

**SYCAMORE**  
ASSOCIATES LLC

**BOTANICAL ASSESSMENT OF THE  
INDIAN VALLEY PROPERTY, MORAGA,  
CONTRA COSTA COUNTY, CALIFORNIA.**



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*The information provided in this document is intended solely for the use and benefit of Mr. David Bruzzone.*

*No other person or entity shall be entitled to rely on the services, opinions, recommendations, plans or specifications provided herein, without the express written consent of Sycamore Associates LLC, 2099 Mt. Diablo Blvd., Suite 204, Walnut Creek, CA 94596.*

## TABLE OF CONTENTS

1.0	INTRODUCTION .....	1
2.0	METHODS AND LIMITATIONS.....	1
3.0	EXISTING CONDITIONS .....	3
3.1	SETTING.....	3
3.2	VEGETATION COMMUNITIES.....	3
4.0	SPECIAL-STATUS PLANTS.....	7
5.0	SENSITIVE NATURAL COMMUNITIES.....	12
6.0	CONCLUSIONS AND RECOMMENDATIONS .....	13
7.0	REFERENCES .....	15

## LIST OF FIGURES

FIGURE 1.	LOCATION OF THE INDIAN VALLEY STUDY AREA .....	2
FIGURE 2.	VEGETATION COMMUNITIES AND SPECIAL-STATUS PLANT SPECIES.....	MAP POCKET

## LIST OF TABLES

TABLE 1:	UNUSUAL AND SIGNIFICANT PLANT SPECIES DETECTED .....	11
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## LIST OF APPENDICES

A	INVENTORY OF OF PLANT SPECIES DETECTED WITHIN THE STUDY AREA
B	POTENTIALLY-OCCURRING SPECIAL-STATUS PLANT SPECIES
C	EXPLANATION OF SENSITIVITY STATUS CODES



## SUMMARY

Sycamore Associates LLC was contracted by David Bruzzone to evaluate the potential for occurrence of special-status plant species and to perform seasonal focused rare plant surveys for the approximately 400-acre Indian Valley study area, in Moraga, California. The undeveloped site is proposed for residential subdivision.

Vegetation within the study area is dominated by non-native annual grassland. Other plant communities identified on site include Central Coast riparian scrub, coast live oak woodland, freshwater marsh and seeps, northern coyote brush scrub, sage scrub, and an abandoned walnut orchard with associated ruderal vegetation.

Based on a review of special-status plant species in Contra Costa County and adjacent Alameda County, and a broad knowledge of the regional flora, a total of 22 special-status plant species were determined to have at least some potential to occur within the region of the study area. These species are considered to be “target species” for the purpose of site-specific focused plant surveys.

During field surveys, the entire study area was traversed on foot. All distinct upland and wetland plant communities were visited and described, and all plant species detected were identified and recorded. The entire study area was surveyed during all seasons necessary for the detection and proper identification of any potentially occurring special-status plant species. Survey methods conformed to guidelines established by the California Department of Fish and Game, the U.S. Fish and Wildlife Service, and the California Native Plant Society.

Based on comprehensive focused botanical surveys of the Indian Valley study area, commencing in March and completed in August 2003, no federally- or state-listed Endangered or Threatened plant species were detected within the study area, and none are expected. However, a total of three special-status plant species listed by the California Native Plant Society (CNPS) were detected within the study area during the present botanical surveys. These include bent-flowered fiddleneck, California Native Plant Society List 1B, robust monardella, California Native Plant Society List 1B, and Oakland star-tulip, California Native Plant Society List 4. Although none of these plants are protected under state or federal law, the sensitivity and significance of these species in the region as recognized by the California Native Plant Society warrants consideration by the lead agency through the California Environmental Quality Act (CEQA) process.

Nineteen additional plant taxa representing regionally uncommon botanical resources were detected on site. The East Bay Chapter of the California Native Plant Society considers these taxa unusual and significant in Alameda and Contra Costa counties. Although not listed by California Native Plant Society on a statewide basis, these botanical resources are regarded as regionally rare or noteworthy.

The study area supports three sensitive vegetation communities that are regulated by municipal, county, state, or federal legislation or policies. These include freshwater marsh and seeps,

Central Coast riparian scrub, and coast live oak woodland. No other sensitive plant communities are present within the study area.

Central coast riparian scrub and freshwater marsh including seeps are regarded as sensitive habitats on site because they serve important biological functions by providing nesting, breeding, foraging, and spawning habitat for a wide variety of resident and migratory wildlife species. These communities also aid in maintaining water quality.

Coast live oak woodland provides important ecological functions such as wildlife movement corridors, temperature regulation of streams, and habitat for special-status species as well as other common wildlife species. Although coast live oak woodland has no formal protection under state law, the Town of Moraga has adopted language in their General Plan (June 4, 2002) indicating an interest in preserving “the Town’s natural setting and environmental resources,” including measures to “preserve and protect trees wherever they are located in the community,” in particular “trees with historical significance” and “certain tree-covered areas, especially with respect to their value as wildlife habitats.”

## 1.0 INTRODUCTION

Sycamore Associates LLC was contracted by David Bruzzone to evaluate the potential for occurrence of special-status plant species and to perform seasonal focused rare plant surveys for the approximately 400-acre Indian Valley study area, located in the Town of Moraga in southwestern Contra Costa County, California (Figure 1). The site is proposed for residential development. This report presents the results of our field investigations.

## 2.0 METHODS AND LIMITATIONS

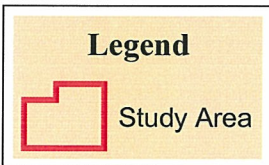
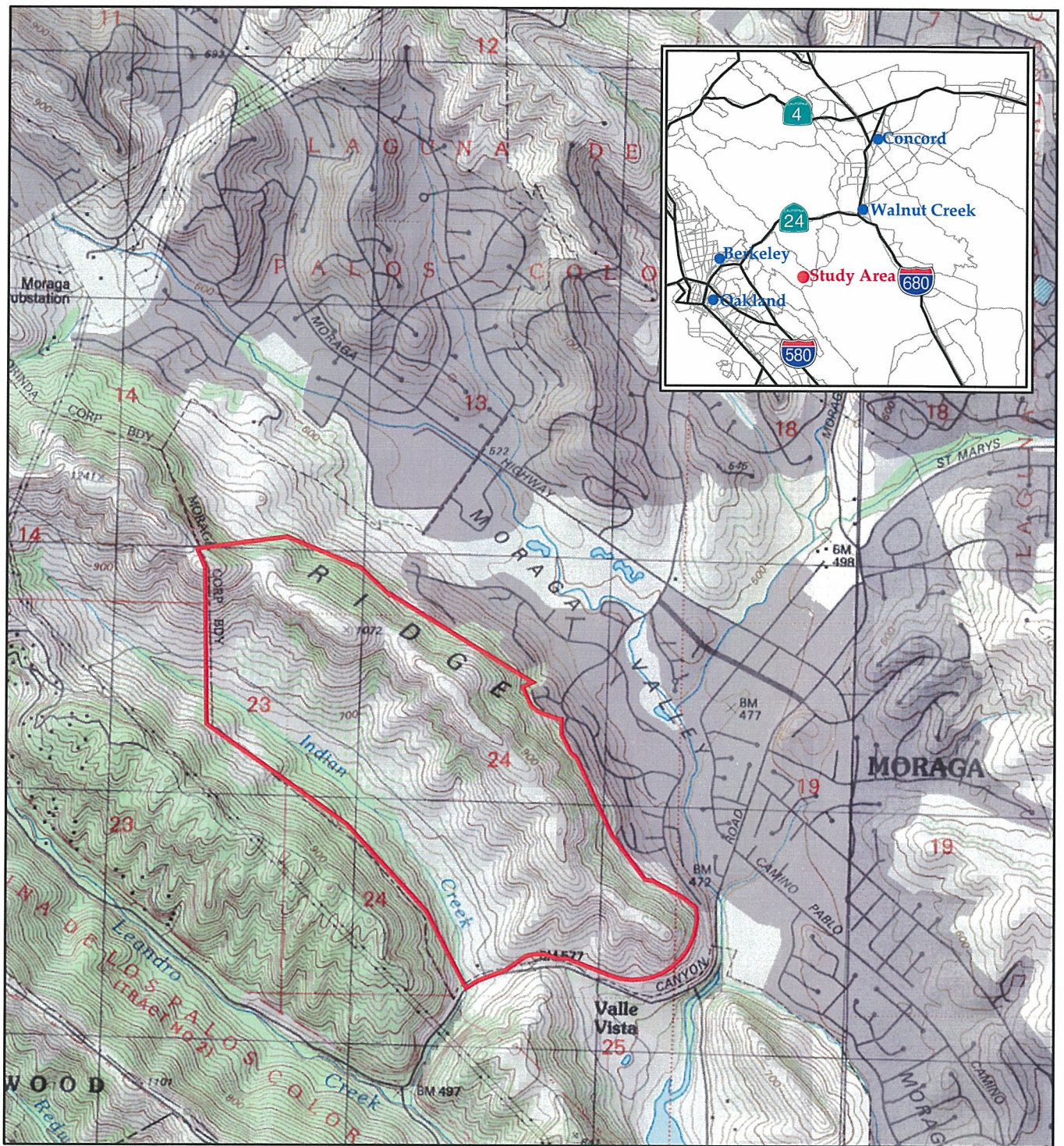
Sycamore Associates botanists Christopher Thayer and Heath Bartosh conducted a reconnaissance-level survey of the entire study area on October 28, 2002. Mr. Thayer and Mr. Bartosh continued floristic surveys of the site on March 28, March 31, April 10, April 24, April 26, May 29, May 30, June 6, July 3, and August 15, 2003. Sycamore biologist Lynn Boyd assisted with field surveys on April 10, 2003.

During field surveys, the entire study area was traversed on foot. All distinct upland and wetland plant communities were visited and described, and all plant species detected were identified and recorded. A complete plant species inventory for the study area is presented in Appendix A. The entire study area was surveyed during all seasons necessary for the detection and proper identification of any potentially occurring special-status plant species. Survey methods conformed to California Department of Fish and Game's *Guidelines for Assessing the Effects of Proposed Developments on Rare and Endangered Plants and Plant Communities* (CDFG 2000) as well as the U.S. Fish and Wildlife Service's *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (USFWS 1996).

