Chapter 4
Impact Assessment and Level of Take

4.1 Introduction and Approach

This chapter addresses the effects of the covered activities described in Chapter 2 *Land Use and Covered Activities* on covered species and natural communities. Direct impacts are assessed quantitatively; indirect impacts are assessed qualitatively. The cumulative effects of projects in or near the study area and impacts on critical habitat are also analyzed.

The approach to analyzing impacts was by necessity a programmatic one. Because the Plan is large in geographic scope, broad in the range of activities covered, and long in terms of the duration, the impact assessment represents approximate impacts rather than precise numbers. Therefore, the acres of impacts presented in this chapter represent total impacts allowable under the Plan. Fees will be paid, in part, based on actual impacts to land cover types as determined during Plan implementation.

The impact analysis was based on the seven major categories of covered activities described in Chapter 2 and listed below.

- Urban Development.
- In-stream Capital Projects.
- In-stream Operations and Maintenance.
- Rural Capital Projects.
- Rural Operations and Maintenance.
- Rural Development.
- Conservation Strategy Implementation.

4.2 Definitions

The terms below are defined for the purposes of this Plan.

Impacts are those actions affecting biological resources, specifically undeveloped land cover types and covered species, in the permit area. Impacts can be direct or indirect; they can also be cumulative.

Direct impacts are defined as activities or projects that remove or alter land cover types, or covered species habitat, populations, or occurrences (or portions of thereof). Direct impacts are caused by the project and occur at the time and place of project implementation (e.g., ground disturbance, inundation). Direct impacts can be either permanent or temporary (see definitions of permanent and temporary impacts immediately below).

Permanent impacts are direct impacts that permanently remove or alter a land cover, or that affect a land cover for more than one year during covered activity implementation and/or more than one year after completion of the covered activity (e.g., creating a new road through grassland). Permanent impacts also include indirect impacts to wetlands that result in a permanent (i.e., more than one year after completion of the covered activity) change to wetland functions (e.g., development around a wetland that reduces the surface water supply to a wetland that subsequently results in a reduction in the size of the wetland). Impacts that result in reduction of long-term viability of a plant occurrence are also considered permanent.

Temporary impacts are direct impacts that alter land cover for less than one year and that allow the disturbed area to recover to pre-project or ecologically improved[1] conditions within one year (e.g., prescribed burning, construction staging areas) of completing construction. For the purposes of this Plan, all impacts associated with covered activities that have a duration exceeding one year or that take more than one year to restore immediately following construction will be considered permanent.

Indirect impacts are defined by USFWS as "those that are caused by the proposed action and are later in time, but are still reasonably certain to occur" (50 CFR 402.02). Indirect impacts in the context of this Plan also include those impacts that occur at the time of the proposed action but beyond the footprint of a project or activity (i.e., beyond the area of land cover disturbance). While more difficult to detect and track, indirect impacts can undermine species viability or habitat quality, especially if multiple indirect or direct impacts work cumulatively to impair the species or to degrade the habitat. Indirect effects that would result from activities permitted by this Plan are listed in **Table 4-1**. This table summarizes the major categories of indirect impacts that could affect each covered species.

Cumulative impacts result from the proposed actions' incremental impact when viewed together with past, present, and reasonably foreseeable future actions. Cumulative impacts are defined under both the ESA and NEPA. HCPs do not require a discussion of cumulative effects as analyzed under NEPA. However, as stated in the HCP handbook, "the applicant should help ensure that those considerations required of the Services by Section 7 have been addressed in the HCP" (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1996:3–15). Accordingly, the Plan addresses the cumulative effects of public or private activities that could result from individually minor but collectively

[1] *Ecologically improved* means that the site functions ecologically better than the functions present on the site prior to ground disturbance.

significant actions that take place over time. Cumulative effects of all projects with a federal nexus will be analyzed under NEPA and will not be addressed in the Plan in accordance with the ESA regulatory guidelines.

The following section discusses specific impact mechanisms for each of the major categories of covered activities.

4.3 Impact Mechanisms

In the following discussion, impact mechanisms are grouped for the purposes of analysis and in accordance with the description of covered activities presented in Chapter 2. Unlike Chapter 2, which provides details on the activities themselves, this section provides a description of how these groups of covered activities affect land cover and habitat for covered species. These descriptions provide an overview of the direct and indirect effects that are likely to result from the categories of covered activities. Impact estimates by acres of land cover affected or miles of stream are discussed in Section 4.5 *Effects on Natural Communities/Land Cover* and Section 4.6 *Effects on Covered Species*. Conditions on covered activities that will reduce the impacts described below are presented in Chapter 6 *Conditions on Covered Activities and Application Process*. Avoidance and minimization measures in this Plan (Chapter 6) are designed to minimize injury or death of all covered species during construction and to avoid injury or death of San Joaquin kit fox, western burrowing owl, tricolored blackbird, and least Bell's vireo.

4.3.1 Urban Development

Urban development is one of the primary impact mechanisms considered in this Plan, accounting for approximately 60% of all impacts assessed in this Plan. The major impact of new urban development is conversion from undeveloped to developed land cover types. In addition to the net loss of undeveloped land cover in the permit area, such conversion may further isolate remaining natural habitat within the planning limit of urban growth, rendering it less suitable or unsuitable for covered species. Riparian and in-stream impacts may also occur as a result of urban development; however, these impacts are described and assessed under the categories of In-Stream Capital Projects and In-Stream Operations and Maintenance Activities.

Urban development is assumed to result in permanent direct impacts because it is assumed that complete conversion of natural land cover types would occur at project sites in urban areas. Accordingly, no temporary direct impacts on land cover are expected to result from this impact type within the planning limits of urban growth.

Urban development will have indirect effects on biological resources in protected open space within and outside the planning limits of urban growth, including the Reserve System. One significant indirect impact is nitrogen deposition on the

local serpentine grassland community resulting from increased traffic associated with new development. The predicted increase in local and regional vehicular traffic may also result in increased disturbance of covered species in the permit area and loss of covered species from vehicular collisions. An assessment of the impact of nitrogen deposition on natural communities and covered species is presented in Section 4.5.2 *Indirect Effects*.

By increasing the extent of impermeable surfaces, urban development contributes to increased runoff, especially during storm events. Such increases can result in greater levels of scour and/or incision of local creeks, increased sediment loads, alterations of downstream hydrology, and decreased groundwater recharge. Also, addition of new development may increase the amount of pollutants such as grease, oil, and lawn pesticides that can be transported from residences during wet weather. An increase in the quantity of pollutants reaching local creeks through higher runoff may affect the biological and physical characteristics of aquatic habitats. Pollutants can also enter groundwater when development occurs over percolation zones in streams, such as in Coyote Valley. This can affect drinking water quality. In addition, if shallow, "perched" water tables occur, this groundwater can be discharged to surface water as part of summer stream flow (such as in the lower Guadalupe River or lower Uvas Creek). However, design guidelines (see Chapter 6) require construction in urban and rural areas to manage runoff so that existing runoff conditions (i.e., rate of runoff) are maintained and to reduce pollutants entering local streams. High runoff temperature may also result in an increase of in-stream water temperatures when runoff enters local streams. Increased impermeable surfaces may also inhibit natural percolation of stormwater into groundwater basins which may lead to a drawdown in ground water levels. Changes from reduced percolation of runoff are expected to be relatively minor as SCVWD operates several groundwater recharge basins and also extracts water to support local water supplies.

Indirect beneficial impacts to local streams may occur as recycled water is increasingly utilized for urban uses (e.g., landscaping) in place of surface and groundwater. This may result in temporary reductions of in-stream withdrawals, although by the end of the permit term it is likely that all water resources (local, imported, and recycled) will be fully utilized. Increased discharges from water treatment plants may also help to supplement in-stream flows from reservoir releases to support aquatic covered species.

Several other indirect impacts may be expected as urban development increases the human population of the permit area. General use of the study area, including units of the Reserve System where certain types of recreation are allowed, will increase. Increased human use within the permit area may have adverse effects on biological resources in the form of collection and harassment of native species, introduction or spread of diseases, competition from or predation by nonnative species, trash dumping, higher noise levels, increased light pollution at night, spills of hazardous materials, water quality degradation from road runoff, and increased frequency of wildfire ignitions (**Table 4-1**). Incidental take associated with legal recreational uses is only extended to the Local Partners for the indirect effects of allowable recreational uses (take caused by actions of

individual recreationalists is not covered). The level of incidental take of recreational use is assumed to be too minimal to measure and thus is not accounted for in the impact assumptions described below in Section 4.4 *Impact Assessment Methods*. Recreational impacts are greatly minimized by Condition 9, described in Chapter 6, *Conditions on Covered Activities and Application Process*. Impacts are mitigated through the conservation strategy as a complete package that includes conservation associated with contributions to recovery of covered species.

Human population growth can exacerbate the introduction or spread of nonnative species. Nonnative aquatic wildlife is known to have serious impacts on native amphibian populations. For example, aquarium species released in the wild may introduce new diseases to wild amphibian or fish populations. Feral cats pose a serious threat to native birds, especially those that nest on or near the ground, as well as to native reptiles. They can also cause a shift in small mammal populations from native to nonnative species. Ornamental plants and native cultivars[2] may spread to adjacent protected areas and outcompete and displace native species; they can also hybridize (interbreed) with local native plants and thereby disrupt the genetics of the native population. Such hybridization can cause a number of problems for the native plant population, including poor growth and reproduction.

The final locations of Plan reserves are not known, but some reserves are expected to be near or adjacent to urban areas. The Plan conservation strategy includes measures to minimize some of the foregoing indirect effects through actions such as development of design guidelines that reduce impacts from development on natural lands. Additionally, outreach programs for the public, especially landowners, renters, and developers, will educate the local populace on these threats and on ways that they can help minimize them. Despite these measures, it is assumed that indirect effects will occur. Most of the indirect impacts of urban development will occur along or near the boundary between new urban development and new reserves. Because the urban areas are relatively consolidated, this boundary zone will be a comparatively small portion of the total Reserve System. **Table 4-1** lists the major categories of these indirect impacts; these impacts may be particularly pronounced at the urban-wildland interface.

4.3.2 In-Stream Capital Projects

Several types of projects will have impacts on in-stream resources. These are discussed below. While some trail construction will occur across streams or in riparian areas, the majority of trails will be designed to avoid these sensitive areas. Accordingly, impact mechanisms for trail construction are discussed in Section 4.3.4 *Rural Capital Projects.*

[2] Native cultivars are plants cultivated from native species and bred for specific characteristics; they have lost the original genetic diversity of the species or population from which they were derived.

Flood Protection Capital Projects

Final designs of flood protection projects described in Chapter 2 are not known at this time. However, conceptual designs have been developed for several projects including Berryessa, mid-Coyote, and upper Penitencia. In addition, SCVWD has completed flood protection projects on the lower Guadalupe River (Santa Clara Valley Water District 2002), the Guadalupe River in downtown San José (Santa Clara Valley Water District 2001), and the upper Guadalupe River (Santa Clara Valley Water District 1999a, 1999b). Conceptual project elements, as well as completed project designs, were used to inform the impact mechanisms described below.

In accordance with SCVWD's Clean, Safe Creeks and Flood Protection Plan, the projects identified for coverage under this Plan include design elements to preserve sensitive natural communities using a mix of setback levees and floodwalls, minimize the use of concrete, protect riparian and wetland environments with revegetation mitigation projects, protect water quality and limit turbidity using sediment control structures, and provide recreational access.

Flood protection projects in the study area are implemented by SCVWD. SCVWD seeks to balance flood control requirements with the habitat needs of riverine and riparian species. This goal is reflected and supported by the Clean, Safe Creeks and Flood Protection Plan, described in Chapter 2, which is focused on four outcomes for projects in local streams: providing flood protection, protecting water quality, enhancing and restoring in-stream and riparian ecosystems, and providing recreational access. Whenever possible (e.g., undeveloped land is available along the outside of the existing levee) and economically feasible (i.e., funding for implementing a large levee reconstruction can be secured), environmentally sensitive design treatments such as levee setbacks and naturalized structural improvements are used instead of channelizing streams in concrete. An example of such an approach is proposed for Berryessa Creek, where banks of the existing channel will be set back and an in-channel floodplain developed to allow the creek more "elbow room" to allow meandering and natural stream hydraulics. Such methods help offset impacts from increased runoff (described above) by reducing flow velocity and increasing roughness, especially during storm events.

However, flood protection projects will sometimes result in some permanent impacts associated with the use of hardscape where naturalized alternatives are not feasible, as well as some temporary impacts associated with construction. The type and severity of both permanent and temporary impacts will vary considerably depending on the scope of specific projects.

Permanent and temporary impacts, both direct and indirect, are expected to occur during implementation of flood protection projects. Riverine and riparian habitat may be permanently affected both during and after construction. Review of the upper and downtown Guadalupe River EIRs reveals a 27% and 50% total impact (i.e., both permanent and temporary), respectively, on riparian and in-stream habitat during project construction (Santa Clara Valley Water District 1999a, 1999b, 2001). Based on these past impact evaluations, and input from SCVWD

engineers regarding current conceptual plans for future projects, some permanent loss of land cover is expected during implementation of covered activities. These permanent losses to land cover types excluding streams are anticipated to average 20% of the total project footprint. Temporary impacts to land cover are anticipated to be approximately an additional 20% of the total project footprint. Permanent impacts will be assessed for loss of natural land cover types that are impacted longer than the time allowed for temporary impacts (defined in Section 4.2 *Definitions*). However, site design for flood protection projects often includes elements to replace and/or improve habitat on site as part of SCVWD's goal of balancing flood protection and habitat value. SCVWD may receive restoration credit for such actions as described in Chapter 9, Section 9.4.1 *Habitat Plan Fees* subheading *Aquatic Restoration or Creation Provided in Lieu of Wetland Fee*. Permanent land cover loss may be attributed to installation of hardscape on the channel bed and banks; installation of levee walls, access roads, and outlet and inlet structures; off-channel detention basins; maintenance road construction; and increased recreational use. Impacts associated with off-channel detention basins fall outside of in-stream areas but within the planning limit of urban growth and as such, impacts are assumed as part of the urban development analysis. Access roads associated with flood protection projects may also be designed for use as recreational trails. Because permanent, direct impacts to land cover associated with such trails are already accounted for through the design of access roads, no additional permanent impacts are anticipated. However, it is possible that indirect and temporary impacts may occur through recreational use (e.g., increased harassment resulting from recreationists or dogs). In addition, changes in sediment transport and deposition within the channel due to channel realignment and changes in channel substrates may occur. Loss of in-stream complexity due to installation of hardscape or channel straightening could lead to increased scour along earthen channels.

Direct, temporary impacts of flood protection projects are most likely to occur during construction when use of heavy equipment may entail loss of vegetation for access, and increased turbidity, in-stream temperature, dust, and noise. Most, if not all, flood protection projects are likely to require dewatering of portions of the channel during construction. These activities will result in temporary reduction in habitat quality and/or loss of habitat, including potential impacts to covered avian species using riparian habitat for nesting. However, most temporary construction impacts can be avoided or minimized through the appropriate use of avoidance and minimization measures (see Chapter 6). Temporary impacts are also likely to occur at staging areas used during construction. Existing developed areas such as access roads or adjacent parking lots will be targeted for use as staging areas. If such areas are not available, highly disturbed ruderal areas will be selected. Staging will not be established in sensitive areas such as stream beds, riparian, or serpentine areas.

Indirect impacts on groundwater may occur if the channel bed is altered to prevent infiltration of flows (e.g., through installation of concrete). The construction of new levees could also prevent streams from naturally meandering, which could lead to channel incision and erosion. Continued use of groundwater recharge ponds and construction of new ponds as described in Chapter 2 may help offset any changes to groundwater levels that could occur

due to installation of flood protection projects. Installation of flood protection projects is not expected to result in significant changes to in-stream flow or velocity. The effects of straightening channels are better understood today than in the past, and new flood control structures will be designed to mimic natural flow conditions as closely as possible. Where hardened elements are required, appropriate flow dissipation devices will be incorporated into the design to prevent flows from increasing to the point that fish cannot move upstream or are washed downstream. In addition, as described above, flow bypass channels may be installed to reduce excessively high flows during storm events that cause erosion in earthen channels.

Levee Reconstruction

Direct, permanent impacts will occur when levees are reconstructed and then maintained in accordance with FEMA and Corps guidelines. Since the events of hurricane Katrina, FEMA and the Corps have tightened rules on how levees must be maintained for flood protection purposes. SCVWD currently conducts vegetation management on these levees under the Stream Maintenance Program and vegetation management follows the Corps guidelines.

It is expected that once reconstructed, levees will be maintained under the Stream Maintenance Program free of all vegetation with the exception of grasses and non-woody shrubs. Therefore, all non-ruderal vegetation is assumed to be permanently lost once reconstruction is complete. SCVWD will avoid areas that were developed for mitigation of previous projects. Most levees will be reconstructed in the same footprint as existing levees. However, where space allows (i.e., where development does not encroach up to the outer edge of the levee), there may be opportunities to set back the levees and create a wider floodplain area that is permitted to support trees and other riparian vegetation.

Direct, temporary impacts may occur during levee construction similar to those associated with flood protection project construction. Similarly, the proper use of avoidance and minimization measures can greatly avoid and minimize construction-related temporary impacts.

Indirect impacts associated with levee reconstruction may include a reduction of in-channel cover and/or woody debris that occurs over time due to a reduction in streamside riparian vegetation. Reconstruction of levees is not expected to result in changes to in-stream flow or velocity because levees will be reconstructed similar to their original designs.

Canal Reconstruction, Realignment, and Decommissioning

SCVWD anticipates needing to fully reconstruct or decommission all of its water conveyance canals over the course of the permit term. Canals may be reconstructed in place, replaced with a pipeline installed within the alignment of

the existing canal footprint, replaced within different alignment that is also within a public right-of-way, or decommissioned. Reconstruction or replacement with a pipeline will require ground disturbance and complete vegetation removal within the entire footprint of the canal. Reconstructed canals may allow some vegetation to reestablish in or along the canal; however, for the purpose of the impact analysis, complete loss of vegetation is assumed. Canals will not be flowing at the time of construction, thus there would be limited impacts to streams that are connected to the canals are expected as a result of reconstruction. Small, discontinuous wetlands may occur in canals that are fed by perennial seeps and springs. These wetlands and some covered species may be affected by canal reconstruction or installation of a pipeline and these affects will be considered impacts where they occur. Canal decommissioning may also have construction-related adverse effects when hardscape and other infrastructure are removed. However, removal of such infrastructure will also allow existing canals to return to a more natural state; thus resulting in long-term beneficial effects.

Direct impacts associated with canal reconstruction or installation of a pipeline would be similar to those direct impacts described for other construction projects including temporary increases in noise and dust. Implementation of avoidance and minimization measures described in Chapter 6 would reduce the potential for these types of indirect temporary impacts.

Decommissioning of a canal entails removal of unnecessary concrete and other materials from the site and allowing the canal to return to a more natural state. It is likely that decommissioning would enhance canals for natural resource management purposes, but credits for such enhancement are not assumed in the impact analysis. Minor indirect temporary impacts maybe associated with concrete removal activities. Canals will be dry at the time of removal activities, thus no impacts to streams that are connected to the canals are expected as a result of decommissioning.

Three Creeks HCP In-Stream Capital Projects

The primary capital project associated with the proposed Three Creeks HCP is retrofit of five of SCVWD's six dams in the north portion of the permit area. These projects include the development of borrow sites to support dam retrofits as well as associated infrastructure to provide supplemental flows during a dewatering event. As such, the impact mechanisms associated with dam repair and seismic retrofit are described independently of the proposed Three Creeks HCP in the following section *Dam Seismic Safety Retrofit.* A supplemental water supply is proposed as part of the Three Creeks HCP Conservation Program. Impact mechanisms associated with this activity are discussed in Section 4.3.3 *In-Stream Operations and Maintenance*.

Three Creeks HCP Conservation Program

The proposed Three Creeks HCP includes a suite of activities to enhance conditions for steelhead trout and Chinook salmon, while maintaining use of local watersheds to meet the water supply needs of northern Santa Clara County. The Three Creeks HCP Conservation Program includes nine main components that will receive take coverage under this Plan.

- Geomorphic Rehabilitation
- Almaden Reservoir Fish Passage
- Gravel Enhancement Program
- In-Stream Habitat Enhancement
- Fish Passage Enhancement
- Reservoir and Recharge Re-Operation
- Upper Penitencia Creek Management Program
- Supplemental Flow Program
- Monitoring Program

Geomorphic rehabilitation, Almaden Reservoir fish passage, gravel enhancement, in-stream enhancement, and the fish passage enhancement program are discussed below. Reservoir and recharge re-operation, Upper Penitencia Creek management, supplemental flows, and monitoring are described in Section 4.3.3 *In-Stream Operations and Maintenance* subheading *Three Creeks HCP Conservation Program*.

Geomorphic Rehabilitation

The criteria for geomorphic rehabilitation ensure that affected reaches of the channels below the reservoirs will be substantially modified and improved in terms of factors such as channel sinuosity and riffle-pool habitat. Implementation of the proposed rehabilitations requires substantial construction. New channel will be graded, large woody debris will be added, and the channel will be replanted. During this process, the existing channel and most of the riparian habitat along the channel will be disturbed. During construction, flow will be bypassed around the construction site and there may be short term loss of stream habitat, including increased temperature in the water that is bypassed around the project site.

Geomorphic rehabilitation will sometimes occur within the current active channel and will have the beneficial effects of permanently separating pond habitats from riverine habitats and replacing existing slow-moving ponded areas with stream riffle-run-pool-run complexes.

Almaden Reservoir Fish Passage

SCVWD proposes to provide steelhead with passage to upstream habitat that is currently blocked by Almaden Dam as part of the proposed Three Creeks Conservation Program. SCVWD has not yet identified a preferred alternative to

providing passage over Almaden Dam; however, SCVWD is currently considering a range of alternatives from trap and truck to construction of a fish ladder.

One of the goals of this program is to isolate juvenile salmonids emigrating downstream from the reservoir to reduce the potential for predation by exotic, predatory species living in the reservoir. As such, a juvenile collection facility may be constructed just upstream of the reservoir. Construction of this facility will require both on- and off-channel disturbance. Off channel disturbance will result in ground disturbance and permanent loss of some land cover types, as well as potential indirect impacts similar to those described in this chapter for other development projects. On-channel activities may result in a small amount of permanent stream loss where a diversion dam and fish screen are placed. Construction of the diversion dam will occur during the summer when natural inflows are at their lowest. Any remaining flows will be diverted around the project site as required by avoidance and minimization measures described in Chapter 6.

A trap and truck operation will have the least effect on covered species. This approach will utilize existing roads for moving fish from downstream of the dam to the upstream end of the reservoir. To trap adults, a collection facility at the base of Almaden Dam would be required. This activity could require a portable collection system placed in the channel. Access to the channel and staging for placement of the system may result in some permanent impacts to the stream bank and any riparian vegetation present. Access will be sited to avoid sensitive habitat to the extent feasible. This approach does not result in any changes to flows.

Construction of a fish ladder is likely to have the greatest effect on non-developed land cover types, including streams. Because the design of the project is not known, it is assumed that the ladder would not be designed as part of the existing dam infrastructure and would instead be constructed largely on non-developed land cover types. Depending on the level of separation of juvenile steelhead from the reservoir pool, a facility may be required to bypass fish around the dam and around the reservoir. If implemented, this facility would likely be constructed around the perimeter of the reservoir in non-developed land cover types. Ground disturbance impacts would be similar to other construction projects. Temporary construction impacts such as noise and dust may be more significant depending on how much excavation is required to construct the ladder and new access road. Operation of the fish ladder will require some amount of water to be released from the reservoir and possibly provided by supplemental sources to provide flows sufficient to encourage migration of adults and simply to fill the fish ladder, thus allowing fish passage. This may result in a small increase in downstream flows when the ladder is operational.

For the purposes of the impact analysis, it is assumed that up to 30 acres of non-developed land cover types may be permanently impacted, as well as up to 50 feet of stream lost where collection facilities at the base of the fish ladder are placed in the stream. Up to 5 acres of temporary construction impacts may also

occur on non-developed land cover types, and up to 30 feet of temporary stream impacts.

Gravel Enhancement Program

Gravel traps will be constructed below the high-waterline of the reservoir. Because reservoirs provide little or no habitat for the covered species, this is not considered an impact. Some minor permanent effects to surrounding terrestrial land cover may result from the construction of new access roads between the perimeter road of the reservoir and the reservoir itself. Temporary impacts associated with gravel extraction will be minimized because excavation will occur in the summer when the stream is dry and the reservoir level has dropped below the location of the gravel trap (i.e., the gravel trap will be dry). Existing access roads will be utilized to transport gravel excavated from these traps. Placement of excavated and processed gravel in downstream reaches could increase turbidity. To minimize the severity and extent of increased turbidity, gravel will be cleaned prior to being deposited downstream of reservoirs. Gravel placement will avoid the California red-legged frog and foothill yellow-legged frog breeding seasons, if possible.

If the new gravel augmentation service yard is constructed on an already developed site, no new permanent impacts are anticipated. If the new service yard is constructed on disturbed lands (i.e., urban development land cover types that provide some habitat value to Plan species), construction will result in a conversion of these land cover types to a fully developed land cover type (e.g., urban-suburban or developed agriculture). Temporary construction impacts will be similar to those described above for development regardless of the land cover type on which the project is constructed.

In-stream Habitat Enhancement

Cover enhancement includes localized installation of in-stream cover elements such as boulders, large woody debris, or biotechnical treatments along stream banks. These activities may create temporary disturbance to stream bank, bed, and adjacent riparian habitat. Short reaches of channel may require dewatering that includes bypassed flow around the construction site. If exotic vegetation removal is conducted, there may be a temporary loss of some canopy or stream-side understory vegetation function until newly planted vegetation matures. Temporary impacts are expected to be similar in scale to the temporary impacts incurred with maintenance of the water supply facilities in channels below reservoirs, but are not expected to recur at a given site (i.e., once a site is enhanced, it will not likely be targeted for enhancement again in the future).

Fish Passage Enhancement

In-stream impediments to fish passage may be modified or removed to improve habitat connectivity. Impacts may occur as the result of construction activities required to improve passage (e.g., removal of a culvert or reconfiguration of an in-channel weir). If sites support flow during construction, avoidance and minimization measures described in Chapter 6 will be implemented to protect water quality downstream of the site. Depending on the projects, some ongoing

maintenance similar to that of the water supply facilities in the channels below the reservoirs may be required.

Dam Seismic Safety Retrofit

Four of the major dams operated by SCVWD in the study area (**Figure 2-6**), two County Park dams, and one City of San José dam may need to be retrofitted in accordance with DSOD and FERC regulations for dam safety and design change. Several direct impacts would result from dam reconstruction, many of which are similar to the direct impacts described above for other in-stream capital improvement projects.

Direct temporary impacts related to dam reconstruction are anticipated to be minimal due to implementation of avoidance and minimization measures and mitigation measures. However, some temporary impacts are expected during staging of construction equipment and with the installation of a flow bypass during construction. In addition, there is also the potential for direct impacts (including noise, dust, and light [if construction activity continues at night]) on tricolored blackbirds, burrowing owls, California red-legged frogs, foothill yellow-legged frogs, California tiger salamanders, and western pond turtles. Implementation of Condition 15 *Western Burrowing Owl* and Condition 17 *Tricolored Blackbird* would help alleviate some of these impacts.

Dam reconstruction projects will be conducted to respond to existing and future safety requirements as required by DSOD and FERC, not to a need to increase reservoir capacity for expanded water supply.

SCVWD Dams

Borrow Sites

As described in Chapter 2, potential borrow sites[3] for dam reconstruction includes the following options.

- The upstream delta of the reservoir.
- The reservoir basin.
- Existing quarries.
- New quarries (a) in the reservoir basin, (b) in the canyon below the dam, or (c) in the alluvial plains within the Habitat Plan permit area.

Alluvial borrow extraction will be focused on areas where alluvial materials may be obtained without impacting wetlands, stream channels, existing or proposed Habitat Plan reserves, and the habitats of Bay checkerspot butterfly, California

[3] These are potential borrow sites located within the permit area of the Habitat Plan. Take associated with borrow sites located in the portion of the Three Creeks HCP permit area that does not overlap with the permit area of the Habitat Plan are possible but are not covered activities under the Habitat Plan and would require authorization through the Three Creeks HCP or another regulatory mechanism.

tiger salamander, or California red-legged frog. This has placed emphasis on obtaining borrow from agricultural and other disturbed or barren habitats, from existing quarries, and from the reservoir area below the maximum reservoir pool elevation. Rockfill excavation at Anderson Dam is assumed to be within the reservoir pool areas below the high water line and would be extracted once the reservoir is dewatered for the retrofit.

In all cases, the analysis has assumed that earthfill borrow sites will be excavated to a maximum depth of 40 feet, resulting in permanent loss of all habitat. Borrow sites may be converted to recharge areas or may fill naturally if groundwater levels are high. Alluvial areas affected would primarily be agricultural (Anderson, Calero, and Almaden) but some natural habitats will be affected. Species effects for alluvial sites tend to be low, reflecting the disturbed nature of the habitats below the dams. The functional value of agricultural lands most likely to be used for alluvial borrow at Anderson, Calero, and Almaden dams is primarily movement and foraging. Species impacts associated with the other types of land cover are likely to be greater, and the potential for impacts to covered plants increases proportionally.

Direct impacts include permanent loss of land cover, potential loss of individuals of covered species during construction and material hauling, and fragmentation of habitat at the landscape level. Noise, dust, and light related effects, previously described for nighttime retrofit activities, are likely to occur as a result of night time borrow extraction. Implementation of avoidance and minimization measures described in Chapter 6 are expected to reduce potential indirect impacts.

Dewatering Events

Dam seismic safety retrofit will likely require reservoir draining, construction in the dry reservoir, and reservoir refilling to the point at which the reservoir is re-operated according to applicable rule curves (collectively referred to as a dewatering event). The impacts associated with each of these actions are described below.

Table 2-4 shows the maximum covered release flows resulting from reservoir draining during a dewatering event[4]. Due to the unique characteristics at each dam site, a reservoir-specific dewatering plan will be developed and submitted to the Wildlife Agencies for review and approval prior to the first dewatering event for each reservoir (see Chapter 8, Section 8.7.3, subheading *Additional Review* for details of this process). This dewatering plan will specify the timing, frequency, and duration of reservoir releases associated with dewatering events. Since the level of detail is not known at this time, the maximum covered reservoir release flows shown in **Table 2-4** are provided as anticipated worst-case scenario for impact evaluation based on the professional judgment of the SCVWD. If at the time a dewatering plan is developed SCVWD determines the flow releases will be higher than those in **Table 2-4**, additional consultation with

[4] Pulse flows implemented for the benefit of anadromous fish species (see Section 2.3.4) may be greater than the flows anticipated for draining of a reservoir as part of a dewatering event. These higher flows are also covered by this Plan.

the Wildlife Agencies will required and additional mitigation may also be required.

Although up to 18 dewatering events are covered under this Plan, SCVWD will only undertake a dewatering event if absolutely required to maintain dam safety. In addition, the dewatering plan will identify avoidance and minimization measures that will reduce the potential effects of draining a reservoir. A key avoidance and minimization measure that SCVWD anticipates including in most, if not all, dewatering plans is a ramping schedule for flows. Ramping flow releases (i.e., slowly building up to a maximum release flow over a specified amount of time) when beginning reservoir draining will help avoid washing covered species downstream. Ramping down flows at the end of draining will help avoid drying back the channel faster than covered amphibian and reptile species can move to new locations to avoid stranding.

After accounting for avoidance and minimization of draining impacts, draining the reservoir may have residual adverse impacts to covered species. Reservoir dewatering will initially result in higher reservoir releases affecting the stream downstream of the reservoir. Extended periods of high flow will affect a significant portion of the channel downstream from the affected reservoir. Increases in flow may affect California red-legged frog egg masses or juveniles if flows are released in early spring before these species have had the opportunity to move out of streams. Foothill yellow-legged frogs may also be affected by high flows; however, this species is more likely to be found in the upper watershed (above dams). Consistent high flows, if started early enough in the year and continued through late spring, may facilitate breeding by providing a reliable water source and may also reduce the potential for stranding. High flows are not expected to affect western pond turtle breeding as this species tends to lay its eggs in uplands away from the active channel.

The Implementing Entity will monitor the effects of flow regulation (including dewatering events) on California red-legged frog, western pond turtle, and foothill yellow-legged frog populations that occur in streams hydrologically affected by existing dams in the permit area (Chapter 7, Section 7.3.3 S*pecies-Level Actions*). This monitoring data will inform the adaptive management process and help to minimize effects on these downstream populations. Results will be reported to the Wildlife Agencies within 60 days of the conclusion of each dry season and wet season dewatering event. Based on these results, the Wildlife Agencies may require an adjustment in the maximum reservoir release flows in **Table 2-4**. During reservoir drawdown, exotic fish and other aquatic species contained in the reservoir may enter the downstream channel in large numbers, resulting in increased predation on aquatic covered species. While these exotic species already exist below the dams, increased numbers of exotic species may increase the level of predation. Potential impacts associated with exotic species will be reduced with implementation of avoidance and minimization measures for dewatering described in Chapter 6 that may be incorporated into the dewatering plan.

Once the reservoir is drained, releases from the reservoir will be limited to bypassed inflow collected at an upstream location and flow from groundwater

seepage. Bypassed flows would be released into the stream immediately below the footprint of the project; therefore, no complete drying out of the channel immediately below the project footprint is expected. There may be some local runoff from tributary watersheds and from domestic irrigation, and in some locations the channel may be fed by upwelling of groundwater, but in all but the wettest years, perennial flow is not common. It is expected that, without supplemental water sources, much of the channel below the dewatered reservoir will go dry and remaining wetted portions would be of poor habitat quality. A supplemental flow system may be installed as part of the proposed Three Creeks HCP Conservation Program at Anderson and Calero Main dams. For reservoirs where supplemental flows are not provided, this impact could potentially affect the area in the channel from the base of the dam to the first confluence with another stream that is fed by a different reservoir. Watershed level impacts will be avoided through measures described in Chapter 6 that only allow one reservoir per watershed to be dewatered at one time.

Loss of water in channels downstream of dams is likely to affect amphibians and reptiles covered by this Plan, and may also affect riparian vegetation along creeks below dams. For the past 10–15 years, dry-back of channels below reservoirs has been minimized to avoid species impacts. Some seasonal dry-back has occurred on Uvas and Llagas creeks, but has been almost entirely avoided on Coyote Creek and Guadalupe River with the exception of approximately 600 feet on Guadalupe Creek in the summer of 2007 due to drought conditions. Thus, covered amphibians and reptiles are not accustomed to seasonal fluctuations in flows, particularly in the northern watersheds of the study area. Some stream segments in the study area below reservoirs currently dry out on an annual basis and reduced flows during a dewatering event may be similar to natural drought conditions. During such times, it is likely that adults of these species will move away from dry streams in search of water in nearby areas. Because dewatering events are generally only expected to last one season, riparian vegetation is not likely to be substantially altered during dewatering. Impacts may be more severe during an extended dewatering event (up to 3.5 years for seismic safety retrofit at Anderson Dam and 2.5 years for all other dams) if occurring during a drought. Immediately below dams, vegetation will still benefit from the natural drainage of the watershed which will be bypassed around the dam. Further downstream, runoff from urban areas is often considerable and enough to keep flow in the channel throughout the year.

Maintaining the reservoir free of water during construction will eliminate the majority of aquatic habitat upstream of the dams around the reservoir perimeter for aquatic covered species, including western pond turtles. Covered species using this area would be required to seek other habitats, which will be limited and which will affect their ability to re-establish following dewatering and repair of the reservoir facilities. Under the worst-case scenario, inflow may be non-existent for several months of the construction period, probably the months of July, August, and September when evapotranspiration is highest and ambient air and water temperatures are also high.

Construction activities occurring in the reservoir during dewatering will implement avoidance and minimization measures as described in Chapter 6, Condition 4 *Stream Avoidance and Minimization for In-Stream Projects*.

During refilling of the reservoir, outflow may also be constrained. First, the reservoir will not make releases until the reservoir has reached the level of the lowest outlet gate. Second, early in the refilling, water quality requirements may limit releases to maintain suitable quality of bypassed flows. Third, SCVWD will endeavor to re-fill the reservoir for both water supply and sustained-flow considerations. Winter flows may be constrained, affecting the length of transition time back to sufficient storage for intended operability. In a dry period, a drained reservoir may not be re-operated according to applicable rule curves until up to 2.5 years from the time reservoir draining is initiated. A dewatering event that takes longer than 2.5 years, with the exception that Anderson Reservoir is covered up to 3.5 years for a dewatering event associated with a seismic safety retrofit, is not a covered activity and SCVWD would initiate consultation with the Wildlife Agencies.

Covered species are unlikely to move into dewatered reservoirs as these sites will, in general, be continuously disturbed until refilling starts. If a project-specific situation arises where impacts to covered species could occur, the potential impact would be identified in the dewatering plan and species surveys as described in Chapter 6 would be required.

County Parks Dams

As discussed in Chapter 2, County Parks dams are much smaller than SCVWD dams, thus, while many of the construction impacts will be the same as those described for SCVWD dams, the scale is much smaller.

Sandywool Lake is located along a small tributary (less than 0.75 miles) to Arroyo de los Coches. Engineered channels allow natural flow from above Sandywool Lake to bypass the lake and continue in the tributary to its confluence with Arroyo de los Coches. Sandywool Lake is used for irrigation and is not managed for water supply to the tributary, thus, the channel below the lake is typically only supplied with natural flows. Dewatering the lake is not expected to affect this tributary or local riparian vegetation.

Grant Lake is not located on a stream, but it does have a drainage connection to Arroyo Aguaque Creek, a tributary to Upper Penitencia Creek. Dewatering Grant Lake is not expected to affect the water supply for local streams.

Borrow sites will be sited in the California annual grassland land cover type or in other already disturbed areas. Whenever possible, borrow sites will be used to create habitat for covered species (e.g., a pond for California tiger salamander). In these cases, development of borrow sites will result in the conversion of one land cover type (e.g., grassland) to another land cover type (e.g., pond). Areas around the borrow site may be temporarily disturbed during borrow site

construction. Location of borrow sites will be within County parks, but exact locations are unknown at this time.

City of San José Dams

As discussed in Chapter 2, Cherry Flat Dam is much smaller than SCVWD dams, thus, while many of the construction impacts will be the same as those described for SCVWD dams, the scale is much smaller.

Cherry Flat Reservoir is located on Upper Penitencia Creek, almost at the top of the catchment; the watershed above the reservoir is 2.4 acres. This reservoir is not currently managed to support fish flows in Penitencia Creek, although it is managed to maintain minimal flows through Alum Rock Park (approximately 0.5 cubic feet per second [cfs]) during summer months. SCVWD has a release point from a pipeline that provides most of the flow in this channel based on SCVWD operational needs, including flows to support fish. Dewatering the lake may reduce the 0.5 cfs summer flows.

The borrow site for this project will avoid sites in areas designated as high or medium priority for conservation in this Plan. Areas around the borrow site may be temporarily disturbed during borrow excavation. Borrow sites will be subject to Wildlife Agency review and approval during implementation of the Plan (Section 8.7.3 *Wildlife Agency Responsibilities*).

Dam Instrumentation Project

As described in Chapter 2, the Dam Instrumentation Project includes the installation of piezometers, inclinometers, survey monuments, real-time monitoring systems, seepage collection systems, reservoir level gauges, and seismographs related to the maintenance of dams in the permit area. Implementation of these activities will result in permanent and temporary impacts associated with installation of equipment and subsequent maintenance. All activities associated with the Dam Instrumentation Project will occur within the same areas as will be affected under the Dam Maintenance Program (described below).

In-Channel Groundwater Recharge Facilities

SCVWD plans to re-operate the Ford Road Groundwater Recharge Pond and the Church Avenue Groundwater Recharge Pond. Both ponds were previously constructed but the Ford Road facility has been out of use and the Church Avenue facility has been operated at reduced capacity. The Ford Road reoperation includes expansion of the site to include up to three additional new ponds. This action would result in the conversion of existing land cover types to the pond land cover type, although these new ponds will be managed to support water supply operations and will not likely support use by covered species. As

described in Chapter 2, Ford Road Pond will be supplied by flows from a new pipeline that receives flows from a new diversion upstream of Ford Road Ponds at Metcalf Road. This new diversion will also provide flows to the Coyote Percolation Pond after it is separated from the main channel as part of the proposed Three Creeks HCP Conservation Program. Church Avenue Pond is supplied by an in-channel diversion which may require rehabilitation.

New construction or rehabilitation of in-channel diversions will affect the stream bank and riparian vegetation surrounding the diversion structure. The new structure will permanently impact riparian land cover types while the rehabilitated structure will be temporarily disturb riparian land cover types where the diversion is rehabilitated. The footprint of the diversion is not expected to change in size, thus impacts to riparian vegetation at the diversion are expected to be temporary during construction. Additional permanent impacts resulting from re-operation of the ponds includes conversion of the dried out pond bed (currently characterized by golf course/urban parks and grain/row-crop/hay/pasture land cover types) to pond land cover type.

Re-operation of the Ford Road and Church Avenue groundwater recharge ponds is not expected to affect in-channel flows. Ford Road pond is being re-operated and expanded in anticipation of reduced in-channel recharge that is expected to occur when the currently on-channel Coyote and Ogier percolation ponds are separated from Coyote Creek. Construction and operation of Ford Road ponds will allow SCVWD to maintain the same level of water diversion to the groundwater basin. As described in *In-Stream Operations and Maintenance* subheading *Proposed Operating Rules for Water Supply Facilities in the Uvas and Llagas Watersheds* (National Marine Fisheries Service et al. 2009), Church Avenue ponds will divert flows from Llagas Creek when reservoir capacity allows, consistent with anadromous fish flow and on-channel recharge requirements. If, when these projects are ready to be implemented, SCVWD identifies a potential change in downstream flows due to re-operation that may adversely affect covered species, additional consultation with the Wildlife Agencies will required.

New Bridge Construction and Replacement/ Rehabilitation

It is estimated that all existing bridges in the permit area will need to be replaced approximately once within the Plan's permit term. Rebuilding all existing bridges, as well as constructing new bridges, will result in impacts on natural communities and covered species. New and rehabilitated bridges will be designed to federal and state guidelines at the time of construction. Conditions on covered activities described in Chapter 6 encourage the use of free-span bridges; however, wide crossings on major roads will likely require construction of pilings in creek beds. Installation of pilings, piers, and/or footings may contribute to roughness in the stream and slow flows in the vicinity of the pilings. Sediments and vegetation may become trapped on the upstream side of the piling, potentially causing further disruptions to flow. Also, scour may occur

immediately downstream of pilings and contribute to channel erosion and downstream sedimentation. In such cases, conditions described in Chapter 6 will be applied to assess the potential effects of a specific bridge design and to implement design elements that will reduce potential negative effects. Reconstruction projects may entail expansion of the existing footprint up to twice as wide as the existing footprint to account for increased traffic demand or new safety requirements such as pedestrian and bicycle access and wide shoulders for emergency access. Such expansion will result in permanent and temporary impacts on terrestrial and aquatic land cover types.

The amount of habitat loss will depend on whether the project is new construction or rehabilitation of an existing structure. Use of standard construction mitigation measures (e.g., proper management of dewatering activities) and avoidance and minimization measures will help to reduce or prevent temporary impacts on water quality during construction.

The County of Santa Clara Roads and Airports Department anticipates one of its road connection projects will require a new bridge across Llagas Creek. A new bridge across Gavilan Creek will also be required for a VTA road extension project. Approximately 75% of new bridges will be related to private development and will be intended for access use by residents in those areas. New bridges constructed in County parks or for access to parts of the Reserve System will be carefully managed for proper use on newly accessible lands. Construction of new bridges outside the planning limits of urban growth may result in indirect impacts associated with increased access to areas that are currently less accessible, including reserve lands that support natural land cover types and/or covered species. As described above in Section 4.3.1 *Urban Development* increased use of open space that is facilitated by new creek crossings may result in impacts on land cover and covered species related to introduction of nonnative species, general use, and illegal activities such as trash dumping. However, indirect impacts related to bridge reconstruction are anticipated to be minimal. Reconstructed bridges are not anticipated to encourage additional traffic beyond that expected on the basis of existing and planned land use patterns.

