3.4 Biological Environment

Botanical and wildlife species in urban landscapes depend on the availability of suitable habitat for survival. Habitat loss and increasing habitat fragmentation are the primary causes of species decline in these environments. This section provides an overview of:

- natural communities;
- wetlands and other waters of the United States;
- plant species;
- animal species; and
- invasive species.

Detailed information about biological resources can be found in the *South Access to the Golden Gate Bridge: Doyle Drive Project Revised Natural Environmental Study* (NES), July 2005. The NES contains an analysis of impacts and specific mitigation measures, as well as *Best Management Practices* (BMPs) and conservation measures for the biological environment. The NES is incorporated in this document by reference, and in all areas where more detail is provided on mitigation measures, the NES commitments are considered part of this document.

The overall mitigation goal identified in the NES is to avoid or minimize construction-related project impacts on biological resources, using generally accepted and practicable mitigation measures through the deployment of BMPs and the designation of Environmentally Sensitive Areas (ESAs)[30]. Generally, BMPs focus on prevention and containment. This is achieved by controlling the generation of source pollutants and then capturing and containing source pollutants that are generated. For example, application of temporary erosion control materials to unfinished slopes can control a source of sediment deposition. Silt fence can also be deployed to capture sediments that are generated. Deploying both source and sediment control measures provides an efficient and manageable method for addressing erosion. Other examples include: locating equipment and material staging areas in existing disturbed areas within construction limits; limiting fueling and maintenance of equipment to areas not containing sensitive resources (e.g., serpentine plant communities and potential raptor breeding habitat); prohibitions against washing vehicles on site; establishing fueling zones at least 30 meters (100 feet) from wetlands; or as

[30] Environmentally Sensitive Areas (ESAs) are locations of identified at-risk resources that are to be protected by avoidance or by restrictions on Caltrans activities. ESAs typically use fencing, flagging, signing, or monitoring to protect resources from direct physical damage by project activities. The use of the term in this document should not be confused with any discussion of sensitive resources within the construction corridor, for which impacts and mitigation measures are identified. An ESA, by definition, is a site where all impact is avoided. ESAs will be staked and flagged prior to construction and clearly marked on the contract project plans.

designated by a qualified biologist.[31] Standard water pollution control procedures such as sandbagging, use of hay bales, diversion ditches, and desilting ponds will also be employed. The project applicant will employ feasible engineering methods during construction to avoid and minimize fugitive dust, erosion and sedimentation, and hazardous materials spills. Refer to the NES for a further description of BMPs for the biological environment. Most of these BMPs are derived from guidelines such as Caltrans' *Storm Water Pollution Prevention Plan*, 2003 (SWPPP), the *Water Pollution Control Program (WPCP) Preparation Manual*, and the *Construction Site Best Management Practices (BMPs) Manual.*

3.4.1 Natural Communities

This section presents a summary of the existing plant communities in the Doyle Drive Project area. The focus is on biological communities, not individual plant or animal species. This section also includes information on wildlife corridors and habitat fragmentation. Wildlife corridors are areas of habitat used by wildlife for seasonal or daily migration. Habitat fragmentation is the potential for habitat to be divided, thereby lessening its biological value[32].

Regulatory Setting

Federal laws and regulations guide the preservation of the biological environment within the Presidio while state and local requirements provide additional guidance in the surrounding study area. These include The:

- *San Francisco General Plan*; and
- National Park Service (NPS) and Presidio Trust (Trust) Plans and Policies:
  - *Final General Management Plan Amendment (GMPA);*
  - *Presidio Trust Management Plan (PTMP);*
  - *Tennessee Hollow Watershed Project Environmental Assessment;*
  - *Natural Resources Section of the Resources Management Plan;*
  - *Presidio Vegetation Management Plan and Environmental Assessment (VMP);* and
  - *National Park Service (NPS) Management Policies.*

Generally, the NPS and the Trust consider all native plant communities that are biologically intact and diverse as important natural communities (NPS, 1999c). Plant communities on serpentine substrates (i.e., mixed serpentine chaparral, serpentine bunchgrass, and northern coastal bluff scrub) or those communities that are biologically intact and diverse have been identified as Special Ecological Areas by resource managers of the Golden Gate National Recreation Area (GGNRA).

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[31] A "qualified biologist," as the term is used here, means any person who has completed at least four years of university training in wildlife or plant biology or a related science, and/or has demonstrated field experience in the identification and life history of the species potentially present.

[32] Biological value as a result of habitat fragmentation is defined as loss of total habitat area and habitat connection, and increased insularity and edge effects.

These plans and policies are discussed in detail in Section 3.2 of this document.

Affected Environment

The project area for biological resources encompasses the Doyle Drive construction corridor (i.e., the footprint and construction limits of the No-Build and the build alternatives) and an area extending 229 meters (750 feet) outside the Doyle Drive construction corridor. The total area of the Doyle Drive construction corridor is 46.66 hectares (115.25 acres).

The majority of the project study area is composed of ornamental landscape (lawn, isolated trees and shrubs), buildings, paved areas, and roadways and total 34.86 hectares (86.14 acres). Many of the plant communities that are in the remainder of the project study area, such as northern coastal bluff scrub, are affected by human activities and natural environmental disturbances (e.g., salt spray, wind, and sun exposure).

The majority of the understory of the non-native introduced forest (understory scrub) and riparian scrub (including central coast arroyo willow scrub and blackberry) within the project study area is highly disturbed, as indicated by the presence of certain invasive plant species (e.g., cape ivy (*Delaria odorata)*, English ivy (*Hedera helix*), and cotoneaster (*Cotoneaster* sp.). Cape ivy is also present, approximately 30 meters (100 feet) north of the construction corridor; wild radish (*Raphanus sativus*), a moderately invasive species, occurs on the northern coastal bluffs.

Many of the plant communities in the Presidio are remnant populations of native communities that were once extensive along the coast of California. Using the Holland (1986) classification system and field observations, 12 wetland and upland plant communities were identified in the project area. They are:

- non-native introduced forest and ornamental wildlife habitat;
- coast live oak woodland;
- riparian scrub (central coast arroyo willow scrub and California blackberry);
- mixed serpentine chaparral;
- non-native grassland;
- native grassland;
- northern coastal scrub (including coastal scrub on sandy soils and on sandy soils with serpentinite inclusions);
- northern coastal bluff scrub;
- northern foredune;
- coastal salt marsh and associated communities; and
- emergent wetland vegetation.

Exhibit 3-78[33] shows the number of hectares (and acres) of each plant community within the project study area and the construction corridor. **Exhibit 3-79**[34] illustrates the general location of native vegetation within the Doyle Drive Project study area.

Non-native Introduced Forest and Ornamental Wildlife Habitat

Non-native introduced forest and ornamental wildlife habitat[35] covers approximately 32.42 hectares (80.10 acres) within the project study area and approximately 9.95 hectares (24.59 acres) in the construction corridor. The non-native introduced forest is primarily composed of blue gum eucalyptus (*Eucalyptus globulus*), Monterey cypress (*Cupressus macrocarpa*), and Monterey pine (*Pinus radiata*). Monterey cypress and Monterey pine are species native to the Monterey Peninsula of California, but are invasive throughout the rest of California. Blue gum eucalyptus grows rapidly and is native to southeast Australia. Where these species occur within the Historic Forest Management Zone, they are designated as a cultural resource in the NPS's *Vegetation Management Plan*. These species are considered non-native invasive species within the Native Plant Zone of the *Vegetation Management Plan*. This report collectively refers to these trees as non-native introduced forest. Non-native introduced forest provides wildlife habitat.

Coast Live Oak Woodland

Coast live oak woodland occurs in moist sites in the project study area and totals approximately 0.98 hectare (2.43 acre). This vegetation type is not present within the construction corridor. Coast live oak (*Quercus agrifolia*) is the dominant species in this plant community, and associated species include poison oak (*Toxicodendron diversilobum*), toyon (*Heteromeles arbutifolia*), and California coffeeberry *(Rhamnus californica*).

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[33] 'Coastal salt marsh and associated communities' include 'Central dune scrub and 'Coastal salt marsh' and are depicted on Exhibit 3-79 separately.

[34] Note that some vegetation types were combined for illustration purposes. 'Northern coastal scrub' and 'Understory coastal scrub' can include 'Northern coastal scrub on sandy soils' and 'Northern coastal scrub on sandy soils with serpentinite inclusions' depending on its location (see Exhibit 3-81). 'Central coast arroyo willow scrub' also includes California blackberry. Non-native grassland is not shown because it is too small to map. Wetland vegetation communities are included for display purposes only on Exhibit 3-79. Refer to Exhibit 3-82 for an illustration of all wetlands.

[35] The term 'Ornamental wildlife habitat' is used to define landscape vegetation that can provide habitat for wildlife species.

Exhibit 3-78
Existing Plant Communities in Project Study Area and Doyle Drive Construction Corridor

Plant Community	Number of Hectares (Acres) in Project Study Area	Number of Hectares (Acres) in Doyle Drive Construction Corridor
Non-native Introduced Forest and Ornamental Wildlife Habitat	32.42 (80.10)	9.95 (24.59)
Coast Live Oak Woodland	0.98 (2.43)	None
Riparian Scrub (arroyo willow and blackberry)	1.16 (2.88)	0.71 (1.76)
Mixed Serpentine Chaparral	0.42 (1.06)	None
Non-native Grassland	0.05 (0.13)	0.05 (0.13)
Northern Coastal Scrub on sandy soils	6.63 (16.36)	0.30 (0.73)
Northern Coastal Scrub on sandy soils and with serpentinite inclusions	Included with northern coastal scrub totals above	0.71 (1.76)
Native Grassland	0.65 (1.62)	None
Northern Coastal Bluff Scrub	1.21 (3.00)	None
Northern Foredune	1.04 (2.58)	None
Coastal Salt Marsh and Associated Communities	Approximately 6 (15)	None
Emergent Wetland	0.26 (0.63)	0.06 (0.15)
TOTAL AREA	48.75 (120.67)	11.60 (28.67)

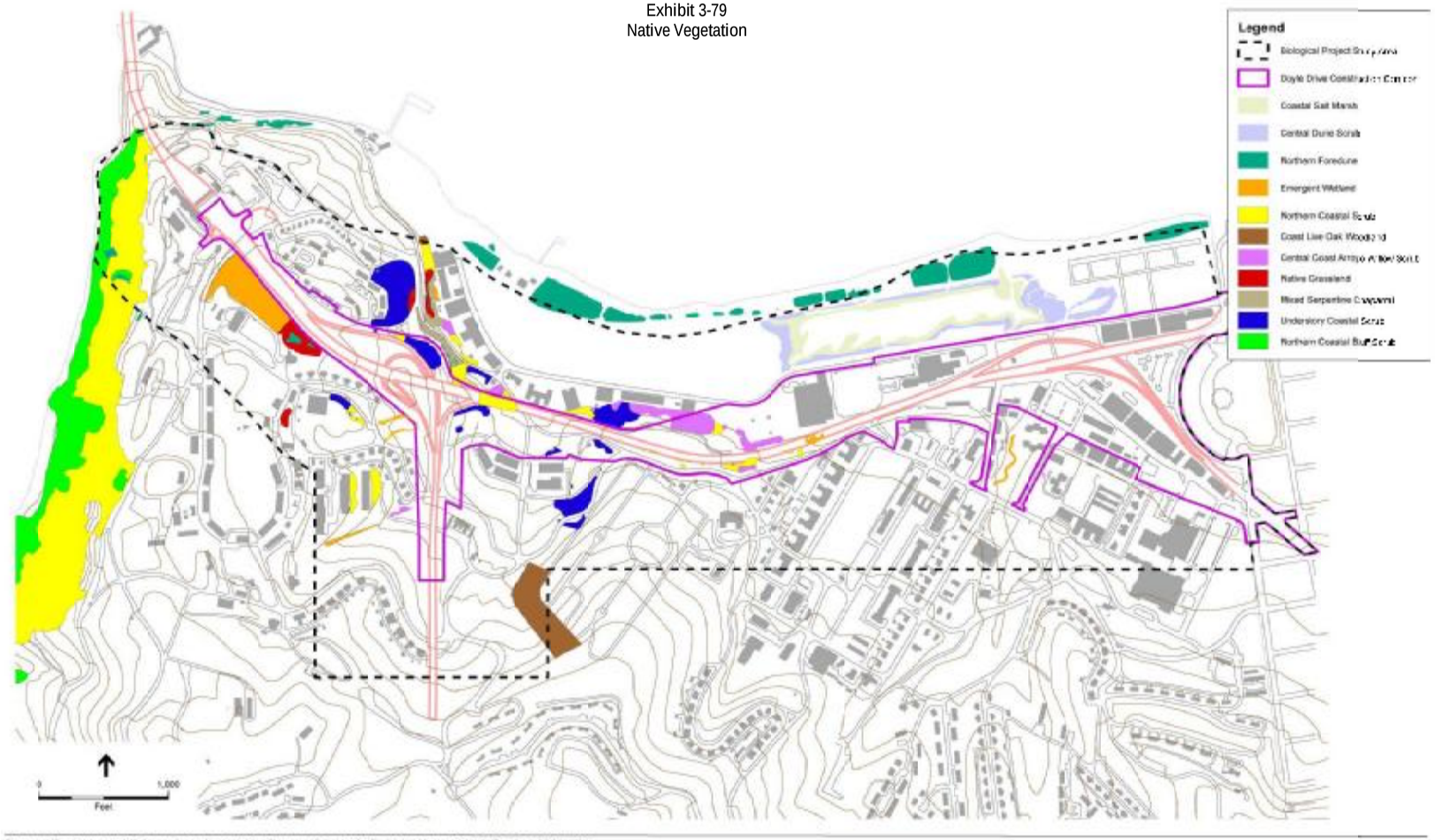
Source: Environmental Science Associates, 2005.