Information on special-status plant species was compiled through a review of the California Natural Diversity Data Base (CDFG 2003a) for the Briones Valley, Walnut Creek, Las Trampas Ridge, and Oakland East 7.5-minute topographic quadrangles, as well as the California Native Plant Society's *Inventory of Rare and Endangered Plants of California* (CNPS 2001), the California Department of Fish and Game's *Special Vascular Plants, Bryophytes, and Lichens List* (CDFG 2003b), *State and Federally Listed Endangered, Threatened, and Rare Plants of California* (CDFG 2003c), the U.S. Fish and Wildlife Service's *Endangered and Threatened Wildlife and Plants* (1998). Also reviewed were *Status of Rare, Threatened and Endangered Vascular Plants in Alameda and Contra Costa Counties (and Some Adjacent Areas)* (Olson 1994) and *Unusual and Significant Plants of Alameda and Contra Costa Counties* (Lake 2004).

Botanical nomenclature used throughout this report conforms to Hickman (1993) except for recent changes in circumscriptions in the family Asteraceae (Baldwin 1999). Nomenclature for special-status plant species conforms to California Department of Fish and Game (2003b,c) and the California Native Plant Society (2001). Plant community names conform to Holland (1986) and Sawyer and Keeler-Wolf (1995) where applicable; wetland community names conforming to Cowardin, *et al.* (1979) are also given where appropriate.





**Figure 1**  
**Location of the Indian Valley Study Area**  
 David Bruzzone  
 Moraga, Contra Costa County,  
 California

0 1,000 2,000 4,000 Feet

02/09/04 1:24,000  
 1 inch equals 2,000 feet

This document provided for the sole use of David Bruzzone.  
 USGS topographic quadrangles provided by MapTech (1988).

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### **3.0 EXISTING CONDITIONS**

#### **3.1 Setting**

The approximately 400-acre study area is located within Indian Valley in the southwest corner of the Town of Moraga. The property is located approximately one mile west of downtown Moraga and approximately three-quarters of a mile east of Redwood Regional Park. The site is accessible via Canyon Road on the southern property boundary. The study area is bordered by Flicker Ridge to the west, with sparse rural residential development in the community of Canyon along the northwestern boundary. To the east, beyond the crest of Gudde Ridge, dense residential developments associated with Moraga Country Club are located. Watershed lands, owned and managed by East Bay Municipal Utilities District, of Upper San Leandro Reservoir are present immediately to the south and west. Undeveloped open space within the City of Orinda is located to the north.

The site is located along Indian Creek, a headwater tributary to San Leandro Creek. The valley supports an abundance of aquatic features including perennial seeps and springs that contribute flows to the main branch of the creek. A few seeps and small, ephemeral streams are also present on the eastern flanks of Gudde Ridge above the Moraga Valley. Within Indian Valley, Indian Creek is represented as a dashed "blue-line" on the USGS Oakland East 7.5 minute quadrangle indicating it is an intermittent stream. The creek flows more or less south and off site into San Leandro Creek, just north of Upper San Leandro Reservoir.

Topography on site consists of valley bottomlands to steeply sloping hills ranging in elevation between 550 feet to 1,070 feet above mean sea level. Geology of the study area is characterized by rocks of Tertiary age, including the durable, ridge-forming volcanics of the Moraga Formation along the tops of the hills on the east, underlain by older sedimentary rocks of the Orinda Formation forming the bedrock of the lower slopes and the valley bottom.

A single residence is located at the southwestern portion of the property, with associated out buildings and livestock corrals. Historically, the site has been used as a walnut orchard and as pasture for cattle.

#### **3.2 Vegetation Communities**

Vegetation within the study area is dominated by non-native annual grassland. Other plant communities identified on site include Central Coast riparian scrub, coast live oak woodland, freshwater marsh and seeps, northern coyote brush scrub, sage scrub, and an abandoned walnut orchard with associated ruderal vegetation. Also present are small, homogenous populations of bitter cherry (*Prunus emarginata*), forming distinct thickets within the coast live oak woodland on the eastern side of Gudde Ridge. The location of vegetation communities on site is presented in Figure 2 (map pocket).

### Non-Native Annual Grassland

Non-native annual grassland is generally found in open areas in valleys and foothills throughout coastal and interior California (Holland 1986). It typically occurs on soils consisting of fine-textured loams or clays that are somewhat poorly drained. This vegetation type is dominated by non-native annual grasses and weedy annual and perennial forbs, primarily of Mediterranean origin, that have replaced native perennial grasslands and scrub as a result of human disturbance. Scattered native wildflower species, representing remnants of the original vegetation may also be common.

Characteristic non-native plant species occurring in grasslands on site include rip-gut brome (*Bromus diandrus*), wild oat (*Avena fatua*), Italian ryegrass (*Lolium multiflorum*), yellow star thistle (*Centaurea solstitialis*), bellardia (*Bellardia trixago*), Italian thistle (*Carduus pycnocephalus*), milk thistle (*Silybum marianum*), bristly ox-tongue (*Picris echioides*), black mustard (*Brassica nigra*), and hedge-parsley (*Torilis arvensis*), among others. Native species such as hirsute grindelia (*Grindelia hirsutula* var. *hirsutula*), coyote thistle (*Eryngium aristulatum* var. *aristulatum*), summer lupine (*Lupinus formosus* var. *formosus*), fireweed (*Epilobium brachycarpum*), narrow-leaf milkweed (*Asclepias fascicularis*), showy milkweed (*Asclepias speciosa*), Kellogg's yampah (*Perideridia kelloggii*), and soap plant (*Chlorogalum pomeridianum* var. *pomeridianum*) were also detected, among others.

Within the study area, non-native annual grassland intergrades freely with northern coyote brush scrub and sage scrub, as well as the ruderal vegetation in the understory of the abandoned orchard. Non-native annual grassland as found on site conforms to the California annual grassland series as described in Sawyer and Keeler-Wolf (1995), and would be classified as an upland following Cowardin, *et al.* (1979).

### Central Coast Riparian Scrub

Central Coast riparian scrub typically consists of a scrubby streamside, open to impenetrable thickets composed primarily of any of several species of willows. This plant community occurs close to river channels and near the coast on fine-grained sand and gravel bars with a high water table. It is distributed along most perennial and many intermittent streams of the South Coast Ranges, from the Bay Area to near Point Conception (Holland 1986). Central Coast riparian scrub is generally regarded as early seral, meaning that it typically precedes the development of other riparian woodland or forest communities in the absence of severe flooding. However, outside of riparian situations, that is, near groundwater seeps, willow-dominated scrub represents a relatively stable plant community and is not considered seral.

Within the study area, Central Coast riparian scrub is supported by freshwater seeps and perennial or intermittent drainages. Characteristic native species present include arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), and occasionally white alder (*Alnus rhombifolia*), among others. Shade tolerant non-native species such as lemon balm (*Melissa officinalis*) are also present. Particularly where willows border oak woodland, common shrubs such as poison oak (*Toxicodendron diversilobum*) are also part of this community.



Central Coast riparian scrub as found on site generally conforms to the arroyo or red willow series as described in Sawyer and Keeler-Wolf (1995) and would be classified as a palustrine shrub-scrub wetland following Cowardin, *et al.* (1979).

#### Coast Live Oak Woodland

Coast live oak woodland is typically found on north-facing slopes and shaded ravines in the southern and inland portions of the state and on more exposed, mesic sites in the north. This community is dominated by coast live oak (*Quercus agrifolia*), which frequently occurs in pure, dense stands with a closed canopy. Coast live oak woodland is restricted primarily to the coast side of the state and is distributed from Sonoma County to Baja California. It occurs throughout the outer South Coast ranges and coastal slopes of the Transverse and Peninsular ranges, usually below 4,000 feet in elevation.

The dominant tree species found on site is coast live oak. Other tree species found within the oak woodlands on site include California bay (*Umbellularia californica*), valley oak (*Q. lobata*), madrone (*Arbutus menziesii*), and California buckeye (*Aesculus californica*). Within this plant community, the shrub layer is typically poorly developed and the herbaceous layer is continuous. Shrub species detected on site include native species such as poison oak, snowberry (*Symphoricarpos rivularis*), California blackberry (*Rubus ursinus*), blue elderberry (*Sambucus mexicana*), ninebark (*Physocarpus capitatus*), and coffee berry (*Rhamnus californica*), among others. Non-native species such as French broom (*Genista monspessulana*) are also present. Native herbaceous species are also present, such as western sword fern (*Polystichum munitum*), goldback fern (*Pentagramma triangularis* ssp. *triangularis*), and wood rose (*Rosa gymnocarpa*), among others. Also noteworthy within this community are small but distinct and homogenous thickets of bitter cherry along the higher slopes on the eastern portions of the study area.

On site, this vegetation type conforms to the coast live oak series as described by Sawyer and Keeler-Wolf (1995) and would be considered as an upland as classified in Cowardin, *et al.* (1979).

#### Freshwater Marshes and Seeps

Freshwater seeps consist of areas with permanently or seasonally saturated soils, generally lacking appreciable surface flows, and typically supporting few to several perennial and annual herbaceous hydrophytic plant species. Within the study area, most freshwater seeps closely resemble freshwater marshes in terms of species composition, supporting characteristic low, emergent species. On site these two plant community types intergrade. Where small thickets of arroyo willow, red willow, or white alder encroach on the margin of freshwater seeps, this community intergrades with Central Coast riparian scrub.

Such aquatic vegetation communities are usually found where the water table is at or near the surface, or where subsurface seepage collects near the surface, such as along the toe of stream banks, on the lower portions of steep slopes, along fault lines or geological contacts, or at the heads of small swales. On site, freshwater seeps and freshwater marshes are located principally along permanently or semi-permanently saturated portions of drainages, often

fanning out upon reaching the valley bottom. Many on-site seeps originate high on hillsides where the geologic contact between the Moraga and Orinda formations forces water to the surface.

Freshwater marshes or seeps on site support numerous native species such as iris-leaved rush (*Juncus xiphioides*), common rush (*Juncus effusus* var. *pacificus*), spreading rush (*Juncus patens*), umbrella sedge (*Cyperus eragrostis*), sneezeweed (*Helenium puberulum*), watercress (*Rorippa nasturtium-aquaticum*), spiny cocklebur (*Xanthium spinosum*), and common large monkey-flower (*Mimulus guttatus*), as well as many non-native species such as pennyroyal (*Mentha pulegium*), dallis grass (*Paspalum dilatatum*), lemon balm (*Melissa officinalis*), rabbits-foot grass (*Polypogon monspeliensis*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), Italian ryegrass, and fiddle dock (*Rumex pulcher*), among others.

Within the study area, most areas of freshwater seep and freshwater marsh do not correspond *per se* to any particular series described by Sawyer and Keeler-Wolf (1996), although some portions would conform to the cattail series. Following Cowardin, *et al.* (1979) these plant communities would be classified as palustrine emergent wetlands.