Streamside Trails and Crossings

As discussed in Chapter 2 and above under *Flood Protection Capital Projects*, SCVWD plans to develop stream-side trails along existing maintenance roads and along new maintenance roads installed as part of flood protection projects. In addition, County Parks and the cities also plan to develop new trail projects, some of which will occur in in-stream areas. Direct impacts from establishing trails along existing maintenance or access roads would have minimal, if any, new direct impacts to land cover as the trail would be placed along an existing road. New trails outside of existing roads or trails would have new impacts to vegetation removed for project construction. Impacts may also occur where new signage is installed. However, whenever possible, signage will be installed in disturbed areas.

Indirect impacts related to development of trails are largely related to ongoing use of trails. Expanding access to stream side areas exposes the stream and riparian areas to higher levels of use which may result in increased pollutants in the stream such as trash, trampling of vegetation, and vandalism. Most of the stream side trails developed in the permit area will be along streams maintained by SCVWD for flood control purposes. The majority of these maintained streams are located in urban or suburban valley floor areas. Trails in the Reserve System and outside of urban or suburban areas will be sited outside of the riparian corridor thus reducing the opportunity for these types of indirect impacts to streams (see Chapter 6, Section 6.4.2, subheading *Condition 4 Stream Avoidance and Minimization for In-Stream Projects* and **Table 6-3**).

4.3.3 In-Stream Operations and Maintenance

Many operations and maintenance activities in streams may have direct and indirect impacts on natural land cover types and covered species. A discussion of the operations and maintenance activities that may cause impacts is provided below.

Facility and Stream Maintenance

Direct impacts of in-stream operations and maintenance activities may result from maintenance of facilities such as bridges, culverts, dams, trails, and roads in the riparian zone. Impacts may also occur during maintenance of streams used for flood control and associated infrastructure such as access roads. Stream maintenance activities may include sediment removal, bank stabilization, levee maintenance, access road maintenance, and vegetation clearing, including fire break maintenance and rodent control, if such action becomes necessary (rodent control measures will be minimized under the Plan).

County Parks and the Cities of Gilroy and Morgan Hill also conduct some in-stream maintenance on their properties. In-stream operations and maintenance activities conducted by cities focus mostly on maintenance of trails and overhanging riparian vegetation. In-stream maintenance activities conducted by County Parks are similar to activities conducted by SCVWD under the Stream Maintenance Program, but with reduced frequency and on a smaller scale. County Parks attempts to replace culverts with in-kind materials and in the same footprint as the existing culvert. However, new and reconstructed culverts are required to be in compliance with conditions in Chapter 6 which may require some design modifications. These Local Partners may also conduct small-scale bank stabilization and sediment removal projects.

Direct impacts associated with in-stream operations and maintenance occur while accessing project sites (e.g., natural land cover is removed to reach a gage or bank stabilization site) or as a result of implementing an operations and maintenance project (e.g., sediment removal). Additionally, maintenance of facilities such as repair and installation of fencing or a monitoring gage may

require vegetation removal in order to access the project site; such vegetation removal would constitute temporary impacts on natural land cover types in the immediate vicinity.

Maintenance of in-stream infrastructure, including trails in riparian areas and bridges, has the potential to result in direct temporary and permanent impacts. However, all project proponents are required to implement the conditions on covered activities described in Chapter 6, including implementation of avoidance and minimization measures.

Direct temporary impacts associated with facility maintenance potentially include increased noise or dust during activities utilizing heavy equipment for mowing or resurfacing roads. Staging areas will be temporarily disturbed by workers and construction equipment. In such cases, application of avoidance and minimization measures would reduce these impacts.

Sediment Removal and Mercury Remediation

As described in Chapter 2, minor mercury remediation projects may be undertaken by Local Partners incidental to sediment removal projects. Sediment removal in stream reaches downstream of abandoned mercury mining operations has the potential to release mercury into the water column and to allow mercury to move downstream of project sites if work is conducted in an active channel. In local streams, mercury may be converted by bacteria into methylmercury, which is highly toxic. Methylmercury may be taken up by insects and other invertebrates which, in turn are consumed by fish and other organisms up the food chain. Over time, methylmercury may bioaccumulate in fish and may cause reduced fertility, impaired growth and development, and abnormal behavior. However, conditions on covered activities require dewatering prior to commencement of work that may contain mercury in the sediment. No indirect effects of sediment disposal are anticipated, because removed sediments are tested for mercury and, if required, are disposed of in a proper receiving facility.

Reservoir Operations under DSOD Interim Storage Restrictions

Reservoir operation under DSOD interim storage restrictions could affect the implementation of the proposed Three Creeks HCP Conservation Program target flows or future operating rules for Uvas and Llagas watersheds, particularly efforts to modify reservoir release schedules to address flow and temperature issues. Over the last 12 years of DSOD storage restrictions, SCVWD has been generally successful in avoiding dry-back of channels. As noted above under *Dewatering Events*, for the past 10–15 years, dry-back of channels has been limited to some seasonal dry-back on Uvas and Llagas creeks, but has been almost entirely avoided on Coyote Creek and Guadalupe River.

However, increased storage restrictions would further reduce reservoir storage. Lower reservoir storage requires that summer flow regimes will be lower than under the proposed Conservation Program and dry back of the affected channels will occur earlier. This may result in stranding of California red-legged frog or foothill yellow-legged for embryos and tadpoles during dry back. During summer, SCVWD does not have water rights to detain natural flows in the reservoir. These flows are by-passed around the reservoir to help maintain a wetted channel, even though it may not reach the requirements of Conservation Program flows. During wet years, by-passed flows are greater and alternative flows from tributaries or groundwater upwelling also help to maintain a wetted channel below dams.

In addition to natural flows (from by-pass or groundwater upwelling), SCVWD anticipates installing supplemental water supply systems at the base of Anderson and Calero Main dams as part of the Conservation Program. Once functional, these systems can be used to meet Conservation Program flow targets (and therefore a wetted channel) during implementation of DSOD interim storage restrictions.

As described above, the Implementing Entity will monitor the effects of flow regulation on California red-legged frog, western pond turtle, and foothill yellow-legged frog populations that occur in streams hydrologically affected by existing dams in the permit area and report to the Wildlife Agencies.

SCVWD expects that it will be able to meet most conservation flows described for the proposed Three Creeks HCP Conservation Program under DSOD restrictions at all times, with perhaps the exception of during a drought. Stream reaches that are dry for more than one year as a result of DSOD storage restrictions will be considered permanently impacted for the purposes of this Plan. Because SCVWD does not anticipate this situation occurring, the impacts of an extended dewatering were not considered in the stream impact caps set for this Plan (**Table 4-2**). If streams are dry for more than one year as a result of DSOD storage restrictions, SCVWD will begin a separate consultation process with USFWS and CDFG and may be required to provide additional mitigation beyond that required by the Habitat Plan. These effects will be minimized through conditions described in Chapter 6 and mitigated through payment of fees (see Chapter 9, *Costs and Funding*) and the Conservation Strategy (Chapter 5).

Reservoir and Recharge Pond Operations

Effects of reservoir and recharge pond operations are discussed together because operations are conducted in tandem, thus effects of one are also the effects of the other. SCVWD operates eight dams and several in-channel and off-channel groundwater recharge ponds within the permit area to support the water supply needs of Santa Clara County. Operation includes flow management, diversion, delivery, and storage. Operation of these facilities focuses largely on timing reservoir releases to supply water to treatment plants and recharge basins. Several covered species may utilize habitat in streams downstream of SCVWD dams. Species models (**Appendix D**) indicate that California tiger salamander is

known to occur downstream of Anderson and Uvas dams in or near to Coyote Creek and Uvas-Carnadero Creek, respectively. California red-legged frog is known downstream of Anderson and Coyote dams on Coyote Creek, and Uvas dam on Uvas-Carnadero Creek. Foothill yellow-legged frog is known to occur on or near to Uvas-Carnadero Creek downstream of Uvas dam. Finally, western pond turtle is known to occur below Anderson and Almaden dams. All of these occurrences are in the near east and west foothills of the study area, and none of these species are known to occur along streams in heavily urbanized areas with the exception of California tiger salamander which has three occurrences on Communications Hill in San José and one occurrence along Coyote Creek in urban San José.

Direct and indirect impacts may occur through several mechanisms including changes in hydrology and sediment transport, lifecycle disruptions, and introduction of exotic species. In addition, impacts may be exacerbated if DSOD interim storage restrictions are increased to the maximum amount covered under this Plan (see Chapter 2, **Table 2-5**). Each of these impact mechanisms is described below.

Flow

The purpose of reservoirs and recharge basins is to store water for improved management of long-term water supply needs. The capture and storage of flows results in changes to the natural hydrology of the watershed in. Reservoir and associated recharge operations generally alter local hydrology by reducing stream flow during the wet season when flows would be higher under natural conditions and by increasing stream flow during the dry season when flows would be lower under natural conditions. Flows are reduced during the wet season as reservoirs and recharge basins both capture available water, particularly early in the season. During the dry season when channels would normally have very low flows, flows are above normal as SCVWD releases water from its reservoirs to maintain water in recharge basins and to meet water supply needs. As such, the channel below dams remains wet for more of the year than may be expected under natural conditions. This regulation of flows may be beneficial to covered frog species that utilize habitat below dams due to a more reliable breeding habitat. However, consistent with natural drought conditions, during or immediately following dry years, the volume of flows released may be altered so that target storage levels in reservoirs and recharge basins may be restored. Large release delays, the reduction in release magnitude, and recharge diversions may reduce habitat due to inadequate flows.

During operation as described above, there may be times of rapid increases or decreases in flows; however, SCVWD does generally ramp flows to reduce potential impacts. This may occur due to unplanned maintenance needs (e.g., blow-off of a pipeline, dewatering of a recharge pond, filling a recharge pond). Rapid decreases in flow may result in stranding of eggs and larvae of California red-legged frog. The potential for increased flows are greatest November through April when eggs and tadpoles are most vulnerable to changes in habitat. The potential for decreased flows may occur at any time of the year. Adults may

also be affected, but have more mobility to combat such environmental changes. However, individuals forced to move out of cover in search of new cover may temporarily be exposed to a higher risk of predation. Foothill yellow-legged frogs are thought to be extirpated below major dams in the study area and would therefore not likely be affected by changes in flows due to dam operations.

Flows are also altered by the operation of diversions and in-channel recharge areas. Through the use of inflatable and flashboard dams, in-channel areas are periodically ponded so that flows can be diverted to off-channel recharge areas or infiltrated into the groundwater basin. Ponding has a number of related impacts including the following.

- Emergent and submergent vegetation is flooded, may be covered by fine sediments, and may die off affecting availability of vegetation appropriate for attaching covered species egg masses.
- Cover is reduced for all covered aquatic species.
- At times when the pond would be drained, backwater pockets within the pond basin may create stranding conditions for frogs—adults or larvae.
- All covered amphibians and reptiles may be affected by higher rates of predation due to low velocity flows and lack of cover.
- The diversion ponds support populations of nonnative fish and amphibians which may prey on native amphibians and turtles.

Condition 5, *Avoidance and Minimization Measures for In-Stream Operations and Maintenance*, described in Chapter 6, will minimize these effects.

Sediment Transport

Reservoirs capture sediment and debris that would otherwise reach the channel below the dams. In particular, reservoirs capture sands and gravels. In addition, large woody debris such as trees and large rock accumulate behind the dam and do not reach the downstream channel. At the same time, a portion of the very fine sediment entering the reservoir remains in suspension and passes through the reservoir into the downstream channels. The result is a combination of altered hydrology and altered sediment transport which affects downstream habitat quality.

The combination of gravel embeddedness and flow changes in the channels below the dams also affects food production and transport. Fine sediment embeddedness inhibits the development of the benthic macroinvertebrates. In addition fine sediments accumulate in low velocity runs and long pools and reduce the general productivity of the aquatic system. Low food production and transport associated with gravel embeddedness and fine sediment accumulations may affect amphibian eggs and juvenile California red-legged frogs, foothill yellow-legged frogs, and western pond turtles (although the presence of exotic species in the affected reaches of channel may preclude viable populations of these covered species in the areas affected).

Increased fine sediments may also cover and thus affect egg laying substrate for amphibians including California red-legged frog. Increases in fine sediment may also affect turbidity (discussed below).

In-channel percolations ponds trap fine sediments during the dry season. Large winter storm events, or the removal of in-channel diversion dams to allow salmonid passage, wash the fine sediments from the in-channel ponds and increase turbidity downstream. Depending on timing, this release of sediment may partially cover egg masses of covered amphibians along the margins of the channels.

Water Quality

Water quality is affected by reservoir releases and recharge pond and pipeline releases. The operation of these systems can result in changes to turbidity, dissolved oxygen, creation of methyl mercury. Operations also affect sediment transport, but this is discussed in the preceding paragraphs.

Reservoirs have a substantial impact on turbidity, both through changes to sediment transport (discussed above) and algal production. Both reservoirs and in-channel ponds behind diversion dams create heat and nutrient sinks. This combination leads to substantial algal production. High levels of algae result in high turbidity as well as fluctuations in dissolved oxygen. Increased turbidity may inhibit foraging of covered amphibians.

Other causes of increased turbidity include overflow and scheduled releases to channels from reservoirs, recharge ponds, and pipelines. These releases may increase turbidity at and downstream of the release points. These releases may coincide with or be independent of storm events. Scheduled releases from ponds or pipelines do not generally cause extensive turbidity increase except during the first release after an extended period of time during which sediments built up in a pipeline or pond. Suspended sediments from such releases would be anticipated to settle out of the water column within 300–1,000 feet, depending on flow rate.

High levels of algae may also affect dissolved oxygen levels. Given the right conditions, nightly dissolved oxygen levels can drop to levels stressful to covered amphibians. This may be observed during larval and tadpole stages; however, covered amphibians will most likely be able to breathe air by the summer when the effect is most apparent. This is most likely to affect areas of slow-moving pools and runs in downstream reaches and in the in-channel diversion ponds.

Dissolved oxygen levels may also be affected by other aspects of reservoir operation. During normal reservoir operations, water may be released from the cold water pool (hypolimnion) with very low dissolved oxygen levels. These releases affect a short reach downstream, as the flow rapidly aerates as it moves downstream. SCVWD studies indicate that this effect may extend about 100–300 yards downstream of the release point. This reduces the suitability of this reach for all aquatic species. Some dams have facilities for ensuring oxygenation of release water.

Metallic mercury enters reservoirs in runoff from local soils containing mercury and from airborne pollution. Once in the reservoir, mercury sinks to the bottom and, when the reservoir stratifies and produces anoxic conditions, microbes convert the metallic mercury to methyl mercury, which is toxic to fish, wildlife, and humans. Releases from the hypolimnion release methyl mercury which may be taken up by plants and animals downstream, thus accumulating in the food chain. This has the potential to affect covered amphibians.

Covered Species Movement

In-channel structures (dams, diversion facilities, drop structures, and stream gauge weirs) create barriers to upstream and downstream movement of covered amphibians and reptiles. Movement of amphibians may be particularly impeded during low-flow periods. Movement constraints inhibit species ability to disperse and expand ranges. In-channel ponds behind diversion dams also present barriers to movement because these areas are often populated by exotic species that prey on covered species. The effect may be less pronounced at smaller structures that do not preclude adult individuals from utilizing the riparian zone to move through a reach.

Exotic Species

Water supply operations that bring non-local water into the study area (i.e., imported water supplies) introduce and distribute exotic (nonnative) species on an on-going basis, alter habitats in a manner that increases exotic species' competitive advantages over native species, and allows exotic species to prey on native species. Off-channel recharge ponds that are accessible to the general public, through legal or illegal access, also provide a mechanism to introduce exotic species (e.g., through the dumping of pets like bullfrogs). Informal monitoring of percolation ponds by SCVWD has shown that these ponds typically do support large populations of exotic species and very infrequent use by covered species (D. Arnold pers. comm. c). Any new individuals added to these ponds by the general public would contribute to a reservoir population of invasive species and could result in the spread of some invasive species (e.g., bullfrogs, nonnative turtles, and fish) into more natural habitat of covered species breeding ponds within dispersal distance. Conditions described in Chapter 6 that require exotic species to be dispatched when ponds are drained for maintenance purposes could help to reduce local populations of exotic species.

In-channel recharge ponds provide habitat for exotic species such as bullfrogs and bass, which both compete with and prey on California red-legged frogs, foothill yellow-legged frog, and western pond turtles. This reduces the successful occupation of the inundated reaches by covered species using local streams to support various life stages and may also act as a reservoir population that spreads into less affected stream reaches.

Proposed Operating Rules for Reservoirs

New operating rules for the reservoirs in the northern portion of the permit area may be implemented as part of the proposed Three Creek HCP. New operating rules for Uvas and Chesbro reservoirs may be established through an informal consultation with NMFS and CDFG, a new HCP process, or through formal consultation with NMFS pursuant to Section 7 of the ESA. Implementation of new operating rules for reservoirs are anticipated to include modifications of reservoir releases that would change the area of wetted channel. The focus of these operating rules is to provide enhanced flow conditions and manage cold water habitat for listed fish species. However, changes to releases may also affect species covered under this Plan including California red-legged frog, foothill yellow-legged frog (if it occurs below reservoirs), and western pond turtle. Anticipated changes in operations will reduce early dry-season release rates and increase late dry-season release rates. The effect will be to dry back the downstream reach of the wetted channel earlier than would occur under baseline operations conditions.

In the process, some foothill yellow-legged frogs and California red-legged frogs may become stranded below the zone of sustained flow. This is an early dry-back impact; the channels in question would often be expected to dry back under baseline conditions, because of the high percolation rates in the recharge zone. Any effects are therefore related to the early action to reduce flows. Dry-back may occur before juvenile California red-legged frogs have the ability to leave the channel. In dry years, when the sustainable flow is low, ponded habitat to support frog tadpoles would generally not be available.

As described above, the Implementing Entity will monitor the effects of flow regulation on California red-legged frogs, western pond turtles, and yellow-legged frog populations that occur in streams hydrologically affected by existing dams in the permit area and report to the Wildlife Agencies.

Recharge Pond Maintenance

Maintenance of recharge basins will range from routine management of vegetation and debris to dewatering and sediment removal to complete re-configuring of a recharge site on a periodic basis. Sediment removal and reconfiguration require dewatering and substantial disturbance of the pond. Vegetation may be entirely cleared from the edges of the pond and sediment scraped from the bottom of the pond, removing any submerged vegetation in the pond. This type of maintenance has been ongoing at SCVWD recharge ponds prior to implementation of the Plan. Some ponds retain vegetation around the edges during and after maintenance that may provide refugia for covered species during pond maintenance. Other ponds are maintained devoid of vegetation and are unlikely to support covered species before, during, or after maintenance. Although regular maintenance inhibits the development of quality habitat, some recharge ponds are known to support western pond turtles. Western pond turtles using these sites may be temporarily affected by loss of habitat during

maintenance activities, or may be permanently extirpated from the site in cases where suitable habitat is entirely removed. In addition, western pond turtles could be injured or killed by maintenance activities.

Maintenance of in-channel recharge ponds may compact soils in and adjacent to the channel. Depending on the site and time, this may injure or kill amphibians utilizing upland refugia and/or amphibian egg masses. These effects will vary by time of year and extent of activity.

Maintenance will require earthmoving activity and disturbance of soil. If there is precipitation during the construction period or before vegetation is fully established on the affected land, there may be construction-related runoff to the riparian/aquatic habitats at and downstream of the construction site. Runoff from the construction zone may raise suspended sediment levels and increase turbidity resulting in suspended sediments being mobilized and discharged to the channel. In addition, dust may be generated by construction which will disperse beyond the construction area. Finally, proximity of construction equipment to the stream channel may result in fuel, lubricant, and other chemical spills to leak into the channel. Application of avoidance and minimization measures identified in Chapter 6 will greatly reduce the potential for sediment runoff during construction.

Dam and Reservoir Maintenance

Dams and reservoirs operated by SCVWD, County Parks, and the City of San José require routine and corrective maintenance to ensure their proper inspection, functioning, and safety. SCVWD operates 8 dams, as well as Coyote Percolation pond in the permit area. County Parks maintains six dams, one at Sandywool Lake and five at Grant Lake. The City of San José maintains Cherry Flat dam.

Dam and reservoir maintenance activities may include infrastructure maintenance including roads, repair or replacement of dam components and stream flow equipment, vegetation clearing on the dam face, and removal of rodent burrows. Direct impacts associated with activities such as road maintenance and vegetation management are similar to those identified above including permanent and temporary loss of vegetation around facilities.

The net effect of dam face maintenance is to permanently clear the face and abutments of dams of all deep rooted vegetation that could impair the integrity of the dam face or inhibit regular inspection of the dam face for leaks and seepage. While the frequency and extent of covered species use of dam faces is not well quantified, there is a potential for covered species such as California red-legged frog, California tiger salamander, and western pond turtle to use this habitat under current conditions.

SCVWD Dam Maintenance Program

SCVWD's Dam Maintenance Program is a covered activity under both the Habitat Plan and the proposed Three Creeks HCP. The Dam Maintenance Program describes activities conducted by SCVWD to operate, maintain, and repair water supply facilities including dams, appurtenant structures, and downstream recharge facilities. These activities include the activities discussed above, but also extend to burrow management on the dam face and sediment removal from the reservoir basin.

SCVWD requires that all burrowing animals are to be removed and burrows filled. The effect of these activities is to make the habitat permanently unsuitable for covered species, including covered plant species. Routine and corrective dam maintenance requires filling of burrows to prevent seepage from causing internal dam erosion, which can lead to dam failure. Burrow management involves both efforts to reduce the populations of burrowing animals such as ground squirrels and excavation and re-compaction of any burrows that are found on the dam face and abutments. Therefore, this activity could potentially affect covered species that may be using the burrows as refugia.

Reservoirs require sediment management to maintain reservoir function (e.g., removal of sediment that blocks inlets), and to provide a source of native gravels for downstream aquatic habitat enhancement. This activity requires sediment extraction and hauling at the upstream end of the reservoir and sorting, cleaning, drying, stockpiling at the new gravel augmentation facility described in Section 2.3.3 *In-Stream Capital Projects*. Extraction and hauling require the use of heavy construction equipment.

SCVWD has identified a footprint for each of its dams in which regular dam maintenance will occur. For the purposes of the impact analysis, it is assumed that all natural land cover types will be permanently removed from dams.

Direct and indirect impacts associated with a dewatering event for maintenance purposes and for provision of supplemental water supplies are the same as those discussed in *Dam Seismic Safety Retrofit*, however, impacts may occur at a reduced scale, as full dewatering of the reservoir is not always needed for maintenance activities.

Non-Routine Stream Maintenance

Most in-stream maintenance in the study area is performed by SCVWD and is currently covered under that agency's Stream Maintenance Program. However, as discussed in Chapter 2, some activities, such as those taking place in serpentine habitats, are considered non-routine and are excluded from the Stream Maintenance Program. Specific non-routine stream maintenance activities covered by this Plan include extensive, one-time vegetation management in the lower Llagas Creek flood control channel, repair and maintenance of canals

(including in serpentine areas), winter season work in canals, invasive vegetation management, maintenance of stream gage and rain gage facilities.

Vegetation management in lower Llagas Creek is expected to reduce overall vegetation in the channel by approximately 50% in perpetuity (once vegetation is initially removed, long-term maintenance to the 50% level will be covered by the Stream Maintenance Program permits). Invasive vegetation management is intended to result in a permanent reduction of invasive vegetation but an increase in native plant species as the site allows.

Repairs to canals including bank stabilization, sediment removal, and vegetation management not otherwise permitted by the Stream Maintenance Program (e.g., in serpentine vegetation areas and during the wet season) are covered under this Plan. Bank stabilization activities may result in both permanent and temporary impacts depending on the size of the project and approach to stabilization used. For example, if rock rip-rap or concrete is required, any natural land covers at the site would be permanently removed. If, however, the repair can be made using compacted earth, then the site would be re-seeded and the site would likely return to pre-project conditions the following growing season. Vegetation management in serpentine communities is likely to result in the permanent loss of such vegetation. Wet season work may result in water quality issue in the canals or the streams to which they connect. Distance to the closest stream and the nature of the canal in the intervening reach will affect the degree to which this potential effect is observed. For example, if the canal is vegetated downstream of the project site, then sediment may be filtered or settled out before reaching the stream connection. Implementation of avoidance and minimization measures described in Chapter 6 will help reduce such potential effects.

Other projects covered under this category are expected to result in temporary reductions in vegetation at project sites.

Three Creeks HCP In-Stream Operations and Maintenance

The proposed Three Creeks HCP describes activities associated with reservoir operations and maintenance, and recharge operations and maintenance. These types of activities will also occur at Uvas and Chesbro dams which are not covered under the Three Creeks HCP but are covered under the Habitat Plan. As such, impact mechanisms for these types of activities are discussed for the entire Habitat Plan study area in the following sections.

Three Creeks HCP Conservation Program

As discussed above, the proposed Three Creeks HCP includes a suite of activities to enhance conditions for steelhead trout and Chinook salmon, while maintaining use of local watersheds to meet the water supply needs of northern Santa Clara

County. The following actions include components of the Three Creeks HCP Conservation Program that are in-stream operations and maintenance activities.

Reservoir and Recharge Re-Operation

The proposed Three Creeks HCP Conservation Program includes modifications of reservoir and groundwater recharge operations to enhance flow, temperature, and water quality conditions in the channels downstream of reservoirs to promote better fish habitat. These activities will be implemented at Coyote Creek, Upper Penitencia Creek, and Alamitos Creek (Almaden Reservoir and the Alamitos Diversion).

These actions are intended to mimic natural conditions in support of salmonids. They are also expected to have beneficial effects on covered species for this Plan. More natural flow patterns, including large flushes of water, may clear fine sediments from stream channels and vegetation, thus improving egg laying substrate for amphibians. In addition, flow management is expected to support benthic macroinvertebrates which form the base of the stream system food chain.

Upper Penitencia Creek Management Program

The Upper Penitencia Creek Management Program requires specific timing of water supply operations including reservoir releases. These types of activities are discussed above under *Proposed Operating Rules for Reservoirs*. This activity may also require replacement or removal of existing infrastructure. This type of activity could result in impacts similar to those described above for minor construction activities in streams. Potential impacts may include permanent and/or temporary impacts to riparian vegetation and ground disturbance.

Supplemental Flow Program

SCVWD has developed a program to provide supplemental flows to the base of Anderson and Calero Main dams to ensure that the conservation strategy flow targets for summer flow targets can be reliably met under a variety of conditions, such as implementation of DSOD Interim Storage Restrictions, short-term equipment failures, and scheduled and unscheduled maintenance that requires reservoir dewatering. Temporary pipelines will be installed prior to the initiation of a dewatering event and when supplemental flows are required. Temporary pipelines will be removed when supplemental flows are no longer needed.

The source of supplemental flows varies from reservoir to reservoir and provision of flows may require installation of a temporary pipeline, use of trucked water, bypass of flows from upstream of the reservoir, use of imported water, or installation and use of a new groundwater pumping system including new pipelines. Imported or recycled water will only be used if it can meet temperature and water quality criteria. Although uncommon, it is possible that imported water contain exotic fish or other invasive species. While many of these exotic species already exist below the dams, increased numbers of exotic species may increase the level of predation on covered species.

New infrastructure installed to provide supplemental flow will be installed along existing roads and pipelines within the disturbed footprint, or within the Dam Maintenance Program area of routine maintenance. Therefore, no additional

impacts to land cover are expected as a result of supplemental flow infrastructure installation.

Monitoring Program

SCVWD will conduct monitoring of species covered by the proposed Three Creeks HCP. The monitoring program will include the same types of activities described below in Section 4.3.7 *Conservation Strategy Implementation*, subheading *Activities within the Reserve System*.

4.3.4 Rural Capital Projects

Rural capital projects (those capital projects occurring outside the planning limits of urban growth) are likely to have the same types of direct, ground-disturbing impacts as development within the planning limits of urban growth. However, like rural development, the severity of impacts associated with rural capital projects is likely to be greater than impacts associated with urban projects because urban projects typically occur in areas that are already degraded. A discussion of direct and indirect impacts associated with the major types of rural capital projects covered by this Plan is presented below.

Rural Transportation Projects

Most of the road projects covered by this Plan are expansions or improvements of existing roads, highways, and intersections. Additionally, VTA plans to install a parallel set of tracks alongside the existing Caltrain route from San José to Gilroy. The County has identified three new roads in the permit area outside of the planning limits of urban growth: a connection of DeWitt Avenue to the West Edmundson Avenue / Sunnyside Avenue intersection near Morgan Hill, a connection on Center Avenue between Omar Avenue and Buena Vista Avenue northeast of Gilroy (requires a new stream crossing), and a connection between Center Avenue and Hill Road across Maple Avenue immediately south of Morgan Hill. VTA is planning to construct one new connector road as part of the U.S. 101 Improvement Project (Monterey to SR 29). This road would be an extension of Santa Teresa Boulevard from Castro Valley Road to U.S. 101 at the SR 25 interchange and requires a new stream crossing. This connector road is just outside of Gilroy's planning limit of urban growth. These projects are anticipated to have permanent, direct impacts on natural land cover types, and therefore on covered species.

Implementation of these projects would result in permanent impacts on land cover within the footprint of each project. Indirect impacts may also occur as a result of expanded roads. In the absence of designs to minimize these effects, wider highways and freeways, already difficult for wildlife to navigate, will intensify road crossing hazards for wildlife and result in increased vehicular strikes. The disruption of wildlife movement results in increased habitat and population fragmentation by creating more extensive and obstructive barriers between populations and habitats. Expanded roads that support a higher volume

of traffic may also result in increased runoff of car waste (e.g., oil, grease, radiator fluid) and debris (e.g., tires, litter, car parts), which may be hazardous to wildlife. Increasing the total amount of roads, even dirt roads, can lead to increased sediment in the watershed from concentration of hillslope and surface runoff, which causes higher peak flows and contributes to bank erosion. In addition, expanded roads can create substantial noise and physical disturbance that may disturb or disrupt covered species far from the road. Finally, as discussed above in Section 4.3.1 *Urban Development* increases in vehicular traffic will result in increased nitrogen deposition in areas adjacent to roadways.

Road expansion projects adjacent to cultivated agricultural areas are expected to have less severe direct and indirect effects than road projects adjacent to natural land cover types because the habitat value of cultivated agriculture is lower. Measures to avoid and minimize the impacts of covered transportation projects, including design measures for new and expanded rural roads, are described in Chapter 6.

South County Airport Expansion

Permanent and temporary direct impacts related to the proposed expansion of the South County Airport as identified in the South County Airport Master Plan are similar to impacts of other capital projects that result in the conversion of non-developed land–cover types to developed uses.

Indirect impacts associated with expansion of the South County Airport include increased noise due to higher usage. Lighting improvements proposed in the master plan may also have indirect impacts on covered species if bright lights are used at night. However, the South County Airport is located in a rural residential area just west of U.S. 101. While ruderal and annual grassland habitats on this project site and in surrounding areas support foraging habitat for many raptor species, the indirect impacts associated with increased noise and/or lights are expected to be minimal. Though suitable habitat for western burrowing owl is present in and around the South County Airport, there are no recent occurrences of western burrowing owls breeding at the site. If the species colonizes the airport, expanded operations may have indirect effects through increased lighting and noise. These potential indirect effects are not anticipated to preclude use by burrowing owls, as demonstrated by the continued use by this species of the San José International Airport nearby, which has much greater levels of aircraft activity and generates much more lighting and noise than would be generated by the South County Airport expansion. Should this species be documented at the site prior to airport expansion, the conditions on covered activities, described in Chapter 6, would be employed to minimize effects.

Expansion of the airport runway is not anticipated to result in increased bird strikes; however, increased use of the airport (i.e., more flights) may result in increased bird strikes. Approximately 100 new hangars were completed at the South County airport in 2005. The master plan identifies a potential future increase in the number of hangars, tiedowns, and fixed base operators that can be accommodated at the airport. Such expansion is likely to lead to increased use of

the airport as a result of more pilots choosing to base their planes at the airport as the population and the abundance of commercial and industrial activities around the airport grow. The extent to which bird strikes may increase is unknown at this time. As noted in Chapter 2, the NEPA/CEQA environmental compliance documents for the proposed master plan have not yet been prepared. However, the number of aircraft based at the South County Airport has almost doubled in the past 3 years, and a significant change in the number of bird strikes has not been recorded. Moreover, there have been no reported bird strikes at the airport in the last 8 years (Honaker pers. comm.). It is anticipated that the potential for increased bird strikes will be evaluated in the environmental compliance documents and avoidance measures identified if it is determined that an increase in bird strikes is likely to occur.

Kirby Canyon Landfill Development

Direct, permanent impacts associated with the Kirby Canyon Landfill development in Fill Areas 3 and 4 include loss of natural land cover types in the footprint of the fill areas and of supporting facilities including roads and sedimentation basins. Temporary impacts may occur in areas where the ground is disturbed during landfill operation activities but revegetated to pre-project or ecologically improved conditions within the time allowed for temporary impacts.

Indirect impacts associated with noise and light are not expected to increase over the current level since the Plan assumes that the amount of waste deposited to the landfill (also called the "disposal rate") will remain consistent with current operations. Indirect impacts could occur if the landfill lining fails, and water that has come in contact with waste (called "leachate") enters the natural ground or surface water system. However, considerable technological efforts are used to prevent leachate from coming into contact with groundwater, and potential impacts are both regularly monitored and addressed by state over-sight agencies. Overall, landfill design and construction methods are sufficiently advanced that a significant indirect effect is unlikely to occur. If it does occur, the mechanism to stop and repair the impact is in place through agency regulation (i.e., the Regional Water Quality Control Board). This Plan does not authorize take associated with a failure of the landfill lining.

Off-Channel Groundwater Recharge Ponds

Several water supply projects are planned in the permit area during the permit term. These include the development of groundwater recharge sites on the valley floor in the Coyote Valley and around San Martin; and infrastructure, such as access roads and conduits, required to support these projects. Implementation of these projects would result in permanent impacts on land cover within the footprint of each project (i.e., loss of undeveloped land cover types to new structures). As is true of other capital projects, some temporary impacts outside the project footprint are expected during construction due to access and staging

needs. Direct impacts of operating new off-channel groundwater recharge basins include potential entrainment of covered aquatic species in outtakes from creeks.

Increases in the number of groundwater recharge sites may result in an increase in groundwater levels, and thus there is a potential to affect local streams by increasing in-channel flows. This effect is only expected to be observed during winter and spring when surface water is most available and SCVWD is actively working to recharge groundwater basins. Any increase in in-channel flows may help to offset the reduction in winter flows resulting from the operation or reservoirs and recharge ponds described in Section 4.3.3 *In-stream Operations and Maintenance* subheading *Reservoir and Recharge Pond Operation*. However, changes to groundwater levels due to recharge that occur within the same hydrologic unit (e.g., the south county Pajaro River basin) may result in no net change in average groundwater levels over time if the recharge and extraction are occurring at equal levels. This will likely be the situation in an average water year. Wet water years may experience high levels of recharge with reduced pumping and stream flows could increase (consistent with the natural process of a wet water year). Dry water years may result in reduced availability of water supplies, and thus less groundwater recharge will occur, more consistent with existing conditions where no recharge ponds currently exist.

Indirect effects of groundwater recharge basins may result from new ponds supporting nonnative predators of covered species. This potential affect could be exacerbated if the new ponds provide habitat to covered species (e.g., vegetation around ponds) and recreational access to the general public. As discussed above, ponds that allow recreational access may be targets for illegal dumping of invasive species (e.g., bass or red-eared slider turtles) that could prey upon covered species using the ponds.

It is unlikely that these projects would result in unanticipated population growth, because these projects are planned to meet currently anticipated demands.

Other indirect impacts may result from the construction of new access roads in areas of little development. As discussed above, new roads in rural areas can cause habitat fragmentation and obstruction of wildlife movement corridors. However, these factors are unlikely to be an issue for three of the four proposed groundwater recharge ponds, because the ponds are located on the valley floor in Morgan Hill and San Martin in an area that is already urbanized or rural residential. The fourth pond is planned for the Coyote Greenbelt in an agricultural area. Because this area is already developed for agriculture and has development both to the north and south of it, it is likely that existing roads may be used to access the site and that habitat and connectivity will not be further affected.

Park Facility and Trail Construction

The cities, County, and Open Space Authority will construct new park facilities and trails in the permit area within the permit term of the Plan. Each of the three cities has developed a master plan for parks and trails within respective planning

limits of urban growth. The County has also developed master plans for each of its parks for which new facilities and trails are proposed (see Section 2.3.5 *Rural Capital Projects* for a full list of master plans).

Major components of developing new parks include the construction of a park entrance (if one does not exist), access roads, staging areas, parking areas, and new trails. Construction of these facilities will have permanent and temporary direct impacts similar to those of other capital projects (i.e., permanent conversion of land cover beneath the footprint of the project, with temporary impacts occurring in a buffer zone around the project site). Ground disturbance due to construction would likely increase the spread of nonnative species, especially in areas not previously disturbed. New trails will be sited to avoid streams and adjacent riparian vegetation whenever possible in accordance with the conditions identified in Chapter 6. However, some new trails will require creek crossings that may result in removal of riparian vegetation and construction of bridges. While some temporary impacts on streams are likely to occur during project construction, many impacts can be avoided through implementation of avoidance and minimization measures and other mitigation measures. In addition, permanent impacts on streams can be avoided through use of appropriate design of crossings (e.g., free-span bridges).

New trails may also require construction materials (e.g., rock, soil, clay) that are taken from borrow sites. Specifically, County Parks anticipates using up to 3 acres for development of borrow sites. This amount of borrow would be used across all parks throughout the permit term. Whenever possible, borrow sites will be located so that they can be used to create habitat for covered species (e.g., a borrow site can be used as a created pond for California tiger salamander). In these cases, development of borrow sites will result in the conversion of one land cover type (e.g., grassland) to another land cover type (e.g., pond). Areas around the borrow site may be temporarily disturbed during borrow site construction.

New park facilities will include parking areas, both unpaved and paved, and new trailhead facilities for multiple trail uses which may also include construction of restrooms, fencing, railing, boundary controls, kiosks, and access roads to the trailheads. Whenever possible, these facilities will be developed in existing disturbed areas and are sited to avoid sensitive land covers. Streams and riparian land covers will be avoided entirely. However, some direct loss of non-developed land covers is expected.

Development of new large recreational facilities such as golf courses will have similar impacts as described for urban development. County Parks anticipates that development of such large facilities will occur in valley floor areas in urban or rural residential settings, thus these facilities are more likely to affect urban and agriculture natural communities as opposed to other less developed natural communities and land covers.

In addition to developing new recreational facilities, County Parks anticipates conducting restoration and resource management activities on lands that are not included in the Reserve System. Restoration and resource management projects

on these lands will have similar impacts to those described below under Section 4.3.7 *Conservation Strategy Implementation.*

Indirect impacts related to development of trails and new trailhead facilities are largely related to ongoing anticipated use of trails and facilities, as well as to inappropriate use of trails (e.g., off-trail hiking, illegal dumping). Indirect impacts related to public use of regional parks and open space as described above in Section 4.3.1 *Urban Development* may result from improved trail access to new open spaces, including areas in the Reserve System. These impacts may be minimized through supervision of regional trail use, education of open space users, and restricted or managed access to open space. Indirect impacts may also be related to increased noise in areas where trail head facilities are located, increases in the amount of trash that escape into natural areas and into local streams, and increased use by pets which may harm or harass covered species. Development of fishing ponds and stock ponds may increase the presence of nonnative species like bullfrogs and red-eared sliders that predate on and compete with covered species.

Up to 40 wells or spring boxes may be constructed in County parks. These wells and spring boxes have the potential to indirectly impact seeps, springs, stream flow, and riparian vegetation health. If a well is placed in such a manner that it draws down groundwater levels along a reach of stream, that reach may experience reduced flows. Reduced flows can occur either from a reduction in groundwater supporting the streamflow or from the more rapid percolation of flows from the upper watershed into the channel substrate, filling the space once occupied by groundwater. Reduced flows may degrade aquatic habitat or prevent riparian vegetation from obtaining adequate water. Lowering of the groundwater table could also result in the drying up of seasonal wetlands or seeps. The wells and spring boxes installed in County parks are not expected to have an effect on groundwater level due to the low level of extraction required to support ponds and because wells will be sited to avoid impacts to aquatic land covers. Wells that are found to result in adverse effects to adjacent streams will be decommissioned and sited elsewhere.

A beneficial effect of developing trails in suburban or urbanizing areas, such as the Coyote Valley, is that trails (e.g., Coyote Creek trail within the Coyote Creek Parkway) have been documented to facilitate nocturnal movement of wildlife such as American badgers, bobcats, Tule elk and other species within the riparian corridor and eventually across the valley floor.

4.3.5 Rural Operations and Maintenance

Rural infrastructure requiring maintenance includes trails, roads, buildings, and park trailhead facilities. Maintenance activities are generally expected to have minimal permanent or temporary direct impacts because the vast majority of these activities occur within the disturbed roadbed or shoulder or in other areas that have been previously disturbed.

Utility Maintenance

Existing utility lines, including pipelines, will likely require maintenance and possibly replacement during the permit term. Most of these lines will be underground and may require excavation to access the lines. Direct impacts include ground disturbance resulting from excavation, access, and staging. All natural areas disturbed by utility maintenance activities will be returned to pre-project or ecologically improved conditions in the time allowed for temporary impacts and in accordance with the conditions in Chapter 6 or the impact will be considered permanent. Indirect impacts associated with this activity are similar to those of other ground-disturbing work; such impacts can be avoided and minimized with use of appropriate avoidance and minimization measures described in Chapter 6.

Facility Maintenance

Facility maintenance refers to maintenance of existing facilities such as buildings, roads, trails, parking lots, airport property, and so on. A large component of this maintenance is vegetation management. Vegetation management along road shoulders and rights-of-way may have the potential to disturb a narrow strip of habitat for covered species and possibly to injure or kill individuals that occur in this habitat. Impacts can be associated with accessing areas, clearing vegetation in order to perform maintenance activities, or managing vegetation to prevent overgrowth and for fire prevention and management. Impacts may also be associated with application of fertilizers or pesticides that are commonly applied to landscaped areas or turf maintained for public parks, play fields, and golf courses. Over application of fertilizer and pesticides may result in these substances washing off the target vegetation and entering local streams where it may cause indirect impacts including algal blooms or mortality of non-target species, including covered aquatic species. Impacts related to vegetation management may be permanent or temporary (e.g., trees completely removed may not reestablish, while mowed vegetation will likely regrow in a short time). Maintenance work involving minor grading or soil disturbance could cause increased sediment discharge into watercourses. However, implementation of standard avoidance and minimization measures should help reduce temporary impacts of such activities.

SCVWD maintains off-channel groundwater recharge ponds. Direct impacts on wetland vegetation around the perimeter of the ponds may result from accessing basins for sediment removal or to clear the areas around intake and outlet structures. Impacts may also occur from annual dry-cycling (when the pond is drained and maintained in a dry condition) which can eliminate aquatic species and standing biomass. This maintenance would adversely affect covered species using the pond; however, it is also beneficial as it eliminates any exotic species or vegetation using the pond. Elimination of exotics also helps slow the spread of exotic species from ponds into surrounding natural areas. These impacts are expected to be minimal and would equal approximately 20 square yards at each facility. Facilities would be maintained approximately once every year (J. Abel

pers. comm.). SCVWD also maintains 39 rain gages throughout the permit area, mostly in the upper watersheds and away from streams. Maintenance activities focus on vegetation clearing to maintain the catch of the gages. In addition, some vegetation clearing may be required to access gages from roads or trails.

The County of Santa Clara conducts maintenance of its facilities including, but not limited to, medical facilities, correctional facilities, shelters, shooting ranges. Some of these activities may directly affect non-developed land covers or result in indirect effects similar to other effects described in this section (e.g., temporary loss of natural land covers, temporary increases in light and noise pollution).

County Parks conducts maintenance of infrastructure such as trails, roads, parking lots, and offices that may include treatments such as mowing for fuel breaks. Such maintenance could result in direct temporary impacts, especially if work is conducted on trails through sensitive land cover types. However, as a natural resource management agency, County Parks implements avoidance and minimization measures and strives for zero impact in all its operations. Any impacts on upland land cover types resulting from operations and maintenance in County parks is likely to be minimal.