Areas of plant communities were calculated using ArcGIS 9.0. Area of Doyle Drive Construction Corridor is 46.66 hectares (115.25 acres). Non-habitat areas comprised of ornamental landscape areas (lawn, isolated trees and shrubs), buildings, paved areas, and roadways total 34.86 hectares (86.14 acres). Thompson Reach is not included in the total of Emergent Wetland. Areas not accounted for in the Exhibit above are wetlands described in Exhibit 3-83.

Riparian Scrub (including Central Coast Arroyo Willow Scrub and California blackberry)

Riparian scrub covers 1.16 hectares (2.88 acres) and occurs on hillside slopes with perennial, or at least intermittent, water flows in three areas of the project study area. A total of 0.71 hectare (1.76 acres) of riparian scrub is present in the construction corridor. Arroyo willow (*Salix lasiolepis*) is the primary species in riparian scrub. A few blue elderberry (*Sambucus mexicana*) and red elderberry (*S. racemosa*) are present in central coast arroyo willow scrub. California blackberry (*Rubus ursinus*) intermixes with arroyo willow in one area of the Presidio. The NPS and the Presidio Trust consider riparian scrub an important plant community; little of this community remains in the Presidio.

Exhibit 3-79
Native Vegetation



Source: Environmental Science Associates, 2004; Parsons Brinckerhoff., 2004; National Park Service, 2001, 2005.

Mixed Serpentine Chaparral

Mixed serpentine chaparral covers 0.42 hectare (1.06 acres) within the project study area but does not occur in the construction corridor. This community occurs on shallow serpentine soils, which are unique geological soils naturally deficient in certain plant nutrients; only plants specially adapted to or tolerant of these chemically unique soils tend to grow and persist. The NPS and the Trust consider mixed serpentine chaparral an important plant community because it is limited within the Presidio and it frequently supports several special-status plant species.

In the project study area, mixed serpentine chaparral is made up of primarily coyote brush (*Baccharis pilularis*), toyon, and blue blossom ceanothus (*Ceanothus thyrsiflorus*).

Mixed serpentine chaparral on the coastal bluffs supports the following special-status plant species, which are classified by the California Native Plant Society (CNPS) as having limited distribution (List 4): coast rock cress (*Arabis blepharophylla*), a federal species of local concern; Franciscan thistle (*Cirsium andrewsii*), a federal species of special concern; and San Francisco wallflower (*Erysium franciscanum*) a federal species of special concern.

San Francisco gumplant (*Grindelia hirsutula var. maritima*), a federal species of special concern, and a species classified as rare, threatened, or endangered in California and elsewhere by the CNPS, occurs in two locations north of the construction corridor.

Non-native Grassland

A small area of non-native grassland, 0.05 hectare (0.13 acre), is present within the project study area and entirely within the construction corridor. These grasses include annuals such as bromes (*Bromus* spp.), wild oats (*Avena fatua*), and ruderal vegetation.

Northern Coastal Scrub

Northern coastal scrub occurs on sandy soil as well as sandy soil with serpentinite inclusions. Soils with serpentinite inclusions are soils with small, localized spots containing chemically unique serpentine soils.

Northern coastal scrub, including coastal scrub in the understory of trees totals 6.63 hectares (16.36 acres) within the project study area. Dominant species of northern coastal scrub that were observed in the project study area included coyote brush and yellow bush lupine (*Lupinus arboreus*).

In the construction corridor, northern coastal scrub comprises 1.01 hectares (2.49 acres). Northern coastal scrub in the construction corridor is an open community with sparsely distributed plants, and it has low plant species diversity. Understory scrub within the construction corridor is primarily composed of non-native species, including cotoneaster, black acacia, blue gum eucalyptus, English ivy, and non-native annual grasses. A very small area (less than 0.1 hectare [0.25 acre]) of understory scrub is located on the north-facing slope of the Park Presidio Interchange and is composed of native species, including poison oak, monkey flower (*Mimulus aurantiacus*) and stinging nettle (*Urtica dioica*). The sandy soil in this area has serpentinite inclusions.

Northern coastal scrub is a common plant community in northern California and is not typically considered sensitive by the California Department of Fish and Game (CDFG) or by the NPS. It is an important plant community and is considered locally rare by the NPS and the Trust.

Northern Coastal Bluff Scrub

The dominant species that compose northern coastal bluff scrub are similar to those in northern coastal scrub. The main difference between these two communities is that northern coastal bluff scrub occurs on steeper slopes and is exposed to harsher environmental conditions (e.g., salt spray, wind, and sun exposure) than northern coastal scrub. Northern coastal bluff scrub comprises about 1.21 hectares (three acres) and occurs on the western perimeter of the project study area. It does not occur in the construction corridor.

Native Grassland

Native grassland consists of native species on serpentine and non-serpentine areas and totals 0.65 hectare (1.62 acres). Serpentine bunchgrass grassland totals approximately 0.19 hectare (0.47 acre) in the study area and primarily consists of herbaceous perennial bunchgrasses. Serpentine bunchgrass grassland occurs approximately 91 meters (300 feet) north of the construction corridor, but not in the construction corridor. This grassland type, occurring on chemically unique serpentinite soils, is primarily composed of purple needlegrass (*Nassella pulchra*), California oatgrass (*Danthonia californica*), and foothill needlegrass (*Nassella lepida*). Non-serpentine grassland consists of similar species as serpentine bunchgrass and occurs south of the Doyle Drive construction corridor. Non-serpentine native grassland totals 0.46 hectare (1.15 acres). The NPS and the Trust consider serpentine native grassland a sensitive plant community.

Northern Foredune

The northern foredune community comprises 1.04 hectares (2.58 acres) of the project study area. It occurs at Crissy Marsh, north of the construction corridor, but does not occur within the construction corridor.

Northern foredune is subject to harsh environmental conditions resulting in an open community with sparsely distributed low-growing herbs and subshrubs. Dominant species in this community include sand-verbena (*Abronia* spp.), beach

primrose (*Camissonia cheiranthifolia*), silvery beachweed (*Ambrosia chamissonis*), and coastal sagewort (*Artemisia pycnocephala*). The NPS and the Trust consider northern foredune an important plant community and is identified as a Special Ecological Area (SEA) by NPS.

Coastal Salt Marsh and Associated Communities

Coastal salt marsh was restored as part of the larger 40.5 hectare (100 acres) Crissy Field Restoration Project. Within the project study area, the dominant salt marsh species include Pacific cordgrass (*Spartina foliosa*), pickleweed (*Salicornia* sp.), salt grass (*Distichlis spicata*), alkali heath (*Frankenia salina*), san-spurrey (*Spergularia* sp.), fleshy jaumea (*Jaumea carnosa*), and marsh rosemary (*Limonium californicum*). Northern foredune, central dune scrub (2.82 hectares [6.98 acres]), and freshwater wetland communities are also present in the approximately six hectare (15 acre) Crissy Marsh area. These communities occur outside of the construction corridor. Both the NPS and the Trust consider communities in the Crissy Marsh important, and the Crissy Field dune community is identified as a Special Ecological Area (SEA) by the NPS.

Emergent Wetland

Emergent wetland includes plant species found in seasonal wetlands and perennial streams. Plant species observed in the emergent wetlands may include water bentgrass (*Agrostis semiverticillata*), watercress (*Rorippa nasturtium-aquaticum*), calla lily (*Zantedeschis aethiopica*), wild celery (*Apium graveolens)* and horsetail (*Equisetum* sp.). Emergent wetland vegetation occurs at W-3, Battery Howe-Wagner, portions of Dragonfly Creek, and North Fort Scott, and totals 0.26 hectare (0.63 acre) in the project study area and 0.06 hectare (0.15 acre) in the construction corridor. Thompson Reach also supports emergent wetland vegetation within the project study area. Emergent wetland vegetation is accounted for in Section 3.4.2 Wetlands and Other Waters of the United States.

Temporary Impacts

Temporary, direct, construction-related effects under the build alternatives would include trampling in the construction corridor areas resulting in minor effects on vegetation. Trampling effects could result in erosion, community fragmentation, soil and root compaction, and plant mortality at localized areas.

This section discusses temporary impacts to the natural communities.

Non-Native Vegetation

All of the build alternatives would require grading and removal of a similar amount of vegetation. Temporary, and direct, construction-related effects under the build alternatives would include trampling in the construction corridor areas. Trampling could lead to erosion, community fragmentation, soil and root compaction, and plant mortality at localized areas. Trampling can also create favorable conditions for invasive non-native plant species, such as bull thistle (*Cirsium vulgare*), and non-native annual species to be introduced or spread into

the area. Invasive plant species can form monocultures and displace native plant species, and as a result, adversely modify species composition and diversity. Temporary construction impacts would be addressed by implementing a revegetation plan in areas disturbed during construction. Revegetating would minimize erosion and the establishment of invasive non-native species.

All build alternatives will involve demolition, excavation and grading during the dry season that would cause dust. If left uncontrolled, dust could temporarily cover the leaves of plants in a localized area and reduce light and gas exchange. Effects on common vegetation caused by dust emissions during the dry season will be locally adverse, but minor.

Important Plant Communities

The build alternatives will result in direct temporary impacts on important upland plant communities. For northern coastal scrub on sandy soils, the area of impact varies from 0.01 hectare (0.02 acre) for the Presidio Parkway Alternative and the Preferred Alternative, to 0.04 hectare (0.11 acre) for the Alternative 2, Detour Option. A slightly larger area, 0.06 hectare (0.16 acre) of northern coastal scrub on sandy soil with serpentinite inclusions would be disturbed by the Alternative 2, With Detour and No-Detour Options. With the Presidio Parkway Alternative, this area of impact is 0.17 hectare (0.43 acre) for the Diamond, Circle and Loop Options and 0.35 hectare (0.87 acre) for the Diamond, Circle and Hook Options. The same area would be disturbed whether or not the Merchant Road Slip Ramp is included. With the Preferred Alternative, the area of impact will be 0.35 hectare (0.87acre). These communities will be revegetated in place to the extent feasible or restored elsewhere within the construction corridor.

The build alternatives may also result in temporary indirect impacts such as soil runoff during the rainy season, dust (particularly during the dry season), and trampling. Important plant communities north of Lincoln Boulevard may be indirectly affected by soil runoff in the rainy season during excavation and grading for the high-viaduct at the Park Presidio Interchange, which will occur with all build alternatives. Construction of the Merchant Road Slip Ramp Option with the Presidio Parkway Alternative would also indirectly affect these plant communities. Implementing measures such as soil stabilization controls and silt fencing during construction would avoid these indirect effects on plant species of concern.

Dust could temporarily cover the leaves, thereby reducing the exchange of light and gas of plants within important plant communities north of the construction corridor and within the project study area. These communities are coastal salt marsh, central dune scrub, freshwater wetland, native grassland, mixed serpentine chaparral, central coast arroyo willow scrub, northern coastal scrub (on sandy soil and sandy soil with serpentine inclusions), and northern foredune. The effects of dust would be minor because Bay Area Air Quality Management District's

(BAAQMD) basic dust control procedures and measures in *Caltrans Special Provisions* would be implemented as part of the project.

Exhibit 3-80 shows the direct temporary impacts to each plant community by alternative.

Exhibit 3-80
Direct Temporary Impacts to Plant Communities other than Wetlands

	Non-native Introduced Forest and Ornamental Wildlife Habitat (hectares / acres)	Northern Coastal Scrub on Sandy Soil (hectares / acres)	Northern Coastal Scrub with Serpentine Inclusions (hectares / acres)	Non-native Grassland (hectares / acres)
Number of Hectares (acres) in Doyle Drive Construction Corridor	9.95 / 24.59	0.30 / 0.73	0.71 / 1.76	0.05 / 0.13
Alternative	Impact Area			
Alternative 2: Detour Option	0.67 / 1.65	0.04 / 0.11	0.06 / 0.16	None
Alternative 2: No-Detour Option	0.59 / 1.45	0.02 / 0.06	0.06 / 0.16	None
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options and the Loop Ramp Option	1.18 / 2.91	0.01 / 0.02	0.17 / 0.43	None
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options, the Loop Ramp Option, and a Merchant Road Slip Ramp	1.18 / 2.91	0.01 / 0.02	0.17 / 0.43	None
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options and the Hook Ramp Option	1.22 / 3.02	0.01 / 0.02	0.35 / 0.87	None
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options, the Hook Ramp Option, and a Merchant Road Slip Ramp	1.22 / 3.02	0.01 / 0.02	0.35 / 0.87	None
Preferred Alternative: Refined Presidio Parkway	1.22 / 3.02	0.01 / 0.02	0.35 / 0.87	None

Permanent Impacts

Permanent impacts to plant communities are anticipated for all build alternatives.

Common Vegetation

If not controlled, demolition, excavation and grading during the rainy season for all build alternatives may cause sedimentation problems that will affect adjacent vegetation. However, by adhering to a *Stormwater Pollution Prevention Plan* (SWPPP) and *Best Management Practices* (BMPs), which are identified at the beginning of this section and further described in the NES, the proposed project would cause only minor effects to common vegetation.

Under Alternative 2, With Detour and No-Detour Options, non-native grasslands would not be permanently affected. However, constructing Alternative 2, With Detour Option would result in a loss of 2.37 hectares (5.86 acres) of non-native introduced forest and ornamental wildlife habitat. Constructing Alternative 2, No-Detour Option would result in the loss of 2.57 hectares (6.35 acres) of non-native introduced forest and ornamental wildlife habitat.

Alternative 5, Diamond or Circle with Loop Options would result in the permanent loss of 4.54 hectares (11.23 acres) of non-native introduced forest and ornamental wildlife habitat and grasslands. The Diamond or Circle with Hook Options would result in the loss of 4.61 hectares (11.39 acres) of non-native vegetation.