#### Northern Coyote Brush Scrub

Northern coyote brush scrub is considered a sub-type of northern (Franciscan) coastal scrub. It differs primarily by the dominance of coyote brush (*Baccharis pilularis*). This scrub type consists of low shrubs 1-6 feet tall with a well-developed herbaceous or low woody understory. Vegetative cover is mostly dense with scattered grassy openings. Northern (Franciscan) coastal scrub is best developed on windy, exposed sites with shallow, rocky soils. An increase in soil depth and moisture availability seems to favor dominance by coyote brush. This vegetation community is distributed in patches from southern Oregon to Point Sur, Monterey County (Holland 1986).

Within the study area, scattered well-developed stands of northern coyote brush scrub are present on both eastern and western slopes of Gudde Ridge on the eastern portion of the site, as well as on the western side of Indian Creek. Elsewhere on site northern coyote brush scrub occurs in small dense patches and is also interspersed throughout other communities often forming an ecotone between non-native annual grassland and coast live oak woodland.

Other plant species occurring within this community on site include narrow leaf mule ears (*Wyethia angustifolia*), poison oak, mugwort (*Artemisia douglasiana*), common California aster (*Aster chilensis*), soap plant, brome grasses, and wild oats, among others.

#### Sage Scrub

Sage scrub consists of a dense to sparse cover of low shrubs up to three feet high. It occurs in inland locations well beyond the coastal fog incursion zone. It is typically found on shallow, rocky soils on hot southern exposures. This vegetation community is distributed in patches along the Inner Coast Ranges from Mount Diablo in Contra Costa County south to the Cholame Hills in northern San Luis Obispo County (Holland 1986). The shrub canopy typically consists of fewer shrub species than other coastal scrub communities but may

exhibit a greater diversity of perennial herbs. Characteristic species of sage scrub include California sagebrush (*Artemisia californica*), coastal buckwheat (*Eriogonum fasciculatum*), and bush monkey-flower (*Mimulus aurantiacus*), coyote brush, California fuchsia (*Epilobium canum*), silver bush lupine (*Lupinus albifrons* var. *albifrons*), bracken fern (*Pteridium aquilinum* var. *pubescens*), foothill needlegrass (*Nasella lepida*), purple needlegrass (*Nasella pulchra*), and coyote mint (*Monardella villosa* ssp. *villosa*), among others.

On the steep, southwest facing slopes of Gudde Ridge, northern coyote brush scrub and sage scrub freely intergrade, making their separation as distinct communities impractical. Areas within the study area that support northern coyote brush scrub and sage scrub have been mapped as undifferentiated scrub (Figure 2).

#### Abandoned Orchard and Ruderal Habitat

Ruderal habitat is that from which the native vegetation has been completely removed by grading, cultivation, or other surface disturbances. Such areas, if left undeveloped, may become recolonized by invasive exotic species as well as native species. The native vegetation may ultimately become at least partially restored if the soils are left intact and there is no further disturbance.

Numerous areas on site have been severely disturbed by grading and cultivation activities. Remnant groups of black walnut trees are present in the valley bottom of the property, once a large orchard that has since been abandoned. Weedy, non-native plant species commonly encountered in such situations include bull thistle (*Cirsium vulgare*), black mustard, brome grasses, Italian thistle, bristly ox-tongue, rose clover (*Trifolium hirtum*), and wild oats, among others.

A single patch of the invasive, non-native weed dittrichia (*Dittrichia graveolens*), numbering approximately 60 individuals, was also noted. This species, first discovered in California since the publication of the Jepson Manual (Hickman 1993), had not been previously noted from the Moraga area (Bob Case, personal communication 2003).

Ruderal habitat is not specifically described by Sawyer and Keeler-Wolf (1995) and would be classified as upland following Cowardin, *et al.* (1979).

#### **4.0 SPECIAL-STATUS PLANTS**

Special-status plant species include those listed as Endangered, Threatened, Rare, or as Candidates for listing by the U.S. Fish and Wildlife Service (USFWS 1998), the California Department of Fish and Game (2003c) and the California Native Plant Society (2001). The California Native Plant Society listing is sanctioned by the California Department of Fish and Game and serves essentially as their list of "candidate" plant species. California Native Plant Society List 1B and List 2 species are considered eligible for state listing as Endangered or Threatened under California Department of Fish and Game Code. Such species should be fully considered during preparation of environmental documents subject to the California Environmental Quality Act (CEQA). California Native Plant Society List 3



and List 4 species are considered to be either plants about which more information is needed or are uncommon enough that their status should be regularly monitored. The sensitivity and significance of such species in the region as recognized by California Native Plant Society warrants consideration by the lead agency through the CEQA process.

Based on a review of special-status plant species in Contra Costa County (CDFG 2003a, CNPS 2001, Olson 1994) and a broad knowledge of the regional flora, a total of 22 special-status plant species were determined to have at least some potential to occur within the region of the study area. These species were considered to be "target species" for the purpose of site-specific focused plant surveys. A summary of the status, habitat affinities, blooming period, and potential for occurrence on site for each of the target plant species is presented in Appendix B. An explanation of sensitivity status codes is provided in Appendix C.

Based on the presence of potentially suitable habitat for a number of these species, focused botanical surveys were conducted on the site during seasons appropriate for the detection of any potentially occurring species (Appendix B). Surveys were commenced in March and completed in August of 2003. During the course of those surveys, no federally- or state-listed Endangered or Threatened plant species were detected within the study area, and none are expected. However, populations of three special-status plant species listed by the California Native Plant Society were detected within the study area. These include bent-flowered fiddleneck (*Amsinckia lunaris*), California Native Plant Society List 1B, robust monardella (*Monardella villosa* ssp. *globosa*), California Native Plant Society List 1B, and Oakland star-tulip (*Calochortus umbellatus*), California Native Plant Society List 4. Although none of these plants are protected under state or federal law, the sensitivity and significance of these species in the region as recognized by the California Native Plant Society warrants consideration by the lead agency through the CEQA process.

None of the remaining target species are considered to have any potential to occur within the study area due to a lack of suitable habitat or the fact that they would have been detectable during the comprehensive focused plant surveys conducted. No other special-status plant species were detected on site, and none are expected. The locations of special-status plant species within the study area are presented in Figure 2 (map pocket). A detailed discussion of each of these plants is provided below.

### Robust Monardella

Robust monardella (*Monardella villosa* ssp. *globosa*) is a rhizomatous, sparsely hairy, perennial herb in the mint family (Lamiaceae), with dense flower heads on stems about 20 or more inches tall. Leaves are mostly cauline, the blades ovate, entire to serrate, with the base tapered to obtuse, ranging from almost an inch to nearly two inches long. Flowering heads are one or more per main stem, and arranged in terminal spikes or panicles. The heads are subtended by two to three series of bracts. The outer and middle bracts resemble leaves in texture and color, and the outer bracts measure greater than three-quarters of an inch long and are reflexed. Heads range from a little wider than three-quarters of an inch to greater than one and one-half inches, and contain numerous, tightly clustered flowers with purple corollas. Flowers appear from June to July. Robust monardella grows on rocky slopes and in

ephemeral drainages, oak woodland, chaparral, and montane forest below about 4,200 feet in elevation. It is known from approximately ten occurrences ranging from the San Francisco Bay area to Humboldt County in the outer North Coast Ranges (CNPS 2001).

Robust monardella has no official status as a state- or federally-protected species. However, it is listed by the U.S. Fish and Wildlife Service as a Species of Concern, meaning it was formerly a federal C-2 candidate for listing as Threatened or Endangered. It is also on the California Native Plant Society List 1B: 3-2-3, indicating that it is considered to be rare and endangered, its occurrence is limited to only a few highly restricted populations, it is endangered in a portion of its range, and that it is endemic to California (CNPS 2001).

During botanical surveys in spring and summer of 2003, several populations of robust monardella were located on the Indian Valley property (Figure 2). Populations consisted of a single plant to several individuals. On site, robust monardella is present on the eastern portion of the property on steep, generally rocky, west-facing slopes associated with scrub communities.

Morphological characters that separate robust monardella from the more common coyote mint (*Monardella villosa* ssp. *villosa*) are based primarily on size, and include overall plant height, length of the leaves and the bracts subtending the flower heads, as well as the width of the flowering head, with robust monardella being the larger of the two (Hickman 1993). Coyote mint is a common species widely found in the East Bay. The presence of robust monardella within the study area is based on individuals displaying one or more of the size characters ascribed to the subspecies. However, robust monardella is highly variable and was found to grow intermixed with coyote mint in most on-site populations, suggesting the two subspecies intergrade. There was no apparent ecological or edaphic variation between the populations of the two subspecies as found on site.

#### Bent-flowered Fiddleneck

Bent-flowered fiddleneck (*Amsinckia lunaris*) is an annual, herbaceous member of the borage family (Boraginaceae). It has an erect stem and a spike-like, terminal inflorescence ending in a coil. Corollas are bright orange, five lobed, bilateral, and with a long, generally slightly bent tube. The flowers are variable in size, but are generally showy, and typically have two bright red spots on the corolla limb. Flowers are generally heterostylous, or have anthers set in the throat in two groups at different levels. The plant is distinguished from other members of the genus found in this region by the irregular shape of the corollas as well as the unusual arrangement of the anthers within.

Bent-flowered fiddleneck is found in coastal bluff scrub, openings in cismontane woodland, and valley and foothill grassland. It is known from Colusa and Lake counties in the north, through Napa, Sonoma, Marin, and the East Bay counties south to Santa Cruz. It is also questionably identified from Shasta and Siskiyou counties in the north.

Bent-flowered fiddleneck has no official status as a state- or federally-protected species. However, it is listed by the U.S. Fish and Wildlife Service as a Species of Concern, meaning it was formerly a federal C-2 candidate for listing as Threatened or Endangered. It is also on

the CNPS List 1B: 2-2-3, indicating that it is considered to be rare, it is distributed in only a limited number of occurrences, it is endangered in a portion of its range, and that it is endemic to California (CNPS 2001). The current status of the species is unknown due in part to the fact that many collections are old, however, the species is believed to be threatened by development.

During botanical surveys in spring of 2003, nine populations of bent-flowered fiddleneck were identified in the Indian Valley study area, on moderate to steep slopes on the upper portions of Gudde Ridge on the eastern side of the property (Figure 2). Population sizes ranged between an estimated 50 to approximately 500 individuals. Additionally, another population was detected immediately adjacent to the southwestern corner of the study area.

### Oakland Star-Tulip

Oakland star-tulip (*Calochortus umbellatus*) is a perennial, bulbiferous member of the lily family (Liliaceae). It has a branched stem generally ranging between three and ten inches in height, terminating in an umbel-like inflorescence. Petals are white to pale pink, and often have a purple spot at the base near the nectary. Leaves are basal and linear, ranging in length from between eight and 16 inches. The fruit capsule is nodding, three-sided, and winged.