Vegetation management conducted during the migratory bird breeding season could result in the loss of habitat for migratory covered birds such as western burrowing owl, least Bell's vireo, or tricolored blackbird. The Habitat Plan requires that vegetation management occur outside the migratory bird nesting period, or surveys will be conducted before clearing to avoid these impacts (see Chapter 6, Section 6.3, subheading *Condition 1 Avoid Direct Impacts on Legally Protected Plant and Wildlife Species*).

Rodent, pest, and invasive plant species abatement activities may be conducted for facilities maintenance. Animal traps, pesticides, and herbicides may be used to control rodents, pests, and invasive plant species. Pesticides and herbicides have strict handling and application requirements; however, potential indirect effects include potential effects on non-target species by applied chemical treatments. For example, pesticide placed for rodents could affect California tiger salamanders seeking refuge in rodent burrows. These potential effects will not be covered under the Section 10(a)(1)(B) permit.

Pond Maintenance

Pond maintenance outside the Reserve System will be implemented consistent with the covered activity description in Chapter 2 and conservation actions for pond maintenance in Chapter 5. Impacts will be consistent with those described below in Section 4.3.7 *Conservation Strategy Implementation* subheading *Activities within the Reserve System*.

SCVWD Pipeline Maintenance Program

SCVWD developed an EIR for the Pipeline Maintenance Program that identifies direct permanent and temporary impacts of a variety of activities, including staging, off-road access, pipeline drainage, excavation, and repair. Impacts may affect aquatic resources and riparian or upland natural communities. Direct impacts associated with staging are similar to other staging impacts described above. Off-road access may cause temporary impacts on upland vegetation around accessed pipelines or on riparian vegetation where creek access points are established so that blow-off (pipeline drainage) can be directed to local watercourses. Off- road access may also result in direct mortality or injury of covered species. These effects will be minimized because SCVWD will use existing access roads wherever possible and will limit off-road travel to disturbed areas. Off-road travel will avoid sensitive communities such as wetlands and known occurrences of covered plants. Blow-off may cause disturbed soil and vegetation at blow-off locations, increased flows in the receiving channel, and channel erosion. Excavation may be required to access buried pipelines in upland or riparian areas.

SCVWD will utilize avoidance and minimization measures to reduce the level of impact caused by these covered activities (see Chapter 6).

Indirect impacts associated with the Pipeline Maintenance Program include temporary increases in dust and noise around project areas. Off-road vehicle travel could also result in the spread of nonnative invasive plants. Other indirect impacts may result from temporarily altered flows downstream of the site where pipeline water is discharged. Changes in flow could result in impacts similar to those described in Section 4.3.1 *Urban Development*. However, the scale of impact would likely be much smaller due to the frequency of maintenance (no more than 10 blow-offs per year and maintenance of up to five pipelines per year) and the implementation of avoidance and minimization measures. Additional indirect impacts could occur if blow-off water is a different temperature than stream flow, causing a temperature fluctuation in the stream.

4.3.6 Rural Development

Rural development, or exurban development, is loosely described as low-density development at or beyond the rural-urban fringe (Glennon and Kretser 2005). Direct and indirect impacts related to rural development are similar to those discussed above in Section 4.3.1 *Urban Development*. Many important causes of habitat loss and fragmentation stem from changes of land use on private lands, especially conversion of agricultural lands to residential development (Theobald 2003). Development of homes and associated structures (e.g., roads, garages, barns, stables, vineyards) and non-residential development (e.g., telecommunications facilities, agricultural structures, rural commercial development, recreational use areas) in rural areas, including ranchland, will have direct impacts on natural land cover types in areas where structures and infrastructure are built. While the footprint of development per acre may be

lower, the impact of habitat fragmentation is higher in rural areas than in urban areas, because the existing landscape is generally less disturbed prior to project construction. From an ecological perspective, this dispersed pattern of development effectively maximizes the individual influence of each home on the land (Lenth et al. 2006).

Moreover, private roads and driveways are often required to access rural homes; such roads further fragment the landscape and potentially degrade movement corridors for covered species. New roads can also create new hazards or barriers to other native species that depend on long-distance dispersal and movement for survival (e.g., American badger, Tule elk, black-tailed deer, bobcat, mountain lion). Finally, roads and other linear projects create dispersal corridors for nonnative plants. Exurban development tends to result in an increase in generalist wildlife species commonly found in urban areas (e.g., opossum, skunk, coyote, American crow), and a decrease in specialized or human-sensitive species (Glennon and Kretser 2005; Lenth et al. 2006). Such trends decrease the health of natural communities and could result in harm of covered species. Cumulatively, these rural development projects fragment the landscape and make it more likely that wildlife populations will become segmented and isolated.

Impacts from light pollution and noise may also be more significant when introduced into areas where they did not previously exist. Noise from vehicle traffic can disrupt nesting birds and typical movement patterns of terrestrial animals. New sources of light in formerly unpopulated areas can affect the ability of some species—especially birds, bats, and many species of insects—to navigate at night.

In addition to residential development, industrial private development projects include the Z Best Composting facility, the Pacheco Pass Landfill, and Freeman Quarry. The County has identified three public projects that may require ground disturbance: James Ranch and Holden Ranch (separate facilities but physically adjacent), the Muriel Wright Center, and the Mariposa Lodge and Sheriff's Firing Range (separate facilities but physically adjacent). These activities would also result in conversion of natural or semi-natural land cover types to developed land cover types and result in similar impacts as described for other rural development projects. The Mariposa Lodge and Sheriff's Firing Range facilities are located in serpentine bunchgrass grassland and implementation of this project is expected to affect up to 27.5 acres of this land cover type.

Indirect impacts on natural land cover and covered species may result from an increase in impermeable surfaces; as described above in Section 4.3.1 *Urban Development* such increases can result in impacts on streams. Additional indirect impacts on streams could result from the use of septic systems. If leach fields are sited too close to waterways, the nutrient-rich liquid exiting the septic tank may travel into the waterway and cause abundant algal growth, degrading water quality. Leach field seepage may also alter the native vegetation if nutrient-rich water reaches the surface. Within the study area, water quality impacts may arise from the use of pesticides and/or fertilizers on small "hobby" orchards or vineyards, or from horses or other livestock that are kept close to streams. Similarly, new agricultural facilities, such as commercial stables, equestrian

event facilities, and wineries, may also produce waste that is rich in nutrients or other potential pollutants for local streams. In addition, exposed soils common to vineyards and equestrian or livestock enclosures are potential sources of erosion and sediment input to streams. This is exacerbated in cases where vineyards are developed in steep terrain. Existing County ordinances, as well as strict NPDES permits overseen by the Regional Boards, require many avoidance and minimization measures targeted at protecting water quality in local streams.

Existing land use restrictions and requirements also substantially limit the footprint and extent of rural development. For example, almost all of the areas intended to be incorporated into the Reserve System (see Chapter 5) are large land holdings designated as Hillside or Ranchland land uses under the County General Plan. In these areas, the maximum development density allowed is one residence per 20 to 160 acres, based on the average slope of a parcel. Subdivision of sites designated Hillside or Ranchland seldom occurs and this pattern is not expected to change during the permit term due to the physical challenges of development in most of the study area. Under County policies, most subdivision proposals for Hillside parcels are required to cluster future development and preserve a minimum of 90% of the site as open space. If suitable (as determined by the Implementing Entity), these large set-asides could be incorporated into the Reserve System. County policies and regulations also require that grading be minimized in Hillside and Ranchland areas through the site design process, which emphasizes compact development. These land-use restrictions help to minimize the effects of rural development on covered species and natural communities.

4.3.7 Conservation Strategy Implementation

Activities related to the implementation of the conservation strategy that may result in impacts are separated into two groups: activities that will occur within the Reserve System and activities that will occur outside the Reserve System. Both groups of activities are described below.

Activities within the Reserve System

Activities within Plan reserves are expected to have a net benefit on all covered species (see Chapter 5 *Conservation Strategy*); nevertheless, some conservation actions may have temporary or limited permanent adverse impacts on covered species, resulting in take. In other cases, activities that are designed to benefit one or more covered species may harm another set of covered species. However, the Plan Reserve System is designed to be large and diverse enough to ensure that the net effect of all reserve activities is beneficial to all species across the system.

Some habitat enhancement, restoration, and creation activities may temporarily and adversely affect wildlife habitat. For example, planting emergent vegetation in stock ponds could temporarily disturb amphibians occupying the pond.

Periodic dredging of ponds to maintain pond capacity and habitat quality may also have temporary adverse effects on pond species. The cleared bank conditions that precede establishment of native riparian plants can also trigger rapid establishment of weedy or undesirable aggressive species if these species are not controlled at the site. Man-made livestock pond removal will be only undertaken if removal improves the functional values of the site or if the pond is a safety hazard. If such actions are taken, the Implementing Entity will replace the pond lost with a new pond in another location in the Reserve System consistent with the requirements of the conservation strategy. Naturally formed ponds will not be removed.

Another example of habitat enhancement actions that may temporarily and adversely affect wildlife habitat is road removal. Road removal will only be undertaken if the benefits are determined to outweigh the adverse effects. For example, it may be appropriate to remove a road that is poorly sited such that it is contributing to localized erosion. It may not be appropriate to remove a road that is not causing other adverse impacts. In such cases, instead of removal, a road may simply be closed off from access.

Monitoring and research activities required by the Plan (see Chapter 7 *Monitoring and Adaptive Management Program*) may also disturb wildlife. For example, in order to determine the presence of some covered species (e.g., California red-legged frog tadpoles), individuals must be handled by a qualified biologist. Such handling constitutes harassment—a form of take—under ESA and requires authorization. All biologists conducting monitoring under the Plan (i.e., Implementing Entity staff or their consultants) will be covered for their monitoring activities should any take occur. See Chapter 6, Section 6.8.5 *Item 5: Results of Applicable Species Surveys and Monitoring* for details on biologist certification to conduct monitoring activities. Translocation activities, which must be coordinated with and approved by the Wildlife Agencies, could also cause take through injury or loss of individuals due to capture, handling, transportation, release, and/or the inability of the individual to find new shelter.

Terrestrial management activities may also disturb or inadvertently harm covered species. For example, fuel breaks must be created in key areas of the Reserves to minimize the risk of wildfire and to protect structures and adjacent lands. Creating and maintaining these fuel breaks may have minor adverse effects on grassland-dependent species such as western burrowing owl and Bay checkerspot butterfly. Prescribed burns will be designed to provide long-term net benefits to natural communities and covered species. However, these burns may result in take of some covered species during the burn. For example, burns in serpentine grassland may adversely affect serpentine covered plants or take Bay checkerspot butterfly larvae. Prescribed burns in annual grassland may temporarily adversely affect western burrowing owl (although burns may also provide new sources of prey to these species, such as insects escaping flames and smoke). Wildfires may have similar adverse effects on covered species as prescribed burns, but these effects may be more severe due to the greater size and intensity of wildfires.

The conservation strategy calls for installation of up to 49 wells to support ponds in the Reserve System. Potential indirect effects related to the installation of

groundwater wells were previously described in Section 4.3.4 *Rural Capital Projects* subheading *Park Facility and Trail Construction.* The groundwater wells installed to support ponds in the Reserve System are not expected to have an effect on groundwater level due to the low level of extraction required to support ponds and because wells will be sited to avoid impacts to aquatic land covers. Wells that are found to result in adverse effects to adjacent streams will be decommissioned and sited elsewhere.

Recreational or management facilities built and maintained within the Reserve System could result in a small amount of habitat removal. Facilities will be sited and built to avoid or minimize their effects on covered species, but a small amount of take may nevertheless occur. The Permittees are covered for incidental take of covered species resulting from public use within the permit area, inside or outside of the designated Reserve System, provided that usage is consistent with park management plans and the guidelines of this Plan. Although the permits do not cover incidental take for private individuals, recreational activities allowed on reserves are expected to have some minor impacts on covered species. Heavily used trails would result in some permanent indirect impacts on wildlife habitat connectivity. Since wildlife is most active at dawn and dusk or at night, disruptions of wildlife movement are not anticipated to be significant. Trails can fragment otherwise intact landscapes and can also facilitate predator movements and invasion by nonnative animals (e.g., feral cats, dogs, pigs). Trails are often a source of invasion by nonnative plant species that are transported into the reserve by trail users. As described in Chapter 5 *Conservation Strategy* recreational uses will be limited to low-intensity activities such as hiking, wildlife observation, horseback-riding and non-motorized bicycling. Any new trails will be carefully sited and maintained to minimize the disturbance of habitat and wildlife, as well as sited and maintained to avoid disturbance of cultural and archaeological resources within reserve areas. Despite these restrictions, some take in the form of harassment associated with recreational activities is expected to affect covered species that are sensitive to human disturbance.

Implementation of the Plan conservation strategy could also affect covered plants through habitat enhancement or restoration and creation which could result in removal of or degradation to species habitat. Plant populations in the Reserve System could also be temporarily affected by management activities such as prescribed burning or livestock grazing although the long-term effects of these activities are expected to be positive. The Plan also includes many types of monitoring which can occasionally have impacts on individual plants in the form of trampling or soil disturbance. In all of these cases, the benefits from Plan implementation are expected to greatly outweigh any negative effects of implementation on the covered plants.

In addition to the conservation actions described above, it will also be necessary for the Implementing Entity to install or replace infrastructure in the Reserve System including signage, fences and gates, field facilities, dirt roads, paved roads, vehicle bridges, and culverts in order to conduct required management and monitoring activities. These activities would have permanent impacts similar to other covered activities. Temporary construction impacts are likely as well. All

facilities within the Reserve System will be sited on already disturbed areas to the extent possible and in areas that minimize effects on covered species. All activities will comply with the conditions on covered activities in Chapter 6.

Activities outside the Reserve System

The Plan proposes to conduct stream and riparian restoration and other conservation actions, including removal of invasive weeds (e.g., *Arundo donax*), that will occur outside the Reserve System. As discussed in Chapter 5 (Section 5.2.3 *Reserve System*), these actions will require agreements to be reached with landowners regarding the installation and maintenance of the conservation actions. The Plan also calls for management of western burrowing owl, and the possible creation of a Coyote ceanothus occurrence outside of the Reserve System.

Stream and riparian restoration activities may result in temporary direct impacts during construction including loss of vegetation during restoration project construction, or removal of invasive weeds. All areas that experience reduced vegetative cover during construction will be replanted and monitored, in accordance with Chapter 7, to ensure that riparian vegetation reestablishes as part of the restoration project. As with implementation of conservation actions inside the Reserve System, these conservation actions are expected to have a net benefit on covered species that utilize stream and riparian habitats.

Burrowing owl management actions could occur on managed lands outside the Reserve System. These activities will likely occur on sites that have been previously impacted (e.g., capped landfills) as well as at sites that are more natural in nature (e.g., foothill grasslands). Burrowing owls prefer nesting sites with ample burrows, low slopes, and short grass. As such, a key management action will be to mow or graze management sites. It is not expected that this management will affect many other covered species as burrowing owl nesting habitat does not extensively overlap with habitat of other Plan covered species. However, if areas in the foothills are managed for owls, there is the potential for these sites to be also used by California tiger salamander or California red-legged frog for refugia. These species, as well as burrowing owl, may be temporarily affected by management activities due to presence of people, livestock, or equipment.

The Plan allows for the creation of new Coyote ceanothus populations outside the Reserve System. Coyote ceanothus is a large, woody shrub that often grows in dense, monotypic stands. Because of the possibility that a new creation could displace serpentine grasslands, siting of a created occurrence will minimize the potential for displacement of habitat for other covered species. The Implementing Entity will develop a plan with the Wildlife Agencies for the occurrence creation. The plan will include measures to avoid other covered species.

Monitoring for covered species and natural communities will also occur outside the Reserve System in the situations described above. Some monitoring actions

may result in temporary harassment of covered species in order to identify, measure, or tag individuals.

Neighboring Landowner Assurances

Because the conservation strategy aims to increase populations of covered species through habitat enhancement, restoration, and creation, certain species may disperse out of the Plan reserves where active management is undertaken and onto neighboring private lands. This Plan includes a Neighboring Landowner Assurances program to protect landowners in the permit area near reserves from the regulatory consequences of special-status species dispersing onto their property. Private lands within 1 mile of the Reserve System that are actively used for agricultural purposes (e.g., crop production) will receive take coverage under the Plan. The rationale for the 1 mile radius is described below. Coverage for nonagricultural lands is unnecessary because take coverage is already provided for urban and rural development; see Chapter 2.

Coverage will be provided to agricultural operations only for take beyond the baseline condition that existed prior to the establishment of the neighboring Reserves and only for ongoing and routine agricultural activities[5] on lands enrolled in the Neighboring Landowner Assurances program. Participation in this program is voluntary and landowners will be able to opt in for coverage. Coverage under the Neighboring Landowner Assurances program expires when the permits expire. See Chapter 10, Section 10.2.7 *Assurances for Private Landowners* for additional details of this program.

The impacts associated with the dispersal of covered species onto neighboring lands are anticipated to be very limited and restricted to species that meet the criteria listed below.

- Species that are expected to increase in numbers on the Reserves.
- Species that are likely to spread onto neighboring lands as populations increase.
- Species for which there is a reasonable likelihood of take from routine, ongoing agricultural activities.

The Neighboring Landowner Assurances program will extend coverage only for three species: western pond turtle, California red-legged frog, and California tiger salamander.

Although California tiger salamander, California red-legged frog, and western pond turtle are capable of dispersing further than one mile, a one mile buffer was chosen to account for typical dispersal range of these species. Covered species are expected to disperse or move more than 1.0 mile but this radius accounts for the most likely area of effect into neighboring lands.

[5] See Chapter 2 for a definition of ongoing and routine agricultural activities.

Based on the landowner participation in other counties with approved HCPs that have similar programs (e.g., San Joaquin County), it is assumed that up to 10% of eligible lands will enter into neighboring land agreements, or no more than 2,040 acres. Of this, it is assumed that most of the potential impacts will occur on land cover types that support farming (agricultural and grassland land cover types) which are used by California tiger salamander, California red-legged frog, and western pond turtle for non-breeding or dispersal habitat, not as breeding or primary habitat. The estimated range of acres impacted represents between 0.1% and 0.6% of modeled habitat for the species covered in the Neighboring Landowner Assurances program.

Adverse effects from allowable agricultural activities on western pond turtle, California red-legged frog, and California tiger salamander could result from rodent control, active farming practices, vehicle and machinery travel, runoff from fields, or disturbance to adjacent streams or wetlands. The habitat for these three species is typically of low quality (and non-breeding), so the magnitude of impacts is expected to be low or very low.

Like Safe Harbor Agreements offered by USFWS, the Neighboring Landowner Assurances program does not allow take of species present before the Reserve was established; rather, coverage is restricted to species that disperse onto lands after the creation of the neighboring reserve. Take granted through the Neighboring Landowner Assurances program may slightly reduce the beneficial effects of the conservation strategy. The Neighboring Landowner Assurances program is described in detail in Chapter 10 *Assurances*.

4.4 Impact Assessment Methods

Implementation of covered activities will result in some incidental take of covered species. To meet regulatory requirements, to properly mitigate effects, and to distribute fees equitably, the amount of take must be discussed and, if possible, quantified. The allowable amount of take from permanent and temporary direct impacts is quantified by estimating impacts on land cover (methods for impact estimation are described below) (**Table 4-2** and **Table 4-3**, respectively). The total impacts by land cover type shown in these tables are the allowable impacts under the permits and the primary way in which impacts will be tracked during implementation to ensure permit compliance. Impacts to plant populations will also be tracked to ensure permit compliance, as described below under *Effects on Plant Occurrences*.

Figure 2-6 and **Figure 2-7** show where many of the capital improvement projects proposed for coverage under this Plan are occurring. The amount of take is also described by estimating permanent and temporary direct impacts on modeled habitat for covered species (**Table 4-4**) and on plant occurrences (**Table 4-6**). If species habitat is not modeled, then land cover proxies are developed. The amount of take from indirect impacts is discussed qualitatively. A discussion of how the impact estimates were derived is provided below in Sections 4.4.1 *Direct Effects* and 4.4.2 *Indirect Effects*.

Because of the broad geographic and temporal scope of the Plan, the impact assessment has been conducted at a programmatic level. The impact numbers presented in this Plan are intended to reflect approximate losses and impacts rather than a precise quantification of impacts on land cover types. Total allowable impacts as described and quantified in the Plan (see **Tables 4-2, 4-3, 4-4, and 4-6**) represent the limit, or cap, on total impacts allowable under the Plan. Once these impact levels are reached, no further take is permitted pursuant to the Plan. Covered activities described in Chapter 2 do not have project-specific impact limits, although activities must be implemented consistent with the conditions described in Chapter 6. The Implementing Entity tracks impacts during Plan implementation to ensure that no covered activities are conducted beyond the capped impacts. As covered activities are implemented, specific impacts will be more accurately quantified. In general, project-specific impacts will be quantified in conjunction with the CEQA process and/or the development permit application process with a local jurisdiction (see Chapter 6). The goal of the impact analysis is to identify practical and appropriate impact assumptions to ensure the Local Partners full coverage for implementing covered activities throughout the permit term and to adequately fund the conservation strategy.

4.4.1 Direct Effects

As described in Chapter 2, the covered activities are broad in scope and address the needs of all Local Partners. To quantify direct impacts on land cover types and streams, covered activities were grouped as they are in Chapter 2. These categories are Urban Development, In-Stream Capital Projects, In-Stream Operations and Maintenance, Rural Capital Projects, Rural Operations and Maintenance, Rural Development, and Conservation Strategy Implementation. Two additional categories—In-Stream Construction and Rural Construction—were added to address temporary, one-time impacts associated with construction of identified capital projects. In-Stream and Rural Construction impacts were identified for the area immediately adjacent (i.e., the area immediately surrounding the project area) to capital project footprints to account for the staging of project construction. As previously defined in Section 4.2 *Definitions*, temporary staging areas would result in temporary impacts to land cover; and will be returned to pre-project or ecologically improved conditions within the time allowed for temporary impacts. Major individual and collective projects or activities with the potential for significant impacts were identified for each category. Smaller-scale activities such as vegetation management and monitoring are captured in the analysis of operations and maintenance impacts. Covered activities that affect very small areas (less than 0.1 acres) were not individually assessed. These activities are still covered under this Plan; however, impacts related to these activities are assumed to be absorbed by the impact estimates developed for larger covered activities. Examples of such covered activities include off-trail monitoring and management activities conducted as part of the conservation strategy implementation.

In addition to grouping activities by the nine identified categories, impact mechanisms within each category were analyzed as either permanent or

temporary. While the impacts from covered activities have both permanent and temporary aspects (see Section 4.3 *Impact Mechanisms*), in most cases the associated impacts are largely either temporary or permanent. To facilitate the analysis and because parsing temporary and permanent impacts within categories would have a minimal effect on the results due to the programmatic nature of the analysis, only the dominant impact type is considered in each category.

Categories identified as having permanent impacts to land cover and species habitat are Urban Development, In-Stream Capital Projects, Rural Capital Projects, Rural Development, and Conservation Strategy Implementation. These categories were identified as permanent because they generally include the construction of structures that would result in permanent loss of the land cover on which they are built. Conservation Strategy Implementation falls into this category because of the permanent impacts associated with constructing new facilities such as fire/access roads, trails, visitor centers, and kiosks.

Categories identified as primarily[6] having temporary impacts to land cover and species habitat are In-Stream Operations and Maintenance, In-Stream Construction, Rural Operations and Maintenance, and Rural Construction. Operations and maintenance and construction impacts were considered temporary because operations and maintenance and construction activities were assumed to affect natural land cover types for a limited time and because these sites would return to pre-project or ecologically improved conditions within the time allowed for temporary impacts. Examples of temporary impacts include mowing and construction staging, which generally take place adjacent to a project footprint. Three exceptions to this grouping specifically called out in the Section 4.3, *Impact Mechanisms,* are SCVWD's Dam Maintenance Program, SCVWD's water supply operations and maintenance, and SCVWD's one-time vegetation management in lower Llagas Creek. Areas maintained under the Dam Maintenance Program and for water supply operations and maintenance (e.g., diversions structure and stream gage maintenance) will be maintained at such a level that the impacts will effectively result in a permanent loss of vegetation. Similarly, once vegetation in lower Llagas Creek is initially reduced, it will then be maintained under the Stream Maintenance Program. The initial reduction in vegetation is therefore more accurately a permanent reduction. Both of these covered activities are assessed as permanent impacts under the In-Stream Capital Project category.

Impacts on streams were identified in all impact categories as appropriate (i.e., for all projects that may have in-stream impacts). A permanent impact on a steam results from a loss of natural structure or function. Examples of activities resulting in permanent stream impacts include installing hardscape in the channel, culverting the channel, constructing a new bridge over the channel, or reducing channel complexity (e.g., removing riffle, runs, or pools). Examples of temporary stream impacts include dewatering, removal of in-stream vegetation so

[6] The assumption that operation and maintenance activities would result primarily in temporary effects was made for the purposes of estimating impacts for the Plan. The nature of impacts, whether temporary or permanent, will be determined on a project-level basis through the application process described in Chapter 6, where the frequency, duration, and nature of the impact will be documented.

that in-stream habitat is affected, and other actions that temporarily reduce stream function and habitat value.

Impacts to known occurrences of plants are assessed by plant occurrence and location. Methods and assumptions used for estimating impacts to covered plant species are described below.

Baseline Land Cover

To estimate impacts resulting from implementation of covered activities over the course of the permit term, it was first necessary to identify the baseline conditions on which the impacts are assumed to occur (i.e., the anticipated composition and distribution of land cover at the time the Plan is implemented). Establishing a baseline helps to ensure that the amount of permanent impacts estimated in this Plan, particularly within the planning limits of urban growth where impacts are assessed by land use, are appropriately scaled (i.e., to ensure impact are not overestimated). Working with each of the cities and the County, parcels currently permitted for development or anticipated to be permitted by the time of Plan implementation[7] were excluded from the impact analysis and therefore considered part of the baseline conditions. Assumptions used to define the impact analysis baseline land cover are made only for the purpose of estimating an accurate level of take proposed for coverage under the Plan; these assumptions have no bearing on whether an activity may be covered or not. Project proponents for parcels assumed to already have permits may seek coverage under this Plan if the activity is covered, take coverage is available, and if the proponent follows the application requirements described in Chapter 6 (such coverage would be tracked and counted against allowable impacts).

Other parcels and sites were excluded from the impact analysis on the assumption that the existing land cover on these sites would not change substantially within the permit term or that the site was not zoned for urban development. Covered activities may still be implemented in these areas but these covered activities will not substantially change the land cover type (e.g., operations and maintenance activities). Areas excluded for the purposes of identifying baseline conditions are listed below.

- Parcels currently permitted for development or anticipated to be permitted by the time of Plan implementation[8].
- Land use categories Rural Parks and Open Space, Urban Parks and Open Space, Agriculture, Ranchland/Woodland, and Water within the planning limits of urban growth (impacts are assumed to occur on these land uses outside the planning limit of urban growth).

[7] *Permitted* means a local land-use permit such as a building permit or grading permit. Some projects may not yet have endangered species permits, but they could not be covered by this Plan because they would obtain their local approvals before the Plan is completed.

[8] These parcels were only removed for the land cover impact analysis to ensure that land cover impacts were not over estimated. These parcels were not removed for the species and critical habitat analyses.

- Wastewater treatment ponds in Gilroy.
- The Norman Y. Mineta San José International Airport.
- The Reid Hillview Airport.
- State Parks lands.

Effects on Land Cover and Streams

Various methods were used to quantify impacts on land cover and streams. An attempt was made to use a consistent approach; however, impacts of covered activities identified in *Urban Development*, *Rural Development*, and *Conservation Strategy Implementation* were calculated using a different method than most of the impact analyses. The sections below describe the methods utilized.

For all analyses, results were only considered to be impacts if the activity affected *natural* land cover types (i.e., land covers not already developed) or Agricultural and Developed natural community land cover types that may have some habitat value. Developed land cover types considered to hold some habitat value are Rural-residential, Golf courses/Urban parks, Barren, and Ornamental woodland. Non-assessed land cover types are the Agriculture developed/covered agriculture, Urban-suburban, Reservoir, and Landfill types.

General Method

The analyses for In-Stream Capital Projects, In-Stream Operations and Maintenance, Rural Capital Projects, and Rural Operations and Maintenance were conducted in the same general manner. Wherever possible, the impacts of specific covered activities on land cover were modeled using GIS software. The general approach was to utilize a GIS overlay of project footprints or infrastructure on the mapped land cover and assess affected acres. To assess construction and operations and maintenance impacts, buffers were applied to GIS-mapped infrastructure or projects. The assumption is that some amount of surrounding acreage would be the target area for operations and maintenance and construction activities, such as vegetation management and staging, respectively. The same approach was used to assess miles of stream affected by covered activities.

Where GIS data were not available, assumptions were developed to describe the activity and estimate impacts. This process generally entailed describing the acres of impact likely to result from a specific activity, then distributing the acres of impacts across the land cover types likely to be affected by the activity. For example, to conduct the bridge construction/reconstruction analysis, existing bridge length and width information was used to quantify the amount of existing bridge that would need to be replaced within the permit term. An assumption for the amount of bridge expansion that would be required based on changing safety standards was also applied. Impacts of bridge construction were assumed to

affect only the riparian corridor and associated stream. Accordingly, the acres of impact were assigned proportionally to the riparian land cover types within the jurisdiction in which the activity was occurring (e.g., bridge reconstruction impacts in San José were assumed to affect riparian land cover types in proportion to the percent of riparian land cover types in San José).

To identify miles of stream impacts where GIS data were not available, assumptions were developed on the basis of the activity or project description, known or approximated number of stream crossings, and assumptions on crossing width. For example, stream impacts for most bridge projects were estimated based on total number of replaced bridges multiplied by an average assumed bridge width.

Overall, 30% of all estimated permanent impacts were calculated outside of GIS. Of this 30%, 57% of the estimated impacts are attributed to rural development. Approximately 25% of total estimated permanent stream impacts were calculated outside of GIS. For temporary impacts, approximately 41% of all estimated impacts were calculated outside of GIS. Approximately 5% of estimated temporary stream impacts were calculated outside of GIS.

Tables 4-5a through 4-5f provide a summary of the methods and key assumptions used to conduct the impact analysis. These tables are not intended to be exhaustively inclusive of all covered activities. Rather, these tables show how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in these tables. Impacts of these minor activities are assumed to be addressed sufficiently by the approach taken in the impact analysis. Although these tables quantify impacts by project and by each Permittee, this was done for estimation purposes only. Compliance with this Plan will not be measured according to the estimated impacts for each project or Permittee, but rather by total land cover/habitat type impacted by the covered activities as a whole.

Method for Urban Development

The analysis for urban development did not attempt to discern the impact of individual, separate activities, but rather assumed that all areas within the planning limits of urban growth for the three cities with current land use designations of urban development or rural residential development (as identified in **Figure 2-2**, *Land Use Categories*) would be fully affected (i.e., converted to a developed land cover). This assumption does not preclude covered activities from occurring on land uses for urban parks, agricultural, or woodland and ranchland; however, it is assumed that the majority of impacts inside the planning limits of urban growth will occur in areas with urban development land uses. This method also assumes that land uses inside planning limits of urban growth will remain approximately the same over the course of the permit term. As is shown in **Figure 2-2**, the majority of current land use is already urban development with some rural development. This approach will likely result in an overestimate of impacts because some of the Biological Goals and Objectives for

plants include commitments to preserve existing populations (e.g., Coyote ceanothus, Metcalf jewelflower) that are located within the San José, Morgan Hill, or Gilroy planning limits of urban growth. There are two exceptions to the assumption that all current land use designations of urban development or rural residential development will be fully affected. First, in-stream areas (Plan-identified streams, including channel bed and banks, and any adjacent riparian land cover types) were excluded from the Urban Development impact analysis and were assessed under In-Stream Capital Projects or In-Stream Operations and Maintenance on a project-by-project basis. Second, impacts occurring in the City of San José Coyote Valley Urban Reserve and the South Almaden Valley Urban Reserve; the City of Morgan Hill Southeast Quadrant; and the City of Gilroy Hecker Pass Specific Plan are assumed to be developed consistent with rural development. Impacts associated with urban development and its effects on watershed health and hydrology were assessed through an impervious surface analysis. This analysis is discussed in Section 4.4.2 *Indirect Effects*.

Method for Rural Development

The method for calculating impacts of rural development was different than that used for other impact categories because the location and amount of rural development is difficult to predict. In addition, parcel sizes of rural development are highly variable, and the impacts of a single home are often not limited to the footprint of the home and access road. The analysis for rural development was based on the following key assumptions.

- Impact footprints of rural development in the future will be approximately one-third smaller than the footprints evident from aerial photo analysis conducted in 2007.
- The pace of rural development during the permit term will continue at approximately half of the average pace evidenced between 1995 and 2004.
- Rural development could occur anywhere in County jurisdiction consistent with County General Plan and zoning restrictions.

To refine the analysis, County planning staff identified development zones where rural residential development is expected to occur within the permit term. Six zones were identified on the basis of similar development patterns, parcel sizes, topography, and other landscape characteristics (**Figure 4-1**). Rural development was estimated for all areas in unincorporated Santa Clara County in the permit area outside open space (Type 1, 2, or 3) and excluding parcels within the planning limits of urban growth, unbuilt parcels approved for development, the South County Airport, reservoirs, SCVWD percolation ponds, and landfills.

Amount of Rural Development

The estimated annual rate of new home construction in rural areas was based on the average number of residential development permits issued by the County within each development zone from 1995 to 2004 (10 years). The average of 40 permits per year was then applied throughout the permit term for a total of 2,000 permits granted over the 50-year permit term. This amount was then

adjusted downward by just over 50% to account for changing patterns in rural development and the coverage areas on the valley floor (see **Figure 2-5**). In addition, permits were assumed to be distributed throughout each of the development zones, with a greater proportion of the permits assumed to be granted in the valley floor areas. County planning staff verified that each development zone had the capacity to support the projected development. This assessment was based on the number of vacant parcels (parcels with no existing buildings as of the 2005–2006 Assessor's roll) and slope (parcels with greater than 50% slopes were excluded). Where capacity did not exist in a zone, excess development was reallocated to other likely zones.

The estimate of permits for nonresidential construction sites (e.g., greenhouses, agricultural structures, telecommunication towers, rural commercial development) was based on the average number of permits issued from 1995 to 2006 (12 years). This average of 7.5 permits per year was applied to the 50-year permit term and then also adjusted downward.

In addition, six specific rural development projects (three County projects, two landfill expansion projects, and one quarry expansion project) were delineated in GIS and impacts calculated based on an overlay with the land cover layer. Impacts were aggregated with other Rural Development impacts. (The Kirby Canyon landfill project is considered a rural capital project, not rural development, so impacts were not included in this category.)

Footprint of Rural Development

To translate the number of home sites predicted during the permit term to an estimate of land cover and species impacts, an average footprint of homesites was developed through air photo interpretation. The actual footprint of each homesite was digitized on screen in ArcView on the basis of substantial disturbances visible on the same color orthophotos used to map land cover (see Chapter 3). The landscape features listed below, when occurring as part of a homesite, were considered part of the direct impact footprint of rural development because they contained little or no habitat value for covered or other native species.

- Homes.
- Outbuildings.
- Driveways and parking areas.
- Landscaping and other active outdoor use areas such as lawns.
- Recreational vehicle trails.
- Vineyards or orchards.
- Heavily grazed or disturbed areas with bare soil.
- Barns, stables and corrals.
- Dirt roads.

The final impact footprint of each homesite was identified as all contiguous features listed above, plus a 50-foot buffer. This buffer incorporates a space around the area of direct impacts most likely to be affected by general maintenance and use of the space around homes such as landscaping, gardens, livestock enclosures, small outhouse structures, and defensible space as required by state fire codes. This area around the home is also subject to indirect impacts such as light, noise, and runoff.

To refine the methodology, several groups of test parcels were selected in the Santa Cruz Mountains and the Diablo Range and visited in the field. Once it was determined, based on field testing, that methods were being applied consistently, 1,199 parcels within the available developable area were randomly selected for the sampling (28% of all available parcels). The parcels were stratified between each side of the Santa Clara Valley and the valley floor to ensure a geographically representative sample. Of these, 693 parcels had no visible home sites so were discarded. The final sample consisted of 506 parcels that were digitized. Final parcel sizes and locations varied widely in the study area, consistent with actual patterns.

Based on this random sample, the median impact footprint[9] of rural home sites was 2.6 acres in the valley floor and Almaden zones and 3.3 acres in the near hills and remote hills zones (**Figure 4-1**). These impact footprints were adjusted downward to 2 acres per development permit to account for changing development patterns (R. Eastwood pers. comm.). The average impact footprint for nonresidential development was estimated to be 1.9 acres.

This approach does not account for the impacts of rural development on landscape linkages or wildlife connectivity. Some larger rural development projects may degrade landscape linkages or impede wildlife movement. Because of the uncertain location of these large rural development projects, their specific effects on wildlife connectivity cannot be evaluated at this time. However, the Plan has incorporated mechanisms to evaluate these effects during implementation and ensure that the conservation goals and objectives of this Plan related to landscape linkage and wildlife connectivity are still met. They will be met through land acquisition of key landscape linkages before development occurs (see Chapter 5, Section 5.3.1 *Land Acquisition and Restoration Actions*), or through project redesign (see Chapter 6, Section 6.4.4, subheading *Condition 7 Rural Development Design and Construction Requirements*).

Calculating the Impacts of Rural Development

To estimate the impact of rural development on land cover, the total number of expected housing units and commercial development sites over the permit term within each development zone was multiplied by the median impact footprint within each zone. These impacts were then distributed across all land cover types determined to be available for development in proportion to the occurrence

[9] The median value was chosen as the best measure of central tendency of the data because of the strong influence of a few data points with very large footprint estimates. This approach was used for the impact analysis estimate only. Fees on rural residential development will be assessed the fee based on their actual project footprint, as defined in Chapter 9.

of each land cover type within each development zone. Land cover types determined to be available for impact are all those land cover types in the permit area except the cases listed below.

- Parcels excluded from the baseline conditions described above.
- Parcels within the planning limits of urban growth.
- The South County Airport[10].
- Open space types 1, 2, and 3.
- SCVWD groundwater recharge ponds.
- Reservoirs.
- Landfills.
- Areas within the stream setback zone described in Chapter 6 (note that stream and associated riparian land cover impacts were calculated separately from the land cover analysis and are discussed below).

This distribution included urban-suburban, landfill[11], reservoir and developed agriculture land cover types (the four land cover types determined to have no habitat value and for which no fee is required [see Chapter 9]) as it is assumed that some new rural development will occur in these land cover types. This method may over- or underestimate effects on some land cover types (e.g., chaparral is more abundant on steep slopes where rural development is less likely to occur). However, a simpler approach was preferred over a complex model with many more assumptions due to the programmatic nature of this impact analysis. Acres of impact for each land cover type were then summed across each development zone to determine total impacts. In addition to the impacts calculated using this method, the County is requesting an additional 78 acres of impact allowance for development of new or expansion of existing County facilities (e.g., Mariposa Lodge, James and Holden Ranches, and Muriel Wright Center).

To estimate miles of stream affected by rural development it is assumed that one out of every 10 residential developments permitted would result in an average of 20 feet of linear stream impacts, primarily from construction of an access road (R. Eastwood pers. comm.). To estimate acres of riparian vegetation affected by rural development it is assumed that each creek crossing (one per 10 residential developments) is 40 feet wide (outer edge of riparian corridor to outer edge of riparian corridor) and that the entire area under the crossing represents a permanent loss of riparian vegetation. Multiplying 20 feet (linear feet of stream affected per crossing) by 40feet by one-tenth the number of anticipated rural residential developments and converting to acres yields a maximum impact estimate for permanent impacts on riparian land cover types due to rural

[10] While rural development (e.g., construction of homes) is not expected to occur on airport lands, the airport expansion is a covered activity. These impacts were estimated using a site-specific approach informed by the airport's master plan.

[11] Note that Kirby Canyon Landfill fill areas 1, 2, and 5 were exempted from the baseline data; accordingly, impacts from rural development would not be distributed to this area.

development. Note that total riparian land cover impacts may be higher if riparian land cover types occur outside the stream setback area and impacts are identified through the land cover analysis described above. While this analysis captures direct impacts to streams, it does not address indirect impacts such as degradation of water quality due to increased development. These types of impacts are assessed through the impervious surface analysis discussed below in Section 4.4.2 *Indirect Effects*. Rural development will be subject to the conditions identified in Chapter 6, including keeping crossings to the minimum amount required per development and avoiding riparian vegetation whenever possible.

Method for Rural Development within the Planning Limits of Urban Growth

The City of San José anticipates some development will occur inside the city limits but outside the planning limit of urban growth. In addition, the Coyote Valley and South Almaden Valley Urban Reserves were removed from the urban development impact analysis, as were Morgan Hill's Southeast Quadrant and the Gilroy's Hecker Pass Specific Plan. For the purposes of the impact analysis, the City of San José assumes three sites will be permitted each year of Plan implementation (A. Danielsen pers. comm.) in areas inside city limits but outside the planning limit of urban growth, and not including the urban reserves. The Coyote Valley and South Alamaden Valley urban reserves are assumed to be developed at rates consistent with the rural development impact analysis for the County in the valley floor rural development zone. This development may occur in the Near East Hills, Near West Hills, Valley Floor, and Almaden Valley rural development zones. Average size of development identified for these areas (2 acres) as part of the rural development analysis was utilized for this analysis as well. Total acres of estimated impacts were calculated and distributed proportionately across land cover types inside the San José city limits but outside of the planning limit of urban growth, but excluding the following lands.

- Parcels excluded from the baseline conditions of the Plan.
- Open space types 1, 2, and 3.
- SCVWD groundwater recharge ponds.
- Reservoirs.
- Landfills.
- Areas within the stream setback zone described in Chapter 6 (note that stream and associated riparian land cover impacts were calculated separately from the land cover analysis and are discussed below).

Stream impacts were calculated using the same method as rural development in the county described above.

Method for Conservation Strategy Implementation

The analysis for Conservation Strategy Implementation was based on those activities expected to occur in the Reserve System as identified in Chapter 2, Chapter 5, and Chapter 9. Estimates were informed by current land management activities of agencies such as the Santa Clara County Open Space Authority that are assumed to be similar to the land management practices that will be applied to the Reserve System. Once an estimate of acres of impacts was developed, the impacts were distributed across the land cover types most likely to be affected by these actions. Capital projects in the Reserve System were assumed to have both permanent and temporary impacts. Temporary impacts were associated with construction activities. With the exception of utility line maintenance in the Reserve System, no additional impacts were assessed for operations and maintenance activities as it is assumed these impacts are very small. See **Tables 4-5g and 4-5h** for the methods and assumptions used for this impact analysis.

No permanent or temporary impacts are identified for conservation actions either because these activities are assumed to have a net benefit on all covered species (see Chapter 5 *Conservation Strategy*) or because these activities result in impacts that are too small to quantify. Grasslands converted to other land cover types as a result of restoration or creation actions will not be counted as an impact. In addition, the grassland removed will not be counted toward the overall preservation goals for grasslands.

Method for Three Creeks HCP

The draft Three Creek HCP (April 2009) provides an impact analysis of all activities covered under that plan. This Plan integrated the impact analysis methods, data, and/or impact numbers developed for the draft Three Creeks HCP to ensure consistency of impact evaluation between the two Plans.

Impact Caps on Serpentine Bunchgrass and Wetlands

Three land cover types (serpentine bunchgrass grassland, coastal and valley freshwater marsh, and seasonal wetland) have impact caps that were informed by the impact analysis, but that were set lower than what was estimated by the impact analysis. The reduction in impacts is intended to account for avoidance and minimization that is required by the conditions on covered activities and because the Plan's fee structure provides financial incentive to avoid these land cover types. Setting impact caps on these land cover types ensures that impacts are not over-estimated and that the conservation strategy is developed consistent with the impacts actually expected to occur.