An additional 0.47 hectare (1.15 acres) of non-native introduced forest and ornamental wildlife habitat would be removed if the Merchant Road Slip Ramp Option is included.

The Preferred Alternative will result in the permanent loss of 4.62 hectares (11.42 acres) of non-native introduced forest and ornamental wildlife habitat and grasslands.

Permanent effects on common non-native vegetation are considered minor. The eastern portion of all build alternatives on Richardson Avenue between Francisco and Lyon Streets will support existing street trees. The street trees along Richardson Avenue will not be affected by the haul route proposed for all build alternatives because they are located away from the road.

Important Plant Communities

Construction of all build alternatives will result in localized permanent effects to northern coastal scrub on sandy soils and northern coastal scrub on sandy soils with serpentine inclusions. The construction corridor does not contain areas designated as Special Ecological Areas by the NPS.

All of the build alternatives will remove, damage or alter northern coastal scrub on sandy soil and northern coastal scrub on sandy soil with serpentine inclusions.

Northern coastal scrub on sandy soil.

Alternative 2, With Detour Option would disturb 0.16 hectare (0.40 acre) of northern coastal scrub on sandy soil. Alternative 2, No-Detour Option would disturb 0.17 hectare (0.43 acre) of this plant community, and each Presidio Parkway Alternative would disturb 0.20 hectare (0.50 acre). The Preferred Alternative will disturb 0.21 hectare (0.53 acre) of this plant community.

Northern coastal scrub on sandy soil with serpentine inclusions

Alternative 2, With Detour Option and Alternative 2, No-Detour Option would each disturb an area of 0.20 hectare (0.50 acre) of northern coastal scrub on sandy soil with serpentine inclusions. The Presidio Parkway Alternative would disturb between 0.20 hectare (0.49 acre) and 0.37 hectare (0.91 acre) of this plant community, depending upon the Presidio Parkway Alternative Option. If the Merchant Road Slip Ramp is built, the area of disturbance would increase by 0.10 hectare (0.44 acre). The Preferred Alternative will disturb 0.21 hectare (0.53 acre) of this plant community.

Permanent impacts on important plant communities caused by the build alternatives will conflict with the NPS' natural resource management policies and the Trust's objectives stated in the VMP and the PTMP, and will be considered adverse.

The Presidio Parkway Alternatives and the Preferred Alternative will allow the area above the Main Post and Battery Tunnels to be revegetated with native plants. The Presidio Parkway and Preferred Alternatives' Main Post Tunnels will constrain rooting depths and limit the volume of soil to between 1 and 2 meters (3 to 6 feet) along a two percent west to east gradient. The Battery tunnels will allow up to five meters (16 feet) of soil depth. Despite these limitations, a 1 to 1.5 meter (3 to 5 feet) depth is considered sufficient to provide a substrate volume for rooting the shrubby coastal and scrub species. Refer to Hydrology, Water Quality and Storm Water, Section 3.3.1 for a further discussion of hydrologic issues associated with the proposed tunnels.

In areas above the tunnels where the volume of soil is greater, perennial herbaceous species, such as California brome (*Bromus carinatus*) and purple needlegrass could establish. The area above the eastern ends of the tunnels would provide the greatest rooting depth below the surface grade, and a variety of annual and perennial species could establish in this area. Additionally, woody shrubs, such as coyote brush and coffeeberry, could be planted at the eastern end of the tunnels.

Exhibit 3-81 shows the permanent impacts to each plant community by alternative.

Exhibit 3-81
Direct Permanent Impacts to Plant Communities other than Wetlands

	Non-native Introduced Forest and Ornamental Wildlife Habitat (hectares / acres)	Northern Coastal Scrub on Sandy Soil (hectares / acres)	Northern Coastal Scrub with Serpentine Inclusions (hectares / acres)	Non-native Grassland (hectares / acres)
Total Number of Hectares (acres) in Doyle Drive Construction Corridor	9.95 / 24.59	0.30 / 0.73	0.71 / 1.76	0.05 / 0.13
Alternative	Impact Area			
Alternative 2: Detour Option	2.37 / 5.86	0.16 / 0.40	0.20 / 0.50	None
Alternative 2: No-Detour Option	2.57 / 6.35	0.17 / 0.43	0.20 / 0.50	None
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options and the Loop Ramp Option	4.54 / 11.23	0.20 / 0.50	0.27 / 0.67	0.02 / 0.04
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options, the Loop Ramp Option, and a Merchant Road Slip Ramp	5.01 / 12.38	0.20 / 0.50	0.37 / 0.91	0.02 / 0.04
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options and the Hook Ramp Option	4.61 / 11.39	0.20 / 0.50	0.20 / 0.49	0.01 / 0.03
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options, the Hook Ramp Option, and a Merchant Road Slip Ramp	5.08 / 12.54	0.20 / 0.50	0.30 / 0.73	0.01 / 0.03
Preferred Alternative: Refined Presidio Parkway	4.61 / 11.39	0.21 / 0.53	0.21 / 0.53	0.01 / 0.03

Avoidance, Minimization, and/or Mitigation Measures

The overall mitigation goal is to avoid and minimize temporary construction-related impacts and long-term project impacts to natural communities. The following presents a discussion of avoidance, minimization, and mitigation measures for the Preferred Alternative.

Implement a Plan for Revegetation of Temporarily Disturbed Vegetation

Mitigation measures for upland natural communities are described below in Section 3.4.3, Plant Species. Mitigation measures for wetland natural communities are described below in Section 3.4.2, Wetlands and Other Waters of the United States.

Implement a General Biological Resource Monitoring Program[37]

The Doyle Drive Monitoring Program for Biological Resources (Monitoring Program) described in this section is designed to ensure that biological monitoring is effectively administered and results in the avoidance and minimization of adverse effects on sensitive resources. It also provides that in cases where standards are not met, the appropriate parties are notified to take corrective action and implement adaptive management. Refer to the NES for further information on the Doyle Drive Monitoring Program for Biological Resources.

Biological Contractor Compliance Manager

The Biological Contractor Compliance Manager (Contractor) will oversee all aspects of the Monitoring Program that need to be implemented by persons working in the field. This person will interact directly with the Biological Monitor to notify the Resident Engineer when an activity is causing concerns, when an activity should be stopped, or when an activity should be modified.

Construction Project Manager

The Construction Project Manager will be responsible for all aspects of the Monitoring Program requiring senior management review. The project manager will receive monitoring reports, forward those reports to resource agencies when appropriate, and make decisions on Doyle Drive Project modifications.

Resident Engineer

The Resident Engineer is the focal point for contact with the Contractor. The biological monitoring staff will direct all construction-related concerns to the Resident Engineer.

Biological Monitors

The Biological Monitors will be qualified biologists who meet a set of established professional criteria. In addition to being able to identify wetlands, special-status plant and wildlife species, general plants and wildlife, woodrat nests, and bird nests, the Biological Monitor functions as a facilitator and record keeper. The Biological Monitors need to be present during construction for Environmentally Sensitive Area (ESA) fence installation, clearing and grubbing, and the initial grading.

Should the contractor's workers encounter wetlands, special-status plant and wildlife species, nesting birds, or any other important biological resource noted in the NES, the contractor will notify the Biological Monitor and, if necessary, stop

[37] A Biological Resource Team, comprised of members of all of the responsible agencies involved, will agree to and approve the details of the Biological Resource Monitoring Program, including the Special-status Bird Avoidance/Mitigation Plan (see Section 3.4.4).

work until the Biological Monitor has addressed the issue involving the biological resource. Biological Monitors will be responsible for the following:

- completing surveys where required (i.e., assessing if nesting birds and roosting bats are present);
- monitoring construction activities, active construction zones and Crissy Marsh;
- completing daily biological monitoring reports for each day spent monitoring construction;
- monitoring biological resources as needed;
- recording compliance with the measures described in this section; and
- helping administer the environmental training sessions to construction personnel.

The specific tasks and procedures associated with biological monitoring will be detailed in the project's special provisions.

Training

Training for project staff and other staff involved with the Doyle Drive Project will include a Pre-Construction training session for all construction workers. This session will:

- describe the construction sequence and key safety concerns;
- present information provided by the Trust and NPS on working with these agencies and within national parks, such as picking up all trash and not feeding wildlife;
- provide insights into effective monitoring and inspection;
- establish a common understanding of the Monitoring Program; and
- establish communication procedures.

A project environmental kick-off meeting for all management-level project staff will be held.

3.4.2 Wetlands and other Waters of the United States

Wetlands are unique, natural areas that occur wherever land is inundated, covered, or influenced by the presence of water. Wetlands support the growth of water-loving and water-tolerant vegetation.

At times of flooding, wetlands at the mouths of streams and rivers receive overflow water that is rich in nutrients and sediments. Such wetlands provide floodwater storage and attenuation functions, which allow sediments to settle and clearer water to percolate into the groundwater. Thus, wetlands play an essential role in filtering nutrients and sediments out of water before it enters lakes and bays. By storing and slowly releasing flood water, wetlands also moderate the damage that flooding can cause. Wetlands are located throughout stream and river systems, providing nutrient and sediment traps and flood

control all along the way. Wetlands support high wildlife diversity as well as provide a water source for species associated with upland habitats.

This section discusses water bodies (e.g., wetlands, streams, marshes) in the project study area and the construction corridor and describes the potential effect of the build alternatives on those water bodies. Water-associated features in the study area include:

- Waters of the United States, which include wetlands and other special aquatic sites that are subject to U.S. Army Corps of Engineers (USACE) jurisdiction under *Section 404* of the *Clean Water Act* and *Executive Order 11990*;
- U.S. Fish and Wildlife Service (USFWS) wetlands according to the Cowardin classification system (Cowardin et al. 1979) that are protected, along with waters of the United States, by the National Park Service (NPS) and the Presidio Trust under *Executive Order 11990*, *Presidio Trust Management Plan* (PTMP) and National Park Service Management Policies; and
- Future wetlands that are planned to exist within the Doyle Drive corridor (e.g., the Tennessee Hollow restoration project and the Crissy Field restoration expansion project) as discussed in the *General Management Plan Amendment* (GMPA) and the *Presidio Trust Management Plan.*

Regulatory Setting

Wetlands and non-wetland water resources (e.g., rivers, streams, and natural ponds) are a subset of waters of the United States. Because of the importance of wetlands within the biological environment, the following laws and regulations govern their preservation.

Federal Laws and Regulations

Clean Water Act, Section 404

The *Clean Water Act* (33 U.S.C. 1344) (CWA) is the primary law regulating waters of the United States. CWA *Section 404* regulates the discharge of dredged or fill material into waters of the United States. The USACE has primary federal responsibility for administering regulations that concern waters of the United States and wetlands within project sites.

Executive Order 11990

Executive Order for the Protection of Wetlands (11990) was issued "to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative…." *Executive Order 11990* directs federal agencies to:

1) provide leadership and to take action to minimize the destruction, loss, or degradation of wetlands;
2) preserve and enhance the natural and beneficial value of wetlands; and

3) avoid direct or indirect support of new construction in wetlands unless there are no practicable measures to minimize harm to wetlands.

State Regulations

San Francisco Bay Regional Water Quality Control Board

The San Francisco Regional Water Quality Control Board (SFRWQCB), North Coast Region, regulates waters of the State under the *Porter-Cologne Act*. Under *Section 401* of the CWA, the RWQCB has review authority of *Section 404* permits. The RWQCB has a policy of no-net-loss of wetlands in effect and typically requires mitigation for all impacts to wetlands before it would issue a water quality certification. Dredging, filling, or excavating isolated waters constitutes a discharge of waste to waters of the State, and prospective dischargers are required to submit a report of waste discharge to the RWQCB and comply with other requirements of the *Porter-Cologne Act*.

San Francisco Bay Conservation and Development Commission

The *Coastal Zone Management Act* (CZMA), Section 307 mandates that federal agency activities be "consistent to the maximum extent practicable with the enforceable policies of approved state management programs" and that this consistency be documented and coordinated with the state. A federal agency ensures consistency of its proposed actions with state management programs by submitting a consistency determination to the relevant state agency. After receipt of the consistency determination, the state agency informs the federal agency of its concurrence with, or objection to, the federal agency's consistency determination.

The San Francisco Bay Conservation and Development Commission (BCDC) is the state agency charged with administering the federal CZMA within the San Francisco Bay segment of the California coastal zone. Within the Commission's areas of concern, the coastal zone consists of all areas located within the Commission's jurisdiction except those lands that the federal government owns, leases, holds in trust, or over which the federal government has sole discretion. While by definition all Presidio lands are outside the coastal zone, any federal activity (regardless of location) that affects any natural resources, land uses, or water uses in the coastal zone will be subject to the consistency requirement. The Federal Highway Administration will ensure that its obligations under the CZMA are met through the appropriate federal consistency determination process outlined in the *Coastal Zone Management Act (CZMA) Federal Consistency Regulations*, 71 Federal Regulation 787-831 (Jan. 5, 2006) at 15 CFR 930.

It is the intent of the lead agencies to comply with and conduct the Doyle Drive Project in a manner which is consistent with the *Bay Plan* to the maximum extent practicable. Based on the information developed through this EIS/R process, the Preferred Alternative, if implemented, will be consistent with the BCDC's coastal management program. The Commission may review this consistency determination and either concur or object.

Affected Environment

The Presidio has a variety of wetland types. The following discusses these wetlands.

U.S. Army Corps of Engineers Jurisdictional Waters of the United States

Thirteen soil pits were examined and 13 water-associated features were delineated on July 25, 2000, and November 28, 2000, within and adjacent to the Doyle Drive construction corridor. Other water-associated features in the project study area that were delineated include North Fort Scott, Battery Howe-Wagner, Dragonfly Creek, and Lower Dragonfly Creek, which is a subset of Dragonfly Creek. All of these features were incorporated into a wetland delineation that was verified by the USACE on August 29, 2001.