Oakland star-tulip is found in grassland associated with open chaparral or woodlands, often on serpentine. It is distributed below 1,600 feet from Marin, Contra Costa, and Alameda counties south through San Mateo and Santa Clara counties. It is also reported from Stanislaus County, and is thought to have been extirpated from the Santa Cruz region.

This species is on California Native Plant Society List 4: 1-2-3, indicating it is uncommon enough that its status should be regularly monitored, that it is rare but found in sufficient numbers and distributed widely enough that its potential for extinction is low at this time, that it is endangered in a portion of its range, and is endemic to California. Although the species has no official state or federal status, the sensitivity and significance of this species in the region as recognized by the California Native Plant Society warrants consideration by the lead agency through the CEQA process.

During botanical surveys in spring of 2003, two populations of Oakland star-tulip were identified in the Indian Valley study area, in grassy openings on the upper, eastern slopes of Gudde Ridge, on the eastern side of the property (Figure 2). Population sizes ranged from four to approximately 140 individuals.

### Unusual and Significant Plants of Alameda and Contra Costa Counties

Although not necessarily regarded as special-status under CEQA, nineteen additional plant taxa representing regionally uncommon botanical resources were detected on site. These taxa are considered unusual and significant in Alameda and Contra Costa counties, and have been assigned various ranks indicating their relative local rarity or significance (Lake 2004). Within the study area, many of these species are associated with steep, often rocky slopes on the eastern ridge line of the study area, although several species are associated with woodlands on the west side, and a few are found in freshwater seeps on slopes or low valley bottomlands.



A list of these taxa and their ranks, as assigned by Lake (2004), is presented in Table 1.

**Table 1: Unusual and Significant Plant Species Detected\***

Scientific Name	Common Name	Rank <sup>1</sup>
<i>Actaea rubra</i>	baneberry	B
<i>Anisocarpus madioides</i>	woodland madia	A-1
<i>Apocynum androsaemifolium</i>	bitter dogbane	B
<i>Asclepias speciosa</i>	showy milkweed	A-1
<i>Carex densa</i>	dense sedge	A-2
<i>Galium triflorum</i>	sweet-scented bedstraw	B
<i>Layia gaillardii</i>	woodland layia	A-2
<i>Lonicera involucrata</i> var. <i>ledebourii</i>	twinberry	B
<i>Penstemon heterophyllus</i> ssp. <i>heterophyllus</i>	foothill penstemon	B
<i>Pinus attenuata</i>	knobcone pine	A-2
<i>Piperia elegans</i>	green rein-orchid	B
<i>Plectritis ciliata</i> ssp. <i>ciliata</i>	plectritis	B
<i>Psilocarphus brevissimus</i> var. <i>brevissimus</i>	dwarf wooly-heads	B
<i>Quercus lobata</i>	valley oak	B
<i>Salix scouleriana</i>	Scouler's willow	A-2
<i>Salvia columbare</i>	chia	B
<i>Sidalcea malvaeflora</i> ssp. <i>malvaeflora</i>	checker mallow	B
<i>Streptanthus glandulosus</i> ssp. <i>glandulosus</i>	common jewelflower	B
<i>Vicia gigantea</i>	giant vetch	B

<sup>1</sup> Rank Descriptions:

- A1: Species known from two or less botanical regions in Alameda and Contra Costa counties.
- A2: Species currently known from three to five regions in the two counties, or, if more, meeting other important criteria such as small populations, stressed or declining populations, small geographical range, or limited or threatened habitats.
- B: Species currently known from six to nine regions in the two counties, or, if more, meeting other important criteria as described above for A2.
- \* As designated by Lake (2004). Note: these taxa are afforded no protection under state or federal law and do not meet the significance criteria pursuant to CEQA section 15380.

Species listed as unusual or significant include those deemed by the California Native Plant Society's East Bay Chapter to be rare, threatened, or endangered in Alameda and Contra Costa counties but not in the rest of California. Plants listed include those occurring in limited or threatened habitats, those occurring in isolated populations or having a narrow geographic range in the two counties, plants found only in small, stressed, or declining populations, plants reaching their range limits in the two counties, or plants that are in some way threatened or endangered in the East Bay, among other considerations.

Of the nineteen unusual plant species detected on site, thirteen are given a B rank by Lake (2004), indicating that they are currently known from six to nine botanical regions in Contra Costa and Alameda counties, or meet other important criteria, such as those outlined above. Four species are A-2 ranked, indicating that they occur in only three to five botanical regions in the two counties, or meet other important criteria. Two species are A-1 ranked, indicating that they are known from only one or two botanical regions in these counties.

Although not listed by the California Native Plant Society on a statewide basis, these botanical resources are regarded as regionally rare or noteworthy. While there may be no requirement that such species be addressed in environmental documents, CEQA Guideline 15125(c) recommends that special emphasis should be placed on environmental resources that are rare or unique to a specific region and would be affected by a project. It is up to the discretion of the lead agency in the CEQA review process to determine the sensitivity or significance of such resources.

## **5.0 SENSITIVE NATURAL COMMUNITIES**

Sensitive natural communities are those that are considered rare in the region, support special-status plant or wildlife species, or receive regulatory protection (*i.e.*, §404 of the Clean Water Act and/or the California Department of Fish and Game §§1600 *et seq.* of the California Fish and Game Code). In addition, the California Natural Diversity Database (CNDDB) has designated a number of communities as rare; these communities are given the highest inventory priority (Holland 1986, CDFG 2003a, CDFG 2003d).

The study area supports three such sensitive vegetation communities that are regulated by municipal, county, state, or federal legislation or policies. These include freshwater marsh and seeps, Central Coast riparian scrub, and coast live oak woodland. No other sensitive plant communities are present within the study area.

Freshwater marsh and seep, and Central Coast riparian scrub are regulated by the U.S. Army Corps of Engineers and/or the Regional Water Quality Control Board as aquatic habitats protected by the Clean Water Act, and are generally regarded as sensitive as wetland communities that make significant contributions toward maintaining water quality. The California Department of Fish and Game regards aquatic communities as offering habitat opportunities for certain special-status wildlife species.

### Central Coast Riparian Scrub and Freshwater Marsh and Seep

Although neither freshwater marsh nor Central Coast riparian scrub are designated as special-status or sensitive natural communities by the CNDDDB, these aquatic communities are expected to fall under state and federal jurisdictions as wetlands or other waters. Freshwater marsh and seep fall under U.S. Army Corps of Engineers jurisdiction when they are contiguous with “navigable waters,” whereas “isolated” wetlands may garner protection from the Regional Water Quality Control Board. The U.S. Army Corps of Engineers also takes jurisdiction over portions of Central Coast riparian scrub where aquatic plant species are rooted in the channel of a watercourse. California Department of Fish and Game jurisdiction is typically bounded by top-of-bank or the outermost edges of riparian vegetation, including the outer extent of willow or other riparian canopy. The California Department of Fish and Game considers Central Coast riparian scrub as potential habitat for special-status as well as common wildlife species. Aquatic vegetation is also widely regarded as providing important ecological functions such as groundwater recharge and filtration, temperature regulation of streams, as well as providing watering, foraging, and cover opportunities to a wide variety of wildlife species.

### Coast Live Oak Woodland

Although coast live oak woodland has no formal protection under state law, the Town of Moraga has adopted language in their General Plan (June 4, 2002) indicating an interest in preserving “the Town’s natural setting and environmental resources,” including measures to “preserve and protect trees wherever they are located in the community,” in particular “trees with historical significance” and “certain tree-covered areas, especially with respect to their value as wildlife habitats.”

Although this vegetation community is not granted special-status by the California Department of Fish and Game, it does fall into their jurisdiction when present within top-of-bank along riparian corridors. It also provides important ecological functions such as wildlife movement corridors, temperature regulation of streams, and habitat for special-status species as well as common wildlife.

## **6.0 CONCLUSIONS AND RECOMMENDATIONS**

Based on comprehensive focused botanical surveys of the Indian Valley study area, commencing in March and completed in August 2003, no federally- or state-listed Endangered or Threatened plant species were detected within the study area, and none are expected. However, a total of three special-status plant species listed by the California Native Plant Society were detected within the study area during the present botanical surveys. These include bent-flowered fiddleneck, California Native Plant Society List 1B, robust monardella, California Native Plant Society List 1B, and Oakland star-tulip, California Native Plant Society List 4. Although none of these plants are protected under state or federal law, the sensitivity and significance of these species in the region as recognized by California Native Plant Society warrants consideration by the lead agency through the CEQA process.

Nineteen additional plant taxa representing regionally uncommon botanical resources were detected on site. The East Bay Chapter of the California Native Plant Society considers these taxa unusual and significant in Alameda and Contra Costa counties. Although not listed by California Native Plant Society on a statewide basis, these botanical resources are regarded as regionally rare or noteworthy.

While there may be no requirement that such species be addressed in environmental documents, CEQA Guideline 15125(c) recommends that special emphasis should be placed on environmental resources that are rare or unique to a specific region and would be affected by a project. It is up to the discretion of the lead agency in the CEQA review process to determine the sensitivity or significance of such resources.

Three sensitive natural vegetation communities are identified on site, including freshwater marsh and seeps, Central Coast riparian scrub, and coast live oak woodland. Portions of each of these communities are expected to fall under the jurisdiction of the U.S. Army Corps of Engineers and/or the California Department of Fish and Game and the state Regional Water Quality Control Board as wetlands, waters, or riparian habitats as interpreted under their respective definitions, and therefore would receive regulatory protection under applicable state or federal laws.

During comprehensive floristic surveys of the study area, no other species listed by the California Native Plant Society were located. No other special-status plant taxa or sensitive natural communities are expected to occur on site due to a lack of suitable habitat or the fact that they would have been detectable during the surveys conducted. Based on these findings, no further botanical studies for special-status plant species are warranted.