Effects on Covered Species Habitat

For covered species with modeled habitat, impacts were assessed based on the intersection of covered activities and covered species modeled habitat. This method uses habitat models that identify the location and amount of habitat assumed to be suitable for each species (see **Tables 3-5 and 3-6** and species model descriptions in **Appendix D**). Estimates of incidental take are based on the habitat models developed for 16 of the 19 covered species. As described in Chapter 3, these estimates of suitable habitat are likely to be somewhat inflated (i.e., conservative) because (1) habitat models may overestimate the actual extent of suitable habitat, and (2) not all suitable habitat is occupied by the subject species. Therefore, species habitat is used as a proxy for species occurrence because of the limitations of survey data. Impacts to Bay checkerspot butterfly were capped lower than estimated impacts to account for avoidance of modeled habitat that may be possible for projects where siting is flexible (e.g., rural development).

For covered plants, impacts were also assessed at the occurrence level (assumed to be equivalent to populations; discussed in the above section) because of the stability of plant occurrence locations (i.e., plants move very slowly). For three plant species, sufficient information was not available to create habitat models. In these cases, worst-case assumptions were used regarding the amount of suitable habitat removed by covered activities. Both methods are described in more detail below.

Effects on Habitat of Modeled Species and Critical Habitat

For the 16 species with habitat distribution models, maximum allowable temporary and permanent impacts on modeled habitat acreages as shown in the models were identified (**Table 4-4**). Critical habitat is designated for three of the covered species (Bay checkerspot butterfly, California tiger salamander, and California red-legged frog) (**Figures 4-4 through 4-6**). Maximum total allowable impacts in critical habitat for these three species are provided in **Table 4-9**. For covered activities with a GIS overlay, the impact analysis was conducted by intersecting the GIS overlay with the modeled habitat of each species (**Appendix D**). For covered activities without GIS data, the following steps were used to identify impacts.

- **Step 1:** GIS was used to identify the acres of habitat for each modeled species and for critical habitat within each of the County-defined development zones (**Figure 4-1**). These zones were used in the Rural Development impact analysis. Rural Development constitutes a large proportion of the non-GIS covered activities, and the zones identified for rural development activities also reflect the general location of many other covered activities not tied to exact locations.
- **Step 2:** Acres of impacts for non-GIS covered activities were estimated within each development zone for each covered activity assessed (see **Table 4-5a through 4-5h**) by applying a weight factor that would result in a

higher or lower percentage of covered activities being attributed to one zone or another. For example, it is expected that most of the impacts associated with implementation of the conservation strategy will occur in the remote east hills and so a higher percentage of estimated impacts for those activities are attributed to the remote east zone than to the valley floor zone. Impacts were estimated by zone according to the general location of the activities.

- **Step 3:** Impacts by development zone were assumed to affect each species in proportion to the amount of the modeled habitat for that species found in that zone.

GIS was used to calculate approximately 63% of species-specific permanent impacts and approximately 60% of species-specific temporary impacts. GIS was used to calculate approximately 32% of critical habitat permanent impacts and approximately 74% of critical habitat temporary impacts. The remainder of the species and critical habitat impacts were developed based on assumptions non-GIS calculated impact distribution and habitat or critical habitat distribution.

Effects on Habitat of Non-Modeled Species

Plants without Models

Habitat models could not be developed for Tiburon paintbrush, Coyote ceanothus, and Santa Clara Valley dudleya because the microhabitat requirements of these species occur at a finer scale than the Plan mapping. For example, Santa Clara Valley dudleya occurs on serpentine rock outcrops, which often occur as scattered patches that are only several square feet in size. In addition, there are few known occurrences of most of these species in the study area (**Table 4-6**), except for Santa Clara Valley dudleya, making the model verification more difficult.

In the absence of models, estimates of temporary and permanent impacts to these species were based on impacts to the number of known occurrences that could be impacted by covered activities, as described above (**Table 4-6**). As a general guide and "worst-case" analysis of potential habitat, effects are also cited to land cover types that are broadly associated with each of these plant species.

Effects on Plant Occurrences

In addition to the impacts to covered plant species habitat described above, it was important to examine as accurately as possible impacts to individual plant occurrences. The potential impacts to plant occurrences from covered activities, and the total allowed impacts to each species were determined by the following methods.

Potential direct effects on plant occurrences were analyzed based on occurrence data in the California Natural Diversity Database (CNDDB), records from SCVWD's Biodiversity Monitoring Program, and data collected on the United Technologies Corporation property (T. Marker pers. comm.). Impacts were

assessed for covered activities for which GIS data were available. Covered activities with significant impacts (i.e., over 100 acres) for which specific location data are not known include rural development, County Parks capital improvement projects, and dam seismic safety retrofit borrow sites. In addition to the methods described here, impacts to specific plant occurrences from the SCVWD Dam Maintenance Program were provided by SCVWD. These were determined by site surveys during their EIR preparation and detailed analysis of the footprint of dam maintenance activities.

It is important to make a distinction between impacts that reduce the long-term viability of an occurrence and impacts that do not reduce the long-term viability of an occurrence. This analysis assumed that in most cases, occurrences that overlapped with the footprint of covered activities would result in complete loss of the occurrence. However, there will be some temporary or partial impacts to occurrences where the occurrence may recover in subsequent years and long-term viability is not affected. This possibility is discussed in Chapter 4, Section 4.4.1, subheading *Partial Permanent Impacts to Plant Occurrences* below and Condition 20 (Chapter 6). The "potential impacts" and "impact limits" defined and discussed in this section refer in all cases to the reduction of long-term viability of a covered plant occurrence.

For the purposes of this Plan, an occurrence of an annual plant species will be assumed to retain long-term viability and will not require replacement in the Reserve System if the decline in population size and percent cover from pre-project conditions is less than 25% over a monitoring period of at least 5 years (i.e., cumulative change over 5 years), unless site-specific conditions otherwise suggest substantial declines in population viability. The population size of annual covered plants may fluctuate more than 25% annually due to environmental variation such as rainfall. If extreme or unusual climate conditions affect the species, then monitoring will be extended 1 or 2 years, as appropriate to assess impacts and success (see Condition 20, Chapter 6).

An occurrence of a perennial plant species will be assumed to retain long-term viability and will not require replacement in the Reserve System if the decline in seedling recruitment and density from pre-project conditions is less than 25% over a monitoring period of at least 3 years, unless site-specific conditions otherwise suggest substantial declines in population viability (see description of Condition 20 in Chapter 6).

Specifically, potential impacts were assessed by first creating a GIS overlay of the location of covered activities (i.e., the planning limit of urban growth and covered capital projects illustrated in **Figure 2-6** and **Figure 2-7**) with the plant occurrence data for all covered plant species. Next, this data and CNDDB occurrence data, were used to determine which occurrences of each species would be impacted by each activity. Finally, total potential impact numbers were determined. The results of this analysis are summarized in **Table 4-6** and discussed for each species in more detail later in this chapter. The impact limits in this table will be tracked during implementation to ensure permit compliance.

After the total potential impacts were calculated, actual impact limits were determined for each species. The impact limit was determined based on a number of factors, including (but not limited to) the overall species range and distribution, number of known occurrences, recent frequency with which new populations have been discovered, and rarity status.

In this section, impacts are discussed in terms of numbers and percentages of occurrences as well as estimates of absolute numbers of individuals where such estimates are feasible (impacts on modeled habitat is discussed in Section 4.6.8 *Serpentine Plants* and 4.6.9 *Non-Serpentine Plants* below). For annual plant species, discussion of absolute numbers is difficult as the populations can fluctuate widely from year to year due to environmental variation (e.g., rainfall). Some occurrences in the CNDDB include estimates of numbers of individuals, however, many occurrences do not or the estimates are from only one year. Additionally, in the rare cases where there are multiple years' data, these numbers often vary widely (e.g., from hundreds in one year to thousands in another for just one occurrence).

As shown in **Table 4-6**, the Plan does not allow for the reduction of long-term viability of Tiburon Indian paintbrush and Coyote ceanothus. For more details on these impacts, including a discussion of permanent and temporary impacts to modeled habitat, see the discussion on each species later in this chapter.

It is expected that new occurrences of many of the covered plants will be discovered both within the impact areas and the Reserve System. In many cases, it is warranted to allow additional impacts to covered plants beyond the occurrences known at this time. Limits on take of some covered plant species can be increased up to the limit shown in the final column of **Table 4-6**. **Table 5-16** identifies the total number of occurrences in the study area[12] and the number of new occurrences that must be protected in the Reserve System before these additional impacts can occur. The species selected for additional limits and the limits set were determined based on two criteria.

- Future survey efforts in the permit area are likely to reveal that there are more occurrences of the species than are currently known.
- There are more occurrences known in the study area at the time of permit issuance than the Recovery Plan de-listing criteria or, for non-listed species, more than the long-term conservation criteria (U.S. Fish and Wildlife Service 1998)[13]. For species without de-listing or long-term conservation criteria, there must be more than 20 occurrences throughout the species' range.

Based on these criteria, all covered plants except three qualify for an increase in allowable impacts during Plan implementation if additional occurrences are found and protected. No additional impacts to Coyote ceanothus, Tiburon Indian

[12] Plant occurrences in the expanded burrowing owl study area do not count toward the baseline necessary before additional impacts may occur.

[13] Santa Clara Valley dudleya de-listing criteria is 30 populations. Species with long-term conservation criteria are Mount Hamilton thistle (23 populations), smooth lessingia (10 populations), and most beautiful jewelflower (22 populations).

paintbrush, or Metcalf Canyon jewelflower are allowed under the Plan even if additional occurrences are found.

As with all other impacts to covered plant occurrences, new occurrences of the species must be protected in the Reserve System before the impacts occur and the protected occurrences must be in as good or better condition than the new occurrences impacted by covered activities ("condition" is defined in Chapter 5, Section 5.3.1 *Land Acquisition and Restoration Actions*). See Chapter 5 for protection requirements to allow additional take limits in **Table 4-6**. Created occurrences will not count toward this Stay-Ahead provision for plants due to the highly experimental nature of creation. For the purposes of this Plan, created plant occurrences will not be used to mitigate adverse effects but rather to contribute to the recovery. The only exception to this rule is Coyote ceanothus. Because it may not be possible to protect one occurrence of Coyote ceanothus in the timeline described in Section 5.4.11, a created occurrence may serve as a portion of the mitigation for this species (see Chapter 5, Section 5.4.11 *Coyote Ceanothus* for details).

Partial Permanent Impacts to Plant Occurrences

Certain covered activities could have permanent impacts to a portion of plant occurrences through construction, occasional operations and maintenance, and other short-term activities. If impacts resulting from covered activities do not reduce the long-term viability of the plant occurrence as described in Chapter 6, Section 6.6.2, subheading Condition 20 *Avoid and Minimize Impacts to Covered Plant Occurrences*, then it will be considered a partial impact on the occurrence and will not count toward the impact limits in **Table 4-6**. If the impacts do result in reduction of long-term viability of the occurrence, then it would be considered a permanent impact, and the impacts to the occurrence would count toward the maximum number of impacts to that species allowed under the Plan. For the purposes of this Plan, an "impact" to a plant occurrence results from the removal of an occurrence or the reduction of long-term viability of an occurrence (as defined in Chapter 6, Section 6.6.2, subheading *Condition 20 Avoid and Minimize Impacts to Covered Plant Occurrences*). Conditions on covered activities minimize the effects of covered activities on covered plants, and include monitoring actions and success criteria to determine the effects on long-term viability (see Chapter 6, Section 6.6.2, subheadings *Conditions 19 Plant Salvage when Impacts are Unavoidable* and *Condition 20 Avoid and Minimize Impacts to Covered Plant Occurrences*).

4.4.2 Indirect Effects

Unlike direct impacts, which are estimated quantitatively, indirect impacts are assessed qualitatively except for nitrogen deposition and watershed impervious surfaces for which quantitative analyses were run. In most cases the indirect impacts on species are summarized in **Table 4-1** and discussed in narrative form in the results sections below. As discussed above, estimates of direct effects on

land cover types have been quantified conservatively (i.e., somewhat overestimated). These conservative estimates are intended, in part, to incorporate many of the indirect effects of the covered activities listed in **Table 4-1** and ensure that the conservation strategy provides enough conservation to offset these indirect impacts.

Impervious Surfaces

Impervious surfaces are materials of natural or anthropogenic sources that prevent the infiltration of water into soil. Impervious surfaces can affect the flow, sedimentation load, and pollution composition of stormwater runoff. An increase in impervious surfaces on a landscape is directly related to increases in human activity through the development of structures and infrastructure such as buildings, streets, sidewalks, and parking lots.

Classification of watersheds and subwatersheds by the amount of impervious cover is an important component of developing land use and habitat planning goals. Although presence of riparian vegetation and wetlands can mitigate the impacts of impervious cover, a watershed with high impervious cover is generally not able to support a high-quality stream system. A strong negative relationship between biotic integrity, land use, and riparian conditions begins to occur at approximately 10% imperviousness. Stream degradation occurs at relatively low levels of imperviousness (10–20%) (Chester and Gibbons 1996).

According to the Center for Watershed Protection (2003), an initial guide to evaluating urban/suburban stream quality is: (1) sensitive streams (0–10% imperviousness) typically have good water quality, good habitat structure, and diverse biological communities if other stresses are absent; (2) impacted streams (10–25% imperviousness) show clear signs of degradation; (3) non-supporting streams (>25% imperviousness) have a highly unstable flow and poor biological condition.

The Plan includes an analysis of the expected increase in impervious surfaces due to urban development and other covered activities. This analysis provides an indication of the magnitude of change of impervious surfaces in the watershed and therefore how covered aquatic species and other native aquatic species might be affected.

For the purposes of the Plan, the important metric is the change in impermeability between existing conditions and conditions in the study area at the conclusion of Plan implementation. To assess this change, the quantity of impervious surface in each of the study area's major watersheds was calculated, both upstream and downstream of reservoirs, using the existing land cover classification developed for the Plan (**Figure 3-10**). An impervious surface assumption for each land cover was derived (**Table 4-7**) from the Center for Watershed Protection research (Cappiella and Brown 2001), based on impervious cover classifications from eight geographic locations in the United States. That group's research has shown that the amount of impervious cover on a developed parcel is generally very similar for a particular zoning category no matter where

it is located. The literature also notes there are no nationally applicable or standard coefficients that account for the variability in forest, shrub, and herbaceous cover and turf cover coefficients.

Method for Calculating Impervious Surface

The calculation used for determining impervious surface cover is shown below.

ALC * IC = AIC

where:

ALC = acres of land cover

IC = impervious assumption for each land cover

AIC = impervious area in acres

This equation was first applied to existing land covers to calculate the current impervious surfaces (in acres) for each subwatershed (Coyote, Guadalupe, Llagas, Uvas, and Pacheco). **Figure 4-2** shows the watersheds assessed in this analysis. To account for interim projects (those projects entitled for development in advance of Plan implementation), it was assumed that interim projects located inside the planning limit of urban growth would be developed to the urban-suburban land cover type and that interim projects located outside the planning limit of urban growth would be developed to the equivalent of the rural-residential land cover. These assumptions are reflected in the existing conditions of the impervious surface analysis.

The results of the impact analysis described in Section 4.4.1 *Direct Effects* were used to identify the acres of each type of land cover anticipated to exist at the conclusion of Plan implementation. To do this, each covered activity analyzed for the impact analysis was assigned a new land cover type that is assumed to be present after covered activity implementation. The majority of impacts are associated with urban or rural residential development. For these two covered activities, all impacted areas inside of the planning limit of urban growth were assumed to become the Urban-Suburban land cover type, and all areas impacted by rural development were assumed to become the Rural Residential land cover type. Land cover type conversions were assigned to the remainder of covered activities based on the assumed land cover type present after covered activity implementation.

Next, covered activities were assigned to watersheds where they are assumed to be implemented. As described above, the impact analysis required both GIS analyses and use of assumptions to describe the activity and estimate impacts (see **Tables 4-5a through 4-5f** for details). For those activities mapped in GIS, location by watershed and land cover type assumed for post-implementation were calculated using GIS. For those activities where the exact location of the activity is not known in GIS, assumptions were developed to assign the activity to a watershed.

Once land cover types by watershed for post-covered activity implementation were established, the above equation was again applied to calculate the amount of impervious acres within each subwatershed. The results are shown in **Table 4-8**.

There are several other partial watersheds in the study area (i.e., Alameda, Calabazas, South Santa Clara Valley, San Thomas, Santa Cruz Mountains, and Watsonville watersheds) that were not included in this analysis. As a result, approximately 23,000 acres of the study area were excluded. In addition, because covered activities were either assessed in GIS or were distributed to watershed according to assumptions on where the covered activity would occur, not all impacts were assessed through this analysis as they either will or are assumed to occur in non-assessed watersheds. This may result in a small underestimation of changes in study area imperviousness.

Nitrogen Deposition

Indirect impacts of increased nitrogen deposition on natural communities and covered species are anticipated to result from urban development and rural development covered under the Plan. These covered activities would result in increased air pollutant emissions from passenger and commercial vehicles and other industrial and nonindustrial sources. Emissions from these sources are known to increase airborne nitrogen, of which a certain amount is converted into forms that can fall to earth as depositional nitrogen. It has been shown that increased nitrogen in serpentine soils can favor the growth of nonnative annual grasses over native serpentine species (Weiss 1999). These nonnative species, if left unmanaged, can overtake the native serpentine species, including dwarf plantain (*Plantago erecta*), the host plant for larval Bay checkerspot butterfly. Nonnative plants may also compete with native plants for water, nutrients, light, and sites for germination, crowding out covered plants (e.g., Metcalf Canyon jewelflower, most beautiful jewelflower, and fragrant fritillary). California grasslands are believed to be among the most sensitive to nitrogen deposition (Fenn et al. 2010). Coyote ceanothus may also be affected by competition with nonnative species, but because this covered species is a woody plant, the effects of such competition are likely to be less severe than the effects on native herbaceous species. To assess the degree to which nitrogen deposition will increase as a result of Plan implementation, a nitrogen deposition study was conducted (see **Appendix E**).

Summary of Methods

Nitrogen deposition was analyzed using several modeling approaches in order to estimate the sources that contribute to deposition in the study area. In order to estimate contributions from individual roadways and to assess the increase in deposition due to increases in traffic, Gaussian models for a limited domain were applied to receptors centered on serpentine habitat that supports populations of the threatened Bay checkerspot butterfly. Modeling with Gaussian models, while

not providing an estimate of overall deposition, provides an estimate of deposition from individual roadways and the expected increases in deposition from those roadways in the future. The much more complex Community Multiscale Air Quality modeling system (CMAQ) was also used to simulate the study area's more complex nitrogen transport processes, and, using the Particle and Precursor Tagging Methodology source apportionment technique, to estimate contributors to deposition on a broader scale. Modeling with CMAQ also provides estimates of expected increases in deposition in future years.

4.5 Effects on Natural Communities/Land Cover

4.5.1 Direct Effects

Temporary and permanent impacts of each covered activity on each land cover type are summarized in **Tables 4-2 and 4-3**.

In most cases the data provided and assumptions made were reasonable worst-case assumptions of future project impacts. The actual impacts of specific projects over the permit term of 50 years may vary from the assumptions described in **Tables 4-5a–h** and total impacts will likely be less than the maximum allowable impacts in **Tables 4-2 and 4-3**.

In-stream impacts calculated for projects without exact footprints distribute all impacts across riparian land covers in proportion to the land cover type's occurrence in the study area. This approach may overestimate actual impacts because riparian land cover may not be present everywhere a project is conducted, particularly in urban areas. Moreover, actual in-stream impacts may be somewhat lower than those calculated because of flexibility in implementing avoidance measures (e.g., building clear-span bridges to avoid streams, building in sites where no riparian vegetation exists).

Stream impacts may be overestimated because miles of impact were calculated on the basis of project footprints. Some capital projects, such as flood-control projects that do not include concrete or riprap, will be able to avoid or minimize impacts on streams.

Estimated impacts on rare or sensitive land cover types do not account for project-by-project avoidance that will be applied to comply with the conditions detailed in Chapter 6 or other regulations such as CEQA. For example, recreational facilities such as buildings, outhouses, trails, and trailhead facilities, can usually be sited away from sensitive land covers. Consequently, impacts on serpentine grassland, serpentine chaparral, valley oak woodland, and knobcone pine woodland may be overestimated. While the areal extent of the impact footprint of these projects may not change, judicious siting may reduce the impacts on sensitive land cover types.

4.5.2 Indirect Effects

Impervious Surfaces Analysis Conclusions

The results are shown in **Table 4-8**. Through comparison of existing and future watershed imperviousness, it is possible to estimate the level of impact on watershed health that implementation of covered activities may have on each subwatershed, as measured by imperviousness.

This imperviousness analysis does not take into account any stormwater management activities that would decrease run-off in the study area (e.g., cisterns or retention ponds). These types of requirements are currently integrated into the San Francisco Bay Regional Board NPDES permits and will be incorporated into new Central Coast Regional Board NPDES permits in the future. As such, this analysis may overestimate the increase in run-off into local streams that may degrade water quality. See Chapter 6, Section 6.4.1, subheading *Condition 3 Maintain Hydrologic Conditions and Protect Water Quality* for more details on stormwater management in the study area.

Nitrogen Deposition Analysis Conclusions

Indirect impacts of continued nitrogen deposition on natural communities are anticipated to result from urban development and rural development covered under the Plan. Serpentine land cover types are the focus of preservation and enhancement actions to offset the effects of nitrogen deposition (among other impacts). However, several other land cover types in the study area have been identified as sensitive or potentially sensitive to nitrogen deposition (Weiss 2006): Northern mixed and serpentine chaparral, mixed oak woodland, foothill pine-oak woodland, mixed evergreen forest, and redwood forest are known to be sensitive to nitrogen deposition. According to this report, California annual grassland, valley oak woodland, blue oak woodland, coast live oak forest and woodland, freshwater marsh, seasonal wetland, and pond may be sensitive to nitrogen deposition.

Baseline Deposition

Emissions for the base year Gaussian modeling were based on traffic counts for highways and roads in 2005. For CMAQ modeling, base year emissions were acquired from the Bay Area Air Quality Management District (BAAQMD). Estimates of baseline deposition based on observations of nitrogen dioxide (NO_2) concentration and modeling using CMAQ both give estimates of total nitrogen deposition of about 6 kg-N/ha/y, which is consistent with other studies such as Weiss (2006).

Changes in Nitrogen Deposition during the Permit Term

Reliable future year emissions were not available when the CMAQ modeling was conducted. As such, future year emissions were extrapolated from the base year based on population growth. Using this assumption, contribution of mobile source emissions in the habitat area are estimated to increase by about 0.6 kg-N/ha/y in 2035 over the base year and by another 0.5 kg-N/ha/y in 2060. The San José contribution to nitrogen deposition in the habitat areas is estimated to be 38% in 2035. Gaussian modeling of major roadways near the habitats indicates an increase in nitrogen deposition of about 0.25 kg-N/ha/y in 2030 over the base year (a 4% increase in total deposition). The increase in 2060 relative to 2030 could be from 0.4 kg-N/ha/y to more than 1 kg-N/ha/y (at the Hale Avenue site) depending on location (a 7% to 17% increase in total deposition).

Based on the CMAQ modeling, should increases in NO_X emissions occur in proportion to growth within the study area, within Santa Clara, and within the region, total average nitrogen deposition in the area around and including the habitat areas could increase to 8 kg-N/ha/y in 2035 (a 33% increase) and almost 10 kg-N/ha/y in 2060 (a 66% increase). Gaussian modeling indicates that, when emissions are extrapolated based on projected growth, contributions to nitrogen deposition from major roadways could increase by almost a factor of two by 2030 and by an even larger amount by 2060.

As described above, the modeling shows that increases in NO_X emissions result in increased nitrogen deposition. As such, it may be fair to assume a similar correlation between a reduction in NO_X emissions and a reduction in nitrogen deposition. In 2011 the BAAQMD released future year projections through 2025. These projections show a decrease in NO_X emissions from approximately 449 tons/day in 2008 to 360 tons/day in 2025 (a reduction of 89 tons/day). There appears to be a slight increase in NO_X emissions between years 2022 and 2025. These new projections indicate that the future year nitrogen deposition rates extrapolated in this analysis are over-estimated and suggest that there may be a decrease in current rates of nitrogen deposition. However, NO_X emissions, and therefore nitrogen deposition, are not expected to cease entirely. In addition, emissions containing other nitrogen compounds (e.g., NH_3 [ammonia]) may also contribute to nitrogen deposition. As cited in Fenn et al. (2010), a recent study shows that 25% of the nitrogen emissions from light duty vehicles in three California cities are in the form of NH3, and in newer cars the proportion is greater (Bishop et al. 2010 as cited in Fenn et al. 2010). The BAAQMD (2010) reports 52 tons/day of ammonia emissions in the Bay Area as of 2008. Leading sources of ammonia emissions include landfills, wastewater treatment, and refineries (19.8%); light-duty motor vehicles (17.4%); livestock (15.5%); commercial refrigeration (wineries, breweries, and cold storage warehouses; 15.4%); human respiration and perspiration (13.8%); and domestic animal waste (9.0%).

Fenn et al. (2010) report a critical load (the load at which undesirable effects are observed) for California serpentine grasslands of 6 kg-N/ha/y. This load is equal to the current estimates for nitrogen deposition rates in the study area (see *Baseline Deposition* above). While this rate may be expected to drop based on

the BAAQMD report of reduced NO_X emissions, it is uncertain how the reduction will be offset by increases in other nitrogen sources, or what level of reduction would be required to reverse the current adverse effects of nitrogen deposition. Additionally, studies from grasslands in other regions of North America have shown that significant impacts to biodiversity in grassland communities can occur from the accumulation of even low levels of nitrogen deposition (Fenn et al. 2010).

Contributors to Deposition

The amount that various sources contribute to deposition was assessed with different modeling approaches. The most complete of these methods was the use of the PPTM tagging approach in CMAQ. In the base year, the CMAQ PPTM simulation attributes 30% of the total nitrogen deposition to mobile sources within the study area. Another 16% of the nitrogen deposition comes from stationary sources in the study area. Therefore, 46% of nitrogen deposition on the habitat areas comes from existing development and vehicle traffic generated locally within the study area. The remainder of Santa Clara County contributes 17% of the nitrogen deposition while the remaining Bay Area counties account for about 11% of the deposition. The CMAQ simulation indicates that the remaining 26% of the N-deposition comes from anthropogenic emissions in the remainder of the modeling domain (i.e., most of the remainder of California other than Bay Area counties and a portion of Nevada), initial and boundary concentrations (i.e., effects from outside of the modeling domain), and biogenic emissions within the Bay Area counties.

Impacts of nitrogen deposition from Morgan Hill and Gilroy were not explicitly identified in the modeling, but are part of the contribution referred to as the remainder of Santa Clara County. In the emissions inventory used to prepare emissions for CMAQ, municipalities are not identified separately from the county in which they are located. Estimates of emissions for Morgan Hill and Gilroy were made based on the overlap of boundaries of these cities with grid cells in the modeling domain. Based on these estimates, Gilroy contributes 2% of the Santa Clara County NO_X emissions, Morgan Hill contributes 3%, San José contributes 79%, and the remainder of Santa Clara County contributes the remainder of the NO_X emissions (16%). It is reasonable to assume that the impacts from Gilroy and Morgan Hill would be roughly in proportion to their emissions. Of the 17% contribution to nitrogen deposition noted for the remainder of Santa Clara County, therefore, we could expect Gilroy to make up about 1.5% (9% of 17%) and Morgan Hill to make up about 2.7% (16% of 17%).

The contribution of emissions outside of the study area but within Santa Clara County are estimated to grow from 1.1 kg-N/ha/y in the base year to 1.5 kg-N/ha/y in 2035 and 1.7 kg-N/ha/y in 2060. The contribution of emissions from all other Bay Area counties are estimated to grow from 0.7 kg-N/ha/y in the base year to 0.9 kg-N/ha/y in 2035 and 1.0 kg-N/ha/y in 2060.

See **Appendix E** for the complete nitrogen deposition analysis.

4.6 Effects on Covered Species

This section describes the potential direct and indirect effects on covered species under the Plan. The amount of incidental take of covered species has been estimated in accordance with the methods described in Section 4.4 *Impact Assessment Methods*. Estimates of incidental take are based on the habitat models developed for 16 of the 19 covered species. These estimates are likely to be inflated for two reasons: habitat models may overestimate the actual extent of suitable habitat (see species profiles in **Appendix D** for details on each model); and suitable habitat may not be occupied by the subject species. For three of the covered species, sufficient information was not available to create geographically explicit (i.e., GIS-based) habitat models. In these cases, worst-case assumptions were used regarding the amount of suitable habitat removed by covered activities.

The major direct impacts on most covered species will result from habitat loss associated with urban and rural development. For wildlife species, the determination of direct and indirect effects on covered species is based on the habitat disturbed for each species. For covered plants, effects are determined both in terms of habitat and effects on known occurrences. **Tables 3-5 and 3-6** and the species accounts (**Appendix D**) provide additional information on specific biological needs for each covered species, including the links between species life-history needs and land cover types used in the analysis. Impacts are described below for groups of species that are subject to similar impact mechanisms. Maximum allowable impacts on covered species for which habitat models have been developed are provided in **Table 4-4**. Maximum allowable permanent and temporary impacts to land cover types and natural communities are provided in **Table 4-2** and **Table 4-3** respectively. Maximum allowable permanent impacts to plant occurrences are provided in **Table 4-6.** Compliance monitoring will document species habitat and plant occurrence impact limits, as well as land cover type and natural community impact limits. Therefore, there will be some overlap in impact accounting (e.g., 1 acre of impact may count both against the serpentine grassland cap and the Bay checkerspot butterfly habitat impact cap).

Descriptions providing additional specificity on the type and location of covered activities anticipated to impact each species are provided; however, these descriptions do not preclude other covered activities from impacting the covered species in different locations. As long as the activity is covered under the Plan, impacts to each covered species are permitted up to the maximum allowable impacts provided in **Table 4-4** and **Table 4-6**.

As discussed in Chapter 1, California State Parks lands are excluded from the permit area. Because of this exclusion, all of the land cover-related analyses in the Plan are based on the study area less State Parks lands unless otherwise noted. The size of the study area less State Parks lands is 460,205 acres. All percentages of impacts discussed below were calculated relative to the 460,205 acre permit area excluding State Parks.

4.6.1 Bay Checkerspot Butterfly

Bay checkerspot butterfly populations within the study area have been studied for many years and are relatively well understood. Serpentine grassland on both sides of the Santa Clara Valley provide habitat for this species. The population along Coyote Ridge, by far the largest in size and area, is critical to the persistence of the species. Because the only extant populations occur within the study area, maintaining and managing serpentine grassland habitats is important for the continued existence of this species.

Bay checkerspot butterfly habitat units are divided into two broad categories: core and satellite. The definitions for core and satellite habitat units are adapted from the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (U.S. Fish and Wildlife Service 1998). Core habitat units are "moderate to large areas of suitable habitat that support persistent Bay checkerspot populations." Satellite habitat units are "generally smaller and contain less high-quality habitat than core areas, and may occur some distance from core areas." The status of the core and satellite habitat units is identified as occupied, potential, historic, or unknown. For habitat units defined as "occupied," species is known to occupy the patch at least in some years. Where individuals were present historically, but now the site is unoccupied and likely no longer suitable, the habitat unit is defined as "historic." If the site has not been surveyed thoroughly or surveyed in the last ten years, habitat unit was classified as "unknown." Otherwise suitable patches of serpentine grassland within the dispersal distance of known populations were considered "potential" habitat units if land use management practices such as livestock grazing could improve conditions for the species.

Direct Effects

Most, but not all, serpentine bunchgrass grassland is considered species habitat (see **Appendix D**, *Modeled Habitat Distribution in Study Area*). As such, most covered activities that remove or alter serpentine grassland habitats are potentially detrimental to this species. Expansion of urban areas or rural residential development is most likely to result in the majority of impacts on this species. For example, suburban and rural residential development could remove suitable habitat—and possibly individuals—along Coyote Ridge and in the Santa Cruz Mountains. In addition, changes in land use or management of serpentine grasslands could also adversely affect the Bay checkerspot butterfly. Changes in land use that are often associated with expansion of urban areas or rural residential development could also be detrimental to the long-term viability of these populations.

A permanent impacts cap of 550 acres is applied to impacts to the serpentine bunchgrass land cover type (**Table 4-2**), the key habitat land cover type for Bay checkerspot butterfly. An additional 91 acres of temporary impacts to serpentine bunchgrass grassland is anticipated and is the maximum impact allowed (**Table 4-3**). Up to 300 acres of permanent impacts and 54 acres of temporary

impacts to Bay checkerspot butterfly modeled habitat mapped (see **Appendix D** and **Table 5-7**) as "occupied" or "potential" are authorized under this Plan (**Table 4-4**), all of which is also serpentine bunchgrass grassland[14]. Impacts to modeled habitat mapped as "historic/unoccupied" and "occupancy unknown" are not subject to this cap because these units:

- are either no longer occupied and have little or no chance of occupancy in the future due to habitat degradation and fragmentation ("historic/unoccupied" units);
- are very small and far from core habitat units and therefore would, at best, support very small populations in only some years (Communications Hill 2 and Valley Christian High School); or
- are surrounded by urban or urbanizing development and are expected to decline in suitability or be lost as covered activities are implemented (Communications Hill 1 and 2, San Martin/Hayes Valley, Southwest Anderson Reservoir, and Valley Christian High School).

Impacts to Bay checkerspot butterfly habitat is further limited to 3% of the unprotected portion (everything except Type 1 open space) of any core or satellite habitat unit targeted for conservation[15] (as defined in **Table 5-7**), with one exception. The exception is the Kirby/East Hills core habitat unit which has an 11% allowance to accommodate the Kirby Landfill expansion of 80 acres. See Chapter 6, Section 6.5, subheading *Condition 13 Serpentine Avoidance and Minimization* for details on serpentine avoidance requirements applied to covered activities.

Impacts are predicted to occur in 12 of the 22 habitat units of Bay checkerspot butterfly in the study area, which constitutes the known range of the species to date. These impacts are distributed across core occupied habitat (**Table 5-7**), satellite occupied habitat, satellite potential habitat, satellite habitat with occupancy unknown, and satellite habitat with historic occurrences. Impacts to critical habitat are detailed in Section 4.7 *Effects on Critical Habitat* below.

A discussion of population trends and key features of the population dynamics of the Bay checkerspot butterfly is presented in **Appendix D**. In **Appendix D**, population estimates for most of Coyote Ridge are presented. Based on this data, the most important core habitats are topographically diverse areas near the ridge top. The higher elevation ridge top and adjacent north slopes and canyons have favorable combinations of high topographic diversity, including large expanses of north-facing slopes, and the coolest and wettest parts of Bay checkerspot butterfly habitat.

The conservation strategy for the Bay checkerspot butterfly includes the acquisition, in fee title or conservation easement, and management of a

[14] The maximum allowable impact to serpentine bunchgrass grassland that is also Bay checkerspot butterfly habitat is 300 acres, leaving 250 acres of allowable impact to serpentine bunchgrass grassland that is not Bay checkerspot butterfly habitat.

[15] These caps do not apply to habitat units in Type 1 open space because loss of habitat will be extremely limited in permanently protected open space (i.e., limited to trail construction and management activities).

substantial portion of the core habitats on Coyote Ridge and the Silver Creek Hills (see Chapter 5, Section 5.4.1 *Bay Checkerspot Butterfly* for details). This acquisition will include most of the core habitat along the ridge tops, which provides high quality habitat for Bay checkerspot butterfly and have historically (since 1984) supported the densest populations of Bay checkerspot butterfly (see **Appendix D**). The lower elevation areas are warmer and drier, and slopes tend to be south and west-facing, with small areas of north-facing slopes in canyons. As a result, these areas have been occupied by far lower densities of Bay checkerspot butterfly than on the ridge top.

All impacts to Bay checkerspot butterfly core and satellite habitat units are expected to be small except for the Kirby Landfill site, as discussed above, and the Pound Site. The proposed development on the Pound Site, approximately 27 acres to accommodate the Mariposa Lodge/Sheriff's Firing Range project, would occur in lower quality habitat in and near developed sites and on dry, south-facing slopes. The ridge tops in this unit support some of the highest quality habitat for Bay checkerspot butterfly and will be avoided for the reasons stated above. Impacts of individual covered activities in core or satellite habitat units are expected to be small (less than 10–20 acres each) because of the limitations on land use development in the County and San José (the two jurisdictions where this habitat occurs) and the requirement to minimize impacts to serpentine bunchgrass grassland (Chapter 6, Section 6.5, subheading *Condition 13 Serpentine and Associated Covered Species Avoidance and Minimization*).

The Kirby Landfill expansion will remove up to 80 acres (11%) of currently unprotected habitat for this species in the Kirby/East Hills core habitat unit. The areas lost to the landfill are primarily south and west-facing slopes, with pockets of north-facing slopes in the canyon. The crests of the north-facing slopes of the developed area have been patchily occupied by Bay checkerspot butterfly, but densities were much lower (100–300 larvae/ha) in 2001 than those along the ridge top (3,000–10,000+/ha) in the 267-acre Butterfly Trust Reserve, which encompasses some of the best quality habitat on Coyote Ridge (S. Weiss pers. comm.). The loss of these 80 acres represents far less than 11% of the prime Bay checkerspot butterfly habitat in the Kirby/East Hills habitat unit. Loss of this habitat is not expected to affect the persistence of the population in this area because it is of relatively low quality and the extent of habitat acquisition and management that will be accomplished through this Plan. Approximately 44% of this unit is already permanently protected.

Impacts to historic/unoccupied Bay checkerspot butterfly habitat units are expected at Communications Hill. Communications Hill 1 and Communications Hill 2 support 230 acres and 25 acres of marginal habitat for the species respectively, all of which is expected to be lost as a result of urban development at that site and habitat fragmentation. Although the species was present at this site historically, it is no longer there due to the site's isolation from core areas and the loss and fragmentation of habitat to date. As previously indicated, loss of serpentine bunchgrass grassland at these two historic/unoccupied habitat units will not count toward the Plan's 300-acre modeled primary habitat impact cap for Bay checkerspot butterfly; however, these impacts will count toward the Plan's 550 acre serpentine bunchgrass grassland impact cap.

The conservation actions for serpentine grassland and serpentine covered species are discussed in detail in Chapter 5. Several aspects of this conservation strategy are relevant to the impacts of nitrogen deposition described below, because these strategies will influence the ways in which excess nitrogen affects covered species. All serpentine grassland incorporated into the Reserve System (both new lands and existing protected areas) will employ proven management techniques such as livestock grazing and prescribed burning. Both techniques can remove excess nitrogen from the community and reduce relative cover of nonnative grasses, maintaining populations of native plants such as dwarf plantain, one of the host plants for Bay checkerspot butterfly, and other serpentine plants (Weiss 2006). Appropriate grazing in some serpentine grasslands, such as Coyote Ridge, has been successful at maintaining high-quality Bay checkerspot butterfly habitat despite elevated nitrogen deposition levels (Santa Clara Valley Transportation Authority 2006). Accordingly, it is expected that management techniques can be used in the future to substantially reduce the adverse effects of increased nitrogen deposition on serpentine grassland communities and thus on Bay checkerspot butterfly and covered serpentine plants.

The most significant threat to the Bay checkerspot butterfly continues to be nitrogen deposition and lack of management to minimize the effects of nitrogen deposition. Key management techniques include livestock grazing, mowing with string cutters, hand-pulling, prescribed fire, and spot applications of herbicide. The ability to conduct long term grazing is central to habitat management. All of these conservation actions are important to maintain and improve Bay checkerspot butterfly habitat but some may have short-term adverse effects. Mowing, hand pulling, and prescribed fire all occur after the Bay checkerspot butterfly has entered diapause in deep soil cracks and under rocks (May–June). Proper use of prescribed fire will have minimal direct negative impacts on Bay checkerspot butterfly populations. Similarly, proper and limited use of herbicide will have minimal direct negative effects on the species. For example, herbicide applications using a graminicide “Envoy” have proven highly effective and are limited to high priority infestations immediately along roads and cover less than 10 acres in any given year.

Recreational trail access creates local disturbance from trail construction, foot traffic, maintenance, and occasional off-trail use. Most likely trail routes will follow existing roads. Additional well designed and maintained trails that will be constructed in the Reserve System will pose minimal threats to healthy Bay checkerspot butterfly populations, even in the smaller satellite populations such as Tulare Hill. Direct effects associated with recreation will be minimized with the implementation of conditions on recreation (see Chapter 6, Section 6.4.6, subheading *Condition 9 Prepare and Implement a Recreation Plan*).

The diversity of serpentine grassland depends on disturbance from many sources, including gophers, cattle, surface erosion, and landslides. The existing grazing regimes provide far more extensive disturbance on an ongoing basis than do the existing or proposed management and recreational uses, and the size and diversity of Coyote Ridge can readily absorb these impacts. Localized

disturbances are usually rapidly recolonized by diverse native plants, including Bay checkerspot butterfly host and nectar plants.

Indirect Effects

Indirect effects to Bay checkerspot butterfly are expected to result from increased vehicular use (i.e., nitrogen emission deposition, vehicular strikes), increased emissions and deposition from stationary sources of nitrogen, conservation strategy implementation, and other covered activities. Each of these categories of indirect effects is discussed below.

Nitrogen Deposition

Covered activities that facilitate increased vehicular use or electricity generation in the study area will contribute to on-going nitrogen deposition on Bay checkerspot habitat, especially on Coyote Ridge. The effects of different nitrogen sources were modeled for the study area and the region (see Section 4.4.2 *Direct Effects* subheading *Nitrogen Deposition*, and **Appendix E** for details). New major point sources of nitrogen deposition that could adversely affect serpentine communities and associated covered species could not be adequately analyzed at this time (e.g., new power plant, large diesel generator, or other facilities). To address this, the Wildlife Agencies will have additional review and approval authority over new major point sources of nitrogen that could adversely affect serpentine natural communities and associated covered species (see Chapter 8, Section 8.7.3 *Wildlife Agency Responsibilities*). Nitrogen deposition (N-deposition) in Bay checkerspot butterfly habitat comes from a mix of the regional plume from all upwind sources, including emissions and deposition from stationary sources, and local plumes from road traffic, primarily along U.S. 101. The deposition from any one road is small relative to the regional plume except on habitat within 660–990 feet (200–300 meters), and is primarily the effects of vehicular NH_3 and NO_2 emissions (CH2M Hill 2004). Large point sources (i.e., stationary sources) like the Metcalf Energy Center also have small incremental effects. Regional mobile and area sources that are closer to the Bay checkerspot butterfly habitat have larger effects than those from more distant counties; Santa Clara County sources within the study area are estimated to provide 63% of the current deposition (**Appendix E**).

Nitrogen deposition levels are high enough across the study area that all serpentine grassland is at risk, but some areas have higher loads than others. The "critical load" for N-deposition in serpentine grassland, where nonnative grasses have difficulty invading completely, is 5-6 kg-N/ha/yr, as measured with passive samplers (CH2M Hill 2004; Fenn et al. 2010). Tulare Hill and the lower slopes of Coyote Ridge, near U.S. 101, have the highest deposition (15–20 kg-N/ha/yr), and the ridge top above Kirby Canyon receives 10–15 kg-N/ha/year. The reduced N-deposition at the ridge top is a function of its distance from immediate sources (U.S. 101) and its position above the inversion layer on many mornings. In contrast, deposition at Jasper Ridge and at Edgewood County Park (both in

San Mateo County) 1,300 feet from U.S. 280 are 4–5 kg-N/ha/yr. Impacts to Bay checkerspot butterfly habitat resulting from development are most likely to occur at the bottom of slopes, where nitrogen deposition is highest (and therefore habitat quality is lowest).

On-going nitrogen deposition will continue to give nonnative species the ability to dominate native serpentine grasslands, systematically supplanting suitable habitat for covered serpentine plant species and for Bay checkerspot butterfly. It is not possible to precisely determine the nature of the effects of on-going nitrogen deposition on serpentine grassland. While it is likely that on-going nitrogen deposition will favor the growth of nonnative annual grasses over native serpentine species, the resulting change in community composition and habitat quality will depend on several factors. Proportional impacts resulting from on-going deposition will be lower in high pollution zones where impacts may already be acute; similarly, they will be higher in low pollution areas (Weiss 2006). Some of the serpentine grasslands in the study area, such as Tulare Hill and Kirby Canyon, already experience elevated nitrogen deposition levels (CH2M Hill 2004).