On August 29, 2001, the USACE also verified that seven of the water-associated features are jurisdictional waters of the U.S. under *Section 404* of the CWA. These are identified in **Exhibits 3-82**[38] and **3-83** (on the following pages) as W-2, W-3, W-8, W-8b, Battery Howe-Wagner, Lower Dragonfly Creek, and Tennessee Hollow. The 2001 wetland delineation was updated in 2007 and is awaiting verification by the USACE. The following analysis incorporates the 2007 wetland delineation data. It is anticipated that a *Nationwide Permit #14* will be required for this project.

- North Fort Scott and Crissy Marsh (W-1) were identified during the 2001 wetland delineation as jurisdictional waters of the U.S. in the project study area. The USACE determined that the remaining water-associated features within the construction corridor were non-jurisdictional. Jurisdictional waters of the U.S. identified in the project study area total 6.82 hectares (16.87 acres), of which 0.17 hectare (0.43 acre) are within the construction corridor.

NPS- and Trust-Protected Cowardin Wetlands

The NPS and Trust define wetlands using the Cowardin classification system, which defines a wetland as having at least one or more of the following attributes:

- at least periodically, the land supports predominantly hydrophytes (wetland vegetation);
- the substrate is predominantly undrained hydric soil; or
- the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

The Cowardin wetlands located in the project study area total one hectare (2.47 acres) and are protected by the NPS or the Trust as palustrine scrub-shrub. Because the NPS and the Trust also protect USACE wetlands, the total number

[38] As a mapping convention, polygons on Exhibit 3-82 are marked differently for Cowardin wetlands and Corps jurisdictional waters. However, the Cowardin system includes all Corps waters as well.

of wetlands protected by the NPS and the Trust is 8.04 hectares (19.86 acres) within the project study area.

Excluding USACE jurisdictional wetlands, NPS or the Trust protect a total of 0.49 hectare (1.21 acres) of Cowardin wetlands within the construction corridor; these are W-4, W-5, W-6a, W-6b, and W-6c. These wetlands are not within the USACE jurisdiction under *Section 404* of the *Clean Water Act* as waters of the United States. The dominant species in these wetlands consist of arroyo willow and California blackberry, referred to collectively as riparian scrub. The riparian scrub Cowardin wetlands also support Algerian ivy (*Hedera helix*) and cape ivy, which are non-native, invasive species. The California Exotic Pest Plant Council includes them in the group of the "most invasive and damaging wildland pest plants species."

In a regional context, most of the Cowardin wetlands and USACE jurisdictional wetlands, with the exception of the restored wetlands at Crissy Field, have low to moderate value as aquatic resources because they have low species diversity and lack canopy structure suitable for most breeding wildlife species. However, relative to the surrounding urban environment, these wetlands may be considered by the NPS and the Trust as high value because they may serve an aesthetic function in a recreational park, are the only water-associated features with well-established plants in the northern portion of the Presidio, and may provide habitat for common and special-status wildlife species.

The Cowardin definition, therefore, includes more habitat types than the definition (33 CFR 328.3) and delineation manual used by the USACE. The 1987 Corps of Engineers *Wetlands Delineation Manual* requires that all three of the parameters listed above (hydrophytic vegetation, hydric soil, wetland hydrology) be present for a habitat to be considered a wetland. The Cowardin wetland definition includes wetlands, but also adds some habitats that, though lacking vegetation or soils, are still saturated or shallow inundated environments that support aquatic life.

Each Cowardin wetland protected by the NPS or the Trust located within the project study area is discussed in the following sections.

Arroyo Willow Scrub and Associated Wetlands

Cowardin arroyo willow scrub is found along the steep hillside slopes north of Doyle Drive at wetlands W-4, W-5, W-7 and W-8a. Currently, wetlands W-4, W-5, W-7 and W-8a receive stormwater runoff from the Doyle Drive roadway above them and water seepage through fractures. **Exhibit 3-83** provides more information on these wetlands.

Exhibit 3-82
Water-Associated Features

Source: Environmental Science Associates, 2007; Parsons Brinckerhoff, 2004; National Park Service, 2007.

Exhibit 3-83
Summary of USACE Jurisdictional Waters of the U.S.
and NPS/Trust Cowardin Wetlands in the Project Study Area

Map Symbol	Type	Jurisdictional Waters of the U.S. in Project Study Area		Jurisdictional Waters of the U.S. in Doyle Drive Construction Corridor	
		Hectares	Acres	Hectares	Acres
USACE Jurisdictional Waters of the U.S.					
W-1	Restored tidal marsh (Crissy Marsh) and associated wetlands	6.56	16.20	0	0
W-2	Arroyo willow scrub	0.07	0.18	0.07	0.18
W-3	Seasonal wetland	0.06	0.15	0.06	0.15
W-8	Freshwater wetland	0.01	0.03	0	0
Lower Dragonfly Creek	Perennial stream with freshwater wetland	0.01	0.01	0	0
North Fort Scott	Freshwater wetland	0.02	0.06	0	0
Battery Howe-Wagner	Perennial stream with seasonal wetland	0.06	0.16	0.01	0.02
Tennessee Hollow (in construction corridor)	Seasonal stream (underground)	0.03	0.08	0.03	0.08
	TOTAL	6.82	16.87	0.17	0.43
Cowardin Wetlands under the Protection of the NPS or The Trust Excluding USACE Wetlands					
W-2	Arroyo willow scrub	0.12	0.30	0.12	0.30
W-4	Arroyo willow scrub	0.71	1.74	0.40	1.00
W-5	Arroyo willow scrub	0.06	0.16	0.01	0.02
W-6a	California blackberry wetland	0.05	0.12	0.05	0.12
W-6b	California blackberry wetland	0.01	0.02	0.01	0.02
W-6c	California blackberry wetland	0.02	0.05 (0.04 + .01)	0.02	0.05
W-6d	California blackberry wetland	0.04	0.11	0	0
W-7	Arroyo willow scrub	0.004	0.01	0	0
W-8b	Seasonal wetland	0.03	0.07	0	0
W-8a	Arroyo willow scrub	0.08	0.19	0	0
	TOTAL	1.12	2.77	0.49	1.21

Source: Environmental Science Associates, NPS, Trust, 2001.

These four wetlands cover a total of 0.85 hectare (2.10 acres) in the project study area. The dominant vegetation consists of arroyo willow in all of these locations; however, California blackberry is a co-dominant species in wetland W-4. Wetlands W-4, W-5, W-7 and W-8a are not within the USACE jurisdiction under *Section 404* of the *Clean Water Ac*t as wetland waters of the United States because they do not meet the soil criterion. However, they would be classified as palustrine scrub-shrub using the Cowardin system.

California Blackberry and Associated Wetlands

California blackberry is found along the gentle hillside slopes between Doyle Drive and Lincoln Boulevard at wetlands W-6a, W-6b, W-6c, W-6d, covering a total of 0.12 hectare (0.30 acre) in the project study area. These hillside slopes supported northern coastal scrub (Jones and Stokes, 1997) prior to the construction of Doyle Drive. Currently, W-6a, W-6b and W-6c receive stormwater runoff from the Lincoln Boulevard roadway above them. Wetland W-6d receives stormwater runoff from Doyle Drive roadway as well as from fracture flows.

Wetlands W-6a, W-6b, W-6c and W-6d are not within the USACE jurisdiction under *Section 404* of the *Clean Water Act* as wetland waters of the United States because they do not meet the soil criterion. These California blackberry wetlands would be classified as palustrine scrub-shrub in the Cowardin system. California blackberry and associated wetlands and Cowardin Arroyo willow scrub and associated wetlands are collectively referred to throughout this document as riparian scrub. **Exhibit 3-83** provides more information on these wetlands.

Temporary and Indirect Impacts

Construction would temporarily disturb wetlands and waters of the United States in the study area and the construction corridor. **Exhibit 3-84** shows a summary of the potential temporary impacts. Alternative 2, Alternative 5, and the Preferred Alternative may each temporarily affect a total of 0.03 hectare (0.08 acre) of USACE jurisdictional area at Tennessee Hollow (see the following section, Effects on the Existing Tennessee Hollow). Although a total of 0.01 hectare (0.02 acre) of Battery Howe-Wagner is within the construction corridor, the Preferred Alternative will temporarily affect 0.0004 hectare (0.001 acre) of Battery Howe-Wagner. All options associated with Alternative 5 would similarly affect Battery Howe-Wagner.

Exhibit 3-84
Temporary Wetland Impacts in the Doyle Drive Construction Corridor by Alternative

	USACE Jurisdiction Waters of the United States (hectares / acres)	Cowardin Wetlands excluding USACE Wetlands (hectares / acres)
Total Wetland Area in Doyle Drive Construction Corridor	0.17 / 0.43	0.49 / 1.21
Impact Areas By Alternative		
Alternative 2: Detour Option	0.03 / 0.08 (Tennessee Hollow)	0.01 / 0.02 (W-6b)
Alternative 2: No-Detour Option	0.03 / 0.08 (Tennessee Hollow)	0.01 / 0.02 (W-6b)
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options and the Loop Ramp Option	0.03 / 0.08 (Tennessee Hollow, Battery Howe-Wagner)	0.06 / 0.16 (W-5)
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options, the Loop Ramp Option, and a Merchant Road Slip Ramp	0.03 / 0.08 (Tennessee Hollow, Battery Howe-Wagner)	0.06 / 0.16 (W-5)
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options and the Hook Ramp Option	0.03 / 0.08 (Tennessee Hollow, Battery Howe-Wagner)	0.06 / 0.16 (W-5)
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options, the Hook Ramp Option, and a Merchant Road Slip Ramp	0.03 / 0.08 (Tennessee Hollow, Battery Howe-Wagner)	0.06 / 0.16 (W-5)
Preferred Alternative	0.03 / 0.08 (Tennessee Hollow, Battery Howe-Wagner)	0.06 / 0.16 (W-5)

The build alternatives would affect Cowardin wetlands. The Alternative 2 (both options) would temporarily affect 0.01 hectare (0.02 acre) of wetland W-6b. All options of Alternative 5 and the Preferred Alternative will affect 0.06 hectare (0.16 acre) of wetland W-5.

The combined area of Cowardin and USACE wetlands that Alternative 2, Replace and Widen Option, may temporarily disturb is 0.04 hectare (0.10 acre). All options of Alternative 5 and the Preferred Alternative will remove or substantially disturb a total of 0.09 hectare (0.24 acre).

ESAs will be designated so that no temporary impacts will occur to riparian scrub (central coast arroyo willow and blackberry and wetland) and other USACE wetlands located within or next to the construction corridor, but outside the area of temporary effect. These communities are generally more susceptible to disturbance and need to be protected.

Indirect Tunneling Effects on Wetlands

Tunneling upslope of the bluffs north of the cemetery during construction of the Presidio Parkway Alternative and the Preferred Alternative may alter or disrupt groundwater flows, potentially affecting existing plants that rely on emergent groundwater. Special consideration has been given to collecting groundwater flow around the tunnel and directing the flows to the existing wetlands to sustain their viability. Equipment that adjusts flows can be incorporated into the project so that after construction, flows can be increased or decreased.

The soil conditions, and the nature, timing, and duration of soil moisture (i.e., submersion, flooding, or soil saturation) are factors that play an important role in the physiological impact that water has on riparian species. The longer riparian species are exposed to saturated soil conditions, the greater the potential for injury. While most riparian species can tolerate short periods of saturated soil conditions during the growing season, most can withstand only 1 to 4 months of water continuously over the soil surface.

Willow species are very tolerant to changes in soil moisture if they are healthy. Depending on the current health of willows in Cowardin wetlands north of the cemetery (i.e., W-4, W-6d, W-7), these riparian species may not be substantially affected by a potential increase in water seepage from fracture flow, provided that the flows do not lead to saturated soil conditions for longer than four months. However, if increased flows to these areas are recurrent and keep the soil saturated or prevent recovery from previous disturbance, injuries to riparian species can accumulate and damage, disease (such as root-rot) or even death, may occur.

Conversely, soil water deficits can affect the normal physiology and growth of plants during the growing season. Some immediate visible effects of soil water deficits may include wilting, scorch, and some defoliation. Long-term symptoms may include dieback of branches and death of the plant as the plant's capacity to absorb water is damaged. Substantial uncertainty thus exists as to the potential effects of the Doyle Drive Project on subsurface water flows, and in turn on the health of these apparently groundwater supported wetlands.

Effects on the Existing Tennessee Hollow

None of the build alternatives would cause impacts to Tennessee Hollow in its existing condition. Although this existing drainage is included in the USACE waters in **Exhibit 3-85** it is contained in storm drain pipes within the construction corridor, and would be allowed to persist. However, 0.03 hectare

(0.08 acre) of existing Tennessee Hollow may be temporarily affected if the flow is redirected, the piping is modified, or if discharge enters the stream.

Permanent Impacts

As shown in **Exhibit 3-85** the permanent effects of Alternative 2 both options, all Presidio Parkway options, and the Preferred Alternative on USACE wetlands are expected to be identical. Build alternatives will permanently affect 0.13 hectare (0.33 acre) of USACE jurisdictional waters of the U.S. at W-2 and W-3.

Both options of Alternative 2 would permanently affect 0.07 hectare (0.17 acre) of Cowardin wetlands at W-6a and W-6c. All of the Presidio Parkway Alternative options and the Preferred Alternative will affect 0.08 hectare (0.19 acre) of Cowardin wetlands at W-6a, W-6b and W-6c.

The combined area affected will be 0.20 hectare (0.50 acre) under both options of Alternative 2, and 0.21 hectare (0.52 acre) under all Presidio Parkway Alternative options and the Preferred Alternative.

ESAs will be designated so that no permanent impacts would occur to riparian scrub (central coast arroyo willow and blackberry and wetland) and other USACE wetlands located within or next to the construction corridor, but outside the area of permanent effect.