## 7.0 REFERENCES

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# Appendix A

## Plant Species Detected at the Indian Valley Property

### Based on Surveys Conducted from March to August 2003

CLASS	Family	Scientific Name	Common Name
<b>FILICINAE</b>			
	Blechnaceae - Deer Fern Family		
		<i>Woodwardia fimbriata</i>	giant chain fern
	Dennstaedtiaceae - Bracken Family		
		<i>Pteridium aquilinum var. pubescens</i>	western brackenfern
	Dryopteridaceae - Fern Family		
		<i>Athyrium filix-femina var. cyclosorum</i>	lady fern
		<i>Dryopteris arguta</i>	wood fern
		<i>Polystichum munitum</i>	western sword fern
	Polypodiaceae - Polypody Family		
		<i>Polypodium calirhiza</i>	polypody
	Pteridaceae - Fern Family		
		<i>Pellaea andromedaefolia</i>	coffee fern
		<i>Pentagramma triangularis</i>	goldback fern
<b>EQUISETAE</b>			
	Equisetaceae - Horsetail Family		
		<i>Equisetum hyemale ssp. affine</i>	scouring rush
<b>CONIFERAE</b>			
	Pinaceae - Pine Family		
		<i>Pinus attenuata</i> <sup>2</sup>	knob-cone pine
<b>DICOTYLEDONAE</b>			
	Aceraceae - Maple Family		
		<i>Acer negundo var. californicum</i>	box elder
	Anacardiaceae - Sumac Family		
		<i>Toxicodendron diversilobum</i>	poison oak
	Apiaceae - Parsley Family		
		<i>Angelica tomentosa</i>	California angelica
		<i>Anthriscus caucalis</i>	bur-chervil
		<i>Conium maculatum</i>	poison hemlock
		<i>Daucus pusillus</i>	rattlesnake weed
		<i>Eryngium aristulatum var. aristulatum</i>	coyote thistle
		<i>Heracleum lanatum</i>	cow parsnip
		<i>Oenanthe sarmentosa</i>	Pacific oenanthe
		<i>Osmorhiza chilensis</i>	sweet-cicely
		<i>Perideridia kelloggii</i>	Kellogg's yampah
		<i>Sanicula bipinnata</i>	poison sanicle
		<i>Sanicula bipinnatifida</i>	purple sanicle
		<i>Sanicula crassicaulis</i>	Pacific sanicle

CLASS	Common Name
Family	
Scientific Name	
<i>Scandix pecten-veneris</i>	shepherd's needle
<i>Torilis arvensis</i>	hedge-parsley
Apocynaceae - Dogbane Family	
<i>Apocynum androsaemifolium</i> <sup>2</sup>	bitter dogbane
<i>Vinca major</i>	periwinkle
Araliaceae - Aralia Family	
<i>Hedera helix</i>	English ivy
Asclepiaceae - Milkweed Family	
<i>Asclepias fascicularis</i>	narrow-leaf milkweed
<i>Asclepias speciosa</i> <sup>2</sup>	showy milkweed
Asteraceae - Sunflower Family	
<i>Achillea millefolium</i>	yarrow
<i>Achyrachaena mollis</i>	blow-wives
<i>Agoseris grandiflora</i>	California dandelion
<i>Anisocarpus madioides</i> <sup>2</sup>	woodland madia (formerly <i>Madia madioides</i> )
<i>Anthemis cotula</i>	dog mayweed
<i>Artemisia californica</i>	California sagebrush
<i>Artemisia douglasiana</i>	mugwort
<i>Aster chilensis</i>	common California aster
<i>Aster radulinus</i>	rough-leaved aster
<i>Baccharis douglasii</i>	marsh baccharis
<i>Baccharis pilularis</i>	coyote brush
<i>Carduus pycnocephalus</i>	Italian thistle
<i>Centaurea calcitrapa</i>	purple star thistle
<i>Centaurea melitensis</i>	totalote
<i>Centaurea solstitialis</i>	yellow star thistle
<i>Chamomilla suaveolens</i>	pineapple weed
<i>Cirsium vulgare</i>	bull thistle
<i>Cotula coronopifolia</i>	African brass-buttons
<i>Cynara cardunculus</i>	artichoke thistle
<i>Dittrichia graveolens</i>	dittrichia
<i>Erigeron foliosum</i> var. <i>franciscensis</i>	leafy daisy
<i>Erigeron philadelphicus</i>	Philadelphia daisy
<i>Eriophyllum confertiflorum</i> var. <i>confertiflorum</i>	golden yarrow
<i>Filago gallica</i>	narrow-leaf filago
<i>Gnaphalium californicum</i>	California everlasting
<i>Gnaphalium ramosissimum</i>	pink everlasting
<i>Grindelia camporum</i> var. <i>camporum</i>	Great Valley gindelia
<i>Grindelia hirsutula</i> var. <i>hirsutula</i>	hirsute grindelia
<i>Helenium puberulum</i>	sneezeweed
<i>Hemizonia congesta</i> ssp. <i>luzulifolia</i>	hayfield tarweed
<i>Hesperisparva sparsiflora</i> var. <i>sparsiflora</i>	short-leaved evax

# CLASS

## Family

### Scientific Name

## Common Name

*Heterotheca sessiliflora* ssp. *echioides*

hairy golden aster

*Hypochaeris glabra*

smooth cat's-ear

*Hypochaeris radicata*

rough cat's-ear

*Lactuca saligna*

willow lettuce

*Lactuca serriola*

prickly lettuce

*Lactuca virosa*

wild lettuce

*Lagophylla ramosissima* ssp. *ramosissima*

common hareleaf

*Layia gaillardoides* <sup>2</sup>

woodland layia

*Madia exigua*

threadstem madia

*Madia gracilis*

slender tarweed

*Madia sativa*

coast tarweed

*Micropus californicus* var. *californicus*

slender cottonweed

*Microseris douglasii* ssp. *douglasii*

Douglas' microseris

*Picris echioides*

bristly ox-tongue

*Psilocarphus brevissimus* var. *brevissimus* <sup>2</sup>

dwarf woolly-heads

*Psilocarphus tenellus* var. *tenellus*

woolly-heads

*Senecio vulgaris*

common groundsel

*Silybum marianum*

milk-thistle

*Solidago californica*

California goldenrod

*Sonchus asper*

prickly sow-thistle

*Sonchus oleraceus*

common sow-thistle

*Stephanomeria exigua*

small wreath-plant

*Taraxacum officinale*

common dandelion

*Tragopogon dubius*

yellow salsify

*Uropappus lindleyi*

silver puffs

*Wyethia angustifolia*

narrowleaf mule-ears

*Wyethia helenioides*

woolly mule-ears

## Betulaceae - Birch Family

*Alnus rhombifolia*

white alder

*Corylus cornuta* var. *californica*

California hazelnut

## Boraginaceae - Borage Family

*Amsinckia lunaris* <sup>1</sup>

bent-flowered fiddleneck

*Amsinckia menziesii* var. *intermedia*

common fiddleneck

*Amsinckia menziesii* var. *menziesii*

common fiddleneck

*Cynoglossum grande*

hound's tongue

*Myosotis latifolia*

forget-me-not

*Plagiobothrys nothofulvus*

rusty popcorn-flower

## Brassicaceae - Mustard Family

*Brassica nigra*

black mustard

*Brassica rapa*

field mustard

*Capsella bursa-pastoris*

shepards purse

*Cardamine californica*

milk maids

*Cardamine oligosperma*

bitter cress

CLASS	Common Name
Family	
Scientific Name	
<i>Lepidium nitidum</i> var. <i>nitidum</i>	shining peppergrass
<i>Raphanus raphanistrum</i>	jointed charlock
<i>Raphanus sativus</i>	wild radish
<i>Rorippa nasturtium-aquaticum</i>	water cress
<i>Streptanthus glandulosus</i> ssp. <i>glandulosus</i> <sup>2</sup>	common jewelflower
<i>Thysanocarpus curvipes</i>	fringe-pod
<b>Caprifoliaceae - Honeysuckle Family</b>	
<i>Lonicera hispidula</i> var. <i>vacillans</i>	California honeysuckle
<i>Lonicera involucrata</i> var. <i>ledebourii</i> <sup>2</sup>	twinberry
<i>Sambucus mexicana</i>	blue elderberry
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	snowberry
<i>Symphoricarpos mollis</i>	spreading snowberry
<b>Caryophyllaceae - Pink Family</b>	
<i>Cerastium glomeratum</i>	mouse-ear chickweed
<i>Silene gallica</i>	common catchfly
<i>Stellaria media</i>	common chickweed
<b>Convolvulaceae - Morning-glory Family</b>	
<i>Calystegia subacaulis</i>	hill morning-glory, stemless morning glory
<i>Convolvulus arvensis</i>	field bindweed
<b>Cornaceae- Dogwood Family</b>	
<i>Cornus sericea</i> ssp. <i>sericea</i>	American dogwood
<b>Crassulaceae - Stone-crop Family</b>	
<i>Crassula connata</i>	pigmy-weed
<b>Cucurbitaceae - Gourd Family</b>	
<i>Marah fabaceus</i>	California man-root
<b>Dipsacaceae - Teasel Family</b>	
<i>Dipsacus sativus</i>	fuller's teasel
<b>Ericaceae - Heath Family</b>	
<i>Arbutus menziesii</i>	madrone
<b>Euphorbiaceae - Spurge Family</b>	
<i>Euphorbia peplus</i>	petty spurge
<i>Euphorbia spathulata</i>	reticulate-seeded spurge
<b>Fabaceae - Pea Family</b>	
<i>Astragalus gambelianus</i>	Gambel's dwarf locoweed
<i>Genista monspessulana</i>	French broom
<i>Lathyrus vestitus</i> var. <i>vestitus</i>	common Pacific pea
<i>Lotus corniculatus</i>	bird foot trefoil
<i>Lotus micranthus</i>	least trefoil
<i>Lotus purshianus</i> var. <i>purshianus</i>	Spanish clover
<i>Lotus scoparius</i>	California broom
<i>Lotus wrangelianus</i>	Chile trefoil
<i>Lupinus albiifrons</i> var. <i>albiifrons</i>	silver bush lupine
<i>Lupinus bicolor</i>	dove lupine