With continued N-deposition as a result of growth in the study area and the region, effective grazing management becomes critical to maintaining Bay checkerspot butterfly populations. N-deposition to Bay checkerspot butterfly habitats in Santa Clara County may be above the critical load (as defined above) well into the future, despite efforts to reduce vehicle emissions. It has proven possible to manage the effects of N-deposition on serpentine grasslands in the highest deposition areas on Tulare Hill and low elevation slopes of Coyote Ridge though grazing (S. Weiss pers. comm.). As discussed elsewhere, a flexible grazing regime that seeks to remove a maximal amount of grass each year compensates for high spatial and temporal variability in annual grass production, driven by weather and N-deposition.

The effects of N-deposition on serpentine grasslands and the Bay checkerspot butterfly are well documented (e.g., Weiss 1999). In the absence of grazing, increased growth of annual grasses and thatch build-up lead to decreased cover of host plants, nectar sources, and all native forb species over the course of 1–3 years (Weiss et al. 2007). This habitat shift has been observed every time grazing has been removed in the South Bay, including in the Silver Creek Hills, Santa Teresa Hills, Kirby Canyon Landfill, and in smaller exclosures (Weiss et al. 2007). Losses of host plants and nectar sources lead to population crashes, and ultimately local extinctions. These local extinctions have been observed at Edgewood County Park in San Mateo County. In contrast, grazed areas maintain high native cover and support Bay checkerspot butterfly populations as weather and local topography permit.

The impact of on-going deposition will also depend on the management of specific serpentine grasslands (Weiss 2006). Grazing and burning of grasslands, an important component of the Habitat Plan conservation strategy, are likely to be effective at controlling nonnative species and, consequently, maintaining the relative cover of native serpentine species, including the Bay checkerspot butterfly host plants (Weiss 1999, 2006).

Vehicular Strikes

Covered activities that facilitate increased vehicular use in the study area will also contribute to an increase in vehicle strikes of Bay checkerspot butterfly. Increased traffic on existing roads is likely to result in higher vehicular strikes. However, the proportional impact of this level of mortality on population dynamics of this species is very small within large core populations such as on Coyote Ridge. Vehicular strikes have a greater impact on adult butterflies dispersing between habitat patches. Existing roads where an increase in vehicle traffic is expected as a result of covered activities and where vehicle strikes with Bay checkerspot butterfly are most likely due to road location, road configuration, and traffic patterns are:

- U.S. 101
- Metcalf Road
- Silver Creek Valley Road
- Monterey Highway
- Santa Teresa Boulevard (expected to be widened during the permit term)
- Dirt ranch roads through or near Bay checkerspot butterfly habitat.
- Roads in residential developments adjacent to butterfly habitat (e.g., Silver Creek Hills, residential areas along Basking Ridge Avenue).

Increased development in open areas between Bay checkerspot butterfly habitat (e.g., Coyote Valley) will also create new hazards and barriers to movement for this species.

Conservation Strategy Implementation

Indirect effects to the Bay checkerspot and its associated habitat will be similar to those described previously in Section 4.3.7 *Conservation Strategy Implementation.* Implementation of the conservation strategy will increase access to bay checkerspot habitat and may result in increased take. Harm could result from reserve visitors trampling habitat, littering, and collecting nectar and larval host plants. Visitors may also harass adult butterflies during the flight season. However, effects associated with increased access to Bay checkerspot habitat will be greatly reduced by the Plan's conditions on recreation (see Chapter 6, Section 6.4.6, subheading *Condition 9 Prepare and Implement a Recreation Plan*). These effects will be minor and temporary, especially when compared to the net benefits gained from the Reserve System and the educational benefit afforded to the community through limited access to portions of the reserves.

Other Covered Activities

Indirect effects of other covered activities will be largely avoided by implementation of conditions on covered activities (see Chapter 6, including subheading *Condition 13 Serpentine and Associated Covered Species Avoidance and Minimization*). Conditions placed on construction practices will limit construction dust and erosion. Populations next the Kirby Canyon landfill do not appear to be affected by dust, much of which occurs during the dry season when Bay checkerspot butterfly are in diapause. Erosion is a natural part of the butterfly habitat; nonetheless, conditions on covered activities will avoid erosion impacts. Use of hazardous chemicals will be avoided throughout the Reserve System, including core habitats, except for precisely targeted herbicide applications under the conservation strategy and adaptive management program.

4.6.2 California Tiger Salamander, California Red-Legged Frog, Western Pond Turtle

Several species of amphibians and reptiles utilize riverine habitats as discussed above but also use a wide variety of seasonal wetlands, marshes, ponds, and upland habitats during different times of the year. Ponds and wetlands in the study area provide breeding habitat for California tiger salamander, and breeding and year-round habitat for California red-legged frog and western pond turtle. All these species are affected by surrounding land uses because they also need sufficient upland habitat near breeding streams and other aquatic habitats (e.g., ponds, wetlands) to accommodate year-round uses (e.g., refugia, dispersal). For example, western pond turtles need upland habitat an average of 92 feet from breeding sites but up to 1,391 feet for nesting and overwintering (see species account for citations). Pond turtles also require sufficient basking sites in the water for year-round use (Crump 2001; Davis 1998).

The human-influenced water regime often does not facilitate successful breeding (e.g., if seasonal wetlands dry up prematurely, or if waters that were historically seasonal become perennial). Moreover, these water regimes often support nonnative species such as bullfrogs and predatory fish that eat young frogs and salamanders.

Direct Effects

Covered activities that adversely affect seasonal wetlands, marshes, ponds, streams, or surrounding upland areas may directly affect these species. Individuals could be killed or injured by construction activities. Moreover, the removal or alteration of habitats upland of potential breeding sites may not allow individuals to complete their life cycles or move to other seasonal habitats. Activities that result in the loss of ground squirrel populations (e.g., rodent control) or in the removal or excavation of rodent burrows could result in the direct loss of individuals utilizing upland refugia. Covered activities that remove

vegetation from the edges of wetlands and riparian corridors or vegetation removal within aquatic habitats will reduce habitat heterogeneity and adversely affect these species. Covered activities that isolate breeding pools from adjacent upland habitats will reduce the overall productivity of these species. Isolation of many breeding sites could cause extirpation of local populations. Increased vehicular traffic following road widening or creation of new driveways/access roads within dispersal habitat for reptiles and amphibians will increase the number of individuals that are killed or injured on roadways.

No more than 52 acres of pond and 40 acres of wetland habitat will be permanently affected by covered activities, relative to a total of approximately 1,110 acres of pond habitat and 583 acres of wetland habitat throughout the study area (4.7% of pond and 7% of wetland habitat of the totals in the study area). In addition, no more than 9.4 stream miles will be permanently affected by covered activities, relative to the total of 2,392 miles of stream in the study area (0.4% of the total stream miles in the study area).

Permanent impacts on California tiger salamander modeled breeding habitat will not exceed 77 acres (7% of total modeled breeding habitat in the study area) and temporary impacts will not exceed 14 acres (1% of total modeled breeding habitat in the study area). Permanent impacts on California tiger salamander non-breeding modeled habitat will not exceed 12,855 acres (4% of total non-breeding modeled habitat in the study area) and temporary impacts will not exceed 1,529 acres (less than 1% of total modeled breeding habitat in the study area) (**Table 4-4**).

Permanent impacts on California red-legged frog modeled primary habitat will not exceed 299 acres (3% of total modeled primary habitat in the study area) and temporary impacts will not exceed 116 acres (1% of total modeled primary habitat in the study area). Permanent impacts on California red-legged frog modeled secondary habitat, which includes areas for refugia and dispersal, will not exceed 12,937 acres (4% of total modeled refugia habitat in the study area) and temporary impacts will not exceed 1,489 acres (less than 1% of total modeled secondary habitat in the study area) (**Table 4-4**).

Permanent impacts on western pond turtle modeled primary habitat will not exceed 1,824 acres (2% of total modeled primary habitat in the study area) and temporary impacts will not exceed 440 acres (less than 1% of total modeled primary habitat in the study area). Permanent impacts on western pond turtle modeled secondary habitat will not exceed 7,825 acres (3% of total secondary habitat in the study area) and temporary impacts will not exceed 986 acres (less than 1% of total secondary habitat in the study area) (**Table 4-4**).

Most of the impacts to California tiger salamander, California red-legged frog and western pond turtle occur due to conversion of habitat to developed land cover types within the San José, Morgan Hill and Gilroy planning limits of urban growth. Geographic specificity is provided below for impacts to modeled habitat in the Santa Cruz Mountains, valley floor, and Diablo Range for impacts calculated in GIS (see Section 4.4 *Impact Assessment Methods*). Impacts to

California tiger salamander and California red-legged frog critical habitat are detailed below (see Section 4.7 *Effects on Critical Habitat*).

Impacts to California red-legged frog, California tiger salamander and western pond turtle habitat in the Santa Cruz Mountains are expected to be limited to the Santa Cruz foothills. Impacts to California red-legged frog modeled primary and secondary habitat are expected to occur from dam seismic retrofit on all dams located in the Santa Cruz Mountains and implementation of flood protection projects in Uvas and Gavilan Creeks. Dam and reservoir maintenance is anticipated to impact potential breeding and upland habitat at the Calero, Guadalupe, and Vasona dams. Development within the planning limit of urban growth of Gilroy, rural development, bridge construction/reconstruction, and construction of County Park facilities and infrastructure is expected impact modeled secondary habitat adjacent to modeled primary habitat in the Santa Cruz foothills, especially along Uvas Creek and its lower tributaries.

For California tiger salamander, development within the Gilroy and Morgan Hill planning limits of urban growth, rural development, bridge construction/reconstruction, and construction/reconstruction of County Park facilities and infrastructure is expected to mainly impact modeled upland habitat, with impacts to modeled breeding habitat concentrated on the west side of Uvas Creek and the west side of the City of Morgan Hill. Dam and reservoir maintenance is anticipated to impact potential breeding and upland habitat at Calero and Calero-Fellows Dike.

Impacts to western pond turtle modeled primary and secondary habitat in the Santa Cruz Mountains are expected to be limited to the foothills. Impacts to western pond turtle modeled primary and secondary habitat are expected to occur from dam seismic retrofits on dams in the Santa Cruz Mountains, and implementation of flood protection projects in Uvas and Gavilan Creeks. Dam and reservoir maintenance is anticipated to impact potential habitat at Guadalupe and Vasona Creeks below dams. Development within the planning limit of urban growth of Gilroy, rural development, bridge construction/reconstruction, and construction of County Park facilities and infrastructure is expected impact both modeled primary and secondary habitat, with impacts to concentrated on the west side of Uvas Creek. Impacts locations from Rural Development, all Rural CIP, and all In-Stream CIP cannot be specified at this time. Two western pond turtle known occurrences are expected to be impacted by Gilroy urban development on the west side of Uvas Creek within the Santa Cruz Mountains.

Impacts to California red-legged frog, California tiger salamander, and western pond turtle habitat on the valley floor are expected to occur within the San José, Morgan Hill, and Gilroy planning limits of urban growth. Impacts to California red-legged frog modeled primary and refugia habitat are expected to occur from flood protection projects, vegetation management on lower Llagas Creek, and road upgrades/construction in East Little Llagas Creek. Development within the planning limit of urban growth of Morgan Hill, Gilroy, San José, rural development, bridge construction/reconstruction, and road improvements may impact California red-legged frog secondary habitat adjacent to primary habitat.

Impacts to California tiger salamander breeding and upland habitat are expected to occur on the valley floor within the San José, Morgan Hill, and Gilroy planning limits of urban growth. Impacts to breeding habitat are expected to occur to along Upper and lower Llagas Creek, while impacts to upland habitat are expected to occur north and south of West Branch Llagas Creek, between the Uvas and Llagas Creeks throughout the Prince Valle Drain and Lower Miller Slough. All breeding habitat and most upland habitat with the Morgan Hill planning limit of urban growth are expected to be removed. This is expected to include the removal of one known occurrence on the northwest side of the Morgan Hill planning limit of urban growth from urban development. Development within the San José planning limit of urban growth, rural development, bridge construction/reconstruction, and road improvements are expected to impact upland habitat along Guadalupe, Calero, Santa Teresa, Upper Penitencia, Lower Silver, and Coyote creeks (between Lower Silver Creek and just north of Upper Penitencia Creek).

Impacts to western pond turtle primary and secondary habitat are expected to occur from flood protection projects, vegetation management on lower Llagas Creek, and road upgrades/construction in East Little Llagas Creek. Development within the planning limit of urban growth of Morgan Hill, Gilroy, San José, rural development, bridge construction/reconstruction, and road improvements are expected to impact primarily secondary habitat. One western pond turtle known occurrence is expected to be impacted at the Vasona Reservoir.

Impacts to California red-legged frog, California tiger salamander, and western pond turtle in the Diablo Range are limited to the Coyote Watershed, primarily within the San José planning limit of urban growth. For California red-legged frog, this includes impacts to primary and refugia habitat from dam seismic retrofits at Anderson Dam, implementation of flood protection projects on Coyote, Mid-Coyote, Upper Penitencia, Fisher, Lower Silver, Upper Silver, Berryessa, Quimby, Sierra, South Babb, and Thompson creeks; and levee reconstruction on Berryessa, Thompson, Coyote, and Upper Penitencia Creeks. Dam and reservoir maintenance is anticipated to impact potential breeding and upland habitat at the Coyote dam. Development within the planning limit of urban growth of San José, rural development, bridge construction/reconstruction, and construction of County Park facilities and infrastructure are expected to impact the lower stream reaches that serve as California red-legged frog primary habitat and adjacent secondary habitat. This is expected to include impacts to two California red-legged frog known occurrences on Metcalf Creek and Coyote Creek.

San José urban development within the planning limit of urban growth, flood protection projects, and levee reconstruction are expected to impact California tiger salamander upland habitat adjacent to Sierra, Upper Penitencia, Upper Coyote, Upper Silver, Thompson, Fowler, and Quimby creeks. Dam and reservoir maintenance is anticipated to impact potential breeding and upland habitat at the Anderson Dam. Two California tiger salamander known occurrences are expected to be impacted. One is adjacent to Thompson Creek and the other is between Coyote and Thompson creeks.

The impact locations for western pond turtle are similar to those from California red-legged frog. Impacts to western pond turtle primary and secondary habitat are expected to occur from dam seismic retrofits at Anderson Dam, implementation of flood protection projects in Coyote, Mid-Coyote, Upper Penitencia, Fisher, Lower Silver, Upper Silver, Berryessa, Fisher, Quimby, Sierra, South Babb, and Thompson creeks; and levee reconstruction and maintenance in Berryessa, Thompson, Coyote, and Upper Penitencia creeks. Dam and reservoir maintenance is anticipated to impact potential habitat on Coyote Creek below Coyote and Anderson dams. Development within the planning limit of urban growth of San José, rural development, bridge construction/reconstruction, and construction of County Park facilities and infrastructure are expected to impact the lower stream reaches that serve as primary habitat and adjacent secondary habitat.

SCVWD manages flows and diversions to meet water supply objectives. As discussed in Section 4.3.3, dry-back conditions may occur due to fluctuations in seasonal operations. SCVWD generally attempts to avoid stranding of aquatic species when flows are reduced using a ramped schedule for flow reduction. When in-channel flow reductions are made, wildlife may be stranded in isolated pools or downstream reaches. While adult individuals may have time to move out of the area, flow reductions occurring early in the year may affect amphibian egg sacs established on stream margins.

Conversely, during dewatering events, consistent high flows, if started early enough in the year and continued through late spring, may facilitate breeding by providing a reliable water source and may also reduce the potential for stranding. High flows are not expected to affect western pond turtle breeding as this species tends to lay its eggs in uplands away from the active channel. To ensure that impacts to covered amphibian species are avoided and minimized during dewatering events, SCVWD will develop a dewatering plan for review and approval by the Wildlife Agencies prior to commencing a dewatering activity. See Chapter 6 for additional information on the possible issues addressed by the dewatering plan.

The year following a dewatering event, flows are expected to be lower than normal. This will likely reduce the availability of egg laying substrate for amphibians.

Dry-back of channels may also occur due to maintenance activities, although this occurrence is much less common. For example, it may be necessary to reduce reservoir releases when a recharge diversion requires repair. Rapid dry-back could also occur if bypass flow (flow that remains in the channel) at a diversion is blocked by debris or other system failure. However, repairs of downstream diversions are likely to be implemented while maintaining some flow in the channel. Even a catastrophic failure for diverting water at a downstream diversion would likely not trigger a rapid in-stream dry-back; however, receiving ponds may experience a reduction in water level. All planned repairs requiring channel dewatering would incorporate bypass flow.

Amphibian larvae and tadpoles may also be affected by changes in water quality associated with operation of reservoirs and groundwater percolation ponds. These potential effects are discussed in Section 4.3.3. Key issues are increased in fine sediments released from reservoirs or ponds that may cover egg sacs if releases are made early in the year. Increased turbidity from sediment and algae may inhibit foraging of adults if releases are made later in the year.

Indirect Effects

Indirect effects resulting from human population growth and increased urbanization is expected to constrain or eliminate stream, pond, and/or wetland habitats and increase water temperatures, while decreasing sediment transfer and dissolved oxygen. Changes in land use in areas adjacent to breeding sites can reduce the overall habitat quality of upland sites for California tiger salamander, California red-legged frog, and western pond turtle. The rate of natural movement of salamanders among breeding sites depends on the distance between the ponds or complexes of ponds and of the quality of intervening habitat (e.g., salamanders may move more quickly through sparsely covered and open grassland than they can through densely vegetation lands) (Trenham 1998). Loss of habitat connectivity may affect species disbursal movements. An increase in urban development adjacent to breeding habitat would facilitate an increase in predators (e.g., feral cats, raccoons, and skunks) that decrease breeding success and predate reptiles and amphibians. This predation may have a detrimental impact on local populations.

Increased runoff from impervious surfaces into wetland areas carries pollutants that are harmful to reptiles and amphibians, which are particularly sensitive to contaminants and other pollutants in the water. An increase of impervious surfaces within a watershed due to urbanization may result in changes to in-stream flow, temperature, and stream geomorphology. Increases in impervious surfaces can also result in increased water pollutants in local streams, particularly during “first flush” rain events. Herbicides, pesticides, and other toxic materials can cause diminished production or mortality of aquatic covered species. Fertilizers and other organic materials can cause algal blooms that decrease dissolved oxygen levels, while fine sediments may degrade breeding habitat. Changes in land use that reduce natural land cover and increase impervious surfaces in areas adjacent to riverine habitats can also lead to increased disturbance of species (e.g., reduced foraging and reproductive success) due to increased sources of noise, light, neighborhood runoff (e.g., fertilizers, oil), and introduced species.

Covered activities that occur in aquatic habitat (i.e., in-stream capital projects, in-stream operations and maintenance, and monitoring) could facilitate the spread of disease such as chytridiomycosis. Increased public access to habitat supporting California tiger salamander, California red-legged frog, and western pond turtle will increase the potential for harm and harassment, and may also result in increased pollution, predation, and introduction of nonnative species.

4.6.3 Foothill Yellow-Legged Frog

Riverine habitats within the study area are subject to human-influenced flows that do not reflect the region's historical water regime. Species that occur in these habitats are usually affected by changes in land use adjacent to the riparian corridor and by the development of permanent infrastructure within the natural floodplain.

Direct Effects

Foothill yellow-legged frogs are expected to be affected by projects implemented within the stream channel or that result in the removal of cobblestone substrate or riparian vegetation, particularly in reaches above reservoirs. Ground-disturbing activities, such as maintenance of stream banks, levees, and channel rights-of-way (e.g., bank repair, vegetation management), could increase erosion and sediment discharge that could disrupt breeding of foothill yellow-legged frogs. Projects that place structures in the channel (e.g., culvert installation) or that require stream access may crush individuals or create permanent pooling habitat where higher risk of predation exists for adults, metamorphs, and tadpoles. If pulse flows from reservoirs (to aid migration by juveniles and smolts of listed fish) are released during the foothill yellow-legged frog egg-laying period, they could dislodge egg masses, causing mortality. However, this is unlikely because pulse flows will be release in winter months (January, February, and March) and are intended to simulate natural flow conditions (see Chapter 5 for details). The timing of oviposition (laying of eggs) for foothill yellow-legged frog typically follows the period of high-flow discharge from winter rainfall and snowmelt (Jennings and Hayes 1994; Kupferberg 1996), thus, pulse flows are expected to occur in advance of oviposition.

Although foothill yellow-legged frogs are not currently known to occur downstream of many of the dams in the permit area, remnant populations may be affected by the operation and maintenance of SCVWD's dams. SCVWD manages flows and diversions to meet water supply objectives. As discussed in Section 4.6.2, dry-back conditions may occur due to fluctuations in seasonal operations. There are events that cause operations to fluctuate substantially and rapidly. For example, it may be necessary to reduce reservoir releases when a recharge diversion requires repair. When in-channel flow reductions are made, amphibians may be stranded in isolated pools or downstream reaches that rapidly dry back as flow rapidly declines and the area of wetted channel is decreased. SCVWD generally attempts to avoid stranding of aquatic species when flows are reduced using a ramped schedule for flow reduction. Flow reductions may affect egg masses established on stream margins as well as larval food availability.

Dewatering events could aid breeding by providing a reliable water source and may also reduce the potential for stranding or could impact breeding by scouring egg masses and reducing the algal food base for larvae. To minimize the impacts to foothill yellow-legged frogs, SCVWD will develop a dewatering plan for review and approval by the Wildlife Agencies prior to commencing a dewatering

activity. See Chapter 6 for additional information on the possible issues addressed by the dewatering plan.

Permanent impacts to foothill yellow-legged frog modeled primary habitat will not exceed 1.9 stream miles, or less than 1% of the total modeled habitat for the species within the study area. Temporary impacts are will not exceed 0.7 miles of stream (less than 1%) of modeled habitat. Permanent impacts on foothill yellow-legged frog modeled secondary habitat will not exceed 4.8 miles (less than 1% of total secondary modeled habitat in the study area) and temporary impacts will not exceed 1.3 miles (less than 1% of total modeled secondary habitat in the study area) (**Table 4-4**).

Geographic specificity of impacts to foothill yellow-legged frog is provided below in terms of expected impacts to modeled habitat in the Santa Cruz Mountains, valley floor, and Diablo Range for impacts calculated in GIS (see Section 4.4 *Impact Assessment Methods*).

Impacts to foothill yellow-legged frog in the Santa Cruz Mountains are expected to be limited to the Santa Cruz foothills. Impacts to modeled primary and secondary habitat are expected to occur from dam seismic retrofit at Uvas Dam, Chesbro Dam, Almaden Dam, Calero Dam, and Guadalupe Dam. Impacts from implementation of flood protection projects are expected in Uvas Creek (secondary habitat) and Gavilan Creek (primary and secondary habitat). Dam and reservoir maintenance is anticipated to impact potential habitat at Guadalupe Dam. One known occurrence is expected to be impacted along Uvas Creek, north of its confluence with Bodfish Creek.

Impacts to foothill yellow-legged frog on the valley floor are expected to be limited to modeled secondary habitat in-streams within the San José, Morgan Hill, and Gilroy planning limits of urban growth. Impacts to secondary habitat are expected to occur from implementation of flood protection projects in East Little Llagas, Jones, Lions, West Branch Llagas, West Little Llagas, Alamitos, Arroyo, Canoas, Los Gatos, Randal, and Ross creeks; levee reconstruction in Lower Llagas, Llagas West, Jones, Lions, West Branch Llagas, Alamitos, Guadalupe, Canoas, Randol, and Los Gatos creeks, and the Guadalupe River; vegetation management on lower Llagas Creek; and road upgrades/construction near East Little Llagas Creek. Development within the planning limits of urban growth of Morgan Hill, Gilroy, San José, rural development, bridge construction/reconstruction, and road improvements are expected to impact foothill yellow-legged frog secondary habitat.

Impacts to foothill yellow-legged frog in the Diablo Range are expected to be limited to the Coyote Watershed, primarily within the San José planning limit of urban growth. Impacts are primarily expected to be to secondary habitat and occur from dam seismic retrofits at Anderson Dam; implementation of flood protection projects on Coyote, Mid-Coyote, Upper Penitencia, Fisher, Lower Silver, Upper Silver, Berryessa, Quimby, Sierra, South Babb, and Thompson creeks; levee reconstruction and maintenance in Berryessa, Thompson, Coyote, and Upper Penitencia creeks. Development within the planning limit of urban growth of San José, rural development, bridge construction/reconstruction, and

construction of County Park facilities and infrastructure are expected to impact the lower stream reaches that serve as foothill yellow-legged frog secondary habitat.

Indirect Effects

Foothill yellow-legged frogs are expected to be indirectly affected by water flow and adjacent land uses within occupied watersheds.

Indirect effects on covered aquatic species are also derived from overall changes in impervious surface in the watersheds during the permit term. An increase of impervious surfaces within a watershed due to urbanization may result in changes to in-stream flow, temperature, and stream geomorphology. Increases in impervious surfaces can also result in increased pollutants entering local streams, particularly during "first flush" rain events. Herbicides, pesticides, and other toxic materials can cause diminished production or mortality of aquatic covered species. Fertilizers and other organic materials can cause algal blooms that decrease dissolved oxygen levels, while fine sediments may degrade breeding habitat. Changes in land use that reduce natural land cover and increase impervious surfaces in areas adjacent to riverine habitats can also lead to increased disturbance of species (e.g., reduced foraging and reproductive success) due to increased sources of noise, light, neighborhood runoff (e.g., fertilizers, oil), and introduced species.

Urban development and agriculture have historically been cited as the cause of degraded watershed health. However, a recent study implicates exurban land use as a significant contributor as well (Lohse et al. 2008). This study found that increases in exurban development within a watershed results in fewer observed areas of high quality in-stream habitat. In addition, the study indicates that exurban development may have a greater relative impact than urban development on stream conditions because exurban development generally occurs in areas that are less developed and have existing high quality habitat (Lohse et al. 2008).

Covered activities that occur in aquatic habitat (i.e., in-stream capital projects, in-stream operations and maintenance, and monitoring) could facilitate the spread of disease such as chytridiomycosis. Increased public access to habitat supporting foothill yellow legged-frogs will also increase the potential for harm and harassment. Increased public access to these areas may also result in increased pollution, predation, and introduction of nonnatives. These effects will be minimized through the implementation of conditions described in Chapter 6.

4.6.4 Western Burrowing Owl

Occupied nesting, potential nesting, and overwintering only habitats were modeled for the burrowing owl (see **Appendix D** for habitat requirements). Impacts to the species will differ depending on the type of burrowing owl habitat that is affected. Impacts to different types of burrowing owl habitat will require

different types of conservation actions to ensure the impacts are appropriately offset and that conservation of the species occurs. Impacts are discussed below for the three types of burrowing owl habitat. Impacts are also discussed below for individual owls that may occur in any of these habitat types.

As previously described in Chapter 1, take authorized by permits issued for this Plan that occur within the expanded study area for burrowing owl conservation will be the result of conservation strategy actions implemented for the burrowing owl. Take associated with any of the six other categories of covered activities described in Chapter 2 or conservation actions for species other than the burrowing owl are not covered by this Plan in the expanded study area for burrowing owl conservation.

Direct Effects

Occupied Nesting Habitat

Within the Habitat Plan study area and expanded study area for burrowing owl conservation, burrowing owl nesting habitat is limited to grassland, barren, and some agricultural land cover types, that are generally flat with an open view shed and active ground squirrel colonies (see **Appendix D** for habitat requirements). Most of the occupied nesting habitat is within the northern portion of the urban service area of the City of San José.

Based on what is known about the recent distribution of nesting burrowing owls in the study area (DeSante et al. 2007; Townsend and Lenihan 2007; California Natural Diversity Database 2012; Barclay 2007), and the propensity of burrowing owls to forage within 0.5 mile of nest sites during the breeding season (Haug and Oliphant 1990; Rosenberg and Haley 2004), there are an estimated 1,348 acres of occupied nesting habitat (defined as breeding sites and associated essential foraging habitat within 0.5 mile of nest sites) in the study area. This estimate excludes the expanded study area for burrowing owl conservation because the only covered activities that will occur there are those associated directly with burrowing owl conservation. A maximum of 198 acres (15%) of occupied burrowing owl nesting habitat could be lost to covered activities within the Habitat Plan study area. Temporary impacts will not exceed 20 acres (1%) of occupied nesting habitat in the Habitat Plan study area (**Table 4-4**). Areas that are considered burrowing owl nesting habitat but will not be impacted by covered activities include the San José International Airport. All of the expected impacts on occupied burrowing owl habitat from covered activities would occur within the City of San José as a result of urban development.

Potential Nesting Habitat

There is an estimated 63,751 acres of potential nesting habitat in the study area. A maximum of 4,000 acres (6%) of potential burrowing owl nesting habitat in the permit area may be permanently affected by covered activities. Temporary

impacts will not exceed 604 acres (less than 1%) of potential nesting habitat (**Table 4-4**). This is valley floor habitat that is outside of 0.5 mile of current nest locations but within 7.5 miles (documented movement distances of banded owls in Santa Clara County) of known nest locations (**Figure 5-11**). Impacts to potential nesting habitat will occur primarily as the result of rural residential development in unincorporated County areas, San José, Gilroy, or Morgan Hill. Additional impacts are expected on some types of agricultural lands on the valley floor, where agricultural lands are converted to other uses (housing or commercial).

Habitat Used Only for Overwintering

A maximum of 9,671 acres or 7% of modeled overwintering habitat in the Habitat Plan study area will be permanently affected by covered activities. Temporary impacts will not exceed 762 acres (less than 1%) of modeled overwintering habitat in the Habitat Plan study area (**Table 4-4**). Impacts to overwintering habitat will occur primarily as the result of rural residential development outside of the jurisdiction of San José, Gilroy, or Morgan Hill. Most of the impacts incurred on overwintering habitat will be under the jurisdiction of the County of Santa Clara. Additional impacts may occur as the result of roadway improvements (widening, bridge replacements) or stream maintenance in areas where burrowing owls have been documented using berms or levees along waterways.

Impacts on Individual Burrowing Owls

As described above, take authorization for burrowing owls is primarily limited to loss or degradation of the three kinds of habitat for the species (occupied nesting, potential nesting, and overwintering). All forms of take of individual owls are possible. Loss (death) or injury could occur from implementation of many covered activities if active burrows or nests are not avoided. However, the potential for this is avoided through the implementation of Condition 15, described in Chapter 6. Similarly, filling burrows used by owls when the owls are foraging off site could cause the owl to abandon the site and subsequently die off site if the owls are not able to find new shelter or are otherwise put in harm's way (e.g., excessive exposure leading to predation by other species). Vehicle strikes are also possible on construction sites, particularly when traffic occurs close to active burrows or nests.

Harm or harassment may occur from construction or operations and maintenance activities if these activities disrupt normal foraging or nesting behavior. In some instances, harassment could be so severe that it causes an owl to abandon its nest or its active burrow. The potential for this is minimized through the implementation of Condition 15, described in Chapter 6.

Capture, harm, and harassment may also occur from surveying, monitoring, and management activities within the Reserve System or on managed lands. For

example, active translocation of owls may be used as part of the conservation strategy (see Chapter 5). While allowed under the Plan, this handling activity would capture, harm, and harass owls temporarily while they are being moved. Unsuccessful translocation efforts conducted on an experimental basis may also result in the death of individuals. Impacts on individual burrowing owls will be minimized through the implementation of Condition 15, described in Chapter 6.

Since burrowing owls are protected by the MBTA, take of owls in the form of death or injury will not be allowed under the federal permit for any covered activity[16]. The NCCP permit serves as authorization by CDFG for take of owls consistent with this Plan under the Fish and Game Code.

Until the owl population in the South Bay Population reaches the population growth trend described in Section 5.4.6, the Plan does not cover take of individual owls, except for conservation strategy implementation or if an exception to the passive relocation prohibition is granted (see Chapter 6, Condition 15, subheading *Passive Relocation)*. Condition 15 and other avoidance measures described in Chapter 6 (e.g., adoption of speed limits on construction sites) will be used to avoid such impacts. Few exceptions to the passive relocation prohibition are anticipated. These provisions will maximize the possibility of success of the conservation strategy in Chapter 5 by initially preserving owls in the study area as much as possible.

Once the owl population in the South Bay Population reaches the population growth trend as described in Chapter 5, take of individual owls in all forms will be allowed under the Plan for all covered activities (avoidance and minimization measures described in Condition 15 will still be required with the exception that passive relocation will be allowed consistent with the process described in Chapter 6). Since the population is now in decline and because of the limitations of the population viability analysis (PVA) model, it is anticipated that at least a 10 year period is necessary for the conservation activities to have a positive effect and to detect that effect through monitoring and re-running of the PVA.

Once the target growth trend is reached and take of individual owls for all covered activities is allowed, the amount of allowable take will be determined annually by the Implementing Entity in partnership with the Wildlife Agencies based on owl monitoring data and population viability modeling. The amount of take annually will be the number of owls in excess of those needed to maintain the positive growth trend as determined by the PVA (**Figure 4-3**). Based on new data and modeling results, the Implementing Entity and the Wildlife Agencies may increase or decrease the allowable take each year to ensure that the biological goals and objectives of the Plan are met. If the positive growth trend is lost during implementation, take authorization would again be limited to all forms of take associated with the implementation of the burrowing owl conservation strategy or take associated with approved exceptions to the passive relocation prohibition.

[16] If burrowing owl is listed under the ESA, this Plan can at that point serve as a Special Purpose Permit under the MBTA.

Take of burrowing owls resulting from the expiration of temporary management agreements will only be authorized if the targeted population growth described in Chapter 5 is being met. The amount of take would be counted toward the annual take authorized for that year. The only exception to this rule is that take of owls associated with implementation of the conservation strategy may continue and is not counted towards the annual take limit.

Indirect Effects

Indirect effects resulting from human population growth, increased urbanization of the valley floor, and the continued build out of the three cities covered by the Plan are expected to reduce the quality of western burrowing owl nesting (occupied and potential) and overwintering habitat. The predominant indirect effects on burrowing owls are anticipated to beincreased harassment from people, increased vehicle-related disturbance (e.g., of nesting habitat near roads), increased vehicle strikes, isolation of individuals on vacant lots, predation by cats, and increased exposure to humans throughout the study area, including within the Reserve System.

4.6.5 Least Bell's Vireo

Least Bell's vireos breed in early successional riparian habitat during the spring and summer months. This habitat is the product of a dynamic riverine environment and is adversely influenced by human-altered riverine systems that minimize disturbance and disallow flooding.

Direct Effects

Because of the rarity of the species in the study area and the importance of maintaining all individuals that occur, this Plan does not authorize take in the form of direct injury or mortality. The Plan also does not authorize take of nests or eggs (these restrictions are in compliance with the MBTA and California Fish and Game code.) Covered activities may result in take in the form of harm and/or harassment, although these effects will be minimized with the avoidance and minimization measures described in Chapter 6 (see Condition 16 *Least Bell's Vireo*). Covered activities that result in the removal or alteration of riparian habitat within the study area will affect riparian obligate songbirds such as least Bell's vireo. Moreover, any activity that diminishes dynamic riverine events (i.e., floods) that cause natural disturbance and create early successional habitats will reduce the amount of breeding habitat available for this species. This species is not only affected by the amount of breeding habitat available but also by land uses adjacent to the riparian corridor. Impacts on the species will be minimized through the implementation of Condition 16, described in Chapter 6.

Covered activities will not exceed 72 acres of permanent impacts on primary least Bell's vireo modeled habitat, or 2% of the total 3,097 acres of modeled

habitat in the study area. Temporary impacts will not exceed 43 acres (1% of total modeled habitat) of modeled habitat (**Table 4-4**).

Geographic specificity of impacts is provided in terms of impacts to potential habitat calculated in GIS (see Section 4.4 *Impact Assessment Methods*). Impacts to modeled habitat are limited to the Santa Cruz Mountains foothill and the valley floor in the South County. Impacts to least Bell's vireo modeled primary habitat are anticipated to occur along riparian corridors from dam seismic retrofit at Uvas Dam and Chesbro Dam, flood protection projects in Uvas and Llagas Creek watersheds, vegetation management on lower Llagas Creek, and road projects along East Little Llagas Creek.

Indirect Effects

Least Bell's vireo is expected to be indirectly affected by water flows and adjacent land uses that alter associated riparian habitat within the study area. See Section 4.6.3 *Foothill Yellow-Legged Frog* subheading *Indirect Effects*, above, for a discussion of indirect effects on riverine natural communities and associated riparian corridors. In addition, breeding success can be reduced if adjacent land uses result in nonnative, or feral, nest predators (i.e., cats) or high numbers of parasitic brown-headed cowbirds.

4.6.6 Tricolored Blackbird

Tricolored blackbirds breed colonially in freshwater marshes and other wetland habitats with reeds, cattails, or other emergent or non-emergent wetland vegetation (such as blackberry). Further, this species needs foraging habitat adjacent to breeding sites to successfully nest and rear young.

Direct Effects

Because of the rarity of the species in the study area and its high breeding site fidelity, this Plan does not authorize the removal of historic[17] or active breeding habitat. No direct impacts are allowed to active colonies. Potential tricolored blackbird breeding sites will be directly affected by covered activities that result in the removal or permanent alteration of wetlands, marshes, and vegetated ponds. Conversion of lands from native or agricultural land cover to urban use will result in the degradation of foraging habitat for this species.

Estimated impacts on tricolored blackbird habitat are shown in **Table 4-4**. Permanent impacts on tricolored blackbird modeled primary habitat and secondary habitat will not exceed 276 acres (3%) and 10,317 acres (8%) of

[17] If a pond or wetland has documented breeding within the past 5 years, it will not be directly impacted by covered activities. Best efforts will be used to determine historic use. Best efforts will include at a minimum, a CNDDB records search, discussion with local experts, and investigation of site for historic nesting materials.

modeled primary habitat and secondary habitat in the study area, respectively. Temporary impacts on tricolored blackbird modeled primary habitat and modeled secondary habitat will not exceed 93 acres (1%) and 768 (less than 1%), respectively.

Geographic specificity of impacts is provided in terms of expected impacts to modeled habitat calculated in GIS (see Section 4.4 *Impact Assessment Methods*). Impacts to tricolored blackbird modeled breeding habitat occur to stream reaches where impacts are expected to result from in-stream capital improvement, in-stream operations and maintenance, and road projects. Such covered activities include seismic retrofits, levee reconstruction, vegetation management on lower Llagas Creek, improvements to the Coyote Valley Parkway interchange, and road projects along East Little Llagas Creek.

The majority of the foraging habitat with San José, Morgan Hill, and Gilroy planning limit of urban growth is expected to be removed due to urban development. In the vicinity of Gilroy, this includes modeled foraging habitat adjacent to Uvas, West Branch Llagas, and Llagas creeks. Within the Morgan Hill planning limit of urban growth, all foraging habitat on the valley floor, as well as limited portions in the Santa Cruz foothills, is expected to be impacted. Within the San José planning limit of urban growth, impacts to modeled foraging habitat are limited to the Diablo foothills. This is expected to include modeled foraging habitat in the adjacent Canoas, Upper Silver, Fowler, Evergreen, Upper Penitencia, and Sierra creeks.

No impacts are allowed to active colonies (see Chapter 6, Section 6.6.1, subheading *Condition 17 Tricolored Blackbird*); however, it is anticipated that the colony located in Morgan Hill will likely relocate due to encroachment of development within foraging radius of the breeding site.

Indirect Effects

The indirect impacts on tricolored blackbird and other native bird species that utilize pond and wetland habitats will be similar to those discussed above in Section 4.6.4 *Western Burrowing Owl*. More specifically, the predominant indirect effects of covered activities on tricolored blackbird are increased harassment from people; vehicle-related disturbance (e.g., of breeding habitat near roads); increased urban predators (e.g., cats, skunks, raccoons); and increased exposure to humans throughout the action area, including within the Reserve System. Edge effects associated with roads and urban development include increased light and noise, which can disrupt breeding and foraging behavior and inhibit communication necessary for successful mating. Changes to existing roadbeds, bridges, and/or barriers and guardrails can change sound characteristics in certain habitats, interfering with acoustic communication for some birds.

4.6.7 San Joaquin Kit Fox

The last documented breeding activity of San Joaquin kit fox within the study area occurred in 1992. Breeding may occur in the southeastern portion of the study area, although it is expected to be rare. San Joaquin kit fox may move through the southeastern portion of the study area between areas of known breeding activity outside the study area. Suitable movement habitat for San Joaquin kit fox is defined as annual grassland and oak savanna contiguous with grassland in the Pacheco Creek Watershed. Secondary foraging habitat occurs in agricultural fields and row crops adjacent to grassland areas within this watershed.

Because habitat fragmentation is a significant threat to kit fox, preservation of contiguous tracts of suitable habitat is of primary importance. Ideally, contiguous habitat should be expansive enough to provide both foraging and movement habitat and ultimately to support a viable breeding population (i.e., support one or more kit fox home ranges) should the species expand its breeding range in the future. Known breeding populations north of the study area represent the northernmost extent of the species' range. Maintaining connectivity between those populations and other known breeding populations south of the study area is critical to maintaining genetic diversity in the population. The southern portion of the Plan area is critical to maintaining this linkage.

Direct Effects

Because of the rarity of the species in the study area and the importance of maintaining all individuals that occur, this Plan does not authorize take of San Joaquin kit fox in the form of injury or mortality. Take is authorized in the form of harm or harassment, although these effects will be minimized with the avoidance and minimization measures described in Chapter 6 (see Section 6.6.1, subheading *Condition 18 San Joaquin Kit Fox*).

Covered activities that occur along the Pacheco Creek corridor and in the portion of the study area south of Henry W. Coe State Park have the potential to affect San Joaquin kit fox. Any new rural development that occurs along the SR 152 corridor could fragment movement habitat and potentially affect movement patterns. Increased vehicular traffic following road widening or creation of new driveways or access roads within movement habitat may increase the risk of injury or death of kit fox on roadways (however, injury or death of kit fox by vehicular collisions is not authorized by this Plan). Any covered activities that require the excavation of burrows or removal of modeled habitat with existing California ground squirrel colonies have the potential to degrade kit fox habitat. Chapter 6, Section 6.6.1, subheading *Condition 18 San Joaquin Kit Fox* reduces the potential to injure or kill kit foxes that might be taking refuge in these burrows.

A maximum of 198 acres of modeled secondary kit fox habitat (less than 1% of modeled habitat), will be permanently removed or degraded and a maximum of 46 acres (less than 1% of modeled habitat) will temporarily affected by covered activities. A maximum of 28 acres of modeled secondary (low use) kit fox habitat (1% of modeled habitat), will be permanently removed or degraded and a maximum of 6 acres (less than 1% of modeled habitat) will temporarily affected by covered activities (**Table 4-4**).

Indirect Effects

Indirect effects resulting from human population growth in Gilroy and increased urbanization along U.S. 101 south and SR 152 east of Gilroy have the potential to affect kit fox movement through the study area through habitat fragmentation, and may also affect availability of foraging areas and cover. Growing traffic pressures on SR 152 increase the risk of vehicle/kit fox conflict. The presence of road kill attracts predators such as kit foxes and exposes them to increased risk of vehicle strike. Increased risk of fire associated with roads (e.g., accidents and tossed lighted cigarette butts) may also harm or kill kit foxes and temporarily remove habitat.

Recreational uses on Plan Reserves have the potential to disturb denning kit foxes. However, these activities will be prohibited or limited to avoid or minimize adverse impacts on the species (see Chapter 6). Increased noise and lights from urban areas and harassment from pets have the potential to affect kit foxes along the urban-wildland interface. Feral cats increase competition for food and introduce disease.

4.6.8 Serpentine Plants

This section describes the direct and indirect effects of the covered activities on covered plants that occur exclusively or primarily in serpentine grassland or serpentine chaparral land cover types. The direct effects are described for each species; indirect effects are described at the end of the section for all serpentine-associated covered plants because indirect effects are similar for the entire group.