Exhibit 3-85
Permanent Wetland Impacts by Alternative

	USACE JURISDICTION WATERS OF THE UNITED STATES (HECTARES / ACRES)	COWARDIN WETLANDS EXCLUDING USACE WETLANDS (HECTARES / ACRES)
Total Wetland Area in Doyle Drive Construction Corridor	0.17 / 0.43	0.49/1.21
IMPACT AREAS OF ALTERNATIVE		
Alternative 2: Detour Option	0.13 / 0.33 (W-2, W-3)	0.07 / 0.17 (W-6a,W-6c)
Alternative 2: No-Detour Option	0.13 / 0.33 (W-2, W-3)	0.0 / 0.17 (W-6a, W-6c)
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options and the Loop Ramp Option	0.13 / 0.33 (W-2, W-3)	0.08 / 0.19 (W-6a, W-6b, W-6c)
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options, the Loop Ramp Option, and a Merchant Road Slip Ramp	0.13 / 0.33 (W-2, W-3)	0.08 / 0.19 (W-6a, W-6b, W-6c)
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options and the Hook Ramp Option	0.13 / 0.33 (W-2, W-3)	0.08 / 0.19 (W-6a, W-6b, W-6c)
Alternative 5: Presidio Parkway Alternative with either Diamond or Circle Drive Options, the Hook Ramp Option, and a Merchant Road Slip Ramp	0.13 / 0.33 (W-2, W-3)	0.08 / 0.19 (W-6a, W-6b, W-6c)
Preferred Alternative	0.13 / 0.33 (W-2, W-3)	0.08 / 0.19 (W-6a, W-6b, W-6c)

Note: All USACE wetlands also qualify as Cowardin wetlands. Affected wetlands are given in parentheses and locations are shown in Exhibit 3-82 and in Appendix I of the Revised Natural Environmental Study (NES), July 2005.

Avoidance, Minimization, and/or Mitigation Measures

Avoidance, minimization, and/or mitigation measures for the Preferred Alternative are addressed in this section.

Mitigation measures to address direct impacts and indirect impacts to USACE jurisdictional waters are required to comply with *Section 404* of the *Clean Water Act*. Similarly, mitigation measures will address impacts to Cowardin wetlands, which are protected by the NPS and Trust. Refer to *Wetland Restoration and Enhancement Mitigation Plan* in **Appendix K** for further information on wetland mitigation measures.

The goals of wetland mitigation are to:

1. Avoid, minimize or compensate (in this order) for the temporary and permanent losses of waters of the U.S. and Cowardin wetlands protected by the NPS or the Trust due to the Doyle Drive Project;
2. Satisfy the "no net loss" policy regarding type, function and value of wetlands per *Executive Order 11990* and consistent with the NPS' and Trust's policies;
3. Improve wetland and riparian value and increase wildlife habitat quality relative to those areas that would be disturbed or filled; and
4. Create successful mitigation sites that will become self-supporting natural systems over time.

Implement a General Biological Resource Monitoring Program

A complete description of this measure was presented in the preceding section.

Implement a Wetland Mitigation/Compensation Plan

Temporary impacts will be mitigated by in-kind, in-place restoration after construction at a 1:1 ratio. Following the 2005 NPS/Trust Strategy, three basic strategies for mitigation of permanent and indirect wetland impacts have been discussed with the Trust and NPS. These are: 1) wetland creation, 2) intensive wetland enhancement, and 3) wetland enhancement. The compensatory value, respectively, are 2:1, 3:1 and 5:1 ratios of created or enhanced habitat to impacted habitat based on current discussions with the NPS and the Trust.

Six sites were identified that can provide wetland creation or enhancement opportunities appropriate to address as mitigation for the project. The criteria for the site selection included:

a) creation of new in-kind habitat;
b) proximity to the impacted area;
c) ability to support mature habitat systems, with similar cover, foraging and nesting opportunities to that lost; and
d) habitat located in the same wildlife corridor as the impact.

These sites, in addition to mitigation goals and values, as presented and discussed in the 2005 and 2006 NPS/Trust Strategies, and the October 31, 2006 field meeting, provide the basic framework of the compensatory mitigation. Refer to the *Wetland Restoration and Enhancement Mitigation Plan* in **Appendix K** for further information on wetland mitigation measures described below**.**

Waters of the U.S. and Cowardin wetlands will be clearly marked on project maps as ESAs. To the extent feasible, the project will avoid causing impacts to waters of the United States and Cowardin wetlands. Where permanent impacts are unavoidable, compensation measures will be implemented.

Compensation Measures

Compensation for permanent impacts on wetlands will include: (1) wetland creation and restoration; (2) funding of Park agency wetland enhancement and creation projects; or (3) a combination of both (1) and (2).

Proposed Wetland Compensation Sites

All of the proposed wetland compensation sites, with inclusion of the restoration of the Eastern Tributary of Tennessee Hollow, will offset permanent and indirect impacts on waters of the U.S. and Cowardin wetlands. Six sites were chosen as potential mitigation sites for impacts on permanent and indirect wetland impacts. These sites include Dragonfly Creek, Quartermaster Reach Connection, North Fort Scott, West Crissy Bluffs, Battery East/Marina Drive, and Eastern Tributary of Tennessee Hollow. Conceptual plans for these sites involving creation and various types of enhancement are described in the *Wetland Restoration and Enhancement Mitigation Plan* included in **Appendix K**. Anticipated future restoration in the Tennessee Hollow area, particularly at the Eastern Tributary, is considered by the NPS/Trust as acceptable mitigation for wetland project impacts. The Trust is developing a restoration plan separate from the *Wetland Restoration and Enhancement Mitigation Plan.* The Doyle Drive Project would restore a total of 1.2 hectares (2.99 acres) of wetlands for permanent and potentially indirect impacts on waters of the U.S. and Cowardin wetlands.

Implementation and Monitoring Plan

Major construction activities for the project will be phased over four years. Mitigation efforts will be initiated before, concurrent with, or immediately following construction of the project. At mitigation sites not disturbed by construction activities, creation and/or enhancement activities will be initiated as soon as possible, following completion of environmental review and permitting. All such sites must be initiated prior to commencement of project construction activities, with all phases complete, except for monitoring and maintenance, by end of construction. Sites disturbed temporarily prior to the planting effort will be treated immediately following construction as described below. At these temporarily disturbed sites, no planting will occur until construction activities are completed in the mitigation areas.

During the design phase, additional geotechnical analysis will be conducted to determine the underlying water conveyance in that area. If it is determined that the nature of the fractures are such that the success of water conveyance will be in question, wetland creation will begin in advance of the project. The Trust and the NPS will review and comment on the details of the monitoring program and will be included in the distribution of those receiving periodic reports of the data and findings.

General biological monitoring will occur during construction and post-construction. Wetland mitigation monitoring will begin at the initiation of the planting phase of wetland restoration. Plant installation may be phased over three years. Wetland mitigation monitoring will continue after the plants are

installed until the plantings demonstrate successful establishment and the performance criteria have been met, which is usually about six years (i.e., three years of monitoring site restoration and plant establishment followed by three years of monitoring post site restoration and plant establishment). Success criteria for wetland mitigation are described in the *Wetland Restoration and Enhancement Mitigation Plan* (see **Appendix K**).

The criteria describe threshold levels for erosion, invasive species, irrigation, vegetation richness, hydrology, wildlife usage, and debris. The success criteria and all aspects of wetland restoration is subject to approval by the Trust and NPS.

3.4.3 Plant Species

This section discusses the individual plant species within the project study area and potential impacts of the Doyle Drive Project on these species. Native and introduced plant communities are discussed more broadly in Section 3.4.1 of this document.

Regulatory Setting

Federal Endangered Species Act of 1973

The primary federal law protecting threatened and endangered species is the *Federal Endangered Species Act* (ESA) of 1973: United States Code (USC), Section 1531, et seq. and 50 CFR Part 402. This act and subsequent amendments provide for the conservation of endangered and threatened species and their ecosystems. Under *Section 7* of this act, federal agencies, such as the Federal Highway Administration (FHWA), are required to consult with the U.S. Fish and Wildlife Service (USFWS) to ensure that they are not undertaking, funding, permitting or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat is defined as geographic locations critical to the existence of a threatened or endangered species.

Species of special concern are not subject to the same consultation requirements as listed endangered or threatened species. However, the USFWS and the California Department of Fish and Game (CDFG) recommend that candidate species, species proposed for listing, and species of special concern also be considered in informal consultation during a project's environmental review. This is recommended because in the event that a species were to be listed during the design or construction phases of a project, new studies and restrictions might be imposed. The current USFWS list of threatened, endangered and species of concern is located in **Appendix H**.

California Endangered Species Act

California has enacted a similar law at the state level, the *California Endangered Species Act* (CESA), *California Fish and Game Code*, Section 2050, et seq. CESA

emphasizes early consultation to avoid potential impacts to rare, endangered, and threatened species and to develop appropriate planning to offset project-caused losses of listed species populations and their essential habitats. The CDFG is the agency responsible for implementing CESA. Section 2081 of the *Fish and Game Code* prohibits "take" of any species determined to be an endangered species or a threatened species. Take is defined in Section 86 of the *Fish and Game Code* as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." CESA allows for take incidental to otherwise lawful development projects; for these actions an incidental take permit is issued by CDFG. For projects requiring a *Biological Opinion* under *Section 7* of the ESA, CDFG may also authorize impacts to CESA species by issuing a *Consistency Determination* under Section 2080.1 of the *Fish and Game Code*.

The National Park Service and the Presidio Trust Plans and Policies

The NPS and Trust plans and policies identify the goals and objectives for the Presidio of San Francisco and govern the protection of wildlife, plant species, natural communities and landscapes, and wetland and riparian habitat within the Presidio. These documents include:

- *Final General Management Plan Amendment (GMPA)* (NPS, 1994)*;*
- *Presidio Trust Management Plan (PTMP)* (Presidio Trust, 2002);
- *Natural Resources Section of the Resources Management Plan* (National Park Service 1999c);
- *Presidio Vegetation Management Plan and Environmental Assessment (VMP);* and
- *National Park Service (NPS) Management Policies* (NPS, 2001).

U.S. Fish and Wildlife Service Plant Recovery Plans

The NPS and Trust have identified both non-native and native habitats as potential serpentine recovery areas for the re-introduction of special-status species based on recommendations in *USFWS Recovery Plans.* The underlying goal is to enlarge existing populations and provide long-term conservation. One area under consideration is within the Doyle Drive construction corridor on the northern bluffs of the Park Presidio Interchange. The *2003 USFWS Recovery Plan for Coastal Plants of the Northern San Francisco Peninsula* (USFWS 2003) recommends that surface exposures of serpentine rocks and soils in the Presidio should be: (i) surveyed; and (ii) assigned reasonable buffers in consultation with the USFWS under the *Endangered Species Act*. A *Biological Report of Species of Concern* was prepared since it was determined that a *Biological Assessment* and *Biological Opinion* was not necessary for the Doyle Drive Project in regard to these recovery plans because there would be no effect on listed species (Don Hankins, USFWS, November 2004), see **Appendix H** for the no effect determination.

Affected Environment

Special-Status Species

Species that are rare or vulnerable to habitat loss or population decline are classified as special-status species. Some of these species are listed by USFWS and CDFG and receive specific protection defined in federal or state endangered species legislation. Other species have not been formally listed as threatened or endangered under federal or state endangered species legislation, but have designations as fully protected, rare, sensitive, or species of local concern based on adopted policies and expertise of state resource agencies, organizations with acknowledged expertise, or policies adopted by federal government agencies on federal land and local governmental agencies such as counties, cities, and special districts with local conservation objectives. Twenty-eight special-status plants either are known to occur within the Presidio or have suitable habitat within the project study area or construction corridor.

Many of these species were reintroduced at Crissy Field Marsh and Dunes as part of a restoration and enhancement effort. Except for Davy's clarkia and California triquetrella moss, 26 species are known to occur in the project study area. Crissy Marsh and the coastal bluffs within the project study area may be potential habitat for Davy's clarkia and California triquetrella moss, although the probability of these species occurring there is low.