CLASS	Common Name
Family	
Scientific Name	
<i>Lupinus formosus</i> var. <i>formosus</i>	summer lupine
<i>Lupinus latifolius</i>	broad-leaved lupine
<i>Lupinus succulentus</i>	succulent annual lupine
<i>Medicago arabica</i>	spotted bur-clover
<i>Medicago polymorpha</i>	bur-clover
<i>Melilotus indica</i>	yellow sweet-clover
<i>Rupertia physodes</i>	scurf-pea
<i>Trifolium albopurpureum</i> var. <i>albopurpureum</i>	rancheria clover
<i>Trifolium bifidum</i> var. <i>decipiens</i>	notch-leaved clover
<i>Trifolium bifidum</i> var. <i>bifidum</i>	notch-leaved clover
<i>Trifolium campestre</i>	hop clover
<i>Trifolium ciliolatum</i>	tree clover
<i>Trifolium dubium</i>	little hop clover
<i>Trifolium fragiferum</i>	strawberry clover
<i>Trifolium hirtum</i>	rose clover
<i>Trifolium microcephalum</i>	small head clover
<i>Trifolium microdon</i>	Valparaiso clover
<i>Trifolium subterraneum</i>	subterranean clover
<i>Trifolium wildenovii</i>	tomcat clover
<i>Vicia americana</i> var. <i>americana</i>	American vetch
<i>Vicia gigantea</i> <sup>2</sup>	giant vetch
<i>Vicia sativa</i> ssp. <i>sativa</i>	common vetch
<i>Vicia sativa</i> ssp. <i>nigra</i>	common vetch
<i>Vicia villosa</i> ssp. <i>villosa</i>	hairy vetch
<b>Fagaceae - Oak Family</b>	
<i>Quercus agrifolia</i>	coast live oak
<i>Quercus lobata</i> <sup>2</sup>	valley oak
<b>Gentianaceae - Gentian Family</b>	
<i>Centaurium muehlenbergii</i>	centaury
<b>Geraniaceae - Geranium Family</b>	
<i>Erodium botrys</i>	long-beaked storkbill
<i>Erodium cicutarium</i>	red-stemmed filaree
<i>Erodium moschatum</i>	white-stemmed filaree
<i>Geranium dissectum</i>	cranesbill
<i>Geranium molle</i>	dovesfoot geranium
<b>Grossulariaceae - Gooseberry Family</b>	
<i>Ribes californicum</i> var. <i>californicum</i>	hillside gooseberry
<i>Ribes menziesii</i>	canyon gooseberry
<b>Hippocastanaceae - Buckeye Family</b>	
<i>Aesculus californica</i>	California buckeye
<b>Hydrophyllaceae - Waterleaf Family</b>	
<i>Nemophila heterophylla</i>	nemophila
<i>Nemophila menziesii</i>	baby blue eyes



CLASS	Common Name
Family	
Scientific Name	
<i>Phacelia imbricata</i>	imbricate phacelia
Juglandaceae - Walnut Family	
<i>Juglans californica</i> var. <i>hindsii</i> **	Northern California black walnut
Lamiaceae - Mint Family	
<i>Melissa officinalis</i> *	lemon balm
<i>Mentha piperata</i> *	peppermint
<i>Mentha pulegium</i> *	pennyroyal
<i>Monardella villosa</i> ssp. <i>globosa</i> <sup>1</sup>	robust monardella
<i>Monardella villosa</i> ssp. <i>villosa</i>	coyote mint
<i>Pogogyne serpylloides</i>	thyme-leaved pogogyne
<i>Salvia columbariae</i> <sup>2</sup>	chia
<i>Satureja douglasii</i>	yerba buena
<i>Stachys ajugoides</i> var. <i>rigida</i>	rigid hedge nettle
Lauraceae - Laurel Family	
<i>Umbellularia californica</i>	California bay
Lythraceae - Loosesstrife Family	
<i>Lythrum hyssopifolia</i> *	loosestrife
Malvaceae - Mallow Family	
<i>Malva nicaeensis</i> *	bull mallow
<i>Malva parviflora</i> *	cheeseweed
<i>Sidalcea malvaeflora</i> ssp. <i>malvaeflora</i> <sup>2</sup>	checker mallow
Onagraceae - Evening Primrose Family	
<i>Camissonia ovata</i>	sun cups
<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	clarkia
<i>Clarkia rubicunda</i>	farewell-to-spring
<i>Clarkia unguiculata</i>	elegant clarkia
<i>Epilobium brachycarpum</i>	tall willow-herb
<i>Epilobium canum</i> (= <i>Zauschneria californica</i> ssp. <i>canum</i> )	California fuchsia or zauschneria
<i>Epilobium ciliatum</i> ssp. <i>ciliatum</i>	northern willow herb
Papaveraceae - Poppy Family	
<i>Eschscholzia californica</i>	California poppy
<i>Platystemon californica</i>	cream cups
Plantaginaceae - Plantain Family	
<i>Plantago erecta</i>	California plantain
<i>Plantago lanceolata</i> *	English plantain
<i>Plantago major</i> *	broadleaf plantain
Polemoniaceae - Phlox Family	
<i>Gilia achilleifolia</i> ssp. <i>multicaulis</i>	California gilia
<i>Linanthus androsaceus</i>	common linanthus
<i>Navarretia squarrosa</i>	skunkweed
Polygonaceae - Buckwheat Family	
<i>Eriogonum nudum</i> var. <i>auriculatum</i>	naked-stemmed buckwheat
<i>Polygonum arenastrum</i> *	common knotweed

# CLASS

## Family

### Scientific Name

## Common Name

*Pterostegia drymarioides*

pterostegia

*Rumex conglomeratus*

whorled dock

*Rumex crispus*

curly dock

*Rumex pulcher*

fiddle dock

## Portulacaceae - Purslane Family

*Claytonia perfoliata* ssp. *perfoliata*

miner's lettuce

## Primulaceae - Primrose Family

*Anagallis arvensis*

scarlet pimpernel

*Dodecatheon hendersonii*

Henderson's shooting star

## Ranunculaceae

*Delphinium patens* ssp. *patens*

spreading larkspur

## Ranunculaceae - Buttercup Family

*Actaea rubra* <sup>2</sup>

baneberry

*Aquilegia formosa*

red columbine

*Clematis lasiantha*

pipestems

*Ranunculus californicus*

California buttercup

*Ranunculus muricatus*

spiny buttercup

## Rhamnaceae - Buckthorn Family

*Ceanothus oliganthus* var. *sorediatus*

Jim brush

*Rhamnus californica* ssp. *californica*

California coffeeberry

## Rosaceae - Rose Family

*Acaena pinnatifida* var. *californica*

California acaena

*Aphanes occidentalis*

western lady's mantle

*Cotoneaster pannosa*

cotoneaster

*Fragaria vesca*

wood strawberry

*Holodiscus discolor*

ocean-spray

*Oemleria cerasiformis*

oso berry

*Physocarpus capitatus*

Pacific ninebark

*Potentilla glandulosa*

cinquefoil

*Prunus cerasifera*

cherry plum

*Prunus emarginata*

bitter cherry

*Prunus virginiana* var. *demissa*

western choke-cherry

*Pyracantha angustifolia*

common firethorn

*Rosa gymnocarpa*

wood rose

*Rosa spithamea*

ground rose

*Rubus discolor*

Himalayan blackberry

*Rubus parviflorus*

thimbleberry

*Rubus ursinus*

California blackberry

## Rubiaceae - Madder Family

*Galium aparine*

bedstraw

*Galium murale*

tiny bedstraw

*Galium porrigens* var. *porrigens*

climbing bedstraw

*Galium triflorum* <sup>2</sup>

sweet-scented bedstraw

CLASS	Common Name
Family	
Scientific Name	
<i>Sherardia arvensis</i>	field madder
Salicaceae - Willow Family	
<i>Salix exigua</i>	narrow-leaved willow
<i>Salix laevigata</i>	red willow
<i>Salix lasiolepis</i>	arroyo willow
<i>Salix scouleriana</i> <sup>2</sup>	Scouler's willow
Saxifragaceae - Saxifrage Family	
<i>Lithophragma affine</i>	woodland star
<i>Lithophragma heterophyllum</i>	woodland star
Scrophulariaceae - Figwort Family	
<i>Antirrhinum vexillo-calyculatum</i> ssp.	wiry snapdragon
<i>Bellardia trixago</i> *	bellardia
<i>Castilleja affinis</i>	Indian paint brush
<i>Castilleja exserta</i> ssp. <i>exserta</i>	purple owl's-clover
<i>Castilleja foliolosa</i>	woolly Indian paintbrush
<i>Collinsia heterophylla</i>	chinese houses
<i>Kickxia elatine</i> *	sharp-leaved fluellin
<i>Mimulus aurantiacus</i>	bush monkey-flower
<i>Mimulus guttatus</i>	common large monkey-flower
<i>Penstemon heterophyllus</i> ssp. <i>heterophyllus</i> <sup>2</sup>	foothill penstemon
<i>Scrophularia californica</i> ssp. <i>californica</i>	California figwort
<i>Triphysaria pusilla</i>	dwarf orthocarpus
<i>Veronica americana</i>	American brooklime
<i>Veronica anagallis-aquatica</i> *	water speedwell
Urticaceae - Nettle Family	
<i>Hesperocnide tenella</i>	western nettle
<i>Urtica dioica</i> ssp. <i>holosericea</i>	hoary nettle
Valerianaceae - Valerian Family	
<i>Plectritis ciliosa</i> ssp. <i>ciliosa</i> <sup>2</sup>	plectritis
Verbenaceae - Vervain Family	
<i>Verbena lasiostachys</i> var. <i>lasiostachys</i>	western vervain
Viscaceae - Mistletoe Family	
<i>Phoradendron macrophyllum</i>	big leaf mistletoe
<b>MONOCOTYLEDONAE</b>	
Cyperaceae - Sedge Family	
<i>Carex barbarae</i>	Barbara's sedge
<i>Carex densa</i> <sup>2</sup>	dense sedge
<i>Carex tumulicola</i>	foothill sedge
<i>Cyperus eragrostis</i>	umbrella sedge
<i>Eleocharis acicularis</i> var. <i>acicularis</i>	needle spike-rush
<i>Eleocharis macrostachya</i>	creeping spike-rush

