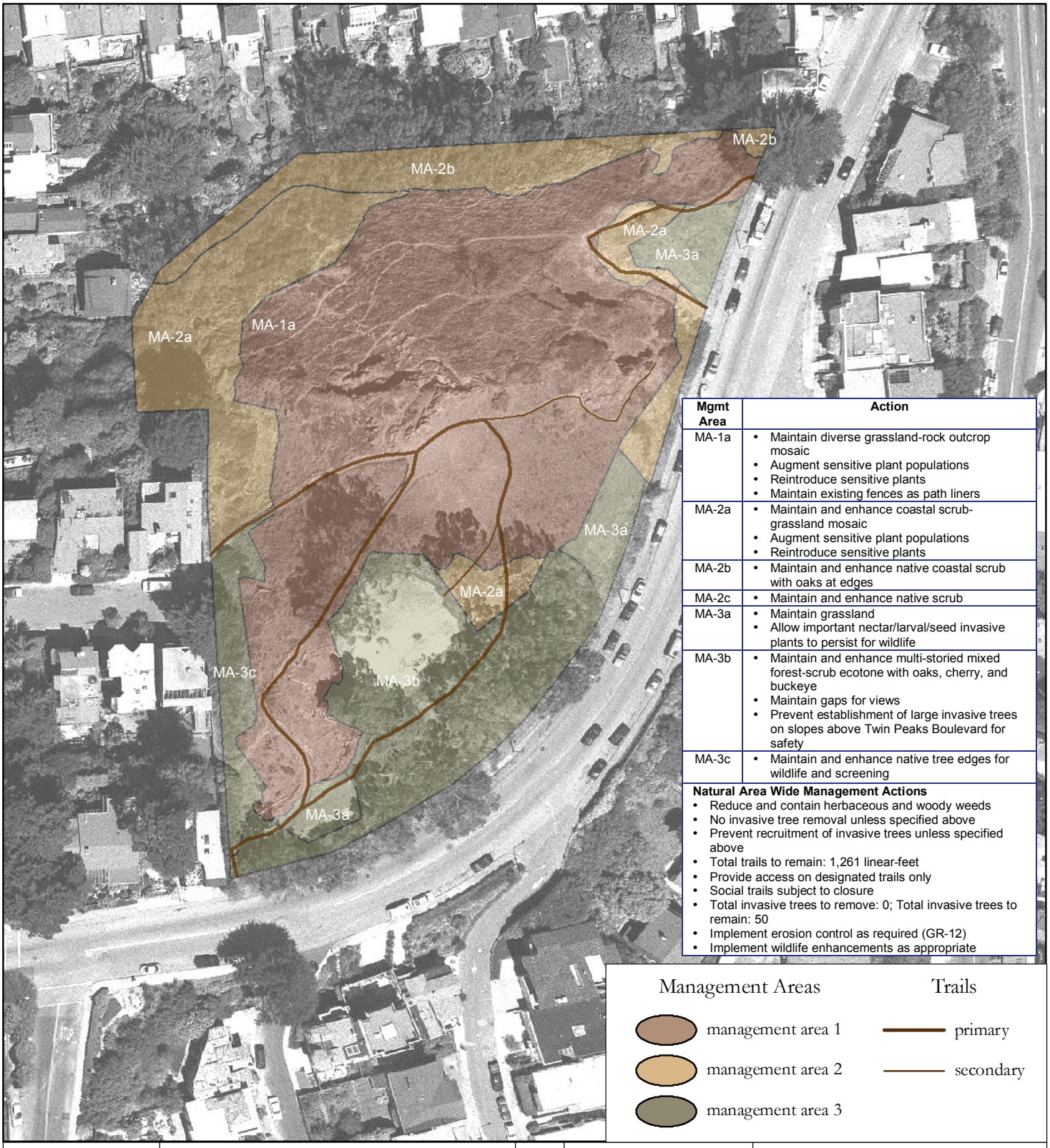
FIGURE 6.14 - 4

Sensitive Species

Tank Hill

Significant Natural Resource Areas Management Plan

San Francisco, California



Mgmt Area	Action
MA-1a	• Maintain diverse grassland-rock outcrop mosaic • Augment sensitive plant populations • Reintroduce sensitive plants • Maintain existing fences as path liners
MA-2a	• Maintain and enhance coastal scrub-grassland mosaic • Augment sensitive plant populations • Reintroduce sensitive plants
MA-2b	• Maintain and enhance native coastal scrub with oaks at edges
MA-2c	• Maintain and enhance native scrub
MA-3a	• Maintain grassland • Allow important nectar/larval/seed invasive plants to persist for wildlife
MA-3b	• Maintain and enhance multi-storied mixed forest-scrub ecotone with oaks, cherry, and buckeye • Maintain gaps for views • Prevent establishment of large invasive trees on slopes above Twin Peaks Boulevard for safety
MA-3c	• Maintain and enhance native tree edges for wildlife and screening

Natural Area Wide Management Actions

- Reduce and contain herbaceous and woody weeds
- No invasive tree removal unless specified above
- Prevent recruitment of invasive trees unless specified above
- Total trails to remain: 1,261 linear-feet
- Provide access on designated trails only
- Social trails subject to closure
- Total invasive trees to remove: 0; Total invasive trees to remain: 50
- Implement erosion control as required (GR-12)
- Implement wildlife enhancements as appropriate

Management Areas

management area 1

management area 2

management area 3

Trails

primary

secondary

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 (SFSU IGIS), 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 29, 2005 by Debra Dwyer, San Francisco State University, Institute for Geographic Information Science; revised August 23, 2005.

N

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Feet

FIGURE 6.14 - 5

MANAGEMENT AREAS AND TRAIL PLAN

Tank Hill

Significant Natural Resource Areas Management Plan

San Francisco, California