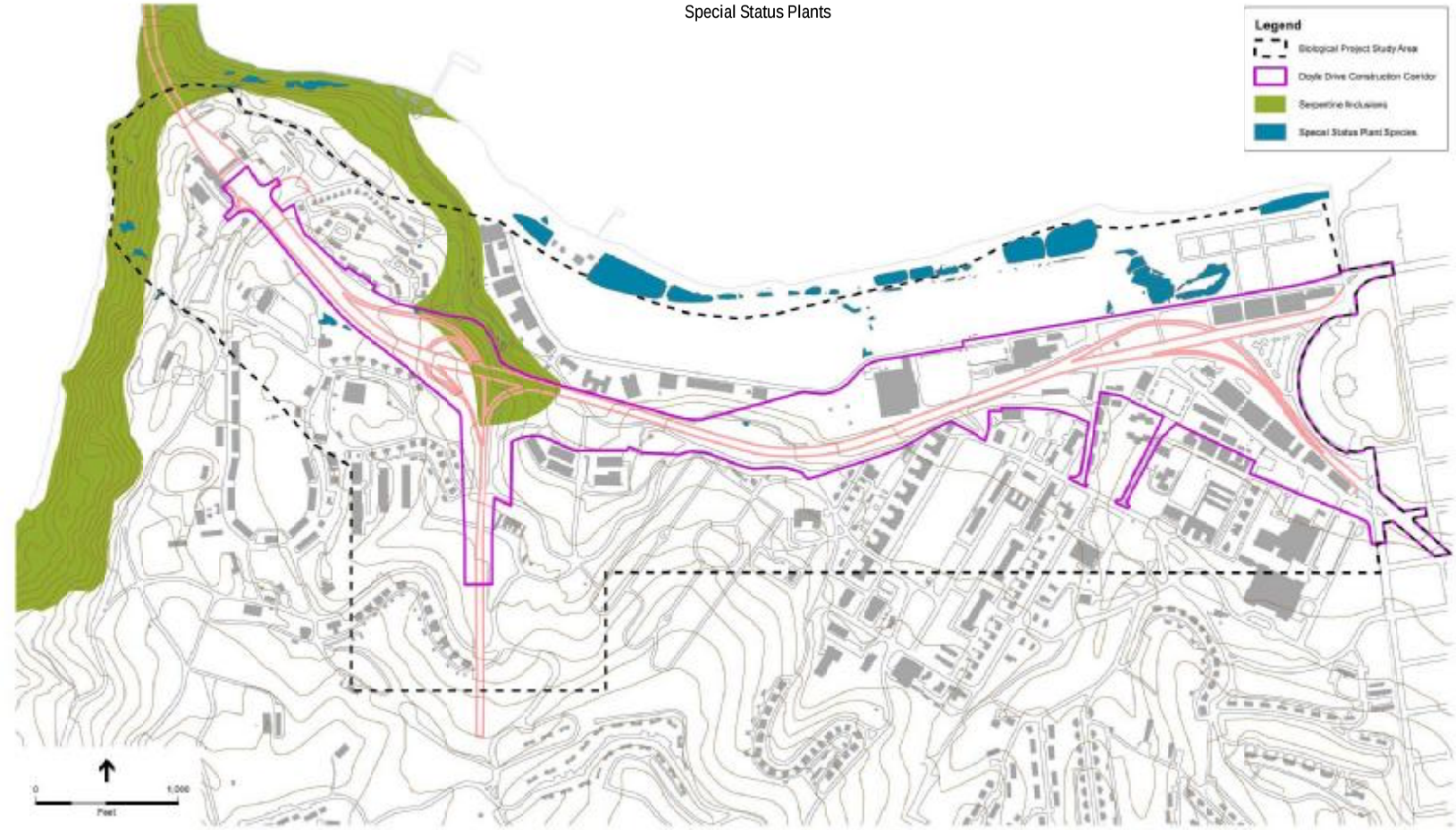
The quality of northern coastal scrub within the construction corridor is marginal because it is highly disturbed. As a result, this community is not likely to support plant species such as San Francisco campion, San Francisco spineflower, coast rock cress, Franciscan thistle, Davy's clarkia, coast Indian paintbrush, California triquetrella moss, and dune gilia. Similarly, the serpentine soil in the construction corridor does not support species such as fragrant fritillary or San Francisco owl's clover. Except for skunkweed and San Francisco gumplant, no special-status plant species are known to occur in the construction corridor, and their potential to occur within the construction corridor is low. **Exhibit 3-86** lists the species and their special-status designations. Location of special-status species within the study area is generally illustrated in **Exhibit 3-87** (on the following pages).

One area that is protected and under consideration for restoration within the construction corridor is on the northern bluffs of the Park Presidio Interchange. In its current condition, this area primarily supports non-native blue-gum eucalyptus trees, black acacia trees, and fennel. The understory consists mostly of non-native annual grasses and herbs, including big-quaking grass, wild oat, and common sow thistle. Few native perennial grasses and bulb species are present.

Exhibit 3-86
Special-Status Species in the Doyle Drive Project Study Area

Species of Federal Concern
California saltbush (*Atriplex californica*)
San Francisco spineflower (*Chorizanthe cuspidata* var. *cuspidata*)
Franciscan thistle (*Cirsium andrewsii*)
Round-headed collinsia (*Collinsia corymbosa*)
Point Reyes bird's-beak (*Cordylanthus maritimus* ssp. *palustris*)
San Francisco wallflower (*Erysimum franciscanum*)
Dune gilia (*Gilia capitata* ssp. *chamissonis*)
San Francisco gumplant (*Grindelia hirsutula* var. *maritime*)
San Francisco campion (*Silene verecunda* ssp. *verecunda*)
San Francisco owl's clover (*Triphysaria floribunda*)
Federal and State Listed Plants
San Francisco lessingia *(Lessingia germanorum)*
Presidio manzanita (*Arctostaphylos hookeri* ssp. *ravenii*)
Presidio clarkia (*Clarkia franciscana*)
Marin dwarf flax (*Hesperolinon congestum*)
Federally Listed Plants
California seablite *(Suaeda californica)*
Federal Species of Local Concern
Pink sand-verbena (*Abronia umbellata* ssp. *umbellata*)
Coast rock cress (*Arabis blepharophylla*)
Nuttall's milk-vetch (*Astragalus nuttallii* var. *virgatus*)
Coast Indian paintbrush (*Castilleja affinis* ssp. *affinis*)
Salt marsh owl's clover (*Castilleja ambigua* ssp. *ambigua*)
California goosefoot (*Chenopodium californicum*)
Davy's clarkia (*Clarkia davyi*)
California croton (*Croton californicus*)
Skunkweed (*Navarretia squarrosa*)
Coast rein-orchid (*Piperia elegans*)
Pacific cordgrass (*Spartina foliosa*)
Dune tansy (*Tanacetum camphoratum*)
California triquetrella moss (*Triquetrella californica*)

Exhibit 3-87
Special Status Plants



Source: Environmental Science Associates, 2004; Parsons Brinckerhoff, 2004; National Park Service, 2004, 2005.
Notes: Location of Biological Resources are conceptual and not drawn to scale.

Currently, no federally or state endangered or threatened listed plant species are located near the Park Presidio Interchange. Lincoln Boulevard separates this non-native eucalyptus habitat from a downward sloping native plant serpentine area, which is located below the Crissy Field overlook. This native serpentine area primarily supports lizard tail, coyote brush, toyon, sticky monkeyflower, and California blackberry. San Francisco gumplant and coast rock cress are also present north of Lincoln Boulevard. Non-native species observed in the native serpentine area include cotoneaster, Monterey cypress, pampas grass, black acacia and iceplant. The non-native, invasive species French broom and cotoneaster are found below the aerial structure of Doyle Drive.

Federal or State Listed or Potentially Listed Plants

Five of the 28 special-status plants that are known to occur within the Presidio or have suitable habitat within the project study area or construction corridor are federally or state listed plants, or both. The five listed species are:

- San Francisco lessingia *(Lessingia germanorum);*
- California seablite *(Suaeda californica);*
- Presidio manzanita (*Arctostaphylos hookeri ssp. ravenii*);
- Presidio clarkia (*Clarkia franciscana*); and
- Marin dwarf flax (*Hesperolinon congestum*).

California Seablite is a Federally Listed Plant. The other four plants are both federally and state Listed.

San Francisco lessingia and California seablite occur at Crissy Marsh and are present in the project study area. None of the five federal or state listed plants are present in the construction corridor. The serpentine soil located in the northwestern portion of the project study area does not support Presidio manzanita, Presidio clarkia or Marin dwarf flax.

Temporary Impacts

Construction of the build alternatives may temporarily disturb plant species in the study area. The following presents a summary of these potential temporary impacts. No federal or state listed special-status plants are located within the construction corridor.

Alternative 1: No-Build Alternative

The No-Build Alternative would not affect existing plant communities.

Alternative 2: Replace and Widen, Alternative 5: Presidio Parkway, and Preferred Alternative: Refined Presidio Parkway

Soil runoff in the wet season during excavation and grading for the high-viaduct at the Park Presidio Interchange for all build alternatives, as well as construction of the Merchant Road Slip Ramp Option for the Presidio Parkway Alternative,

could indirectly affect federal special concern plant species and their habitat in the study area near the construction corridor.

Additionally, plant species that are of federal special concern located on the coastal bluffs adjacent to the construction corridor—coast rock cress, Franciscan thistle, San Francisco wallflower and San Francisco gumplant—could also be affected by runoff. These species are located on the downward north-facing slope approximately 91 meters (300 feet) north of the area of construction. San Francisco owl's clover is immediately south of the construction corridor in the Fort Scott area. San Francisco gumplant and skunkweed also both occur within the construction corridor.

By implementing measures such as soil stabilization controls and silt fencing, which would be mandated by the *Stormwater Pollution Prevention Plan* (SWPPP), the project would avoid causing indirect effects to plant species of concern. Additionally, plants would be fenced-off with orange fencing, which would designate the area as an Environmentally Sensitive Area (ESA).

Demolition, excavation, and grading during the dry season under the build alternatives would cause dust, which could temporarily cover the leaves of plant species of concern, thereby reducing the exchange of light and gas. Within the project study area, plants at Crissy Marsh, such as California seablite, would be particularly susceptible to the effects of dust. To minimize the effects of construction dust, the project would adhere to the basic dust control procedures specified by the Bay Area Air Quality Management District (BAAQMD) and the Caltrans special provision. This would ensure that dust emissions during the dry season would be minor and that impacts to special-status plant species would be minimal.

Permanent Impacts

The Doyle Drive Project will have no effect on special-status plant species within the construction area. No federal or state listed special-status plants are located within the construction area.

Alternative 1: No-Build

The No-Build Alternative would not affect existing plant communities.

Alternative 2: Replace and Widen

Permanent impacts resulting from Alternative 2 are the same for all build alternatives. Impacts are discussed below.

Alternative 5: Presidio Parkway

Permanent impacts resulting from Alternative 5 are the same for all build alternatives. Impacts are discussed below.

Preferred Alternative: Refined Presidio Parkway

Permanent impacts resulting from the Preferred Alternative are the same for all build alternatives. Impacts are discussed below.

Alternative 2: Replace and Widen, Alternative 5: Presidio Parkway, and Preferred Alternative: Refined Presidio Parkway

No permanent impacts to skunkweed and San Francisco gumplant are anticipated because these plant species could be re-introduced within or adjacent to their pre-disturbance areas. Both skunkweed and gumplant could respond well to seed gathering from other local populations and seeding within designated areas.

For all build alternatives, construction near Battery Blaney may result in skunkweed, a federal species of local concern, and San Francisco gumplant, a federal species of concern, being removed or disturbed. Skunkweed is located in the construction corridor next to Battery Blaney and will be affected by activities such as excavation and grading for lane widening, retrofitting and moving or installing piers as part of the Replace and Widen Alternative (including No-Detour and With Detour Options), and trenching and excavation for the battery tunnels for the Presidio Parkway Alternatives (including Diamond and Circle Drive Options) and the Preferred Alternative. The gumplant population north of Merchant Road on-ramp is also at risk, but both populations could be avoided as described below.

Much of the eastern area of the project study area is developed and paved, and provides no suitable habitat for special-status plant species. Therefore, the build alternatives will not affect special-status species in this area.

Given that the project will designate ESAs both before and during construction and implement avoidance and minimization measures, impacts to special-status plant species will be minimal.

Avoidance, Minimization, and/or Mitigation Measures

Avoidance, minimization, and mitigation measures for the Preferred Alternative are discussed below. Refer to the NES for further information on mitigating effects to sensitive habitat and special-status plant species, and temporarily disturbed sites.

Implement a General Biological Resource Monitoring Program

See a complete description of Monitoring Program in Section 3.4.1.

Implement a Plan for Special-Status Plant Avoidance/Mitigation and Revegetation of Temporarily Disturbed Upland Vegetation

All sensitive habitat and special-status plant species within or next to the construction corridor that are not temporarily or permanently affected by the project will be designated as ESAs. These areas will include habitats and species documented in the 2001 *Vegetation Management Plan* (VMP) and the current NPS

and the Trust Natural Resources GIS database. The ESAs will be off-limits to all construction activity and will be clearly marked on the project plans. To protect against direct and indirect construction impacts, the areas will be flagged before construction and fenced-off using materials such as construction orange fencing and silt-fencing. All fencing materials will be approved by the NPS and the Trust. ESAs will be monitored by the Biological Monitor during construction to ensure that these sites are avoided. Any vegetation slated for removal, such as trees, will be clearly marked and identified on construction drawings.

If avoiding special-status plant species is not feasible, federal or state species of concern habitat will be restored at a 1.5:1 ratio as described in the following section. Funding of Park agency projects will be required if federal or state species of concern restoration is impracticable.

Revegetation of Temporarily Disturbed Areas

Within the construction corridor, all natural areas disturbed temporarily because of project activities will be revegetated and restored to the appropriate native vegetation type in natural areas, or appropriate ornamental vegetation type in landscaped areas. Revegetation and restoration will be completed in accordance with the 2001 VMP and standard NPS and Trust restoration practices. The revegetation and restoration methods will include using locally native plant material, protecting and restoring soil conditions, irrigating, and controlling aggressive non-native species.

Major construction activities for the project will be phased over five years. Mitigation efforts will be initiated before, concurrent with, or immediately following construction of the project. Revegetation will occur as soon as practicable at those sites that will not be subsequently disturbed. Seed collection and propagation will occur from January to December before the year of planting. Sites disturbed before the planting effort will be treated immediately with: (1) a seed mixture and mulch using broadcast methods; or (2) hydroseed as approved by the Trust and NPS. No planting will occur until construction activities are completed in these areas. All terrestrial and aquatic revegetation efforts will be coordinated with and approved by the Trust and NPS natural resource staff. All terrestrial and aquatic revegetation materials, including seeding, mulching and hydroseeding, will be approved by the Trust and NPS natural resource staff.

The native plants used for revegetating may include coyote brush, coffeeberry, sticky monkeyflower, yellow bush lupine, toyon, San Francisco gumplant, skunkweed, California poppy, purple needlegrass, California brome, and blue wild rye. The plants used for revegetating landscape areas will be selected in consultation with the NPS and the Trust forester. Procedures will follow current Trust forestry practices.

Maintenance and Monitoring

The project proponent will maintain the mitigation site. Maintenance will include replacing plants, maintaining erosion control materials and irrigation systems, controlling weeds, and removing trash and other debris. Maintenance may include monitoring the site every 30 days for the first three months following planting and every 60 days thereafter during the first year of plant establishment. Plants will be checked for disease and pests. Non-native invasive plants will be removed in accordance with *Executive Order 13112*. Weed removal will occur during the monitoring period if deemed necessary.