**CLASS****Family****Scientific Name****Common Name****Iridaceae - Iris Family***Sisyrinchium bellum*

California blue-eyed grass

**Juncaceae - Rush Family***Juncus balticus*

wire rush

*Juncus bufonius* var. *bufonius*

toad rush

*Juncus effusus* var. *pacificus*

common rush

*Juncus patens*

spreading rush

*Juncus xiphioides*

iris-leaved rush

*Luzula comosa*

wood rush

**Lemnaceae - Duckweed Family***Lemna* sp.

duckweed

**Liliaceae - Lily Family***Brodiaea elegans* ssp. *elegans*

harvest brodiaea

*Calochortus luteus*

yellow mariposa-lily

*Calochortus umbellatus*

Oakland star-tulip

*Chlorogalum pomeridianum* var. *pomeridianum*

wavy-leaf soap plant

*Dichelostemma capitatum* ssp. *capitatum*

blue dicks

*Dichelostemma congestum*

ookow

*Disporum hookeri*

disporum

*Fritillaria affinis*

checker lily

*Smilacina racemosa*

false Solomon's seal

*Smilacina stellata*

false Solomon's seal

*Trillium chloropetalum*

giant wake-robin or trillium

*Triteleia laxa*

Ithuriel's spear

*Zigadenus fremontii*

death camas

**Orchidaceae - Orchid Family***Corallorhiza maculata*

spotted coralroot

*Epipactis helleborine*

orchid

*Piperia elegans*

green rein-orchid

**Poaceae - Grass Family***Agrostis pallens*

leafy bentgrass

*Agrostis viridis*

water bent grass

*Aira caryophyllea*

silver European hairgrass

*Avena barbata*

slender wild oat

*Avena fatua*

wild oats

*Briza minor*

little quaking grass

*Bromus carinatus* var. *carinatus*

California brome

*Bromus diandrus*

ripgut brome

*Bromus hordeaceus*

soft chess

*Bromus madritensis* ssp. *rubens*

red brome

*Bromus madritensis* ssp. *madritensis*

Spanish brome

*Bromus sterilis*

sterile brome-grass

*Cynosorus echinatus*

hedgehog dogtail



CLASS	Family	Scientific Name	Common Name
		<i>Elymus glaucus ssp. glaucus</i>	blue wildrye
		<i>Elymus multisetus</i>	big squirreltail
		<i>Festuca californica</i>	California fescue
		<i>Festuca idahoensis</i>	blue bunch-grass
		<i>Hordeum brachyantherum ssp. brachyantherum</i>	meadow barley
		<i>Hordeum marinum ssp. gussoneanum</i>	Mediterranean barley
		<i>Hordeum murinum ssp. leporinum</i>	hare barley
		<i>Koeleria macrantha</i>	june grass
		<i>Lolium multiflorum</i>	Italian ryegrass
		<i>Melica californica</i>	California melic grass
		<i>Melica torreyana</i>	Torrey melic
		<i>Nassella lepida</i>	foothill needlegrass
		<i>Nassella pulchra</i>	purple needlegrass
		<i>Paspalum dilatatum</i>	Dallis grass
		<i>Phalaris aquatica</i>	Harding grass
		<i>Phalaris paradoxa</i>	paradox canary-grass
		<i>Poa annua</i>	annual bluegrass
		<i>Poa secunda ssp. secunda</i>	one-sided bluegrass
		<i>Polypogon monspeliensis</i>	rabbitfoot grass
		<i>Vulpia bromoides</i>	six-weeks fescue
		<i>Vulpia myuros var. myuros</i>	zorro grass

\* = non-native species; \*\* = species native to California but not naturally occurring on project site;  
 1 = special-status taxon; 2 = unusual or significant taxon in Alameda or Contra Costa County (Lake, 1999);  
 ? = species identification tentative, based on condition of plant material.

## APPENDIX B

### Potentially Occurring Special-Status Plant Species

Family Scientific Name Common Name	Status <sup>1</sup>	Habitat Affinities and Reported Localities in the Project Area	Comments	Potential for Occurrence On Site
<b>Asteraceae - Sunflower Family</b>				
<i>Blepharizonia plumosa</i> ssp. <i>plumosa</i> big tarweed	Federal: none State: CEQA CNPS 1B:3-3-3	Valley/foothill grasslands, on dry sites. Extant in Alameda, Contra Costa, and San Joaquin counties. Believed extirpated in Stanislaus and Solano counties.	July-October annual herb	None: Out of expected range. Would have been detectable.
<i>Centromadia parryi</i> ssp. <i>congdonii</i> Congdon's tarplant (formerly <i>Hemizonia parryi</i> ssp. <i>congdonii</i> )	Federal: SC State: CEQA CNPS 1B:3-3-3	Valley/foothill grasslands on alkaline soils. Restricted to San Luis Obispo, Monterey, Alameda, Contra Costa, and Santa Clara counties; presumed extirpated in Santa Cruz and Solano counties.	June-November annual herb	None: marginally suitable habitat present. Would have been detectable.
<i>Helianthella castanea</i> Diablo helianthella	Federal: SC State: CEQA CNPS 1B:2-2-3	Broadleaf upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, and valley/foothill grassland. Occurs in Alameda, Contra Costa and San Mateo counties; presumed extirpated in Marin and San Francisco counties.	April-June perennial herb	None: suitable habitat present. Would have been detectable.
<i>Holocarpha macradenia</i> Santa Cruz tarplant	Federal: FT State: CE CNPS 1B:3-3-3	Coastal prairie, valley/foothill grassland, often on heavy clay soils. Known from coastal areas of Contra Costa, Monterey and Santa Cruz counties; presumed extirpated in Alameda and Marin counties. Several introduced populations present along San Pablo Ridge in western Contra Costa County.	June-October annual herb	None: marginally suitable habitat present. Would have been detectable.
<i>Lasthenia confjugens</i> Contra Costa goldfields	Federal: FE State: CEQA CNPS 1B:3-3-3	Mesic sites in valley/foothill grassland, vernal pools. Known from Napa and Solano counties and recently rediscovered in Contra Costa County. Presumed extirpated in Alameda, Mendocino, Santa Barbara and Santa Clara counties.	March-June annual herb	None: marginally suitable habitat present. Would have been detectable.
<b>Boraginaceae - Borage Family</b>				
<i>Amsinckia lunaris</i> bent-flowered fiddleneck	Federal: none State: CEQA CNPS 1B:2-2-3	Open woods, valley/foothill grasslands. Reported from the vicinity of the San Francisco Bay to Lake, Shasta and Siskiyou counties.	March-June annual herb	Detected: mapped at nine locations on site (see Figure 2).
<b>Brassicaceae - Mustard Family</b>				
<i>Streptanthus albidus</i> ssp. <i>peramoenus</i> most beautiful jewel-flower	Federal: SC State: CEQA CNPS 1B:2-2-3	Chaparral, cismontane woodland and valley/foothill grasslands on serpentine. Known from Alameda, Santa Clara and Contra Costa counties.	April-June annual herb	None: marginally suitable habitat present. Would have been detectable.

# APPENDIX B

## Potentially Occurring Special-Status Plant Species

Family Scientific Name Common Name	Status	Habitat/Affinities and Reported Localities in the Project Area	Comments	Potential for Occurrence On Site
<b>Caprifoliaceae - Honeysuckle Family</b>				
<i>Viburnum ellipticum</i> oval-leaved viburnum	Federal: none State: CEQA CNPS 2.2-1-1	Chaparral, cismontane woodland, lower montane coniferous forests. Distributed from the Central Valley and the Sierra Nevada to the North Coast, Oregon and Washington.	May-June shrub (deciduous)	None: suitable habitat present. Would have been detectable.
<b>Ericaceae - Heath Family</b>				
<i>Arctostaphylos pallida</i> pallid manzanita	Federal: FT State: CE CNPS 1B.3-3-3	Broadleaved upland forest, cismontane woodland, chaparral and coastal scrub, on siliceous shale, sandy and gravelly soils on uplifted Marine terraces. Restricted to Alameda and Contra Costa counties.	December-March evergreen shrub	None: no suitable habitat present. Would have been detectable.
<b>Fabaceae - Pea Family</b>				
<i>Astragalus tener</i> var. <i>tener</i> alkali milk-vetch	Federal: None State: CEQA CNPS 1B.3-2-3	Playas, valley and foothill grassland on adobe clay alkaline vernal pools. Extant in Merced, Solano, and Yolo counties. Extirpated throughout the Bay Area and San Joaquin Valley. Recently rediscovered in Alameda County.	March-June annual herb	None: no suitable habitat present. Would have been detectable.
<b>Geraniaceae - Geranium Family</b>				
<i>Erodium macrophyllum</i> round-leaved filaree	Federal: none State: CEQA CNPS 2.2-3-1	Cismontane woodland, valley and foothill grasslands, on clay soil. Widespread throughout California, Baja California, Oregon, Utah, and other states.	March-May annual herb	None: marginally suitable habitat present. Would have been detectable.
<b>Juglandaceae - Walnut Family</b>				
<i>Juglans californica</i> var. <i>hindsii</i> Northern California black walnut	Federal: SC State: CEQA CNPS 1B.3-3-3	Riparian forests and riparian woodlands. Known from only two extant natural populations in Napa and Contra Costa counties. Presumed extirpated in Sacramento, Solano and Yolo counties. Widely naturalized in cismontane Calif., used as a rootstock for J. regia.	April-May tree (deciduous)	None: planted orchard stock present. Natural populations not present.
<b>Lamiaceae - Mint Family</b>				
<i>Monardella antonina</i> ssp. <i>antonina</i> San Antonio Hills monardella	Federal: none State: none CNPS 3.2-2-3	Chaparral and cismontane woodland. Recorded from Monterey County; possible also in Alameda, Contra Costa, San Benito and Santa Clara counties.	June-August perennial herb (rhizomatous)	None: suitable habitat present. Would have been detectable.
<i>Monardella villosa</i> ssp. <i>globosa</i> robust monardella	Federal: none State: CEQA CNPS 1B.3-2-3	Openings in chaparral, cismontane woodland. Occurs from the San Francisco Bay Area to Humboldt County.	June-July perennial herb (rhizomatous)	Detected: suitable habitat present. Twelve locations mapped on site (Figure 2).