Direct Effects

For each serpentine species listed below, direct effects on known occurrences and suitable habitat are discussed. The discussion includes information on the general location and population estimates of occurrences expected to be affected by covered activities, where these data are available. Population data are often incomplete or out of date due to inconsistent reporting to the state database (CNDDB). In addition, population sizes reported in one year may not accurately represent long-term averages. Almost all of the covered species discussed in this section are herbaceous annuals or perennials (all but Coyote ceanothus, which is a woody perennial). Both annual and perennial herbaceous plants experience

yearly fluctuations in population numbers due to factors related to climate, disturbance, and chance. For all of these reasons, the population data provided below should be considered as a general overview only. Surveys conducted during Plan implementation of affected and protected populations will yield more accurate population data to be used in tracking impacts, land acquisition, and adaptive management.

In addition to estimates of location and population size of potential impacts, the discussion below includes the maximum allowable occurrence impact limit for each species and the impacts on modeled or suitable habitat.

Tiburon Indian Paintbrush

Potential habitat for Tiburon Indian paintbrush exists in serpentine bunchgrass grassland within the study area. However, the two known extant occurrences in the study area appear to occur on a specific sub-type of serpentine soils (S. Weiss pers. comm.). Two of nine known extant occurrences of Tiburon Indian paintbrush occur within the study area (**Table 4-6**; California Natural Diversity Database 2012). Both of these are located along Coyote Ridge. One is on private land that may be protected as a mitigation site for expansion of the Kirby Canyon Landfill. The second occurrence is on a mitigation site for Bay checkerspot butterfly established by Waste Management, Inc for previous landfill development. Both occurrences are being monitored and managed by the Kirby Canyon Butterfly Trust; neither site is currently permanently protected.

Population estimates for this species exist for all except one of the occurrences. The total estimate of known populations reported in the CNDDB is 1,687 individual plants (from estimates between 1988 and 2006). More recent surveys, in 2009, of the two occurrences in the study area counted 1,203 individuals. This species will only be affected by the implementation of the conservation strategy. Management actions (i.e., prescribed burning and livestock grazing) on the one occurrence currently under temporary easement may result in temporary effects. These management actions however, will result in a net benefit to the species and impacts are considered minor and temporary. No additional impacts are allowed to the species, even if more occurrences are discovered during the permit term.

All serpentine bunchgrass grassland in the study area is considered potential habitat for this species. A permanent impacts cap of 550 acres (5.3% of the total in the study area) is applied to impacts to the serpentine bunchgrass land cover type. An additional 91 acres (less than 1%) of temporary impacts to serpentine bunchgrass grassland is anticipated and is the maximum impact allowed (**Table 4-3**).

Coyote Ceanothus

Coyote ceanothus is generally found growing on dry slopes in chaparral, grassland, and coastal scrub on serpentine soils. All three known occurrences of

Coyote ceanothus are located within the study area (**Table 4-6**; California Natural Diversity Database 2012). One of these occurrences is located northwest and southwest of Anderson Dam. This occurrence is the largest known. It is mostly on private land although a small portion of it occurs adjacent to Anderson Dam on SCVWD property and a small portion is located on Anderson Lake County Park. Much of the portion of the occurrence on SCVWD property is likely to be permanently impacted by a seismic retrofit of Anderson Dam or major maintenance of the dam. Because of the rarity of this species and the need to quantify the magnitude of the effects, additional analysis was conducted on this occurrence.

The size of the occurrence adjacent to Anderson Dam was estimated using data from previous surveys conducted by SCVWD botanists (2006 and 2007) combined with field surveys conducted on May 5 and 6, 2009. Field data were used to estimate the population density of Coyote ceanothus in three chaparral types mapped on high-resolution aerial photographs (from April 2006). The site includes unburned chaparral and an area of 100–200 acres that burned at varying intensities in 2003. The burn area supports a large population of young plants (most appeared to be 5–6 years old during 2009 surveys) many of which flowered for the first time in the spring of 2010 (U.S. Fish and Wildlife Service 2011).

The 2009 population estimate for this occurrence was 188,475 plants, the vast majority of which (99.5%, or 187,534) were 5–6 years old plants (J. Hillman pers. comm.). The young plants observed during May 2009 appeared to be healthy, and mortality from herbivory or other causes was not observed. The recent 5-year review indicates that many of the individual plants survived to reproductive maturity (U.S. Fish and Wildlife Service 2011). This survival rate is considered conservative because this species is highly adapted to post-burn reproduction and drought conditions and it is resistant to herbivory.

We used overlays of the maximum footprint of the Anderson Dam retrofit and the extent of the Dam Maintenance Program at this site (the boundaries of these projects mostly overlap, but not entirely) to estimate the number of individuals that could be impacted by covered activities. Based on this analysis, we estimate that 3,550 individuals (less than 2% of the total current population) will be affected. Almost all of the plants to be lost are from the 2003/04 crop. With a conservative survival rate for juvenile plants of 50%, the population could be reduced to 94,708 (= 187,534/2 + 941adults) by the time the covered activities occur (this assumes no recruitment into the population in the meantime, which is unrealistic). Dam seismic safety retrofit and activities associated with the Dam Maintenance Program would remove no more than 3.7% of the western portion of the Anderson population (= 3,550/94,708).

A portion of the same occurrence of Coyote ceanothus located east of Anderson Dam could be affected by dam operations following a seismic retrofit. Currently, Anderson Reservoir is operated under storage restrictions because of seismic safety concerns. Under current restricted operations there is only a small chance that the dam would spill and this site could be inundated. However, after the seismic retrofit the reservoir would return to “normal” operations under which

there would be a higher probability that water level of the reservoir would rise to the current vegetation line (approximately equal to spillway elevation) for a portion of the water year. The size of this portion of the occurrence is estimated at 300 individuals, up to 100 of which (33%) may be impacted when the normal reservoir levels are restored (J. Hillman pers. comm.). All of the impacted plants are seedlings or young plants up to 3 years old in 2009. Therefore, all of these individuals germinated on the reservoir shoreline while storage levels were below average.

In summary, up to 3,650 individuals of the occurrence on either side of Anderson Dam could be removed by covered activities, or up to 5% of the total population[18], whichever is smaller. This standard will be applied to the population as it existed during the 2009 surveys. It will not be applied to any new recruits that are a result of natural or artificial disturbance event such as fire.

Adverse effects to the other two Coyote ceanothus occurrences are not covered under this Plan. However, minor and temporary effects associated with management of these occurrences, if they are incorporated into the Reserve System, would be covered under this Plan since the net effect would be beneficial. No additional impacts are allowed to the species, even if more occurrences are discovered during the Permit term.

The other two occurrences are located on private property near Kirby Canyon Landfill and in Morgan Hill. A portion of the Morgan Hill occurrence is on the Morgan Hill serpentine conservation easement. Based on surveys conducted in 2010 these occurrences have approximately 150 and 600-650 individuals each (U.S. Fish and Wildlife Service 2011).

All serpentine bunchgrass grassland and mixed serpentine chaparral in the study area is considered potential habitat for this species. The maximum allowable permanent impact to serpentine bunchgrass grassland is 550 acres (5.3% of the total in the study area (**Table 4-2**). The maximum allowable temporary impact to serpentine bunchgrass grassland is 91 acres (less than 1%) (**Table 4-3**). The maximum allowable impact to mixed serpentine chaparral is 131 acres (3.5% of the total in the study area) for permanent impacts and 30 acres for temporary impacts (less than 1% of the total in the study area) (**Tables 4-2 and 4-3**).

Santa Clara Valley Dudleya

Santa Clara Valley dudleya is restricted to rocky outcrops in serpentine grassland and oak woodland. Land cover types in the study area that could support this species include serpentine/rock outcrop, serpentine bunchgrass grassland and, to a lesser degree, valley oak woodland, coast live oak woodland, and mixed oak woodland and forest. There are currently 207 known extant occurences in the study area and 209 throughout California (**Table 4-6**; California Natural Diversity Database 2012). Of the extant study area occurrences, two occur in

[18] An impact cap of 5% of the Anderson Dam occurrence (rather than the 3.7% estimated impact) is established to account for error in the estimate of the total population size.

protected open space. One hundred fifty eight (158) occurrences of the 209 known occurences are not yet recorded in the CNDDB. All but one of these non-CNDDB occurrences are on private property on Coyote Ridge (T. Marker pers. comm.), on County Parks parkland, and on Santa Clara Valley Water District land. Of the 209 known extant occurences, two are in the San Martin area.

Overall, impacts to this species from covered activities are anticipated to be relatively small. The largest impacts will likely be through habitat loss in serpentine bunchgrass grassland and serpentine rock outcrop land cover types. A maximum of 550 acres (5.3% of total in study area) of serpentine bunchgrass grassland and 22 acres (8.5% of total in study area) of serpentine rock outcrop will be permanently affected. A maximum of 91 acres (less than 1% of total in study area) of serpentine bunchgrass grassland and 2 acres (0.6% of total in study area) of serpentine rock outcrop will be temporarily affected (**Table 4-2**).

A maximum of 11 known occurrences (5% of extant occurrences in the study area; **Table 4-6**) have the potential to be impacted by covered activities if no additional occurrences are found during the permit term. Impacts are anticipated to occur from urban development within the planning limit of urban growth, SCVWD canal reconstruction, and from dam and reservoir maintenance and dam seismic safety retrofits in the vicinity of Almaden Dam and Coyote Reservoir.

There are population estimates for 10 of the 11 occurrences to be impacted. These estimates, based on observations between 1992 and 2008, range from 10 to 1,800 plants per occurrence. The total for all 11 is 3,700 (California Natural Diversity Database 2012; J. Hillman pers. comm.). Forty-seven occurrences documented in the California Natural Diversity Database (2012) (those affected by covered activities and those not) have population estimates that total approximately 72,500. Therefore, if all 11 occurences were impacted bycovered activities, this would impact far less than 5% of the known individuals of Santa Clara Valley dudleya. This is likely a large overestimate of impact because there are at least 158 occurrences without data that could include large populations. Therfore, actual impacts are likely less than 1%. New occurences of this species are discovered frequently (California Natural Diversity Database 2012) so it is highly likely that more occurrences will be discovered during Plan implementation. A maximum of three additional new occurrences (i.e., occurrences not yet known) may be impacted by covered activities if additional new occurrences are protected according to the conditions described in Section 4.4.1 *Direct Effects* subheading *Effects on Plant Occurrences* and protection requirements described in Chapter 5 and **Table 5-16**. For each additional new occurrence impacted, new occurrences of good or better condition than the new occurrences impacted by covered activities must be protected within the Reserve System prior to impacts.

Based on this analysis, the impact on Santa Clara Valley dudleya from covered activities is not expected to have a long-term effect on the species' viability. This is due to the relatively small percentage of the population that will be affected, the low number of individuals affects, and the likelihood that more occurrences will be discovered and protected. The primary habitat of this species is serpentine/rock outcrop. Based on the impact analysis, up to 11% of this land

cover type will be permanently affected by covered activities. However, this proportion is likely an overestimate of impacts because Santa Clara Valley dudleya is often found on serpentine rock outcrops that were too small to be mapped. In addition, at least some of the occurences within the planning limit of urban growth are likely to prove undevelopable due to the harsh terrain of the rock outcrops on which they occur. Because many more outrcrops will be discovered and mapped within the Reserve System during Plan implementation, actual impacts are likely to be much less than 11% of available habitat.

Fragrant Fritillary

Primary habitat for fragrant fritillary is serpentine bunchgrass grassland and secondary habitat includes annual grassland, northern coastal scrub/Diablan sage scrub, and oak woodland. The study area contains eight of 59 known extant occurrences of this species (**Table 4-6**). Thirty-five (35) of the known occurrences have population estimates from the 1980s, 1990s and 2000s. These range from a low of one individual up to a high of 4,000 individuals, with a total of 16,383 (California Natural Diversity Database 2012).

A maximum of one occurrence in the study area (13% of known occurrences in the study area) that contained eight individuals during a 2000 survey (California Natural Diversity Database 2012) may be impacted by urban development (it is located within the planning limit of urban growth). In addition, it is possible that newly discovered occurrences of this species could be impacted by covered activities during Plan implementation. A maximum of two additional new occurrences (i.e., occurrences not yet known) may be impacted by covered activities if additional new occurrences are protected according to the conditions described in Section 4.4.1 *Direct Effects* subheading *Effects on Plant Occurrences* and protection requirements described in Chapter 5 and **Table 5-16**. For each additional new occurrence impacted, new occurrences of good or better condition than the new occurrences impacted by covered activities must be protected within the Reserve System prior to impacts.

Impacts to habitat can also occur from other covered activities. A maximum of 550 acres of modeled primary habitat and 2,729 acres of modeled secondary habitat (6% and 2% of modeled habitat, respectively) may be permanently affected. A maximum of 59 acres of modeled primary habitat and 655 acres of modeled secondary habitat, less than 1% of each of total modeled primary and secondary habitat, may be temporarily impacted (**Table 4-4**). Dam and reservoir maintenance could result in small permanent and temporary impacts to modeled species habitat.

Most Beautiful Jewelflower

Suitable habitat for this species includes primary habitat in serpentine bunchgrass grassland, serpentine rock outcrops/barren, and mixed serpentine chaparral. Secondary habitat includes non-serpentine rock outcrops. Of the 86 total known extant occurrences of this species known, 39 of them are located in the study area

(**Table 4-6**; California Natural Diversity Database 2012; J. Hillman pers. comm.). Up to six occurrences (7% of the total known) may be impacted by covered activities if additional occurrences are not discovered during the permit term. One of these is located within the planning limit of urban growth in Morgan Hill, northeast of Chesbro Reservoir, one is located within the expected impact area for SCVWD canal reconstruction, and four are located near Almaden, Anderson, and Chesbro dams and may be impacted by seismic retrofit and/or dam maintenance activities during the permit term.

In addition, it is possible that newly discovered occurrences of this species could be impacted by covered activities during Plan implementation. A maximum of two additional new occurrences (i.e., occurrences not yet known) may be impacted by covered activities if additional new occurrences are protected according to the conditions described in Section 4.4.1 *Direct Effects* subheading *Effects on Plant Occurrences* and protection requirements described in Chapter 5 and **Table 5-16**. For each additional new occurrence impacted, new occurrences of as good or better condition than the new occurrences impacted by covered activities must be protected within the Reserve System prior to impacts.

Forty of the 86 known occurrences have population estimates. These range from 1 individual to 10,000; however, most estimates are in the low hundreds. These estimates were gathered between 1991 and 2008. The total estimate for all occurrences is 44,549. The six occurrences that will be impacted have a total population estimate of 1,076. Therefore, impacts to this species as a whole will be relatively small. In addition to the 86 recorded occurrences, there are 68 "jewelflower" occurrences on one private property that have not been identified to species, but are either most beautiful jewelflower or Metcalf Canyon jewelflower. This property will be acquired and included in the Reserve System. This also reduces the likely overall impact of covered activities on this species.

A maximum of 550 acres (4% of the total in the study area) of primary modeled habitat will be permanently affected by covered activities, and a maximum of 92 acres (less than 1% of the total in the study area) of primary modeled habitat will be temporarily affected (**Table 4-4**). No secondary habitat is anticipated to be impacted. Dam and reservoir maintenance and dam seismic safety retrofits could result in permanent and temporary impacts to habitat in the vicinity of the Coyote, Almaden, and Anderson dams.

Metcalf Canyon Jewelflower

Suitable habitat for Metcalf Canyon jewelflower includes serpentine bunchgrass grassland and serpentine rock outcrops. There are 11 known extant occurrences of Metcalf Canyon jewelflower, 10 of which occur within the study area (**Table 4-6**; California Natural Diversity Database 2012). There is one occurrence near Lexington Reservoir that is outside the study area. Of these 10, the maximum allowable permanent impact is two (20% of known occurrences) occurrences under the Plan (**Table 4-6**). No additional impacts are allowed to this species, even if more occurrences are protected during the Permit term. Population estimates are available for only four of the known occurrences; three

of these estimates date from 1989 and one from 2006. They are 27, 40, 1,000, and 5,000, for a total of 6,067 individuals (California Natural Diversity Database 2009).

CNDDB occurrence numbers 4 and 8 are expected to be impacted by SCVWD operations and maintenance activities on the Coyote Canal. Occurrence 8 was surveyed in 1989 and found to have 40 individuals. Occurrence 4 was surveyed in 1989 and found to include 5,000 individuals. Impacts to these occurrences are expected to be "partial impacts" as defined in Condition 20 of Chapter 6.

A maximum of 550 acres (7% of the total in the study area) of modeled primary habitat will be permanently affected, and a maximum of 62 acres (less than 1% of the total in the study area) of modeled primary habitat will be temporarily affected by covered activities (**Table 4-4**).

Smooth Lessingia

Suitable habitat for smooth lessingia includes serpentine bunchgrass grassland and serpentine rock outcrops. All 39 extant occurrences of smooth lessingia are located within the study area, which comprises the entire range of this species (**Table 4-6**; California Natural Diversity Database 2012). There are estimates for 22 of these occurrences and the numbers for some of them are quite high (10,000 for two and 57,400 for another). There are also lower numbers in the 100–200 range, but on the whole this species tends to have high numbers where it occurs. The total of the 22 occurrences with estimates is 101,629 individuals, and these estimates are mostly from 2003–2008, although there are three from 1996, 1999 and 2000 (California Natural Diversity Database 2012; J. Hillman pers. comm.).

Impacts from covered activities may occur on a maximum of six occurrences from SCVWD canal reconstruction, dam seismic safety retrofits, or dam maintenance activities to Almaden Dam, Anderson Dam, Calero Main Dam, and Chesbro Dam (**Table 4-6**) if no additional occurrences are discovered. Prior to impact, two occurrences must be protected for every permanent impact to one occurrence. Dam retrofits and maintenance activities will impact an estimated 6,000 individual plants (30 at Almaden Dam, 3,600 at Chesbro Dam, 175 at Calero Main and 5,800 near Anderson Dam), based on 2006 surveys conducted by SCVWD. Canal reconstruction is estimated to impact approximately 6,500 individuals, according to surveys conducted by SCVWD in 2008.

In addition, it is possible that newly discovered occurrences of this species could be impacted by covered activities during Plan implementation. A maximum of three additional new occurrences (i.e., occurrence not yet known) may be impacted by covered activities if additional new occurrences are protected according to the conditions described in Section 4.4.1 *Direct Effects* subheading *Effects on Plant Occurrences* and protection requirements described in Chapter 5 and **Table 5-16**. For each additional new occurrence impacted, new occurrences of as good or better condition than the new occurrences impacted by covered activities must be protected within the Reserve System prior to impacts.

Some covered activities may create partial impacts to smooth lessingia occurrences as defined in Chapter 6, Section 6.6.2, subheading *Condition 20 Avoid and Minimize Impacts to Covered Plant Occurrences*. If partial impacts occur, some of these may not count as a permanent impact and therefore would not require preservation of other occurrences to offset them. If partial impacts occur, the requirements in Condition 20 must be followed, including monitoring of the affected occurrence to ensure that the occurrence continues to be viable.

A maximum of 2 acres (less than 1% of the total in the study area) of serpentine/rock outcrop will be temporarily affected, and a maximum of 22 acres (8.5% of the total in the study area) will be permanently affected by covered activities. A maximum of 91 acres (less than 1% of the total in the study area) of serpentine bunchgrass grassland will be temporarily affected, and maximum of 550 acres (5.3% of the total in the study area) will be permanently affected by covered activities (**Tables 4-2 and 4-3**).

A maximum of 550 acres (5% of the total in the study area) of modeled primary habitat will be permanently affected, and a maximum of 68 acres (less than 1% of the total in the study area) will be temporarily affected by covered activities (**Table 4-4**).

Mt. Hamilton Thistle

Primary habitat for Mt. Hamilton thistle is serpentine seeps or serpentine soils or grasslands within 25 feet of riverine habitat. There are 48 known extant occurrences of Mt. Hamilton thistle throughout its range and 40 of them are in the study area (**Table 4-6**; California Natural Diversity Database 2012; J. Hillman pers. comm.). The maximum impact limit for this species is six occurrences (12% of known occurrences) if no additional occurrences are discovered during the permit term. This includes occurrences within the planning limit of urban growth, two that will be impacted by SCVWD canal reconstruction, and one that is adjacent to, and likely to be affected by, the seismic retrofit of Anderson Dam. The six impacted occurrences are all located east of U.S. 101. It is expected that at least one of the impacts to Mt. Hamilton thistle will qualify as a partial impact (as defined in Condition 20 of Chapter 6) and therefore would not count toward the total impacted occurrences for the species.

In addition, it is possible that newly discovered occurrences of this species could be impacted by covered activities during Plan implementation. A maximum of two additional new occurrences (i.e., occurrences not yet known) may be impacted by covered activities if additional new occurrences are protected according to the conditions described in Section 4.4.1 *Direct Effects* subheading *Effects on Plant Occurrences* and protection requirements described in Chapter 5 and **Tables 5-16**. For each additional new occurrence impacted, new occurrences of good or better condition than the new occurrences impacted by covered activities must be protected within the Reserve System prior to impacts.

There are population estimates for 36 occurrences of this species, from as early as 1983 up to as recently as 2008. The range in population is from 1 to 4,500, and totals 28,962. There are estimates for all six potentially impacted occurrences, totaling approximately 9,500 individuals (California Natural Diversity Database 2012; J. Hillman pers. comm.).

Impacts to modeled habitat are limited to a maximum of 26 acres of permanent impacts (5% of the total habitat modeled in the study area) and 4 acres of temporary impacts (less than 1% of the total habitat modeled in the study area) (**Table 4-4**). Included in these impact limits are impacts associated with recharge operations, dam and reservoir maintenance and dam seismic safety retrofits, which were difficult to estimate because of the broad scale of Plan land cover mapping.

The Mt. Hamilton thistle is one of eight covered species addressed in the *Recovery Plan for Serpentine Species of the Bay Area* (U.S. Fish and Wildlife Service 1998). At the time the recovery plan was written, known occurrences of Mt. Hamilton thistle were distributed nearly evenly on the east and west side of U.S. 101. Many more occurrences have since been identified, most of which are located on the serpentines areas in and around Coyote Ridge on the east side of U.S. 101. It is for this reason that the Plan will focus conservation efforts for the Mt. Hamilton thistle on acquiring occurrences on the east side of U.S. 101 (J. Hillman pers. comm.).

Indirect Effects

One of the primary, and possibly the most critical, potential indirect effects to serpentine plants is nitrogen deposition, as described above, under Bay checkerspot butterfly Indirect Effects (Section 4.6.1 *Bay Checkerspot Butterfly*). Nitrogen deposition associated with use of local and regional roads has led to an increase in nitrogen availability in the nitrogen-depleted serpentine soils. In turn, this has led to an increased ability for nonnative plants, primarily nonnative annual grasses, to establish in the serpentine, and outcompete the covered serpentine endemic species.

Additionally, new trails and facilities associated with the Reserve System will increase public access to areas that had not previously been accessible. An increase in foot traffic in reserves may increase the risk of invasion by nonnative species and could facilitate opportunities for illegal collection of covered species.

Indirect effects could also occur from increased risk of wildfire in serpentine species' habitat. However, since most native plants in these habitats are adapted to a burn regime, this impact may not be detrimental to certain covered plant species.

4.6.9 Non-Serpentine Plants

Non-serpentine plant species covered by the Plan have a wide variety of habitat requirements and are distributed throughout the study area, though typically outside urban areas. The potential for covered activities to permanently remove individuals or habitat varies with the species. Because these species are often found in the low hills east of U.S. 101 or in the Santa Cruz Mountains, several of the issues discussed for serpentine plants and Bay checkerspot butterfly also apply to this suite of species. Direct effects for each species are discussed individually below; indirect effects are discussed at the end of the section for all the species together, as these effects generally impact the entire group similarly.

Direct Effects

Plant occurrences in habitats other than serpentine grassland could be affected by any of the Covered Activities; however, they are most likely to be affected by rural residential development. Rural residential development is expected to remove suitable habitat for these species, particularly in the Santa Cruz Mountains and in some of the low hills east of U.S. 101 that are unprotected. Moreover, the increase in infrastructure that is associated with rural development (e.g., roads, water conveyance) is expected to permanently remove suitable habitat and could kill individuals if they are not discovered prior to construction. Because most of these species occur in areas where the general land use is not likely to change during the permit term, long-term population viability should not be affected. Operations and maintenance activities that require accessing areas off established roadways could cause individuals to be crushed or habitat to be altered. If such activities require vegetation clearing or ground disturbance, they could remove suitable habitat for covered plant species. Additionally, Plan implementation activities, such as controlled burns and livestock grazing, could affect covered plant species. The Plan also includes many types of monitoring which can occasionally have impacts on individual plants in the form of trampling or soil disturbance. In both these cases, the benefits from Plan implementation are expected to greatly outweigh any negative effects of implementation.

For each non-serpentine species below, direct effects on known occurrences and suitable habitat are discussed. The discussion includes information on the general location and population estimates of occurrences expected to be affected by covered activities, where these data are available. Population data are often incomplete or out of date due to inconsistent reporting to the state database (CNDDB). In addition, population sizes reported in one year may not accurately represent long-term averages. All of the covered species discussed in this section are annuals. Annuals experience yearly fluctuations in population numbers due to factors related to climate, disturbance, and chance. For all of these reasons, the population data provided below should be considered as a general overview only. Surveys conducted during Plan implementation of affected and protected occurrences will yield more accurate population data to be used in tracking impacts, land acquisition, and adaptive management.

In addition to estimates of location and population size of potential impacts, the discussion below includes the maximum allowable occurrence impact limit for each species and the impacts on modeled or suitable habitat.

Loma Prieta Hoita

Suitable habitat for Loma Prieta hoita occurs in mixed oak woodland and coast live oak forest and woodland (primary habitat) and northern mixed chaparral/chamise chaparral and mixed serpentine chaparral (secondary habitat). Fourteen of 26 known extant occurrences of this species are located in the study area. No occurrences of this species will be impacted by covered activities if additional occurrences are not discovered during the permit term (**Table 4-6**). It is possible that newly discovered occurrences of this species could be impacted by covered activities during Plan implementation. A maximum of two additional new occurrences (i.e., occurrences not yet known) may be impacted by covered activities if additional new occurrences are protected according to the conditions described in Section 4.4.1 *Direct Effects* subheading *Effects on Plant Occurrences* and protection requirements described in Chapter 5 and **Table 5-16**. For each additional new occurrence impacted, new occurrences of as good or better condition than the new occurrences impacted by covered activities must be protected within the Reserve System prior to impacts. Of the 26 known occurrences, 18 have population estimates, most of which are from 2004–2006, with one from 1995 and one from 2002. They range from 20 to 3,000 individuals and total 7,260 (California Natural Diversity Database 2012).

Maximum allowable impacts to modeled primary habitat are 2,117 acres (2%) of permanent impacts and 413 acres (less than 1 %) of temporary impacts. A maximum of 266 acres (1%) of modeled secondary habitat may be permanently impacted, and 60 acres (less than 1%) may be impacted temporarily impacted (**Table 4-4**).

Indirect Effects

New trails and facilities associated with the Reserve System will increase public access to areas that had not previously been accessible. Such an increase in foot traffic and trails could increase the risk of invasion by nonnative species which can result in the permanent loss of habitat for covered species. Increased access also increases the possibility of collection, disturbance, injury or mortality from trampling by humans or domestic animals (e.g., dogs, horses, etc.).

Indirect effects could also occur from increased risk of wildfire in covered species' habitat. However, since most native plants in these habitats are adapted to a burn regime, this impact may not be detrimental to certain covered plant species.

4.7 Effects on Critical Habitat

Critical habitat is defined in Section 3 of the ESA as:

1. The specific areas within the geographical area occupied by a species at the time it is listed in accordance with the Act, on which are found those physical or biological features
    a. essential to the conservation of the species and
    b. that may require special management considerations or protection; and
2. Specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

A summary of effects on critical habitat is provided in **Table 4-9**. A discussion of effects of covered activities on critical habitat in the study area is provided below.

4.7.1 Bay Checkerspot Butterfly

Critical habitat was redesignated for Bay checkerspot butterfly in 2008 [73 FR 50405–50452]. Most of the designated critical habitat is within the study area boundary (**Figure 4-4**). In fact, 10 of the 13 units or 16,601 acres of the designated 18,293 acres (91%) fall within the study area. This critical habitat includes serpentine and California annual grasslands that stretch from southern San José to just south of Morgan Hill. The five primary constituent elements for Bay checkerspot butterfly are:

1. The presence of annual or perennial grasslands with little to no overstory that provide north–south and east–west slopes with a tilt of more than 7 degrees for larval host plant survival during periods of atypical weather (for example, drought).
2. The presence of the primary larval host plant, dwarf plantain (*Plantago erecta*), and at least one of the secondary host plants, purple owl's-clover (*Castilleja densiflora*) or exserted paintbrush (*Castilleja exserta*), are required for reproduction, feeding, and larval development.
3. The presence of adult nectar sources for feeding.
4. Soils derived from serpentinite ultramafic rock (Montara, Climara, Henneke, Hentine, and Obispo soil series) or similar soils (Inks, Candlestick, Los Gatos, Fagan, and Barnabe soil series) that provide areas with fewer aggressive, nonnative plant species for larval host plant and adult nectar plant survival and reproduction.
5. The presence of stable holes and cracks in the soil, and surface rock outcrops that provide shelter for the larval stage of the Bay checkerspot butterfly during summer diapause.

The 16,601 acres of designated critical habitat for the Bay checkerspot butterfly in the study area includes 7,616 acres of modeled habitat for the Bay checkerspot butterfly and 8,985 acres of additional areas outside the Plan's modeled habitat. Critical habitat areas that do not support serpentine soils and vegetation are included in the designation because USFWS concluded that they "likely play an important role in dispersal of adult butterflies from one habitat patch to another" (73 FR 50405-50452). Although Bay checkerspot butterfly tend to show high fidelity to patches of serpentine grassland, a small but important number (estimated to be 10% or less), will leave serpentine bunchgrass areas (see **Appendix D**).

Critical habitat as defined by the primary constituent elements may be affected by covered activities as described below.

Continued urban and rural growth on the east side of Coyote Creek in and near the Silver Creek hills would result in the conversion of critical habitat into developed land cover types. Any conversion of habitat would also result in a complete loss of primary constituent elements. An increase in vehicles on local highways, as well as highways throughout the San Francisco Bay Area, will result in increased nitrogen deposition which would reduce the quality of designated critical habitat. In addition, several of the critical habitat units are near urban areas which may limit the types of management (i.e., fire) used to return these sites to a more natural state. Public access to Plan reserves would further affect critical habitat units by facilitating transfer of invasive plants into areas that were previously inaccessible, or by treading on individuals, larvae, and host plants. However, this Plan targets the acquisition of most of the core habitat areas identified in this Plan. Grazing will be a key management tool used within reserves and it is expected that careful grazing management will successfully rehabilitate degraded serpentine areas and protect existing habitat from the stressors of nitrogen deposition and competing plants. Furthermore, within the Reserve System, trails and recreational use will only be allowed if it is consistent with the biological goals and objectives of the Plan. As such, the potential for impacts associated with recreation will be minimized in reserves. Protection of critical habitat and proper management will result in the preservation of the primary constituent elements of Bay checkerspot butterfly habitat within the Reserve System.

Impacts to modeled primary Bay checkerspot butterfly habitat are capped at 300 acres and impacts to serpentine bunchgrass grassland are capped at 550 acres. No more than 550 acres (less than 3%) of Bay checkerspot butterfly critical habitat in the study area associated will be lost as a result of covered activities in this Plan (**Table 4-9**). This estimate does not include nitrogen deposition impacts.

The impact analysis does not identify impacts by critical habitat unit; however, impacts to Bay checkerspot butterfly habitat is limited to 3% of the unprotected portion (everything except Type 1 open space) of any core or satellite habitat unit targeted for conservation (as defined in **Table 5-7**) with the exception of the Kirby/East Hills core unit which has a 11% allowance to accommodate the Kirby Landfill expansion (80 acres) and the Pound Site core habitat unit which has an

13% allowance to accommodate the Mariposa Lodge/Sheriff's Firing Range project (approximately 27 acres).

There are more core habitat units identified for this Plan than critical habitat units, but core habitat does largely overlap with critical habitat designations. The impact caps for each core habitat unit are intended to ensure that core habitat will continue to function as habitat for the butterfly. Therefore, it is expected that limits on core habitat development will also ensure that units of critical habitat continue to function for Bay checkerspot butterfly.

Table 5-21 describes estimated acreages of Bay checkerspot butterfly critical habitat that will be preserved within the Reserve System by unit. As shown, no conservation for critical habitat units 9b and 12 is anticipated for this Plan. Unit 9b is located in the foothills of the Santa Cruz Mountains at the southern tip of the Coyote Valley Urban Reserve, just outside of the planning limit of urban growth for the City of San José. It also borders a portion of the Coyote Valley Greenbelt. This area is unincorporated and is characterized by the Ranchland/Woodland land use type (**Figure 2-2**) which allows a maximum development density 1 dwelling unit per 20 acres. No water or transportation projects are planned for this site (**Figures 2-6 and 2-7**). While it is possible that this unit could be affected by rural development permitted by this Plan, due to the location of the site (outside urban areas), development density requirements, and the small size of the unit (only 56 acres), it is not expected that this unit will experience much development.

Unit 12 is located in the foothills of the Santa Cruz Mountains between the planning limits of urban growth for the Cities of Morgan Hill and Gilroy. A portion of this unit borders the western edge of the unincorporated community of San Martin. This unit is in unincorporated lands and is characterized by the Ranchland/Woodland land use type. No water or transportation projects are planned for this site (**Figures 2-6 and 2-7**). Approximately 52% of unit 12 is currently protected as Type 1 Open Space. While it is possible that this unit could be affected by rural development permitted by this Plan, due to the location of the site (outside urban areas) and development density requirements, it is not expected that this unit will experience much development.

4.7.2 California Tiger Salamander

Critical habitat was designated for the central population of California tiger salamander in 2005 [70 FR 49380–49458]. There are eight critical habitat units within the study area (East Bay Region Units 5–12) (**Figure 4-5**). The study area supports 28,096 acres of critical habitat, including 92 acres of modeled breeding habitat and 27,235 acres of modeled non-breeding habitat (**Table 4-9**).

The three primary constituent elements for California tiger salamander are:

1. Standing bodies of fresh water including natural and manmade (e.g., stock) ponds, vernal pools, and other ephemeral or permanent water bodies which

typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall.

2. Upland habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground habitat that CTS depend upon for food, shelter, and protection from the elements and predation.

3. Accessible upland dispersal habitat between occupied locations that allow for movement between such sites.

Nearly all the critical habitat units are in or on the periphery of urban areas, meaning that urban development, rural residential development, and any associated infrastructure (e.g., roads, water conveyance) could affect this critical habitat. Such impacts are less likely in units 11 and 12 because these areas are in the far east hills of the study area where fewer covered activities are anticipated. Operations and maintenance activities will affect all units in the study area, particularly those associated with aquatic resources that serve as potential breeding habitat. Covered activities that result in a change in land use adjacent to potential breeding habitat, particularly if the change in land use includes control or elimination of burrowing mammals, would result in a loss of important upland habitat for the species, including the primary constituent elements listed above, and reduce the overall habitat quality for year-round occupation. Avoidance and minimization measures described in Chapter 6 will reduce the potential for indirect impacts on critical habitat.

No more than 272 acres (1%) of all California tiger salamander critical habitat in the study area will be affected by covered activities in this Plan (**Table 4-9**). The impact analysis does not identify impacts by critical habitat unit; rather, it identifies impacts grouped by all critical habitat present in the study area. However, 97% of all critical habitat was also mapped as breeding or non-breeding habitat for this Plan. Impacts to breeding and non-breeding habitat are quantified and discussed in Section 4.6.2 *California Tiger Salamander, California Red-legged Frog, Western Pond Turtle*.

Table 5-21 also describes estimated acreages of California tiger salamander critical habitat that will be preserved within the Reserve System by unit. As shown, little to no critical habitat in units EB-9, EB-10A, and EB-11 is anticipated to be included in the Reserve System. Unit EB-9 is located in the Diablo Range east and south of Coyote Reservoir. A large portion of unit EB-9 is located in the Palassou Ridge Open Space Preserve (Type 2 Open Space). The portion south of the reservoir is split across Coyote Lake Harvey Bear Ranch County Park (Type 3 Open Space) and the Ranchland/Woodland land use type. No water or transportation projects are planned for this site (**Figures 2-6 and 2-7**). Open space areas account for approximately 66% of this unit. While it is possible that some covered activities occur within the open space, it is expected to be minimal. It is also possible that this unit could be affected by rural development permitted by this Plan. However, due to the location of the site (outside urban areas), development density requirements, and portion of this unit that is available for development (approximately 34%), it is not expected that this unit will experience much development.

Unit EB-10A is located in the foothills of the Santa Cruz Mountains between the planning limits of urban growth for the Cities of Morgan Hill and Gilroy. This unit largely overlaps Bay checkerspot critical habitat unit 12. Permanent impacts to Bay checkerspot butterfly modeled primary habitat that overlaps Bay checkerspot butterfly critical habitat is capped at 300 acres to meet regulatory standards (**Table 4-9**). Subsequently, it is likely that permanent impacts in the portion of California tiger salamander critical habitat unit EB-10A that overlaps with Bay checkerspot critical habitat unit 12 will be minimal. A portion of this unit borders the western edge of the unincorporated community of San Martin. This unit is in unincorporated lands and is characterized by the Ranchland/Woodland land use type. No water or transportation projects are planned for this site (**Figures 2-6 and 2-7**). None of this unit is currently protected by any type of open space. While it is possible that this unit could be affected by rural development permitted by this Plan, due to the location of the site (outside urban areas) and development density requirements, it is not expected that this unit will experience much development.

Unit EB-11 is located is located in the Diablo Range east and somewhat south of unit EB-9. Approximately 94% of this site currently located within Henry Coe State Park. Activities occurring within Henry Coe State Park are not covered by this Plan. As such, a maximum of 6% of this site could be affected by the covered activities of this Plan. However, no water or transportation projects are planned for this site (**Figures 2-6 and 2-7**). This site is located in the far east portion of the study area and is unlikely to receive much rural development. As such, it is not expected that this unit will be substantially affected by the covered activities of this Plan.

4.7.3 California Red-Legged Frog

Critical habitat was designated for California red-legged frog in 2010 [75 FR 12816–12959]. The two main critical habitat units in Santa Clara County are STC-1 (52,283 acres) which is entirely within Santa Clara County and STC-2 (204,718 acres in total, 97,214 acres of which are in the study area) which extends west into Stanislaus County and south into San Benito County (**Figure 4-6**). Santa Clara County also contains a small section of ALA-2 (1,465 acres). STC-1 is located in the near and far east hills of the study area, from the northern border of the study area south to Anderson Reservoir. STC-2 is adjacent to STC-1 in the north and continues south to the southern and eastern boundaries of the study area. The study area supports 150,962 acres of critical habitat, including 2,964 acres of primary habitat and 146,452 acres of secondary habitat (**Table 4-9**). These critical habitat units include both breeding and upland habitats and account for 9% of the designated critical habitat for this species throughout the species' range.

The three primary constituent elements for California red-legged frog are:

1. *Aquatic Breeding Habitat*. Standing bodies of fresh water (with salinities less than 4.5 ppt), including natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent

water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.

2. *Aquatic Non-Breeding Habitat*. Freshwater pond and stream habitats, as described above, that may not hold water long enough for the species to complete its aquatic life cycle but which provide for shelter, foraging, predator avoidance, and aquatic dispersal of juvenile and adult California red-legged frogs. Other wetland habitats considered to meet these criteria include, but are not limited to: plunge pools within intermittent creeks, seeps, quiet water refugia within streams during high water flows, and springs of sufficient flow to withstand short-term dry periods.

3. *Upland Habitat*. Upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat up to a distance of 1 mile (1.6 km) in most cases (i.e., depending on surrounding landscape and dispersal barriers) including various vegetation types such as grassland, woodland, forest, wetland, or riparian areas that provide shelter, forage, and predator avoidance for the California red-legged frog.

Impact of covered activity implementation on critical habitat units may occur as a result of rural development, park maintenance and new construction activities, and Plan implementation. There is some potential for impacts due to ongoing operations and maintenance activities, particularly in streams, to affect these two units, but permanent changes in land use are anticipated to be minimal. Avoidance and minimization measures described in Chapter 6 will reduce the potential for indirect impacts on critical habitat.

No more than 1,035 acres (less than 1%) of all California red-legged frog critical habitat in the study area will be affected by covered activities in this Plan (**Table 4-9**). The impact analysis does not identify impacts by critical habitat unit; rather, it identifies impacts grouped by all critical habitat present in the study area. However, 99% of all California red-legged frog critical habitat was also mapped as primary or secondary habitat for this Plan. Impacts to primary and secondary habitat are quantified and discussed in Section 4.6.2 *California Tiger Salamander, California Red-legged Frog, Western Pond Turtle*. In addition, **Table 5-21** also describes estimated acreages of California red-legged frog critical habitat that will be preserved within the Reserve System by unit.

4.8 Cumulative Effects

As described above, the impacts of covered activities were assessed in the context of existing conditions in the study area. Some activities and projects that are outside the scope of this Plan may nonetheless contribute to cumulative impacts on covered species. An analysis of cumulative effects is not required in an HCP or NCCP. However, we include an analysis here to support the federal Biological Opinion that will conclude the USFWS Section 7 internal consultation process (see Chapter 1 for details). The scope of the cumulative analysis in a Biological Opinion is limited to non-federal actions because federal actions (i.e., any federal project, project with federal funding, or project that requires a federal

permit) will be the subject of future Section 7 consultations in which cumulative impacts can be considered more fully. To support this analysis, the cumulative projects evaluated in this section are limited to non-federal projects that are not covered by the Plan. The EIR/EIS presents a thorough analysis of the cumulative effects of all projects, federal and non-federal, when combined with the effects of the Habitat Plan.

4.8.1 Future Potential Development by the City of Gilroy

The Gilroy General Plan (City of Gilroy 2002) designates a number of areas outside the 20-year planning boundary as future areas for development and open space (W. Faus pers. comm.). Policy 2.11 of the Gilroy General Plan designates two areas outside its 20-year planning boundary (the boundary used as the planning limit of urban growth for the purposes of this Plan) as potential areas for future development. These areas are described below.

- The area north of Day Road, west of Santa Teresa Boulevard, and east of the foothills. This area is suitable for long-term residential expansion and related development.
- The area east of U.S. 101 between Buena Vista and Masten Avenue, bordering on the highway. This area is suitable for long-term expansion of highway-oriented commercial development.

Other City policies place further restrictions on where future development may occur. Gilroy General Plan Policy 1.03 states that uses east of U.S. 101 are restricted to industrial and agricultural use except for (1) commercial developments with the majority of the customer base from outside Gilroy, and (2) public and quasi-public facilities. Residential care facilities that meet criteria of Policy 14.05, *Residential Care Facilities for Seniors*, will also be allowed east of U.S. 101. Future development is also identified for the area north of Day Road and west of Santa Teresa Boulevard, east of the foothills, which is an area suitable for long-term residential expansion and related development.

Policy 20.05 designates protected open space areas in conjunction with agricultural lands to create natural buffers, or "greenbelts," between Gilroy and surrounding communities; in particular, between Gilroy and San Martin to the north. The policy states that if an adequate greenbelt cannot be established in the area north of Masten and Fitzgerald Roads, then the Gilroy land use designations should be amended to include a greenbelt strip in the northern part of Gilroy's 20-year Planning Area. Masten and Fitzgerald Roads make up the northern boundary of Gilroy's 20-year plan (the planning limit of urban growth for this Plan) as well as the southern boundary of the unincorporated community of San Martin. Both the requirements of a greenbelt along Masten and Fitzgerald Roads and the proximity to San Martin would greatly reduce the possibility of Gilroy expanding farther than the 20-year planning boundary to the north except as identified in the first bullet above.

Policy 25.01 restricts development in areas where potential danger to the health, safety, and welfare of residents exists unless it can be mitigated to an "acceptable level of risk." This applies to development in areas subject to flood damage or geological hazard due to location and/or design. Policy 4.06 works together with policy 25.01 to encourage existing agricultural lands in areas subject to natural hazards, such as major flooding or soils with a high water table, to remain in long-term agricultural production where such use exists. Much of the land to the east of Llagas Creek and south of Gilroy falls into this category of potentially hazardous areas. While development is not prohibited in these areas, a great deal of work on existing flood management infrastructure may be required in advance of any further development in these areas.