Restored and revegetated sites will be monitored throughout the plant establishment period. At the end of each monitoring period the success of the restoration effort will be assessed against the restoration goals (e.g., at least 80 percent survival of plantings, 75 percent vegetative cover by desirable species, and a viable, self-sustaining plant community). The project proponent will monitor the mitigation site at the initiation of plant installation until the plants are successfully established and the performance criteria have been met, which is usually about six years following plant installation. The Trust and the NPS are expected to manage the revegetated areas after the performance criteria have been met, which will be agreed upon by all agencies.

3.4.4 Animal Species

This section describes the wildlife that lives within the study area and the potential effects of the Doyle Drive Project on these species. Wildlife includes common species and special-status species. Common species are considered habitat generalists because they do not depend on a specific habitat type or area; their populations are usually large, and they have high dispersal rates. Species that are rare or vulnerable to various causes of habitat loss or population decline are classified as special-status species. Special-status species may also be federal or state listed species. Listed species are included on the Federal or State list of threatened or endangered species, or both.

Regulatory Setting

Section 3.4.3 of this document discusses the regulatory agencies, policies, and laws that govern the protection of wildlife. In addition, the *Migratory Bird Treaty Act* protects migratory birds in the Presidio. This treaty with Canada, Mexico and Japan makes it unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, or kill migratory birds. The law applies to the removal of nests (such as swallow nests on bridges).

Affected Environment

The project study area has a rich biological environment, which includes special-status animal species and their habitats. Specific or multiple native plant communities and non-native introduced plant communities provide habitat for a variety of common animal species in the Presidio.

However, within the project study area, the construction corridor is a disturbed area that contains remnant native vegetation and is conducive to non-native plant growth, in addition to the non-native forest landscape that surrounds it. Because of the highly disturbed qualities of the corridor, habitat value is not considered high, although all habitat can be considered important in the highly urbanized San Francisco landscape. Smaller animals such as small mammals, reptiles, invertebrates and birds use this habitat primarily for foraging and movement purposes (primarily birds). **Exhibit 3-88,** illustrates the general location of non-native and ornamental wildlife habitat.

The following is a summary of animal species that were actually observed or are expected to use each natural community. **Exhibit 3-89**[39], provides a listing of common birds in the Presidio.

Common Species

Birds

A variety of common avian species are attracted to the natural plant communities, non-native habitats and landscaped habitats in the Presidio and use them for perching, nesting, and foraging habitat.

Mammals

Mammals that are likely to be in the Presidio or were observed are presented in **Exhibit 3-90**.

Amphibians

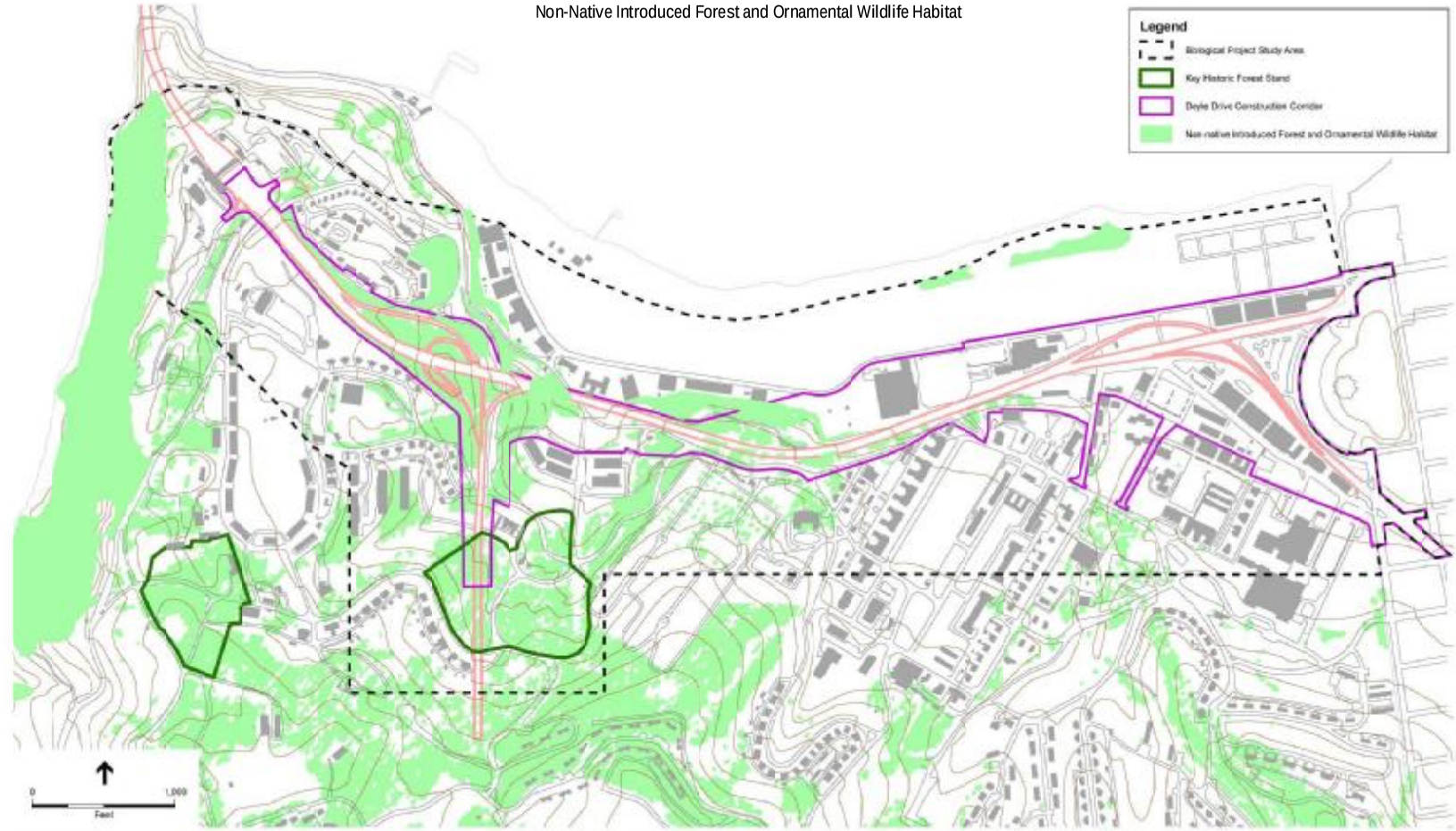
Riparian scrub habitats are an important breeding habitat for amphibians. The physical structure of arroyo willow trees provides a protected travel corridor between aquatic and upland habitat types.

Reptiles

The sandy soils of northern coastal scrub habitat provide burrowing habitat for reptiles, such as the western fence lizard. These reptiles also use grassland habitat for feeding on invertebrates, which are found within and underneath grass tussocks.

[39] Exhibit 3-89 and Exhibit 3-90 associate some species with non-native vegetation, because they are frequently observed there. These species use native vegetation as well. In addition, other species listed in these exhibits can be found in other habitats.

Exhibit 3-88
Non-Native Introduced Forest and Ornamental Wildlife Habitat



Source: Environmental Science Associates, 2004; Parsons Brinckerhoff, 2004; National Park Service, 2001; The Presidio Trust, 2001, 2005.

Exhibit 3-89
Common Bird Species in the Presidio

COMMON NAME	SCIENTIFIC NAME
American robin	*Turdus migratorius*
Anna's hummingbird	*Calypte anna*
black phoebe	*Sayornis nigricans*
black-headed grosbeak	*Pheucticus melanocephalus*
black-throated gray warblers	*Dendroica nigrescens*
Brewer's blackbird	*Euphagus cyanocephalus*
California quail	*Callipepla californica*
California towhee	*Pipilo crissalis*
Caspian tern	*Sterna caspia*
chestnut-backed chickadees	*Parus rufescens*
chipping sparrows	*Spizella passerina*
common raven	*Corvus corax*
European starling	*Sturnus vulgaris*
Forster's tern	*Sterna forsteri*
great egret	*Ardea alba*
Heermann's gull	*Larus heermanni*
hummingbird	*Selasphorus spp.*
Hutton's vireo	*Vireo huttoni*
kinglet	*Regulus spp.*
lesser goldfinch	*Carduelis psaltria*
mallard	*Anas platyrhynchos*
marsh wren	*Cistothorus palustris*
mourning dove	*Zenaida macroura*
northern harrier	*Circus cyaneus*
northern mockingbird	*Mimus polyglottos*
northern shoveler	*Anas clypeata*
orioles	*Icterus spp.*
pygmy nuthatches	*Sitta pygmaea*
rock dove	*Columba livia*
sanderling	*Calidris alba*
scrub jay	*Aphelocoma californica*
snowy egret	*Egretta thula*
song sparrow	*Melospiza melodia*
spotted towhee	*Pipilo maculatus*
warblers	*Dendroica spp.*
western sandpiper	*Calidris mauri*
willet	*Catoptrophorus semipalmatus*
Wilson's warbler	*Wilsonia pusilla*
wrentit	*Chamaea fasciata*
yellowlegs	*Tringa sp.*

Exhibit 3-90
Common Mammals Observed or Likely to be in the Presidio

COMMON NAME	SCIENTIFIC NAME
Botta's pocket gopher	*Thomomys bottae*
California ground squirrel	*Spermophilus beecheyi*
California vole	*Microtus californicus*
Coyote	*Canis latrans*
deer mouse	*Peromyscus maniculatus*
fox squirrel	*Sciurus niger*
Grey fox	*Urocyon cinereoargenteus*
Norway rat	*Rattus norvegicus*
raccoon	*Procyon lotor*
striped skunk	*Mephitis mephitis*
western harvest mouse	*Reithrodontomys megalotis*

Special-Status Animal Species

Eleven special-status species may occur in the project study area. None of these species are listed as threatened or endangered. These are:

- Tree lupine moth (*Grapholita edwardsiana*);
- California yellow warbler (*Dendroica petechia brewsteri*);
- Allen's hummingbird (*Selasphorus sasin*);
- Red-tailed hawk (*Buteo jamaicensis*);
- Red-shouldered hawk (*Buteo lineatus*);
- Cooper's hawk (*Accipiter cooperi*);
- Great horned owl (*Bubo virginianus*);
- American kestrel (*Falco sparverius*);
- Western screech-owl (*Otus kennecottii*);
- San Francisco forktail damselfly (*Ischnura gemina*); and
- Yuma myotis bat (*Myotis yumanensis*).

The tree lupine moth is a federal special concern species. Coastal sand dunes are typically associated with the moth's larval host plant, yellow bush lupine (*Lupinus arboreus*). The tree lupine moth is found at several locations south of the Golden Gate Bridge.

The California yellow warbler breeds between April and August with a peak in June and uses riparian deciduous habitats throughout California with the exception of deserts and the Central Valley. Yellow warblers have been observed at Crissy Field.

Allen's hummingbird frequents brush and woodlands and is known to breed at the Presidio.

Red-tailed hawk, red-shouldered hawk, Cooper's hawk, American kestrel, great-horned owl, and western screech owl are protected in California under *California Fish & Game Code* §3503.5. All of these species nest in either dead or living large trees, including conifers and eucalyptus, located in forest or woodland habitat. All of these species have been observed, and are known or suspected to nest, in the Presidio, and all may potentially use trees within the construction corridor for nesting.

According to past surveys, suitable habitat for San Francisco forktail damselfly is sparse within the project study area. Potential habitat for this damselfly species is present in Tennessee Hollow and in a seep behind Building 926. San Francisco forktail damselfly has been observed along Marina Drive outside the general study area and construction corridor.

In April 2002, the project study area was surveyed for potential bat roosts. No bats were observed and no evidence of use by bats (fecal matter or staining) was observed. Some modest structural habitat is available, yet the Yuma myotis bat was not observed in the general study area.

A number of special-status birds have been observed at the Presidio. The majority of these are rare to uncommon seasonal migrants that do not breed at the Presidio or in the state. For example, the double crested-cormorant (*Phalacrocorax auritus*) is a common non-breeding resident. The California gull (*Larus californicus*) is a common visitor to the Presidio but does not breed there. Ferruginous hawk (*Buteo regalis*), Vaux's swift (*Chaetura vauxi*), harlequin duck (*Histrionicus histrionicus*), and long-billed curlew (*Numenius americanus*) are among the uncommon seasonal migrants that also do not breed at the Presidio.

Federal or State Listed or Potentially Listed Animals

No species listed as threatened or endangered are known to breed in the Presidio. The current USFWS list of threatened, endangered and species of concern is located in **Appendix H.** The listed species discussed in this section are known either to occur in the Presidio or have suitable habitat in the Presidio.

Invertebrates

Federal or state listed invertebrates include three species, Bay checkerspot butterfly (*Euphydryas editha bayensis*), Mission blue butterfly (*Icaricia icarioides missionensis*), and San Bruno elfin butterfly (*Incisalia mossii bayensis*). Bay checkerspot butterfly inhabits native grasslands in the San Francisco Bay area on serpentine soils with its associated host plants *Plantago erecta*, *Castilleja densiflora* and *C. exserta.* Only one record documents the occurrence of this species at Twin Peaks located outside of the Presidio. Bay checkerspot has not been detected at the Presidio in previous studies. The project study area does not contain any host plants that support this species.

San Bruno elfin butterfly occurs in coastal scrub and bunchgrass grasslands with its larval food plant *Sedum spathulifolium*. All known populations are from San Mateo County, and this species has not been detected near the project study area during past surveys.

Mission blue butterfly occurs in grassland and coastal scrub with its larval food plants (*Lupinus albifrons*, *L. variicolor* and *L. formosus*). This species is primarily known from San Mateo County, but occurs at Twin Peaks and at the north end of Golden Gate Bridge in Marin County. Mission blue butterfly has not been recently observed in the Presidio. The project study area does not contain any host plants to support this species.