# APPENDIX B

## Potentially Occurring Special-Status Plant Species

Family Scientific Name Common Name	Status	Habitat/Affinities and Reported Localities in the Project Area	Comments	Potential for Occurrence On Site
<b>Onagraceae - Evening Primrose Family</b>				
<i>Clarkia franciscana</i> Presidio clarkia	Federal: FE State: CE CNPS IB:3-3-3	Coastal scrub, valley/foothill grassland, on serpentine. Known from fewer than five occurrences in Alameda and San Francisco counties.	May-July annual herb	None: no suitable habitat present. Would have been detectable.
<b>Polygonaceae - Buckwheat Family</b>				
<i>Chorizanthe robusta</i> var. <i>robusta</i> robust spineflower	Federal: FE State: CEQA CNPS IB:3-3-3	Cismontane woodland (openings), coastal dunes, coastal scrub (sandy locations). Restricted to Monterey and Santa Cruz counties; believed extirpated in Alameda, Santa Clara and San Mateo counties.	May-September annual herb	None: no suitable habitat present. Would have been detectable.
<b>Rosaceae - Rose Family</b>				
<i>Horkelia cuneata</i> ssp. <i>sericea</i> Kellogg's horkelia	Federal: SC State: CEQA CNPS IB:3-3-3	Closed-cone coniferous forest, old dunes and coastal scrub. Restricted to coastal areas from Santa Barbara to San Mateo counties; presumed extirpated in San Francisco, Alameda and Marin counties.	April-September perennial herb	None: no suitable habitat present. Would have been detectable.
<b>Scrophulariaceae - Figwort Family</b>				
<i>Cordylanthus maritimus</i> ssp. <i>palustris</i> Pt. Reyes bird's-beak	Federal: SC State: CEQA CNPS IB:2-2-2	Coastal saltmarsh. Believed extant in Humboldt, Marin and Sonoma counties; presumed extirpated in Alameda, Santa Clara and San Mateo counties.	May-October annual herb (hemiparasite)	None: no suitable habitat present.
<b>Thymelaeaceae - Mezereum Family</b>				
<i>Dirca occidentalis</i> western leatherwood	Federal: none State: CEQA CNPS IB:2-2-3	Broadleaf upland forest, closed cone coniferous forest, chaparral, cismontane woodland, North Coast coniferous forest, riparian forest, and riparian woodland. Restricted to brushy slopes and mesic sites. Known from San Mateo to Sonoma counties.	January-April shrub (deciduous)	None: suitable habitat present. Would have been detectable.
<b>Liliaceae - Lily Family</b>				
<i>Calochortus pulchellus</i> Mount Diablo fairy-lantern	Federal: none State: CEQA CNPS IB:2-2-3	Chaparral, cismontane woodland, valley/foothill grassland. Known from Contra Costa and possibly Solano counties.	April-June perennial herb (bulbiferous)	None: marginally suitable habitat present. Would have been detectable.
<i>Calochortus umbellatus</i> Oakland star-tulip	Federal: none State: none CNPS 4:1-2-3	Broadleafed and upland forest, chaparral, lower montane coniferous forest, valley/foothill grassland, often on serpentine. Known from Alameda, Contra Costa, Marin, Santa Clara and San Mateo counties. Presumed extirpated in Santa Cruz County.	March-May perennial herb (bulbiferous)	Detected: two locations mapped on site (Figure 2).
<i>Fritillaria liliacea</i> fragrant fritillary	Federal: SC State: CEQA CNPS IB:2-2-3	Coastal prairie, coastal scrub, valley/foothill grassland near the coast, on clay or serpentine. Known from throughout the Central Coast from Sonoma to Monterey counties and the San Francisco Bay Area.	February-April perennial herb (bulbiferous)	None: marginally suitable habitat present. Would have been detectable.

<sup>1</sup> Explanation of sensitivity status codes provided in Appendix C.



## APPENDIX C

### Explanation of Sensitivity Status Codes

#### CALIFORNIA NATIVE PLANT SOCIETY DESIGNATIONS (CNPS)

- List 1: Plants of highest priority  
 List 1A: Plants presumed extinct in California  
 List 1B: Plants rare and endangered in California and elsewhere  
 List 2: Plants rare and endangered in California but more common elsewhere  
 List 3: Plants about which additional data are needed  
 List 4: Plants of limited distribution

#### CNPS R-E-D Codes

##### R (Rarity)

- 1 Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction or extirpation is low at this time.
- 2 Occurrence confined to several populations or to one extended population.
- 3 Occurrence limited to one or a few highly restricted populations, or present in such low numbers that it is seldom reported.
- ? More data are needed

##### E (Endangerment)

- 1 Not endangered
- 2 Endangered in a portion of its range
- 3 Endangered throughout its range
- ? More data are needed

##### D (Distribution)

- 1 More or less widespread outside California
- 2 Rare outside California
- 3 Endemic to California
- ? More data are needed

Note: currently, all CNPS list 1B and 2 taxa are considered "Special Plants" by the CDFG.

#### U.S. FISH AND WILDLIFE DESIGNATIONS (USFWS)

- FE listed as Endangered by the Federal Government  
 FT listed as Threatened by the Federal Government  
 FPE proposed as Endangered by the Federal Government  
 FPT proposed as Threatened by the Federal Government  
 FSS federal sensitive species, as listed by Bureau of Land Management and USFWS  
 C1 Candidate; taxa for which USFWS has sufficient biological information to support a proposal to list as Endangered or Threatened.  
 SC Species of Concern  
 MB migratory non-game birds of management concern to the USFWS; protected under the Migratory Bird Treaty Act.

<sup>1</sup>As of Feb. 28, 1996, all Category 1 candidate taxa are now regarded merely as Candidates.

#### CALIFORNIA DEPT. OF FISH AND GAME DESIGNATIONS (CDFG)

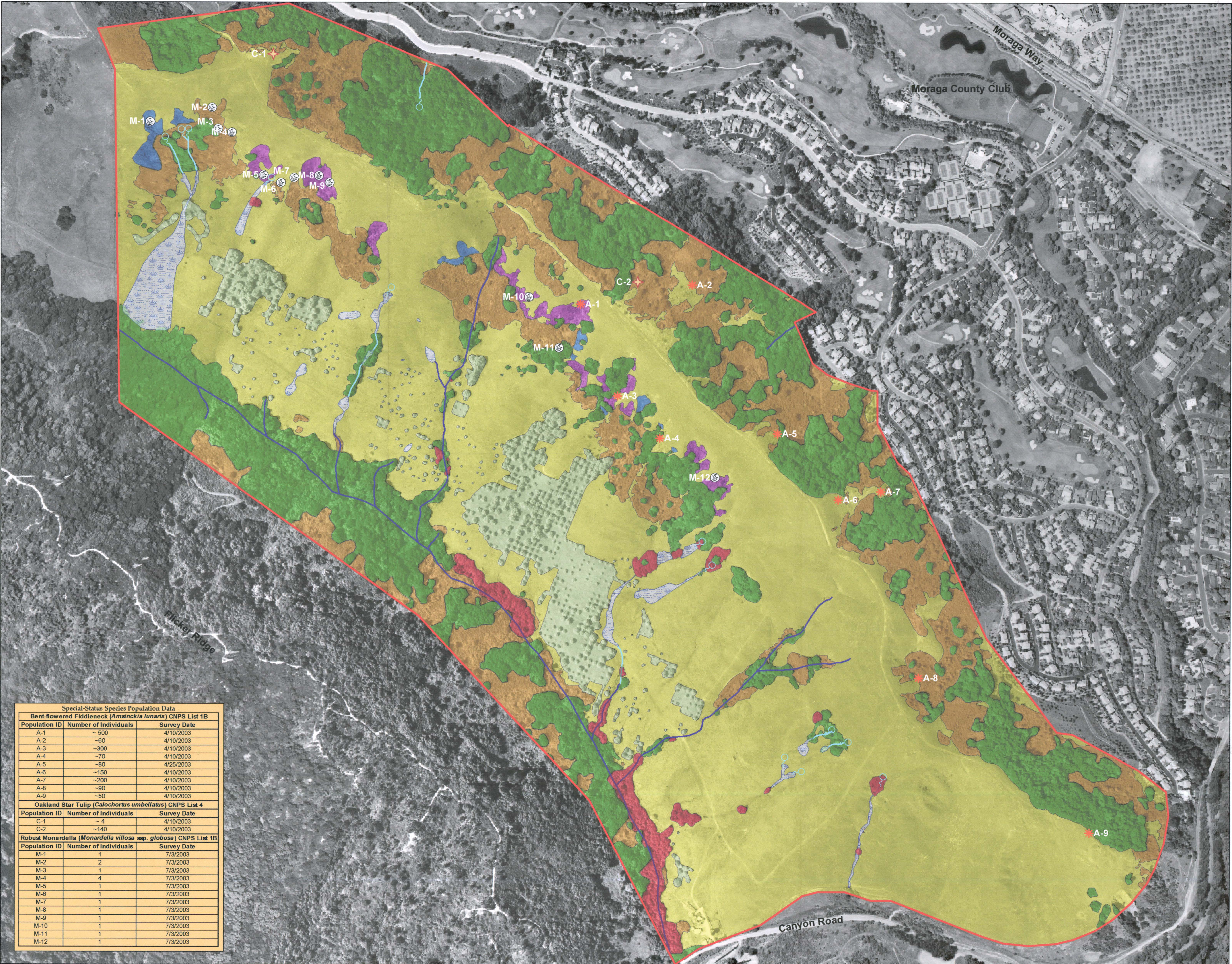
- CE Listed as Endangered by the State of California  
 CR Listed as Rare by the State of California  
 CT Listed as Threatened by the State of California  
 CPE Proposed for listing as Endangered  
 CSC California Species of Special Concern  
 \* taxa that are restricted in distribution, declining throughout their range, or associated with habitats that are declining in California.  
 CFP Fully protected under the Cal. Fish and Game Code.  
 CP Protected Species under Cal. Code of Regulations.  
 CEQA taxa which are considered to meet the criteria for listing as Endangered, Threatened or Rare by the CDFG; impacts to such taxa must be addressed in CEQA documents.  
 CEQA? Taxa that might be locally significant; should be evaluated for consideration during preparation of CEQA documents, as recommended by the CDFG



# Figure 2

## Vegetation Communities and Special-Status Plant Species of Indain Valley

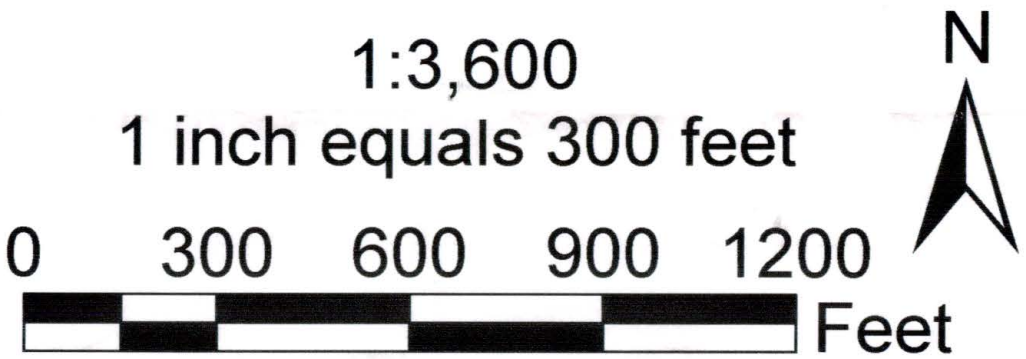
David Bruzzone  
Moraga, Contra Costa County, California



**Legend**

- Study Area
- Bent-flowered fiddleneck (*Amsinckia lunaris*) CNPS List 1B
- Oakland star tulip (*Calochortus umbellatus*) CNPS List 4
- Robust monardella (*Monardella villosa* ssp. *globosa*) CNPS List 1B
- Seeps
- Freshwater Marsh/Seep
- Unvegetated Waters
- Freshwater Marsh/Seep
- Non-native Annual Grassland
- Coast Live Oak Woodland and Isolated Oaks
- Northern Coyote Brush Scrub
- Undifferentiated Scrub
- Sage Scrub
- Abandoned Orchard
- Central Coast Riparian Scrub

Population labels (i.e. A-1) indicate a discrete groupings or individual plants. Plant surveys performed during four blooming periods, 2003. Note: Biological conditions as noted during focused surveys. Conditions may vary and may be reviewed at a later date. For the exclusive use of Dave Bruzzone. Aerial photography provided by HJW.



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