Permanent and temporary, direct and indirect impacts to Plan covered species could occur as a result of expansion of urban development outside of the planning limits of urban growth for the City of Gilroy. These impacts would be similar to those impacts described above as occurring within the planning limit of urban growth or nearby to Gilroy, but would increase the extent of described impacts beyond that anticipated by this Plan. Species most likely to be affected by the expansion of Gilroy include species that use agricultural and riparian land cover types on the valley floor. This may include California red-legged frog, California tiger salamander, western pond turtle, western burrowing owl, least Bell's vireo, tricolored blackbird, and San Joaquin kit fox (**Table 3-5**). The only plant covered species that may be affected is Loma Prieta hoita (**Table 3-6**).

4.8.2 Ongoing and Routine Agriculture

Ongoing and routine agricultural activities in the study area are not covered by this Plan except for pond maintenance as described in Chapter 2 if project proponents obtain a permit with the local jurisdiction and those activities eligible for and enrolled in the Neighboring Landowner Assurances Program (see Chapter 10, Section 10.2.7 *Assurances for Private Landowners*, for details of this program and what is covered). Under Section 4(d) of the ESA, routine ranching activities located on private or Tribal lands are exempt from the take prohibitions of Section 9 of the ESA (50 CFR 17.43). This exemption applies to both California red-legged frog and California tiger salamander. However, this exemption does not apply to cultivated agriculture. While it is anticipated that the effects of ongoing agricultural activities on covered species will be relatively low, there is the potential for cumulative effects on covered species to accrue. Ongoing ranching operations such as road construction, road maintenance, or intensive livestock grazing may limit or degrade habitat for species such as western pond turtle, California tiger salamander, California red-legged frog, and foothill yellow-legged frog. (However, ranching activities such as pond maintenance and moderate livestock grazing are essential to the long-term survival of some covered species such as California red-legged frog and California tiger salamander.) Rodent control on grazing lands may adversely affect western burrowing owl and California tiger salamander. Pesticide run-off could also reduce water quality. Some ongoing cultivated agricultural activities may limit or degrade foraging habitat for tricolored blackbird and western

burrowing owl. Covered species could be trampled by cattle, and hydrology of an area may also be impacted by a loss of or change to agricultural practices, specifically grazing practices (Pyke and Marty 2005).

4.8.3 Use of Existing Roads

As described above, the construction of rural roads, driveways, and access roads covered by this Plan is expected to increase mortality of covered species such as California red-legged frog and California tiger salamander. Continued use of existing rural roads (i.e., those not covered by the Plan) will contribute to a cumulative impact on these species through continued mortality and injury. The magnitude of this cumulative impact is unknown.

4.8.4 Landfill or Quarries

Landfills and quarries other than those described in this Plan are not covered activities under this Plan. If such projects are implemented, they would result in the loss of land cover at the site of the project. Due to urban development constraints and siting requirements for such projects, it is likely that construction of a landfill or quarry project would occur outside the valley floor where natural land covers are dominant. The substantial loss of natural land covers would likely affect the covered species of this Plan. At this time, no landfills or quarries other than those described in this Plan are anticipated to be developed in the study area. As such, possible cumulative impacts are unknown.

Permanent and temporary, direct and indirect impacts to Plan covered species could occur as a result of development of landfills or quarries within the study area. Due to the lack of information about where these projects could occur, it is difficult to describe the land cover-types or covered species that may be affected. Any additional loss of un-developed land cover would likely result in direct and indirect impacts to covered species in accordance with **Table 3-5** and **Table 3-6**.

Table 4-1. Potential Indirect Adverse Impacts on Covered Species from New Urban and Rural Development and Operation of the Habitat Plan Reserve System

	Lights in New Urban and Rural Areas	Harassment, Disturbance from More People	Harassment or Injury from Additional Pets	More Noise	Increased Vehicle-Related Disturbance and Mortality[1]	Spread of Invasive Exotic Plants or Wildlife	Increased Risk of Wildfire[2]	Increased Runoff of Urban Pollutants/ Change in Hydrology	Increased Recreation in Reserves	Enhancement or Restoration Activities[3]	Habitat Plan Monitoring
Location of Impact											
Outside Habitat Plan Reserves	✓	✓	✓	✓	✓	✓	✓	✓[4]			
Inside Habitat Plan Reserves	✓	✓	✓	✓		✓	✓		✓	✓	✓
Within existing parks/open space		✓	✓	✓	✓	✓	✓		✓	✓	
Covered Species Potentially Affected											
Bay checkerspot butterfly		✓	✓		✓	✓	✓		✓	✓	✓
Tricolored blackbird	✓	✓							✓	✓	✓
Western burrowing owl		✓	✓		✓	✓	✓		✓	✓	✓
Least Bell's vireo	✓	✓	✓	✓				✓		✓	✓
Western pond turtle		✓	✓		✓	✓	✓	✓	✓	✓	✓
California tiger salamander	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
California red-legged frog	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Foothill yellow-legged frog	✓	✓	✓		✓	✓		✓	✓	✓	✓
San Joaquin kit fox	✓			✓	✓		✓		✓	✓	✓
Tiburon Indian paintbrush		✓	✓		✓	✓	✓		✓[5]	✓	✓
Coyote ceanothus		✓	✓		✓	✓			✓[5]	✓	
Mount Hamilton thistle		✓	✓		✓	✓	✓	✓	✓[5]	✓	
Santa Clara Valley dudleya		✓	✓		✓	✓	✓		✓[5]	✓	
Fragrant fritillary		✓	✓		✓	✓	✓		✓[5]	✓	✓
Loma Prieta hoita		✓	✓		✓	✓	✓		✓[5]	✓	✓
Smooth lessingia		✓	✓		✓	✓	✓		✓[5]	✓	✓
Metcalf Canyon jewelflower		✓	✓		✓	✓	✓		✓[5]	✓	✓
Most beautiful jewelflower		✓	✓		✓	✓	✓		✓[5]	✓	✓

	Lights in New Urban and Rural Areas	Harassment, Disturbance from More People	Harassment or Injury from Additional Pets	More Noise	Increased Vehicle-Related Disturbance and Mortality[1]	Spread of Invasive Exotic Plants or Wildlife	Increased Risk of Wildfire[2]	Increased Runoff of Urban Pollutants/ Change in Hydrology	Increased Recreation in Reserves	Enhancement or Restoration Activities[3]	Habitat Plan Monitoring

Notes:

[1] Excludes indirect effects of vehicle emissions, which causes the spread of invasive exotic plants on serpentine grassland.

[2] Accounts for the increased risk of wildfire from a growing human population and increased access to wildfire-prone areas (i.e., the Reserve System), all of which is expected to increase the frequency of human-caused wildfire ignition. Effects of wildfires and firefighting activities would be direct, including grading, clearing, disking, mowing, irrigation and other fire suppression activities, plus the temporary damage done by the wildfire itself. In some cases, wildfire will be beneficial to many covered species.

[3] Adverse impacts from restoration activities on covered species are expected to be temporary; long-term effects of restoration and enhancement will be beneficial.

[4] Impacts from increased runoff of urban development downstream of urban development would be confined to streams and channels and would not likely affect terrestrial covered species.

[5] Potential impacts if recreational users go off-trail.

Table 4-2. Total Allowable Permanent Impacts on Land Cover Types and Natural Communities (acres)

Land Cover Type	Total in Study Area	Estimated Impacts					Total Allowable Impact	% of Total in Study Area
		Urban Development	In-Stream Capital Projects	Rural Capital Project	Rural Development	Conservation Strategy Implementation		
Grassland								
California annual grassland	81,795	421	76	672	700	137	2,006	2.5%
Serpentine bunchgrass grassland	10,308	359	32	104	155	23	550[1]	5.3%
Serpentine rock outcrop	260	16	0	1	4	1	22	8.5%
Serpentine seep	34	0	0	0	0	0	0.5	1.5%
Rock outcrop	87	0	0	0	0	0	0.5	0.6%
Subtotal Grassland	92,483	796	108	777	860	161	2,579	2.8%
Chaparral & Northern Coastal Scrub								
Northern mixed chaparral/chamise chaparral	23,763	1	4	15	58	7	86	0.4%
Mixed serpentine chaparral	3,712	57	9	32	29	4	131	3.5%
Northern coastal scrub/Diablan sage scrub	10,306	19	26	53	71	8	178	1.7%
Coyote brush scrub	180	0	6	2	2	0	10	5.5%
Subtotal Chaparral & Northern Coastal Scrub	37,960	78	45	102	160	19	404	1.1%
Oak Woodland								
Valley oak woodland	12,895	46	11	62	70	12	201	1.6%
Mixed oak woodland and forest	84,488	610	71	292	411	57	1,441	1.7%
Blue oak woodland	11,160	41	5	25	51	9	131	1.2%
Coast live oak forest and woodland	31,652	316	45	230	230	18	840	2.7%
Foothill pine-oak woodland	10,960	1	3	13	27	2	46	0.4%
Mixed evergreen forest	5,775	0	6	20	22	2	50	0.9%
Subtotal Oak Woodland	156,930	1,014	142	642	810	100	2,709	1.7%
Riparian Forest and Scrub								
Willow riparian forest and scrub	2,544	32	130	16	1	2	180	7.1%
Central California sycamore alluvial woodland	373	0	2	4	1	1	7	1.9%
Mixed riparian forest and woodland	3,766	5	62	31	6	5	109	2.9%
Subtotal Riparian Forest and Scrub	6,682	37	194	50	8	7	296	4.4%

Table 4-2. Continued

Land Cover Type	Total in Study Area	Estimated Impacts: Urban Development	In-Stream Capital Projects	Rural Capital Project	Rural Development	Conservation Strategy Implementation	Total Allowable Impact	% of Total in Study Area
Conifer Woodland								
Redwood forest	9,693	0	0	80	28	1	109	1.1%
Ponderosa pine woodland	419	0	1	0	0	0	0[1]	0.0%
Knobcone pine woodland	711	0	0	5	3	1	8	1.1%
Subtotal Conifer Woodland	10,823	0	1	84	31	2	117	1.1%
Wetland								
Coastal and valley freshwater marsh	381	18	8	5	3	0	25[1]	6.6%
Seasonal wetland	201	16	0	0	5	0	15[1]	7.4%
Subtotal Wetland	583	34	8	5	7	0	40	6.9%
Aquatic								
Pond	1,110	40	5	0	6	1	52	4.7%
Riverine (miles)	2,391.5	0[2]	7.1	1.9	0.4	0.0	9.4	0.4%
Subtotal Aquatic (acres)	1,110	40	5	0	6	1	52	4.7%
Agricultural								
Orchard	2,697	492	5	59	69	0	625	23.2%
Vineyard	1,393	0	0	2	34	0	37	2.6%
Grain, row-crop, hay and pasture, disked/ short-term fallowed	33,648	6,220	95	261	766	14	7,356	21.9%
Subtotal Agricultural	37,738	6,711	100	322	870	14	8,018	21.2%
Developed								
Rural residential	12,414	1,207	30	103	261	2	1,603	12.9%
Golf courses / Urban parks	8,673	1,989	47	16	43	0	2,095	24.2%
Ornamental woodland	95	25	1	3	1	0	30	31.3%
Barren	211	0	18	5	9	0	32	15.2%
Subtotal Developed	21,392	3,221	95	127	314	2	3,759	17.6%
TOTAL	365,701	11,931	699	2,110	3,067	307	17,975	4.9%

[1] A maximum allowed impact is set for this land cover type that is lower than the total estimated impacts to ensure regulatory standards are met. Estimated impacts do not sum to the total allowable impact.

[2] Stream impacts occuring inside the planning limits of urban growth are included in the In-Stream Capital Projects category.

Table 4-3. Total Allowable Temporary Impacts on Land Cover Types and Natural Communities (acres)[a]

Land Cover Type	Total in Study Area	Estimated Impacts: In-stream Capital Project Construction	Estimated Impacts: In-stream O&M	Estimated Impacts: Rural Capital Project Construction	Estimated Impacts: Rural O&M	Total Allowable Impact	% of Total in Study Area
Grassland							
California annual grassland	81,795	46	0	158	267	574	0.7%
Serpentine bunchgrass grassland	10,308	23	14	6	23	91	0.9%
Serpentine rock outcrop	260	0	0	0	0	2	0.6%
Serpentine seep	34	0	0	0	0	0.4	1.3%
Rock outcrop	87	0	0	0	0	0.2	0.2%
Subtotal Grassland	92,483	68	14	164	291	667	0.7%
Chaparral & Northern Coastal Scrub							
Northern mixed chaparral/chamise chaparral	23,763	5	0	2	16	31	0.1%
Mixed serpentine chaparral	3,712	10	0	3	12	30	0.8%
Northern coastal scrub/Diablan sage scrub	10,306	31	0	7	19	66	0.6%
Coyote brush scrub	180	4	0	5	0	10	5.4%
Subtotal Chaparral & Northern Coastal Scrub	37,960	50	0	17	48	136	0.4%
Oak Woodland							
Valley oak woodland	12,895	8	0	7	16	45	0.3%
Mixed oak woodland and forest	84,488	63	0	39	136	302	0.4%
Blue oak woodland	11,160	5	0	7	16	39	0.3%
Coast live oak forest and woodland	31,652	33	0	36	91	181	0.6%
Foothill pine-oak woodland	10,960	5	0	3	16	26	0.2%
Mixed evergreen forest	5,775	6	0	2	15	25	0.4%
Subtotal Oak Woodland	156,930	120	0	94	290	618	0.4%
Riparian Forest and Scrub							
Willow riparian forest and scrub	2,544	62	26	6	6	103	4.0%
Central California sycamore alluvial woodland	373	0	0	0	4	6	1.6%
Mixed riparian forest and woodland	3,766	39	27	8	22	101	2.7%
Subtotal Riparian Forest and Scrub	6,682	101	54	14	32	209	3.1%

Table 4-3. Continued

Land Cover Type	Total in Study Area	Estimated Impacts: In-stream Capital Project Construction	Estimated Impacts: In-stream O&M	Estimated Impacts: Rural Capital Project Construction	Estimated Impacts: Rural O&M	Total Allowable Impact	% of Total in Study Area
Conifer Woodland							
Redwood forest	9,693	0	0	8	47	56	0.6%
Ponderosa pine woodland	419	1	0	0	0	1	0.3%
Knobcone pine woodland	711	0	0	0	0	2	0.3%
Subtotal Conifer Woodland	10,823	1	0	8	48	59	0.5%
Wetland							
Coastal and valley freshwater marsh	381	6	0	1	0	7	1.9%
Seasonal wetland	201	0	0	0	1	2	0.8%
Subtotal Wetland	583	6	0	1	2	9	1.5%
Aquatic							
Pond	1,110	5	0	0	3	9	0.8%
Riverine (miles)	2,391.5	44.7	1.5	1.5	0.1	48.0	2.0%
Subtotal Aquatic (acres)	1,110	5	0	0	3	9	0.8%
Agricultural							
Orchard	2,697	13	0	10	2	24	0.9%
Vineyard	1,393	0	0	1	1	3	0.2%
Grain, row-crop, hay and pasture, disked/ short-term	33,648	63	0	163	42	284	0.8%
Subtotal Agricultural	37,738	76	0	174	45	311	0.8%
Developed							
Rural residential	12,414	35	0	50	51	139	1.1%
Golf courses / Urban parks	8,673	15	0	4	21	40	0.5%
Ornamental woodland	95	1	0	6	1	8	8.2%
Barren	211	1	0	13	0	15	7.0%
Subtotal Developed	21,392	52	0	73	74	201	0.9%
TOTAL	365,701	481	69	545	832	2,219	0.6%

Notes:
Temporary impacts shown for operation and maintenance activities are annual impacts. Construction impacts are one-time impacts.

Table 4-4. Maximum Allowable Permanent and Temporary Impacts to Covered Species Modeled Habitat

Species and Habitat Type[1]	Total Modeled Habitat[2] in Study Area (acres)	Maximum Allowable Permanent Impact to Modeled Habitat from Covered Activities (acres)	Proportion (%)	Maximum Allowable Temporary Impact to Modeled Habitat from Covered Activities (acres)	Proportion (%)
Bay Checkerspot Butterfly					
Primary Habitat	8,621	300[3, 4]	3%	54	<1%
California Tiger Salamander					
Breeding Habitat	1,027	77	7%	14	1%
Non-Breeding Habitat	323,721	12,855	4%	1,529	<1%
Total	324,748	12,932	4%	1,543	<1%
California Red-Legged Frog					
Primary Habitat	10,101	299	3%	116	1%
Secondary Habitat	331,672	12,937	4%	1,489	<1%
Total	341,773	13,236	4%	1,605	<1%
Foothill Yellow-Legged Frog (length in miles)					
Primary Habitat	244	1.9	<1%	0.7	<1%
Secondary Habitat	447	4.8	1%	1.3	<1%
Total	690	6.7	1%	2.0	<1%
Western Pond Turtle					
Primary Habitat	82,895	1,824	2%	440	<1%
Secondary Habitat	232,021	7,825	3%	986	<1%
Total	314,916	9,649	3%	1,426	<1%
Western Burrowing Owl[5]					
Occupied Nesting Habitat	1,348	198	15%	20	<1%
Potential Nesting Habitat	63,751	4,000	6%	604	<1%
Overwintering Habitat	132,770	9,671	7%	762	<1%
Total	197,869	13,869	7%	1,385	<1%
Least Bell's Vireo					
Primary Habitat	3,097	72	2%	43	1%
San Joaquin Kit Fox					
Secondary Habitat	38,543	198	<1%	46	<1%
Secondary Habitat (Low Use)	2,349	28	1%	6	<1%
Total	40,892	226	<1%	52	<1%
Tricolored Blackbird					
Primary Habitat	7,933	276	3%	93	1%
Secondary Habitat	132,358	10,317	8%	768	<1%
Total	140,291	10,593	8%	861	<1%

Species and Habitat Type[1]	Total Modeled Habitat[2] in Study Area (acres)	Maximum Allowable Permanent Impact to Modeled Habitat from Covered Activities (acres)	Proportion (%)	Maximum Allowable Temporary Impact to Modeled Habitat from Covered Activities (acres)	Proportion (%)
Mt. Hamilton Thistle					
Primary Habitat	487	26	5%	4	<1%
Fragrant Fritllary					
Primary Habitat	8,820	550[3]	6%	59	<1%
Secondary Habitat	156,635	2,729	2%	655	<1%
Total	165,455	3,279	2%	714	<1%
Loma Prieta Hoita					
Primary Habitat	104,126	2,117	2%	413	<1%
Secondary Habitat	17,745	266	1%	60	<1%
Total	121,871	2,383	2%	473	<1%
Smooth Lessingia					
Primary Habitat	10,491	550[3]	5%	68	<1%
Metcalf Canyon Jewelflower					
Primary Habitat	8,105	550[3]	7%	62	<1%
Most Beautiful Jewelflower					
Primary Habitat	14,277	550[3]	4%	92	<1%
Secondary Habitat	85	0	0%	0	<1%
Total	14,362	550	4%	92	<1%

Notes:

[1] Includes species for which habitat distribution models were developed. For other covered species, see the text.

[2] Habitat as shown in Appendix D habitat distribution models.

[3] Allowable impacts to Bay checkerspot butterfly, fragrant fritillary, smooth lessingia, Metcalf Canyon jewelflower, and most beautiful jewelflower are capped below the estimated impacts to account for the caps on serpentine grassland (see Table 4-2) and Bay checkerspot butterfly habitat. These acreages are caps, not estimates.

[4] This cap does not apply to Bay checkerspot butterfly habitat units mapped as "historic/unoccupied" and "occupancy unknown."

[5] Western burrowing owl modeled habitat includes occupied and potential nesting habitat only in the study area.

Table 4-5a. In-Stream Capital Improvement Project Permanent Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
San José[4]		
New and existing bridge (re)construction	• Determine total acres of expanded area on existing bridges • Determine total acres of new proposed bridges • Combine acres of expanded bridge with acres of new bridge • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in San José city limits • Estimate stream impacts by identifying the total new width (bridge dimension parallel to stream bed) of expanded and new bridges in feet	• Impacts are based on list of bridges provided by City of San José that will be built or reconstructed within the permit term. This list included bridge width and length for each existing, expanded, and new proposed bridge • The list of bridges for City of San José includes the bridges that are likely to receive funding for replacement and/or rehabilitation within the 50-year permit term (J. Hart pers. comm. b) • New permanent impact to land cover and streams is assumed only for new or expanded areas, not total footprint of all bridges as permanent impacts are assumed to have already taken place for existing infrastructure • This method likely over estimates riparian impacts as it assumes that all new bridge area will remove riparian vegetation. It is likely that some new bridge locations will not have existing riparian vegetation • Stream impacts assume that new bridge width is directly related to linear stream ft and that stream length covered by new or expanded bridge is permanently impacted
New trails	• Identify all proposed new trails in GIS layer • In GIS, overlay trails on the land cover layer and apply a 16-foot buffer • Exclude all land covers from the results except the riparian land covers as impacts to all other land cover are already assumed in the urban development impact analysis • Estimate stream impacts using GIS to calculate the number of new stream crossings made by new trails • Multiply number of new stream crossings by 16-foot width to determine total linear ft of stream impacted	• Impacts are based on a GIS trails layer provided by City of San José • Assume a width of 16 feet (12 feet for the trail and two 2-foot compact gravel shoulders) (J. Hart pers. comm. a) • Assume 100% of impacts resulting from overlay are permanent • Existing trails are not assumed to be widened if reconstructed during the permit term • Stream crossings of trails assumed to be 16 feet wide
Cherry Flat dam seismic safety retrofit, including borrow site(s)	• Develop footprint of project based on existing dam footprint from aerial photos • Overlay footprint on land cover layer in GIS • Assess impacts to land cover types, including streams	• That borrow site(s) will be approximately scaled to the size of the reservoir and dam when compared to County Parks dams, reservoirs, and borrow site size
Morgan Hill[4]		
Bridge expansion	No impacts assessed	• No expansion of existing bridges is assumed and therefore no new permanent land cover or stream impacts are assumed

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
New bridge construction	No impacts assessed	• No new vehicular bridge construction is assumed for Morgan Hill; pedestrian and trail bridge impacts are assumed under the New Trails covered activity
New trails	• Identify trail bridges using GIS • Apply a 15-foot buffer to each trail where it crosses the in-stream area • Overlay the resulting buffered area on the land cover layer to determine impacts to riparian land covers and linear ft of stream	• Impacts based on an AutoCAD file provided by City of Morgan Hill (S. Golden pers. comm.); AutoCAD files were imported into GIS • It is assumed that all trails in the AutoCAD data are new trails • Impacts are assumed to occur in the area encompassed by a 15-foot buffer (30-foot width) along all linear infrastructure identified in the AutoCAD files provided by Morgan Hill (City of Morgan Hill recommended a buffer of 10–20 feet and the middle value of 15 feet was used) (S. Golden pers. comm.)
Storm drains	No impacts assessed	• No impacts to streams from implementation of storm drain infrastructure are assumed; All crossings will be jack and bore (beneath the streambed) (J. Behzad pers. comm.)
Gilroy[4]		
Bridge expansion	• Utilize data provided by the City of Gilroy to calculate the area of each expanded bridge • Distribute acres of expanded bridge to riparian land cover types proportional to occurrence in Gilroy • Add all bridge expansion widths together to calculate linear feet of stream impacts	• Bridge count, including length and width for planned bridge widening, was provided by the City of Gilroy for planned and existing bridges (K. Abrams pers. comm.)
New bridge construction	• Utilize data provided by the City of Gilroy to calculate the area of each new bridge • Distribute acres of new bridge to riparian land cover types proportional to occurrence in Gilroy • Add all new bridge widths together to calculate linear feet of stream impacts	• Bridge count, including length and width for planned new bridges, was provided by the City of Gilroy for planned and existing bridges (K. Abrams pers. comm.)
New trails	• Identify location of new trails using GIS • Apply a 15-foot buffer the mapped facility boundary where it crosses the in-stream area • Overlay the resulting buffered area on the land cover layer to determine impacts to riparian land covers and linear ft of stream	• Impacts are based on AutoCAD files provided by Gilroy of current master plans for infrastructure development; AutoCAD files were imported into GIS • Impacts are assumed to occur in the area encompassed by a 15-foot buffer (30-foot width) along all linear infrastructure identified in the AutoCAD files; this assumption is consistent with the assumptions used for Morgan Hill

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Sewer improvements	• Identify location of sewer improvements using GIS • Apply a 15-foot buffer the mapped facility boundary where it crosses the in-stream area • Overlay the resulting buffered area on the land cover layer to determine impacts to riparian land covers	• Impact consideration is based on AutoCAD files provided by Gilroy of current master plans for infrastructure development; AutoCAD files were imported into GIS • Sewer improvement projects are assumed to avoid streams and not result in permanent stream impacts; a small amount of riparian vegetation may be affected; this is consistent with the guidance provided in the Water Collaborative Guidelines and Standards
New recycled water pipes	• Identify location of new recycled water pipes using GIS • Apply a 15-foot buffer the mapped facility boundary where it crosses the in-stream area • Overlay the resulting buffered area on the land cover layer to determine impacts to riparian land covers	• Impact consideration is based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Recycled water pipe projects are assumed to avoid streams and not result in permanent stream impacts; a small amount of riparian vegetation may be affected; this is consistent with the guidance provided in the Water Collaborative Guidelines and Standards
Water improvements	• Identify location of water improvements using GIS • Apply a 15-foot buffer the mapped facility boundary where it crosses the in-stream area • Overlay the resulting buffered area on the land cover layer to determine impacts to riparian land covers	• Impact consideration is based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Water improvement projects are assumed to avoid streams and not result in permanent stream impacts; a small amount of riparian vegetation may be affected; this is consistent with the guidance provided in the Water Collaborative Guidelines and Standards
SCVWD		
Dam Maintenance Program	• In GIS, overlay the Area of Routine Maintenance footprint on the land cover layer and assess acres of land cover impacted • In GIS, overlay the Area of Routine Maintenance and the Area of Potential Effect on the land cover layer • Assess acres of land cover within the Area of Potential Effect but outside of the Area of Routine Maintenance • Take 15% of the acres identified in the above bullet, proportional to the occurrence of each land cover type identified • Add the land cover identified in the first bullet to the land cover identified in the fourth bullet together to identify total impacts	• GIS footprint of Dam Maintenance Program project extent was provided by SCVWD • SCVWD Dam Maintenance Program GIS data identifies the zone in which 85% of all impacts are expected to occur (also called the *Area of Routine Maintenance*); this area is assumed to experience permanent impact • The remaining 15% of impacts would occur within the Area of Potential Effect; the Area of Potential Effect includes the Area of Routine Maintenance but is somewhat larger than the Area of Routine Maintenance • Although this is a maintenance program, implementation of the Dam Maintenance Program results in a permanent clearing of all vegetation from the dam face and surrounding areas; therefore, this is considered a permanent impact to land covers (excluding riverine/streams) and is assessed under In-stream CIP • Streams are not assumed to be permanently impacted due to implementation of the Dam Maintenance Program

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Dam safety retrofit footprint	• Overlay GIS footprints of "Area A" on land cover layer AND on Dam Maintenance Program footprints • Assess acres of land cover impacted Area A excluding any areas that overlap with the Dam Maintenance Program footprints • Integrate stream impact lengths provided by SCVWD	• Because permanent impacts to land cover were fully assumed for the Dam Maintenance Program, additional impacts to land cover in this zone are not assessed under safety retrofit • SCVWD provided safety retrofit footprints for all dams; this data identifies the footprint of the new dam (Area A), and the area affected by construction impacts (Area B); these footprints assume worst case dam reconstruction of downstream embankment strengthening • All land cover types, including streams, falling within the footprint are assumed to be lost • SCVWD provided stream impact numbers • Safety retrofit of Coyote, Chesbro, and Uvas Dams is not a covered activity under this Plan
Safety retrofit borrow sites	• Use the total acres of borrow site impacts as calculated in the draft Three Creeks HCP (April 2009) for Anderson, Almaden, Calero, and Guadalupe dam borrow sites • Identify the acres of each land cover type present within a 5-mile radius of each of the four dams • For each dam, distribute the total acres of borrow site impact proportionally across the land cover types within a 5-mile radius of the dam	• Acres required for safety retrofits covered by the draft Three Creeks HCP (April 2009) were used as the basis of this analysis • That borrow will be acquired within a 5 mile radius of the dam • This analysis does not account for avoidance of certain land cover types based on the siting criteria in Chapter 2; impacts to certain land cover types may be overestimated while others are underestimated
Temporary supplemental water supply systems during reservoir drawdown	No impacts assessed	• That impacts associated with this activity will be entirely contained within the footprints of the Dam Maintenance Program, the water utility / water supply operations and maintenance impacts, or within existing roads and other disturbed areas
Water utility / water supply operation and maintenance	• Determine permanent impacts as defined in the draft Three Creeks HCP (April 2009) impact analysis for the Coyote and Guadalupe watersheds (Stevens Creek numbers were excluded) • Divide this number by the number of dams in the study area in north County (six dams) • Multiply this number by the number of dams in south County (2 dams) • Distribute 0.4 acre of permanent impact to land cover types proportional to impact for other impacts in this activity	• The draft Three Creeks HCP (April 2009) identifies permanent impacts for operations and maintenance activities in the north County; these impacts were used for this Plan directly for north County impacts and indirectly to derive estimates for impacts associated with activities in south County • In addition to these estimates, some new access roads and facility pads may be required; assume up to 1,600 sq ft per new facility and up to 10 new facilities (0.4 acre); distribute impacts to land cover types proportional to other impacts in this category • That impacts in south County are proportional to impacts in north County based on the number of dams

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Lower Llagas vegetation management	• Using an aerial map for guidance, draw a polygon in GIS around the full extent of the project area including the outer edge of the channel levee as appropriate • Overlay GIS polygon on land cover layer • Assess total acres of land cover and streams impacted • Reduce impacts by 50% for each land cover type • Reduce impacts by 95% for permanent stream impacts	• 50% of existing vegetation will be removed and this reach permanently maintained in this state for flood protection purposes, resulting in a 50% permanent impact • The stream may experience some degradation to habitat due to removal of large woody debris and other in-channel vegetation due to flood protection management needs; this amount of degradation is estimated as a permanent impact to 5% of the total stream length
Canal reconstruction or realignment	• Using an aerial map for guidance, draw a polygon around the extent of each canal including access roads adjacent to the canal • Overlay GIS polygons on land cover layer • Assess total acres of land cover impacted	• Canals will be dry when they are reconstructed and no stream impacts are anticipated • Decommissioning of canals would result in reduced permanent impacts compared to reconstruction or realignment; this analysis assumes the highest level of impacts as associated with reconstruction or realignment
Flood protection projects (collective)	• Using an aerial map for guidance, draw a polygon in GIS around the full extent of the project area including the outer edge of the channel levee as appropriate • Overlay GIS polygon on land cover layer • Assess total acres of land cover and streams impacted • Reduce impacts by 80% for each land cover type • Reduce impacts by 95% for permanent stream impacts • Reduce final impacts by approximately one-third to account for cap on total flood protection projects covered by the Plan	• That 20% of existing vegetation, on average, will be removed and permanently due to construction of flood control projects; this assumption is based on engineer drawings from past and current projects, and SCVWD professional experience in implementing flood control projects; this assumption is also based on implementation of the Clean, Safe, Creeks Program by which SCVWD protects and maintains as much natural structure of a stream system as possible • Project footprint impacts were based on a polygon footprint from the outer edge of the existing channel or levee • Total length of flood protection projects covered by the Plan is capped at 64 miles, with a maximum of 3.1 miles of permanent stream impacts • The assumption that only 5% of the total stream length will be permanently impacts is based on: o review of past and planned projects; o the understanding that SCVWD is committed to designing flood control projects to incorporate and support natural stream function and riparian habitat; o development and adoption of the Clean, Safe Creeks and Natural Flood Protection Plan program to support the above commitment; o examples of planned flood control projects that seek to remove existing development and replace it with a wider and more natural channel (Upper Penitencia project) and that may result in net benefit for habitat; and o the understanding that conditions identified in the Habitat Plan (Condition 4) will be utilized and incorporated into project design and

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
		construction o Feedback from SCVWD engineers (D. Arnold pers. comm. a)
Levee reconstruction projects (collective)	• Using an aerial map for guidance, draw a polygon in GIS around the full extent of each individual levee (i.e., a channel with a levee on each side would require two separate polygons) including the outer edge of the channel levee as appropriate • Import GIS levee layer and combine with levees mapped from the aerial photo • Overlay GIS polygons on land cover layer • Assess total acres of land cover impacted • Reduce impacts by 95% for permanent stream impacts • Divide all resulting impacts (land cover and stream) by one-half to account for 10 mile impact cap	• Includes all reconstruction activities including improvements and expanded levees (taller or wider levees) • SCVWD provided aerial images marking the extent of levee location (D. Arnold pers. comm. b); SCVWD also provided a GIS layer for SCVWD levees; levees identified in both data sources were utilized for this analysis • Assumes levees will be reconstructed within the same footprint as in aerial photos and in GIS; may be a slight under estimation of impacts if levee encroaches into stream bed area due to design constraints • Assumes that all vegetation within the footprint will be removed; may be an overestimate as levee reconstruction will not result in a loss of shaded riverine habitat • Assumes impacts are capped at 10 miles
Groundwater recharge ponds	• Digitize recharge ponds, new diversion dam at Metcalf Road, pipeline to Ford Road pond, and existing diversion outtake at Church Avenue in GIS • Overlay GIS polygons on land cover layer • Assess total acres of land cover impacted • Delete impacts to “ponds” land cover type	• SCVWD plans to re-operate Ford Road and Church Avenue groundwater recharge ponds; projects includes rehabilitation of diversion at Church Avenue and construction of a new diversion at Metcalf Road • Ford Road project includes installation of a new pipeline from the diversion to the pond • SCVWD provided aerial maps showing where the re-operated ponds are located • Metcalf Road diversion is assumed to be approximately 200 feet (stream length) by 170 feet (stream width); and that approximately half of this area is riparian vegetation (0.4 acre of riparian) • Approximately 80% of the Church Avenue ponds site is currently mapped as ponds land cover type; because ponds will be the land cover type after project implementation, impacts to the ponds land cover type were not included in the impact analysis • As SCVWD’s water rights have not changed, no impact to in-stream flow is anticipated
Alamitos Creek/ Almaden Reservoir Fish Passage	• Digitize in GIS the general area of where the project components may go • Distribute 30 acres of impacts proportional to the percentages of land cover in the generally mapped area • Assess 50 feet of stream impact	• Assume up to 30 acres of impact to land cover types around Almaden Dam and Reservoir • Assume up to 50 feet of permanent stream loss

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Trails	No impacts assessed	• Assumes that trail projects are located on existing maintenance roads or as components of flood protection projects; therefore, impacts are assumed to either already have occurred (existing maintenance roads) or that impacts are captured by the impacts assessed for flood protection projects; no additional impacts to land cover are assessed
County Roads and Airports		
Bridge replacement - expanded footprint	• Determine total acres of expanded area on existing bridges or acres of new bridges • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in the county • Estimate stream impacts by identifying the total new width (bridge dimension parallel to stream bed) of expanded and new bridges in feet	• Impacts based on data provided by County of Santa Clara Road and Airports containing a list of bridges that will be reconstructed within the permit term; This list includes bridge width and length for each existing bridge (D. Cameron pers. comm. a) • County Roads has identified three road connection projects in the study area. One of these projects, Center Avenue extension to Marcella will require a new bridge. Another project, McKean Road connection to Almaden Expressway, may require a new bridge depending on land acquisition constraints (D. Cameron pers. comm. b) • Aside from the exceptions noted in the above bullet, County Roads has no plans to build bridges in new locations in the Study area Any new bridges would be due to land use development and would have to be funded by the developer and impacts are assessed under Rural Development • Bridges are assumed to be double in width during reconstruction to account for new safety and seismic codes • New permanent impact to land cover and streams is assumed only for new or expanded areas, not total footprint of all bridges as permanent impacts are assumed to have already taken place for existing infrastructure • This method likely over estimates riparian impacts as it assumes that all new bridge area will remove riparian vegetation. It is likely that some new bridge locations will not have existing riparian vegetation • Stream impacts assume that new bridge width is directly related to linear stream ft and that stream length covered by new or expanded bridge is permanently impacted

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
County Parks		
New bridges	• Calculate the stream miles of existing bridges (i.e., total width of all bridges) • Calculate the ratio of existing but unplanned parks to existing but planned and constructed parks • Multiple the miles of existing bridges by the ratio calculated in the previous bullet to determine miles of bridges in existing but unplanned parks • Calculate the ratio of future park lands to existing park lands • Multiple the miles of existing bridges by the ratio calculated in the previous bullet to determine miles of bridges in future parks • Add the results of 3rd and 5th bullets for total new permanent stream impacts	• The number of bridges constructed in the future is proportional to the number of bridges currently in existence • Analysis only accounts for stream impacts as all other impacts are assessed under Rural CIP
Dam safety retrofit, including borrow sites	• Using data provided by County Parks, develop polygons in GIS around dams • Overlay on land cover layer to assess impacts to land cover type from dam retrofits • Apply acres of impact for borrow sites to California annual grassland land cover type	• County Parks provided impact numbers for the dam at Sandywool Lake and the five dams at Grant Lake and for the size of borrow pits required for each dam (D. Rocha pers. comm.) • Borrow sites will be located in grasslands
VTA		
Light-rail bridge reconstruction	• No impacts assessed	• VTA provided a list of eight (8) light rail bridges that are likely to be replaced over the permit term • New permanent impact to land cover and streams is assumed only for new or expanded areas, not total footprint as permanent impacts are assumed to have already taken place for existing infrastructure • No expansion is assumed for reconstruction of VTA bridges
S.R. 237 HOV /HOT lane (full length inside the study area)	• Use GIS to identify number of stream crossings • Using aerial photos, identify length and width of existing stream crossings • Add 24 ft to width of crossing (linear ft of stream) • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist within the planning limit of urban growth for the City of San José • Assess permanent impacts to streams at 24 feet per crossing	• VTA provided project location • Full length of project is inside the planning limit of urban growth; no new land cover impacts are assumed because this area was assessed under the Urban Development impact category, with the exception of stream crossings • Each stream crossing will require bridge widening of 24 feet • New bridge width will affect in-stream riparian and linear feet of stream

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
S.R. 85 HOV/HOT lane (full length inside the study area)	• Use GIS to identify number of stream crossings • Using aerial photos, identify length and width of existing stream crossings • Add 24 feet to width of crossing (linear ft of stream) • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist within the planning limit of urban growth for the City of San José • Assess permanent impacts to streams at 24 feet per crossing	• VTA provided project location • Full length of project is inside the planning limit of urban growth; no new land cover impacts are assumed because this area was assessed under the Urban Development impact category, with the exception of stream crossings • Each stream crossing will require bridge widening of 24 feet • New bridge width will affect in-stream riparian and linear feet of stream

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

[4] Impacts assessed for cities under the In-Stream impacts category only include impacts to riparian and riverine land cover types as impacts to all other land covers for urban development are assumed under the Urban Development impact analysis assumptions.