Amphibians

California red-legged frog (*Rana aurora draytonii*) requires ponds and habitat elements such as upland refugia, which are not present within the project study area or construction corridor.

The most recent document that evaluates suitable habitat for the California red-legged frog is the *2002 U.S. Fish and Wildlife Service (USFWS) Recovery Plan* for the species. This document describes the frog as breeding in a variety of aquatic habitats, from deep pools to marshes and sag ponds, and in shallow sections of streams with and without riparian vegetation. Because larvae typically metamorphose between July and September, depressions incapable of holding water into this period would be unlikely to support successful reproduction. Moreover, because egg masses (deposited between November and April) need to be laid in water, ponding of a depth sufficient to float egg masses must be present during this period to even attract frogs to breed at the site.

The wetland sites within and next to the limits of the construction corridor are not the result of ponded water at any time of year. The largest and most diverse sites are on a hillside, which allows some water to accumulate at the bottom of the slope, but a concrete drainage channel conducts this water away. Where the channel is absent, water is briefly held but not collected. A strip of saturated soil supports a few cattails (*Typha sp.*) but does not have a defined bank or bed.

Birds

Federal and/or state listed bird species include marbled murrelet (*Brachyramphus marmoratus*), western snowy plover (*Charadrius alexandrinus*), little willow flycatcher (*Empidonax traillii brewsteri*), willow flycatcher (*Empidonax traillii extimus*), American peregrine falcon (*Falco peregrinus anatum*), bald eagle (*Haliaeetus leucocephalus*), brown pelican (*Pelecanus occidentalis californicus*), and California least tern (*Sterna antillarum browni*).

Peregrine falcon is an uncommon non-breeding resident of the Presidio. Brown pelicans are regular visitors along the shores of the Presidio, but it does not nest in the Presidio. Western snowy plover is a non-breeding overwintering resident of the shores of the Presidio. The other species are rare seasonal visitors during the non-breeding season.

Temporary Impacts

Common Wildlife

Construction of the project may disturb or directly cause the mortality of common wildlife species, as well as habitat loss and degradation. Causes of mortality may include road kills and destruction of burrows and nests during the construction phase of the project. Construction noise may reduce habitat quality, causing the displacement of some animals. Such habitat losses may be permanent for certain burrowing mammals, whose populations may be eliminated. Impacts to common wildlife species are considered minor.

Night construction will require lighting, which adds another type of impact beyond the effects of noise discussed above/elsewhere in this FEIS/R. There are current sources of night lighting in the project area and to some degree it is part of the existing environment. However, construction lighting is expected to be considerably brighter. This raises the possibility of light as an attractant, especially for migratory birds, a phenomenon observed by Reed et al. (1985). Although this will be an adverse impact, an assessment of the degree of impact will be difficult to determine. The same study found that shielding lights to prevent upward radiation decreased attraction by nearly 40 percent. The NPS/Trust have made a determination that the effects may be potentially considerable; therefore the reduction of upward radiation by the best available and feasible means (for example, downward-pointing lights, side shields and visors), as agreed upon by the NPS and Trust, will be used along Doyle Drive, and will be considered part of the project. In order to insure the use of the best available current data, a *Night Lighting Plan* will be developed as part of final mitigation design. Other methods of impact reduction (large screens, for example) will have their own impact on night flying birds and bats and will not be used.

Wildlife Corridor

Activities such as grading and trenching for all build alternatives will temporarily disrupt a segment of a primary corridor used by urban wildlife. This corridor is in the northern portion of the Presidio between the Pacific Ocean and coastal bluffs in the west and the non-native introduced forest in the east. Smaller animals such as small mammals, reptiles, invertebrates, and primarily birds use this habitat and corridor mainly for foraging and movement purposes. Construction in this corridor may further restrict wildlife movement, which is already impeded by the barrier of Doyle Drive and considerable habitat fragmentation and degradation. Passage under raised structures and causeways will be difficult for some bird species, and wildlife movement along a north-south axis might be affected. This impact is considered adverse, but minor, and localized in the Presidio. For further discussions on the wildlife corridor refer to the *Doyle Drive Project Wetland and Wildlife Corridor Mitigation Prospectus* in **Appendix K.**

Special-Status Invertebrate Species

Dust generated by construction activities may indirectly affect plant vigor and survival, and cause plants to become unsuitable for perching, metamorphosing nymphs (immature stage), or egg-laying, or unpalatable for foraging invertebrates. Effects on special-status invertebrate species due to dust emissions during the dry season will be minor because dust control procedures will be implemented as part of the project.

The habitat for the tree lupine moth will be affected by the construction of all build alternatives, which will require clearing the larval host plant, yellow bush lupine.

Removing wetland emergent vegetation, such as the freshwater wetland (map symbol W-8), within the construction corridor may result in the mortality of eggs and larvae of the San Francisco forktail damselfly. However, none of the build alternatives will directly affect W-8. The effect is minor for all build alternatives.

Special-Status Avian Species

Construction of all build alternatives may result in the mortality or reduced productivity of nesting special-status raptors and other avian species. Within and next to the construction corridor, the yellow warbler, for example, is protected against impacts to suitable roosting and nesting habitat during the breeding season under *California Fish and Game Codes 3503* and *3503.5* and the *Migratory Bird Treaty Act*. Bird nest surveys will be conducted immediately before construction to assess the actual number of bird nests that may be affected by the proposed project and formulate appropriate mitigation measures.

Construction for the build alternatives includes grading and tree removal for lane widening, tunnel cutting and trenching, grading and moving or installing piers, and creating staging areas and haul roads. These activities will affect wildlife habitat created by the non-native introduced tree forest and the arroyo willow wetland areas north of the cemetery.

Mitigation measures incorporated into the project for all build alternatives will ensure that the loss of birds, their young, or active nests will not be extensive.

Raptors nesting or foraging near ongoing disturbances perceived as non-threatening are more prepared for human intrusion than raptors inhabiting more remote areas. This suggests that the indirect effects of construction activity within the construction corridor will be negligible, since ambient noise levels from moving vehicles and humans in the project study area are already high. Construction noise within the construction corridor will be indistinguishable from what occurs at present. This conclusion is not intended to suggest that the pattern or intensity of construction activity is exactly analogous to ambient disturbance, but that the effect of such disturbance would not be measurable. Therefore, the effect on avian species is minor for all build alternatives.

The exception will be the effects of conventional pile driving, which can cause concussive noises in excess of 100 dBA. In general, animals exposed to such sounds at first instance can be expected to display a startle reaction that might cause, for example, a bird to briefly or permanently abandon a nest, causing some increase in the exposure of the eggs to heating, cooling, or predation. These reactions are similar to those caused by other disturbances such as cars backfiring, a sonic boom, or humans approaching the nest site. The impact of pile driving on birds is considered adverse for all build alternatives.

Federal or State Listed Special-Status Species

No state or federal threatened or endangered animal species will be affected by the Doyle Drive Project.

Permanent Impacts

The Doyle Drive Project will have no effect on any state or federal listed animal species or designated critical habitat. The long-term impact of all build alternatives is the loss of minor amounts of wildlife habitat. The Doyle Drive footprint created by the build alternatives will include:

- wider lanes (all build alternatives);
- an expanded Presidio Parkway Interchange and Veterans Boulevard (Presidio Parkway Alternative Diamond and Circle Drive); and
- an expanded Presidio Parkway Interchange and Veterans Boulevard (Preferred Alternative).

The greatest impact of all build alternatives is the permanent removal or damage of non-native vegetation. The area of impact to non-native introduced forest and ornamental wildlife habitat within the construction corridor varies for each alternative: 2.37 hectares (5.86 acres) for Alternative 2, No Detour Option; 2.57 hectares (6.35 acres) for Alternative 2, With Detour Option; 4.61 hectares (11.39 acres) for the Preferred Alternative; 5.07 hectares (12.54 acres) for Alternative 5 (Diamond, Circle, Hook Merchant Options) Diamond/Circle/Hook/Merchant.

The project will require removing existing structures within the construction corridor, which may affect bat habitat. During the habitat assessment for the project, bats were not observed however, habitat is available at: (a) the wood framed, composite-shingled single-level building (Building 230) scheduled for removal; and (b) portions of the existing elevated roadway, which contains expansion joints that provide possible sites for day and night roosting.

Avoidance, Minimization, and/or Mitigation Measures

For the Preferred Alternative, the following measures to avoid and minimize impacts (including effects of pile-driving) to wildlife will be implemented. Refer to the NES for further information on wildlife mitigation measures.

Implement a General Biological Resource Monitoring Program

See a complete description of this measure in Section 3.4.1. In addition, a *Night Lighting Plan* will be developed as part of final mitigation design.

Implement a Special-Status Bird Avoidance/Mitigation Plan

The goal of bird mitigation is to avoid the loss of active bird nests, from the onset of reproductive behavior through the fledging of young. Periodic surveys will be conducted before and during construction for raptors and other native avian species. Mitigation actions are situation-specific, and the need for and type of action are determined by qualified biologists as the work is taking place. In compliance with the *Federal Migratory Bird Treaty Act* and *California State Fish and Game Code*, such actions will include either: (1) restricting project construction to between September 1 through December 31; or (2) if it is not practical and feasible that a construction window, which restricts project construction to between September 1 through December 31, can be incorporated as part of the proposed project, then minimize impacts to nesting birds by designating buffer zones 90 to 150 meters (300 to 500 feet) around nests identified by the surveying biologist. Also, vegetation will be removed (to the least extent practicable) during the non-nesting season (September 1 through December 31) to reduce the possibility that nests will occur within the construction corridor. Refer to Cultural Resources Section and Noise and Vibration Section for construction methods to be used to reduce noise and vibration effects.

Although it is not really a part of the mitigation measures for the effects of construction, the final restoration planting of Doyle Drive will avoid using plant species along or on the median of the roadway which will attract birds. The purpose of this is to reduce potential for vehicle-related bird mortality. Plants will not include seed or berry-producing genera such as *Acacia, Alnus, Cornus, Heteromeles, Prunus* or *Ribes*.

Implement a Special-Status Bat Avoidance/Mitigation Plan

To protect breeding bats at the Doyle Drive Project site, pre-construction surveys and avoidance measures will be implemented. Pre-construction surveys for breeding or roosting bat species, including Yuma myotis bat, are proposed in the event that bats occupy buildings or structures during the year preceding actual demolition and construction.

Implement Best Management Practices (BMPs) to Minimize Impacts on Invertebrates

The overall mitigation goal is to avoid and minimize temporary construction related impacts and long-term project impacts to natural communities. In regard to temporary construction related impacts, BMPs for construction that are summarized above and identified in the NES will be incorporated as part of the proposed project. Additionally, habitat for special-status invertebrates will be restored. No additional measures are proposed.

3.4.5 Invasive Species

This section describes plant and animal species within the project study area that are considered invasive species.

Regulatory Setting

National Park Service (NPS) and Trust policies regarding the protection of native plant communities are described in Section 3.4.1. In addition, *Executive Order 13112*, issued in 1999, requires federal agencies to combat the introduction or spread of invasive species in the United States. The Order defines invasive species as "any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem whose introduction does or is likely to cause economic or environmental harm or harm to human health."

The FHWA guidance, issued on August 10, 1999, directs the use of the state's noxious weed list to define the invasive plants that must be considered as part of the *National Environmental Policy Act* (NEPA) analysis for a proposed project.

Affected Environment

Disturbance of northern coastal scrub within the construction corridor is considered a combination of both human and natural events. It is very open and is subject to eroding soils as shown by existing erosion control mats in the sandy hills beneath Doyle Drive. Invasive plant species typically colonize open and disturbed ground and can indicate a high level of disturbance (historical or ongoing).

The majority of the non-native introduced forest (understory scrub) and central coast arroyo willow scrub are highly disturbed, indicated by the presence of certain invasive plant species (e.g., cape ivy [*Delaria odorata*], English ivy [*Hedera helix*], and cotoneaster [*Cotoneaster* sp.]). Cape ivy is also present approximately 30 meters (100 feet) north of the Doyle Drive construction corridor, along with wild radish (*Raphanus sativus*), a moderately invasive species, which occurs on the northern coastal bluffs. French broom (*Genista monspessulana*) occurs below the aerial structure of Doyle Drive. Invasive species are present in willow riparian habitat as well.

Temporary Impacts

Temporary disturbances resulting from construction activities may affect the distribution of invasive plant species in the study area.

Permanent Impacts

Invasive plant and animal species have evolved to reproduce in high numbers and use an environmental niche or ecosystem. Permanent impacts will vary, depending on the type of species. It is likely that various weedy, invasive plants will establish along portions of the Doyle Drive alignment even with judicious pre- and post-construction management. Under certain circumstances, invasive

species can be totally eradicated from specific areas. More often, the control or management of invasive species is an ongoing, long-term practice.

Avoidance, Minimization, and/or Mitigation Measures

Avoidance and minimization measures for the Preferred Alternative will be included in the project to address invasive species.

Implement Best Management Practices to Limit the Spread of Invasive Species

The project will comply with *Executive Order 13112*, and subsequent guidance from the FHWA. Erosion control and landscaping included in the construction of the project will not use species listed as invasive. In areas of particular sensitivity, extra precautions will be taken if invasive species are found in or adjacent to the construction areas. Precautions will include: inspecting and cleaning construction equipment; implementing eradication strategies should an invasion occur; and discouraging colonization of invasive, non-native species by stabilizing disturbed soil areas affected by construction areas as soon as they are completed.

Additionally, the project proponent will make available $10,000 annually, for up to five years, to fund projects controlling or removing non-native vegetation throughout the Presidio. Application for the funds may be made to the proponent either by the Trust or the NPS, depending on the location of the plant population (i.e., under the jurisdiction of the Trust or NPS).