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive of all covered activities. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5b. In-Stream Capital Improvement Project Construction Temporary Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
San José[4]		
New and existing bridge (re)construction	• Determine the total length of all existing and planned bridges • Multiply the total length of all existing and planned bridges by a construction width of 30 ft (15 ft buffer[5] on each side of the bridge) to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in San José city limits • Estimate temporary stream impacts by multiplying a 30 ft width of temporary impacts per bridge by the number of bridges to be constructed or reconstructed	• Impacts are based on list of bridges provided by City of San José that will be built or reconstructed within the permit term. This list included bridge width and length for each existing, expanded, and new proposed bridge • The list of bridges for City of San José includes the bridges that are likely to receive funding for replacement and/or rehabilitation within the 50-year permit term (J. Hart pers. comm. b) • Length of bridges is assumed to be bank to bank, perpendicular to flow, and that construction impacts would occur along the full length of the bridge • Temporary construction impacts are assumed to occur within 15 ft upstream and downstream of the bridge crossing, for a total construction width of 30 ft along the linear stream • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges • This method likely over estimates riparian impacts as it assumes impacts will temporarily affect riparian vegetation. It is likely that some bridge locations will not have existing riparian vegetation
New trails	• In GIS, overlay trails on the land cover layer and apply a 4 ft buffer • Exclude all land covers from the results except the riparian land covers as impacts to all other land cover are already assumed in the urban development impact analysis • Estimate stream impacts using GIS to calculate the number of stream crossings (existing and new) by trails • Multiply number of new stream crossings by 8 ft width to determine total linear ft of stream impacted	• Impacts are based on a GIS trails layer provided by City of San José • Assume temporary construction impacts occur in a buffer of 4 ft along each trail (8 ft total width, one-half of trail footprint)

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Morgan Hill[4]		
Bridge replacement and expansion	• Identify the existing number of bridges using GIS by overlaying the road layer on the stream layer • Verify on aerials that bridge locations were accurate from the overlay of roads and streams • Apply a 15 ft buffer to each bridge footprint where it crosses the in-stream area • Overlay the resulting buffered land cover to determine riparian land covers impacted during bridge replacement	• Neither a list of bridges for replacement nor GIS locations of existing bridges were provided; instead, bridges were assumed to occur at locations where roads cross a mapped creek or stream • Temporary impacts are assumed to occur within 15 ft upstream and downstream of the bridge crossing, for a total construction width of 30 ft along the linear stream • Temporary impacts are not assumed for the area under the existing bridge as that area is assumed to be already permanently impacted
New bridge construction	No impacts assessed	• No new vehicular bridge construction is assumed for Morgan Hill; pedestrian and trail bridge impacts are assumed under the New Trails covered activity
New trails	• Identify trail bridges using GIS • Apply a 5 ft buffer to each trail where it crosses the in-stream area • Overlay the resulting buffered area on the land cover layer to determine impacts to riparian land covers and linear ft of stream	• Impacts based on an AutoCAD file provided by City of Morgan Hill (S. Golden pers. comm.) • Assume a 5 ft buffer (10 ft width); This is equivalent to 1/3 the area of CIP footprint • It was assumed that all trails in the AutoCAD data are new trails
Storm Drainage	No impacts assessed	• No impacts to streams from implementation of storm drain infrastructure are assumed; All crossings will be jack and bore (beneath the streambed) (J. Behzad pers. comm.)
Gilroy[4]		
Bridge replacement and expansion	• Identify number of bridge expansion projects based on data provided by the city of Gilroy • Identify average length of each bridge widening project • Multiply number of bridges by average length by 30 ft (15 ft buffer on either side of expanded bridge) to calculate acres of temporary impact • Distribute acres of impact to riparian land cover types proportional to occurrence in Gilroy • Estimate temporary stream impacts by multiplying a 30 ft width of temporary impacts per bridge by the number of bridges to be replaced or expanded	• Impacts are based on bridge count, including length and width for planned bridge widening, was provided by the City of Gilroy for planned and existing bridges (K. Abrams pers. comm.) • Temporary impacts are assumed to occur within 15 ft upstream and downstream of the bridge crossing, for a total construction width of 30 ft along the linear stream • Temporary impacts are not assumed for the area under the existing bridge as that area is assumed to be already permanently impacted

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
New bridge construction	• Identify number of new bridges based on data provided by the city of Gilroy • Identify average length of each new bridge project • Multiply number of bridges by average length by 30 ft (15 ft buffer on either side of new bridge) to calculate acres of temporary impact • Distribute acres of impact to riparian land cover types proportional to occurrence in Gilroy • Estimate temporary stream impacts by multiplying a 30 ft width of temporary impacts per bridge by the number of bridges to be replaced or expanded	• Impacts are based on bridge count, including length and width for planned new bridges, was provided by the City of Gilroy for planned and existing bridges (K. Abrams pers. comm.) • Temporary impacts are assumed to occur within 15 ft upstream and downstream of the bridge crossing, for a total construction width of 30 ft along the linear stream
New trails	• Multiply permanent impacts identified in permanent in-stream impacts for new trails by one-third	• Impacts are based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Assume a 5 ft buffer (10 ft width); This is equivalent to 1/3 the area of CIP footprint • Assume that the land covers impacted by construction are the same types and the same proportion as the permanent impacts
Sewer improvements	• Multiply permanent impacts identified in permanent in-stream impacts for sewer improvements by one-third	• Impacts are based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Assume a 5 ft buffer (10 ft width); This is equivalent to 1/3 the area of CIP footprint • Assume that the land covers impacted by construction are the same types and the same proportion as the permanent impacts
New recycled water pipes	• Multiply permanent impacts identified in permanent in-stream impacts for recycled water pipes by one-third	• Impacts are based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Assume a 5 ft buffer (10 ft width); This is equivalent to 1/3 the area of CIP footprint • Assume that the land covers impacted by construction are the same types and the same proportion as the permanent impacts
Water improvements	• Multiply impacts identified in permanent in-stream impacts for water improvements by one-third	• Impacts are based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Assume a 5 ft buffer (10 ft width); This is equivalent to 1/3 the area of CIP footprint • Assume that the land covers impacted by construction are the same types and the same proportion as the permanent impacts

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
SCVWD		
Dam Maintenance Program	No impacts assessed	• Because full permanent impacts to land cover were assumed under the In-Stream CIP category, and because this is not a construction projects, no temporary impacts are assessed
Dam safety retrofit footprint	• SCVWD provided GIS footprints of estimated extent of safety retrofit for all SCVWD dams • Overlay GIS footprints of "Area B" on land cover layer AND on Dam Maintenance Program footprints • Assess acres of land cover impacted in Area B excluding any areas that overlap with the Dam Maintenance Program footprints • Assess temporary impacts to miles of streams for all length of stream occurring in Area B	• SCVWD provided safety retrofit footprints for all covered dams; this data identifies the existing dam face, the footprint of the new dam (Area A), and the area affected by construction impacts (Area B)
Safety retrofit borrow sites	• April 2009 draft Three Creeks HCP identified acres of temporary impacts for Anderson, Almaden, Calero, and Guadalupe dam borrow sites • Identify the acres of each land cover type present within a 5-mile radius of each of the four dams • For each dam, distribute the total acres of temporary impact proportionally across the land cover types within a 5-mile radius of the dam	• The April 2009 draft Three Creeks HCP identified acres of temporary impacts • Borrow will be acquired within a 5 mile radius of the dam • This analysis does not account for avoidance of certain land cover types based on the siting criteria in Chapter 2; impacts to certain land cover types may be overestimated while others are underestimated
Lower Llagas vegetation management	• Using GIS, identify stream miles of entire project footprint • Assess temporary impacts on 5% of the identified stream miles	• Temporary losses of vegetation are assumed to be incorporated in the 50% permanent loss of vegetation assessed under In-Stream CIP; therefore, no temporary impacts are assessed • Temporary impacts to streams can largely be avoided by applying the requirements identified in Chapter 6; however, vegetation management activities that require removal of trees, or root wads from the active channel (channel with water) may result in temporary water quality impacts associated with ground disturbance. These impacts are assumed to be very small and are estimated to be 5% of the project length
Canal reconstruction or realignment	• Using the GIS footprint developed for In-stream CIP impacts, apply a 10 ft buffer around the project site • Assess impacts to land cover in the buffer area only	• Temporary impacts are assumed for an average of 10 ft buffer around the project site which is the full extent of the canal • Canals are assumed to be dry at the time of construction and therefore no stream impacts are assessed

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Flood protection projects (collective)	• Using the polygons developed for In-Stream CIP project footprints, overlay the GIS polygon on the land cover layer • Assess total acres of land cover and streams impacted • Reduce impacts by 80% for each land cover type • Reduce impacts by 50% for temporary stream impacts • Reduce final impacts by approximately one-third to account for cap on total flood protection projects covered by the Plan	• Temporary impacts to land cover are assumed to be on average 20% of all existing land cover; this represents vegetation that will be impacted during project construction but replaced upon completion of construction • Construction impacts were assumed to occur within the same footprint as the project; as such, no buffer was used • Total length of flood protection projects covered by the Plan is capped at 64 miles • Temporary impacts to streams are assumed to be on average 50% of the total stream miles in the project area; this account for dewatering in portions of the channel and other temporary construction impacts
Levee reconstruction projects (collective)	• Using the GIS polygons developed for In-Stream CIP levee project footprints, apply a 20 ft buffer • Overlay with the polygon buffer with the land cover layer in GIS • Assess total acres of impacts by land cover • Using GIS, identify the full length of stream miles associated with each channel that will require levee reconstruction • Assess temporary stream impacts along the identified stream miles	• Temporary impacts are assumed for an average of 20 ft buffer around the project site which includes the inner (i.e., in-channel) and outer edges of the levee • Because this project calls for full levee reconstruction, it is assumed there will be temporary impacts to the entire length of stream in the channel being reconstructed
Groundwater recharge ponds	• Digitize temporary impact area in GIS • Overlay GIS polygons on land cover layer • Assess total acres of land cover temporarily impacted	• A perimeter of 10 ft around the outer edge of the Ford Road ponds site and around the Church Avenue diversion site is assumed to be temporarily affected during construction
Alamitos Creek / Almaden Reservoir Fish Passage	• Distribute 5acres of impact proportional to the acres of land cover affected by permanent project impacts • Assess 30 ft of temporary stream impact	• Assume up to 5 acres of temporary construction impacts to non-stream land cover types may occur and up to 30 ft of temporary stream impacts • Construction impacts are distributed proportional to land cover types affected by permanent project impacts

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
County Roads and Airports		
Bridge replacement - expanded footprint	• Determine the total length of all existing bridges • Multiply the total length of all existing and planned bridges by a construction width of 32 ft (16 ft buffer on each side of the bridge) to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in Santa Clara unincorporated county • Estimate temporary stream impacts by multiplying a 32 ft width of temporary impacts per bridge by the number of bridges to be reconstructed	• Impacts based on data provided by County of Santa Clara Road and Airports containing a list of bridges that will be reconstructed within the permit term; This list includes bridge width and length for each existing bridge • County Roads plans one new bridge in the study area • Temporary impacts are assumed to occur within 16 ft upstream and downstream of the bridge crossing, for a total construction width of 32 ft along the linear stream (D. Cameron pers. comm.) • This method likely over estimates riparian impacts as it assumes that all bridge construction will remove riparian vegetation. It is likely that some bridge construction will not have existing riparian vegetation
County Parks		
Existing and New Bridge Construction	• Apply ratios of new bridges to existing bridges determined for In-stream CIP permanent impacts to the number of existing bridges to identify numbers and types of future bridges by bridge type • Add results of first bullet to the number of existing bridges to identify total number of existing bridges to be rebuilt and new bridges to be constructed for each type of bridge • Multiple construction buffers by 2 (to get total length of stream temporarily affected during construction) and then multiply by the total number of bridges for each bridge type • Add results of three bridge types together to get total stream miles of temporary construction impacts	• County Parks provided data on total number of existing bridges by bridge type (non-bridge water crossings, large bridges, and small bridges and puncheons), dimensions of each bridge type, and count of existing bridges by type • Assume temporary construction buffers of 2 ft for non-bridge water crossings, 15 ft for large bridges, and 5 ft for small bridges and puncheons • Analysis only accounts for temporary construction stream impacts as all other construction impacts are assessed under Rural CIP

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
VTA		
Light-rail bridges	• Determine the total length of all existing bridges • Multiply the total length of all existing bridges by a construction width of 30 ft (15 ft buffer on each side of the bridge) to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in San José city limits • Estimate temporary stream impacts by multiplying a 30 ft width of temporary impacts per bridge by the number of existing bridges	• Impacts based on data provided by VTA regarding location of bridges assumed to be reconstructed over the permit term • The average width of each bridge is assumed to be 100 ft and average length 143 ft; these numbers correspond to the average width and length of San José bridges; all VTA bridges are located in San José • Temporary impacts are assumed to occur within 15 ft upstream and downstream of the bridge crossing, for a total construction width of 30 ft along the linear stream • All eight bridges are located inside of the San José planning limit of urban growth; therefore, only riparian impacts are assessed as all other impacts are assessed under the Urban Development category • This method likely over estimates riparian impacts as it assumes impacts will temporarily affect riparian vegetation. It is likely that some bridge locations will not have existing riparian vegetation
S.R. 237 HOV/HOT lane (full length inside the study area)	• 20 ft of linear stream temporary impact per stream crossing • Multiply 20 ft by the length of each crossing as identified under the permanent impact calculations and convert to acres • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist within the planning limit of urban growth for the City of San José	• All construction impacts are assumed to occur on the adjacent freeway or within the median that is being permanently impacted, with the exception of in-stream areas • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing • Assume a temporary riparian impact buffer of 10 ft (20 ft total width) on either side of the crossing
S.R. 85 HOV /HOT lane (full length inside the study area)	• 20 ft of linear stream temporary impact per stream crossing • Multiply 20 ft by the length of each crossing as identified under the permanent impact calculations and convert to acres • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist within the planning limit of urban growth for the City of San José	• All construction impacts are assumed to occur on the adjacent freeway or within the median that is being permanently impacted, with the exception of in-stream areas • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing • Assume a temporary riparian impact buffer of 10 ft (20 ft total width) on either side of the crossing

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

[4] Impacts assessed for cities under the In-Stream impacts category only include impacts to riparian and riverine land cover types as impacts to all other land covers for urban development are assumed under the Urban Development impact analysis assumptions.

[5] Buffers described for temporary impacts identify the area immediately surrounding the footprint of the associated project where temporary impacts are assumed to occur. Temporary impact buffers are in addition to buffers assumed to represent the project footprint as described in Table 4-5a.

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive of all covered activities. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5c. In-Stream Operations and Maintenance Temporary Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
San José		
New and existing bridge maintenance	• Determine the total length of all existing and planned bridges • Multiply the total length of all existing and planned bridges by a maintenance width of 24 ft (12 ft buffer on each side of the bridge) and convert to acres to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in San José city limits • Estimate temporary stream impacts by multiplying the maintenance buffer zone (24 ft) by the number of bridges to be maintained	• Impacts are based on list of bridges provided by City of San José that will be built or reconstructed within the permit term. This list included bridge width and length for each existing, expanded, and new proposed bridge; average length is 143 ft and average width is 100 ft • The list of bridges for City of San José includes the bridges that are likely to receive funding for replacement and/or rehabilitation within the 50-year permit term (J. Hart pers. comm. b) • Temporary land cover and stream impacts are assumed to occur within 12 ft upstream and downstream of the bridge crossing, for a total maintenance width of 24 ft along the linear stream; this assumption is based on County Roads maintenance buffers • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges • This method likely over estimates riparian impacts as it assumes all impacts will temporarily affect riparian vegetation. It is likely that some bridge locations will not have existing riparian vegetation
New and existing trail maintenance	• In GIS, overlay trail layer provided by San José on the land cover layer • Apply a 4 ft buffer • Exclude all land covers from the results except the riparian land covers as impacts to all other land cover are already assumed in the urban development impact analysis • Estimate stream impacts using GIS to calculate the number of trail stream crossings (existing and new) • Multiply number of stream crossings by 8 ft width to determine total linear feet of stream impacted	• Impacts are based on a GIS trails layer provided by City of San José • Temporary land cover and stream impacts in urban areas are assumed to occur within 4 ft upstream and downstream of the bridge crossing, for a total maintenance width of 8 ft along the linear stream • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges • This analysis only attempts to capture trail impacts in in-stream areas; impacts in upland areas are identified in the Urban Development impact category

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Morgan Hill		
Bridge maintenance	• Identify the existing number of bridges using GIS by overlaying the road layer on the stream layer • Verify on aerials that bridge locations were accurate from the overlay of roads and streams • Apply a 12ft buffer to each bridge footprint where it crosses the in-stream area • Overlay the resulting buffered land cover to determine riparian land covers impacted	• Bridges were assumed to occur at locations where roads cross a mapped creek or stream; 6 bridges were identified in Morgan Hill. • Temporary land cover and stream impacts are assumed to occur within 12 ft upstream and downstream of the bridge crossing, for a total maintenance width of 24 ft along the linear stream; this assumption is based on County Roads maintenance buffers • Temporary impacts are not assumed for the area under the bridge (60 ft by 100 ft) as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges • This analysis only attempts to capture trail impacts in in-stream areas; impacts in upland areas are identified in the Rural Operations and Maintenance impacts category
Trail maintenance	• In GIS, overlay trail layer provided by Morgan Hill on the land cover layer • Apply a 4 ft buffer • Exclude all land covers from the results except the riparian land covers as impacts to all other land cover are already assumed in the urban development impact analysis • Estimate stream impacts using GIS to calculate the number of trail stream crossings (existing and new) • Multiply number of stream crossings by 8 ft width to determine total linear feet of stream impacted	• 10 trail stream crossings are assumed • Temporary land cover and stream impacts in urban areas are assumed to occur within 4 ft upstream and downstream of the bridge crossing, for a total maintenance width of 8 ft along the linear stream • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges • This analysis only attempts to capture trail impacts in in-stream areas; impacts in upland areas are identified in the Urban Development impact category
Gilroy		
Bridge maintenance	• Determine the average length of all planned new and widened bridges • Multiply the average length of all planned bridges by a maintenance width of 24 ft (12 ft buffer on each side of the bridge) and convert to acres to identify acres of temporary impact • Distribute acres across the three riparian land–cover types in proportion to those land covers occurrence in Gilroy city limits • Estimate temporary stream impacts by multiplying the maintenance buffer (24 ft) by the number of bridges to be maintained	• Bridge count, including length and width for new and widened bridges, was provided by the City of Gilroy for planned and existing bridges (K. Abrams pers. comm.) • Gilroy is assumed to have 32 planned and existing bridges • Existing bridges are assumed to have the same average width and length as new and widened bridges • Temporary land cover and stream impacts are assumed to occur within 12 ft upstream and downstream of the bridge crossing, for a total maintenance width of 24 ft along the linear stream; this assumption is based on County Roads maintenance buffers • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Trail maintenance	• In GIS, calculate total ft of trails that occur in the in-stream area • Apply a 4 ft buffer on each side of the trail and overlay on land cover data • Assess impacts to acres of land cover	• Impacts are based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Temporary impacts for urban trail operations and maintenance are assumed to occur within 4 ft on either side of a trail • This analysis only attempts to capture trail impacts in in-stream areas; impacts in upland areas are identified in the Urban Development impact category
Stream maintenance	• Distribute 12 acres of temporary impact across the three riparian land-cover types in proportion to occurrence in Gilroy planning limits of urban growth	• City of Gilroy provided impact estimates of 3 acres 4 times per year (R. Smelser pers. comm.)
SCVWD		
Canal Maintenance in Serpentine	No impacts assessed	• No impacts are assumed for canal maintenance because full permanent impacts to canals are assumed under In-Stream CIP for canal reconstruction
Ground-Disturbing, Winter work in Almaden-Calero	No impacts assessed	• No impacts are assumed for winter work in Almaden-Calero canal because full permanent impacts to this canal are assumed under In-Stream CIP for canal reconstruction
County Roads and Airports		
Bridge Maintenance	• Determine the total length of all existing bridges • Multiply the total length of all existing and planned bridges by a maintenance width of 24 ft (12 ft buffer on each side of the bridge) and convert to acres to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in the County • Estimate temporary stream impacts by multiplying the maintenance buffer zone (24 ft) by the number of bridges to be maintained	• County Roads is assumed to have 91 bridges that will be maintained • Temporary land cover impacts from operations and maintenance are assumed to occur within a 12 ft buffer up and downstream of the bridge (24 ft width total) • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
County Parks		
Bridge Maintenance	• Determine the total length of all existing and planned bridges • Multiply the total length of all existing and planned bridges by a maintenance width of 24 ft (12 ft buffer on each side of the bridge) and convert to acres to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in the County • Estimate temporary stream impacts by multiplying the maintenance buffer zone (24 ft) by the number of bridges to be maintained	• Impacts based on data provided by County of Santa Clara Parks Department containing a list of existing bridges; this list includes bridge width and length for each existing bridge • County Roads is assumed to have 69 bridges, inclusive of vehicular and trail stream crossing • Temporary land cover impacts from operations and maintenance are assumed to occur within a 12 ft buffer up and downstream of the bridge (24 ft width total) • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges
VTA		
Light-rail bridge Maintenance	• Determine the total length of all bridges • Multiply the total length of all bridges by a maintenance width of 24 ft (12 ft buffer on each side of the bridge) and convert to acres to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in San José city limits • Estimate temporary stream impacts by multiplying the maintenance buffer zone (24 ft) by the number of bridges to be maintained	• Impacts based on data provided by VTA regarding location of bridges assumed to be reconstructed over the permit term • The average length is assumed to be 143 ft; this number corresponds to the average width and length of San José bridges; all VTA bridges are located in San José • Temporary land cover and stream impacts are assumed to occur within 12 ft upstream and downstream of the bridge crossing, for a total maintenance width of 24 ft along the linear stream; this assumption is based on County Roads maintenance buffers • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges • All eight bridges are located inside of the San José planning limit of urban growth; therefore, only riparian impacts are assessed as all other impacts are assessed under the Urban Development category • This method likely over estimates riparian impacts as it assumes impacts will temporarily affect riparian vegetation. It is likely that some bridge locations will not have existing riparian vegetation

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
General		
Natural resource protection (small bank stabilization projects, restoration to reduce erosion, fish passage enhancements, and debris)	• For bank stabilization, multiply 10*50 feet*20 feet, convert to acres, and distribute this impact across riparian land-cover types in proportion to relative presence in the study area of the riparian land-cover types • For bank stabilization projects, multiply 10*50 feet, convert to miles of temporary steam impact • For erosion control projects, multiply 5*50 feet*50 feet, convert to acres, and distribute this impact across riparian land-cover types in proportion to relative presence in the study area of the riparian land-cover types • For erosion control projects, multiply 5*50 feet, convert to miles of temporary steam impact • For fish passage projects, multiply 2*50 feet*20 feet, convert to acres, and distribute this impact across riparian land-cover types in proportion to relative presence in the study area of the riparian land-cover types • For fish passage projects, multiply 2*50 feet, convert to miles of temporary steam impact	• Assume that Local Partners will request, on average,10 bank stabilizations per year; each stabilization is 50 feet long and 20 feet wide; that this area will impact riparian vegetation; that one-half of the projects will require dewatering which results in a temporary stream impact • Assume that Local Partners will request, on average, 5 erosion correction projects per year; each project 50 feet long and 50 feet wide; that this area will impact riparian vegetation; that one-half of the projects will require dewatering which results in a temporary stream impact • Assume that Local Partners will request, on average, 2 fish passage enhancement projects per year; each project 50 feet long and 15 feet wide; that this area will impact riparian vegetation; that one-half of the projects will require dewatering which results in a temporary stream impact • Debris removal impacts are assumed to be too small to estimate

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5d. Rural Capital Improvement Project Permanent Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2,3]
San José		
Kirby Canyon Landfill expansion	• Digitize in GIS the Kirby Canyon Landfill Fill Areas • Overlay digitized Fill Areas on the land cover layer • Assess impacts to land cover and to streams for Fill Areas 3 and 4	• The City of San José is seeking coverage under the Habitat Plan for development of Fill Areas 3 and 4 • A digital aerial map of Kirby Canyon Landfill Fill Areas was provided that identified Fill Areas (T. Peterson pers. comm.)
Morgan Hill		
Butterfield detention basin	• Identify proposed Butterfield detention basin in GIS • Overlay footprint of detention basin on the land cover layer to determine land cover impacts	• Impacts based on an AutoCAD file provided by City of Morgan Hill (S. Golden pers. comm.); AutoCAD files were imported into GIS • No stream impacts are assumed
SCVWD		
Llagas recharge basins #1, #2, and #3, and Coyote Greenbelt recharge basin	• SCVWD provided approximate project locations for the three Llagas groundwater recharge basins, and for the approximate location of the Coyote Greenbelt groundwater recharge basin • Digitize in GIS the boundaries for the location of the Llagas recharge basins and the Coyote Greenbelt basin • These boundaries are larger than the actual project, but represent the general area in which the project will occur • Assess total acres of each project area including acres of project area that is located inside of a planning limit of urban growth • Assess acres of land cover inside of each project area and determine proportion of each land cover within each project area • Calculate total project footprint based on percentage of project area acres inside/outside of a planning limit of urban growth (e.g., project area #3 is 69% located in the County and 31% located in Morgan Hill's planning limit of urban growth; therefore, for a 10 acre project, only 69% of 10 acres would be counted in the impacts because the other 31% was already assessed under Urban Development impacts) • Distribute project impacts proportionally across the land covers identified to be located in each project area • Include an additional 2.2 acres of impacts, distributed to barren and agriculture land covers	• For the Llagas recharge basins, total project footprint for each project is 10 acres (for a total of 30 acres) • Portions of the Llagas recharge basin project area fall within the Morgan Hill planning limit of urban growth; all impacts for areas zoned for development were included in the Urban Development impact assessment; therefore, portions of projects that overlap with Morgan Hill are not assessed in this analysis • For the Coyote Greenbelt basin, total project footprint is 15 acres • Coyote Greenbelt project will occur in the Coyote Greenbelt in close proximity to the Cross Valley Pipeline • 1.5 miles of new access road are assumed to be gravel roads, 12 ft wide and located in disturbed barren or agriculture lands • No stream impacts are assumed as the projects are not located in a stream or in a riparian area

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2,3]
County Roads and Airports		
South County Airport Master Plan	• Digitize in GIS the extent of the airport, excluding existing developed areas, avigation easements, and proposed fee simple acquisition areas • Calculate the acres of each land cover type within this area • Distribute project impacts identified by the County proportionally across the land covers identified GIS	• The South County Airport Master Plan was used to identify areas of impact; lands identified as proposed avigation easements and proposed fee simple acquisition were not included in the impact analysis as they are not assumed to be developed further than already exists (e.g., developed residences may be removed and replaced with agricultural uses) • The County provided acres of estimated impacts to be 11.5 acres associated with runway extension and 26 acres associated with new facilities (D. Cameron pers. comm. a) • No stream impacts are assumed
South County Circulation Study intersection improvement projects	• Based on data provided, identify intersection projects in GIS • Apply project footprint width and length in GIS • Overlay project footprint on land cover layer • Assess impacts to land cover	• County of Santa Clara provided a spreadsheet of road intersection projects identified in the South County Circulation Study that may be completed during the permit term (D. Cameron pers. comm. b) • Data provided included width of expansion by intersection; most projects include an expansion of 12 ft (6 ft buffer) along 300 ft of road in each direction from the center of the intersection; these widths were used to identify new permanent impacts for each project • Impacts were not assessed for projects, or portions of projects, that overlap with a planning limit of urban growth AND that occur outside of in-stream areas as these impacts are already assessed under the Urban Development assumptions • No new stream impacts are assumed as all intersection improvements are made to existing intersections and replacement of existing bridges is assessed under the In-Stream CIP category

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2,3]
South County Circulation Study road improvement projects	• Based on data provided, identify project road segment in GIS • Apply project width to road line in GIS • Overlay resulting project footprint on land cover layer • Remove areas of overlap with South County Circulation Study Intersection Improvement Projects • Assess impacts to land cover • Identify number of stream crossings for each new road alignment by counting number of times the new road alignment crosses a stream • Multiply the number of crossings by 60 ft	• County of Santa Clara provided a spreadsheet of road projects identified in the South County Circulation Study that may be completed during the permit term (D. Cameron pers. comm. b) • Data provided included start and end points for each projects, and width of expansion or new road project; widths ranged from an additional 8 ft to 92 ft; these widths were used to identify new permanent impacts for each project • Impacts were not assessed for projects, or portions of projects, that overlap with a planning limit of urban growth, including projects that immediately border a planning limit of urban growth, AND that occur outside of in-stream areas as these impacts are already assessed under the Urban Development assumptions • Assume stream impacts only for new roads (impacts for replacement of existing roads is assessed under In-Stream CIP Construction category); Stream impacts were calculated based on number of crossings and the assumptions that each stream crossing was, on average, 60 ft
County Roads safety projects and turn lanes	• Multiply miles of safety and intersection projects by the appropriate width and convert to acres • Distribute 25 miles of safety projects and 0.5 mile of turning lane project impacts to land cover types proportional to those land cover type occurrences in the near and far east hill zones developed for the Rural Development analysis • Distribute 8 miles of safety projects and 1 mile of turning lane project impacts to land cover types proportional to those land cover type occurrences in the valley floor zone developed for the Rural Development analysis	• The County provided data for miles and width of safety and intersection projects, as well as general location of projects; 33 miles of safety projects, requiring 8 ft of new road, with 25 miles in the near east and west hills and the remainder on the valley floor; 1.5 miles of turn lanes requiring 12 ft of new road, with 0.5 miles in the near east and west hills and the remainder on the valley floor • No additional bridge expansions beyond those addressed in the road projects

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2,3]
County Parks		
New trails, fire roads, and development	• Import County Parks covered activity impacts into the Plan's impact analysis • Reduce impacts by 25%	• County Parks conducted its own impact analysis and provided these impacts for inclusion in this Plan; this analysis evaluated all uses and impacts (recreational and natural resource management) anticipated to occur during the permit term and impacts associated with implementing the Plan's conservation strategy within County Parks lands • County Parks developed impact numbers and distributed impacts to land cover types based on existing land use in existing parks, components of master plans not yet implemented, and anticipated avoidance of certain land cover types • Assumptions for development outside of the planning limit of urban growth: 20 miles of fire road (12 ft wide); 25 miles of unpaved, single-track trail (5 ft wide); 3 miles of paved service roads (12 ft wide); 7 miles of paved multi-use trail (16 ft wide); and 10 miles of paved roads (20 ft wide); This does not include roads and trails that are part of a larger site development (e.g., nature center, large picnic areas, pavilions, golf course, etc.) • Assumptions for development outside of the planning limit of urban growth: larger-scale site development projects (e.g., nature center, large picnic areas, pavilions, golf course, etc.) requiring 1,700 acres • Assumptions for impacts to in-stream resources: 300 non-bridge water crossings (e.g., single-track trail crossings; 40 sq ft), 20 large bridges (i.e., one-or two-way automotive use; 924 sq ft), and 30 small bridges and puncheons (i.e., footbridges; 54 sq ft) • Assumption that County Parks will only implement approximately 75% of described projects

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2,3]
VTA[4]		
U.S. 101 Improvement Project (Monterey Road to SR 129)	• Acres of permanent impact by land cover type, including streams, provided by VTA were used to assess impacts	• This project includes extending Santa Teresa Boulevard from Castro Valley Road to US 101 • This road extension requires a new bridge to be constructed across Gavilan Creek • VTA provided impact estimates for this project that were recently developed for the environmental compliance process for this project (A. Calnan pers. comm.); impacts included both permanent and temporary impacts • These impact estimates were used for both land cover and stream impacts
U.S. 101 widening between Cochrane Rd. and Monterey Hwy	• Identify project road segments in GIS • Apply a 50 ft buffer to the existing road line in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify number of stream crossings along the length of the project by counting number of times the project crosses a stream • Multiply the number of crossings by 100 ft to determine stream impacts	• Assume a buffer of 50 ft (100 ft width) on either side of the existing road line • Assume a stream impact width of 100 ft per stream crossing • A portions of this project fall within the Morgan Hill and Gilroy planning limits of urban growth • Areas inside the planning limit of urban growth AND outside of the in-stream areas were excluded from the analysis as impacts for these areas are assessed under urban development • Assume a stream impact width of 100 ft per stream crossing
Buena Vista Interchange	No impacts assessed	• The Buena Vista Interchange is located inside of the Gilroy planning limit of urban growth and does not overlap with any in-stream areas or stream channels; no additional impacts (beyond those assumed for areas inside planning limits of urban growth under urban development) are assumed for this project
Caltrain Double Tracking	• Identify project track segments in GIS • Apply a 50 ft buffer to the existing track line in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify number of stream crossings along the length of the project by counting number of times the project crosses a stream • Multiply the number of crossings by 100 ft	• Assume a buffer of 50 ft (100 ft width) on either side of the existing track line • Assume a stream impact width of 100 ft per stream crossing

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2,3]
Coyote Valley Parkway Interchange	• Identify project road segments in GIS • Apply a 50 ft buffer to the existing road line in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify number of stream crossings along the intersection by counting number of times the project crosses a stream • Multiply the number of crossings by 100 ft	• Assume a buffer of 50 ft (100 ft width) on either side of the existing road line • Assume a stream impact width of 100 ft per stream crossing
East Middle Interchange	• Identify project road segments in GIS • Apply a 50 ft buffer to the existing road line in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify number of stream crossings along the intersection by counting number of times the project crosses a stream • Multiply the number of crossings by 100 ft	• Assume a buffer of 50 ft (100 ft width) on either side of the existing road line • Assume a stream impact width of 100 ft per stream crossing
SR 152/SR 156 Interchange	• Overlay project footprint on the land cover layer in GIS • Calculate the acres of impact for each land cover type	• VTA provided a GIS footprint of the project that included both permanent and temporary impact zones (A. Calnan pers. comm.) • The project footprint does not overlap with any streams
U.S. 101 HOV/HOT lane (western study area boundary to Cochrane Road)	• Use GIS to map length of project • For calculating land cover impacts other than in-stream, exclude areas inside the planning limit of urban growth • For areas outside the planning limit of urban growth, multiply length of project by 32 ft (2 lanes plus 2 shoulders) and convert to acres of impact • Apply acres of impact to annual grassland land cover type • Using aerial photos, identify length and width of stream crossings • Add 24 ft to width of crossing (linear ft of stream) • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist within the City of San José or the valley floor rural development zone, depending on the location of the crossing • Assess permanent impacts to streams at 24 ft per crossing	• VTA provided project location • Assume 12 ft for a new HOV/HOT lane in each direction, plus 4 ft in each direction for additional shoulder • All impacts occur in the existing median • Median is categorized as annual grassland land cover type • Impacts inside the planning limit of urban growth are excluded because these area were assessed under the Urban Development impact category, with the exception of stream crossings • Each stream crossing will require bridge widening of 24 ft

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2,3]
U.S. 101 HOV/HOT lane (Cochrane Road to Masten Avenue; VTA ID H6)	• Use GIS to map length of project • Multiply length of project by 32 ft (2 lanes plus 2 shoulders) and convert to acres of impact • Apply acres of impact to annual grassland land cover type • Using aerial photos, identify length and width of stream crossing • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist on the valley floor • Assess impacts to streams consistent with the required width of the new bridge	• VTA provided project location • Assume 12 ft for a new HOV/HOT lane in each direction, plus 4 ft in each direction for additional shoulder • All impacts occur in the existing median • Median is categorized as annual grassland land cover type • Impacts inside the planning limit of urban growth are excluded because these area were assessed under the Urban Development impact category, with the exception of stream crossings • One stream crossing will require a new bridge
U.S. 101 HOV/HOT lane (Masten Avenue to 10th Street; VTA ID H7)	• Using aerial photos, identify width of stream crossing • Assess impacts to streams consistent with the required width of the new bridge	• VTA provided project location • This project is located entirely within the planning limit of urban growth for Gilroy, the development of which is covered in the Urban Development category; no impacts are assessed aside from the stream crossing • One stream crossing will require a new bridge • No riparian impacts are assumed because aerial photos show this reach of stream is channelized and does not support any riparian vegetation
U.S. 101 HOV/HOT lane (10th Street to SR 25; VTA ID H8)	• Use GIS to map length of project • Multiply length of project by 32 (2 lanes plus 2 shoulders) and convert to acres of impact • Apply acres of impact to annual grassland land cover type • Using aerial photos, identify length and width of stream crossing • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist in Gilroy • Assess impacts to streams consistent with the required width of the new bridge	• VTA provided project location • Assume 12 ft for a new HOV/HOT lane in each direction, plus 4 ft in each direction for additional shoulder • All impacts occur in the existing median • Median is categorized as annual grassland land cover type • Impacts inside the planning limit of urban growth are excluded because these area were assessed under the Urban Development impact category, with the exception of stream crossings • One stream crossing will require a new bridge

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2,3]

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

[4] All VTA projects are listed in Table 2-6.

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5e. Rural Capital Improvement Project Construction Temporary Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2,3]
San José		
Kirby Canyon Landfill Expansion	No impacts assessed	• Construction impacts are assumed to be included within the permanent impacts for Kirby Canyon landfill
Morgan Hill		
Butterfield detention basin	• Identify proposed Butterfield detention basin in GIS • Apply a 10 ft buffer around the project footprint • Overlay the buffer on the land cover layer in GIS • Assess temporary impacts to land cover	• Impacts based on an AutoCAD file provided by City of Morgan Hill (S. Golden pers. comm.); AutoCAD files were imported into GIS • Temporary construction impacts are assumed to occur within a 10 ft buffer around the project footprint • No stream impacts are assumed
SCVWD		
Llagas Recharge basins #1, #2, and #3, and Coyote Greenbelt Recharge basin	• Based on 10-acre or 15-acre square sites, identify the acres of construction and staging area within a 10 ft buffer of the project site • Scale construction buffer impacts according to how much of the project area is located outside of a planning limit of urban growth • Distribute construction buffer impacts proportionally across the land covers identified to be located in the project area (conducted a part of capital improvement project impact assessment)	• Project areas will be approximately square • Buffer of average distance outside of project area that will be impacted during construction is 10 ft • 1.5 miles of new access road are assumed to temporarily disturb 1 ft on either side of the road and will affect the same land-cover types as the permanent road footprint • No stream impacts are assumed as the projects are not located in a stream or in a riparian area
County Roads and Airports		
South County Airport Master Plan	• Multiply permanent land cover impacts for this project by 10%	• Temporary construction impacts to land cover are assumed to be 10% of the total permanent impacts to land cover • No stream impacts are assumed
South County Circulation Study intersection improvement projects	• Based on data provided, identify intersection projects in GIS • Apply 10 ft buffer to project footprint in GIS • Overlay construction buffer on land cover layer • Assess impacts to land cover • Identify temporary stream impacts by multiplying the permanent stream impacts by one-third	• County of Santa Clara provided a spreadsheet of road intersection projects identified in the South County Circulation Study that may be completed during the permit term (D. Cameron pers. comm.) • Impacts were not assessed for projects, or portions of projects, that overlap with a planning limit of urban growth AND that occur outside of in-stream areas as these impacts are already assessed under the Urban Development assumptions • Assume temporary impacts to land cover occur in a 10 ft buffer[4] around project footprints • Assume temporary stream impacts occur within a 10 ft construction buffer (20 ft width); this is equal to one-third of permanent stream impacts

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2,3]
South County Circulation Study road improvement projects	• Based on data provided, identify intersection projects in GIS • Apply 10 ft buffer to project footprint in GIS • Overlay construction buffer on land cover layer • Assess impacts to land cover • Identify number of stream crossings for each new road alignment by counting number of times the new road alignment crosses a stream • Multiply the number of crossings by 20 ft	• County of Santa Clara provided a spreadsheet of road projects identified in the South County Circulation Study that may be completed during the permit term (D. Cameron pers. comm.) • Impacts were not assessed for projects, or portions of projects, that overlap with a planning limit of urban growth AND that occur outside of in-stream areas as these impacts are already assessed under the Urban Development assumptions • Assume temporary impacts to land cover occur in a 10 ft buffer around project footprints • Assume stream impacts only for new roads (impacts for replacement of existing roads is assessed under In-stream CIP Construction category); Assume temporary stream impacts occur within a 10 ft construction buffer (20 ft width)
County Roads safety projects and turn lanes	• Multiply miles of safety and intersection projects by the appropriate width assumed for temporary construction impacts and convert to acres • Distribute 25 miles of safety projects and 0.5 mile of turning lane project impacts to land-cover types proportional to those land-cover type occurrences in the near and far east hill zones developed for the Rural Development analysis • Distribute 8 miles of safety projects and 1 mile of turning lane project impacts to land-cover types proportional to those land-cover type occurrences in the valley floor zone developed for the Rural Development analysis	• The County provided data for miles and width of safety and intersection projects, as well as general location of projects; 33 miles of safety projects, with 25 miles in the near east and west hills and the remainder on the valley floor; 1.5 miles of turn lanes with 0.5 miles in the near east and west hills and the remainder on the valley floor • Assume temporary construction impacts is 4 ft for safety projects and 6 ft for turning lane projects (or 50% of the permanent impact) • No additional bridge expansions beyond those addressed in the road projects
County Parks		
New trails, fire roads, and development	• Multiply permanent land cover impacts for these actions by 10%	• Temporary construction impacts to land cover, excluding streams, are assumed to be 10% of the total permanent impacts to land cover • Temporary construction stream impacts for County Parks projects are assumed under In-Stream CIP Construction new trails, fire roads, and development
VTA		
U.S. 101 Improvement Project (Monterey Road to SR 129)	• Acres of temporary impact by land cover type provided by VTA were used to assess impacts	• VTA provided impact estimates for this project that were recently developed for the environmental compliance process for this project (A. Calnan pers. comm.); impacts included both permanent and temporary impacts • These impact estimates were used for both land cover and stream impacts

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2,3]
U.S. 101 widening between Cochrane Rd. and Monterey Hwy	• Identify project road segment in GIS • Apply a 20 ft construction buffer to the project footprint in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify temporary stream impacts by multiplying permanent stream impacts for this project by 20%	• Assume a construction buffer of 20 ft (40 ft width) around the project footprint • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing; this equals 20% of the value calculated for permanent impacts associated with the stream project
Buena Vista Interchange	No impacts assessed	• The Buena Vista Interchange is located inside of the San José planning limit of urban growth and does not overlap with any in-stream areas or stream channels; no additional impacts (beyond those assumed for areas inside planning limits of urban growth) are assumed for this project
Caltrain Double Tracking	• Identify project track segment in GIS • Apply a 20 ft construction buffer to the project footprint in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify temporary stream impacts by multiplying permanent stream impacts for this project by 20%	• Assume a construction buffer of 20 ft (40 ft width) around the project footprint • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing; this equals 20% of the value calculated for permanent impacts associated with the stream project
Coyote Valley Parkway Interchange	• Identify project road segment in GIS • Apply a 20 ft construction buffer to the project footprint in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify temporary stream impacts by multiplying permanent stream impacts for this project by 20%	• Assume a construction buffer of 20 ft (40 ft width) around the project footprint • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing; this equals 20% of the value calculated for permanent impacts associated with the stream project
East Middle Interchange	• Identify project road segment in GIS • Apply a 20 ft construction buffer to the project footprint in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify temporary stream impacts by multiplying permanent stream impacts for this project by 20%	• Assume a construction buffer of 20 ft (40 ft width) around the project footprint • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing; this equals 20% of the value calculated for permanent impacts associated with the stream project
SR 152/SR 156 Interchange	• Overlay project footprint on the land cover layer in GIS • Calculate the acres of impact for each land-cover type	• VTA provided a GIS footprint of the project that included both permanent and temporary impact zones (A. Calnan pers. comm.) • The project footprint does not overlap with any streams

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2,3]
U.S. 101 HOV/HOT lane (western study area boundary to Cochrane Road)	• Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist within the City of San José or the valley floor rural development zone, depending on the location of the crossing	• All construction impacts are assumed to occur on the adjacent freeway or within the median that is being permanently impacted, with the exception of in-stream areas • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing • Assume a temporary riparian impact buffer of 10 ft (20 ft total width) on either side of the crossing
U.S. 101 HOV/HOT lanes (Cochrane Road to Masten Avenue; VTA ID H6)	• 20 ft of linear stream temporary impact per stream crossing • Multiply 20 ft by the length of each crossing as identified under the permanent impact calculations and convert to acres • Convert to acres and apply impacts to the riparian land cover types	• All construction impacts are assumed to occur on the adjacent freeway or within the median that is being permanently impacted with the exception of in-stream areas • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing • Assume a temporary riparian impact buffer of 10 ft (20 ft total width) on either side of the crossing

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

[4] Buffers described for temporary impacts identify the area immediately surrounding the footprint of the associated project where temporary impacts are assumed to occur. Temporary impact buffers are in addition to buffers assumed to represent the project footprint as described in Table 4-5d.

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5f. Rural Operations and Maintenance Temporary Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
SCVWD		
Pipeline Maintenance Program		• All impacts assessed under the Pipeline Maintenance Program were derived from the Pipeline Maintenance Program EIR (Santa Clara Valley Water District 2006) • The Pipeline Maintenance Program covers SCVWD's activities throughout the County, not only in the Habitat Plan study area; therefore, impacts assessed here are slightly over estimated • The Pipeline Maintenance Program uses the term "aquatic" to describe impacts to acres of stream. This Plan assesses stream, or riverine, impacts linearly. For this analysis, acres of impact assessed for aquatic habitats in the Pipeline Maintenance Program are included in the riparian land cover type impacts. Aquatic impacts were also used to derive liner stream impacts • These analyses did not use GIS to derive total impact numbers • Impacts are calculated on an annual basis
Staging	• Identify acres of impact described in the Pipeline Maintenance Program EIR for upland impacts related to staging • Distribute acres of upland impact proportionally across all upland land covers in the study area	• Upland impacts assume that 5 pipelines are maintained per year; that there are up to 20 staging areas per pipeline in natural areas; and that each staging area is up to 100 ft by 100 ft • Impacts are applied to the proportion of land cover throughout the entire study area, inclusive of land covers excluded from the baseline data; this is based on the fact that SCVWD supply pipelines occur throughout the entire study area • Upland land covers include all land covers except the Riparian Forest and Scrub natural community land covers and the Reservoir land cover
Off-road access	• Identify acres of impact described in the Pipeline Maintenance Program EIR for upland impacts related to off-road access • Distribute acres of upland impact proportionally across all upland land covers in the study area • Identify acres of impact described in the Pipeline Maintenance Program EIR for riparian impacts related to off-road access • Distribute acres of riparian impact proportionally across all riparian land covers in the study area	• Upland impacts assume that 5 pipelines per year are maintained; up to 12 access points per pipeline; access areas are up to 15 ft by 1 mile • Riparian impacts assume that 5 pipelines per year in which they are maintained; up to 3 access points in riparian areas; access area would be up to 15 by 50 ft • Impacts are applied to the proportion of land cover throughout the entire study area, inclusive of land covers excluded from the baseline data; this is based on the fact that SCVWD supply pipelines occur throughout the entire study area • Upland land covers include all land covers except the Riparian Forest and Scrub natural community land covers and the Reservoir land cover • Riparian land covers include all land covers in the Riparian Forest and Scrub natural community

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Draining	• Identify acres of impact to riparian and aquatic habitats described in the Pipeline Maintenance Program EIR • Distribute acres of impact proportionally across all riparian land covers in the study area • Identify linear ft of stream impacts described in the Pipeline Maintenance Program EIR • Distribute linear ft of stream impacts to the streams, or riverine, land cover type	• Riparian impacts assume placement of erosion control structures would impact up to 15 by 20 ft; up to 10 structures placed per year • Aquatic impacts assume that no more than 10 temporary flow check dams would be installed per year and that the maximum impact area per dam would be 5 ft by 25 ft • Stream impacts assume that the longest in linear stream feet that a temporary flow dam could be is 25 ft; assume 25 ft for each of the 10 installations per year • Impacts are applied to the proportion of land cover throughout the entire study area, inclusive of land covers excluded from the baseline data; this is based on the fact that SCVWD supply pipelines occur throughout the entire study area • Riparian land covers include all land covers in the Riparian Forest and Scrub natural community
Excavation	• Identify acres of impact described in the Pipeline Maintenance Program EIR for upland impacts related to excavation • Distribute acres of upland impact proportionally across all upland land covers in the study area • Identify acres of impact to riparian and aquatic habitats described in the Pipeline Maintenance Program EIR • Distribute acres of impact proportionally across all riparian land covers in the study area • Identify acres of wetland impacts described in the Pipeline Maintenance Program EIR • Distribute acres of wetland impacts to the seasonal wetland land cover type • Identify linear ft of stream impacts described in the Pipeline Maintenance Program EIR • Distribute linear ft of stream impacts to the streams, or riverine, land cover type	• Upland impacts assume up to 4 pipelines; excavation area per pipeline of 25 ft by 1 mile per pipeline; AND up to 10 point excavations of 25 ft by 25 ft each per pipeline • Riparian impacts assume a maximum of 3 excavations in riparian corridors per year, each excavation with a maximum footprint of 25 ft by 50 ft; also assumes a max of 1 acre per year of disturbance due to road repair • Aquatic impacts assume up to 3 blow-off points across all systems; excavation area of 25 ft by 50 ft • Wetland impacts assume up to 1 acre of wetland impact per year • Stream impacts assume 50 ft of stream impact per blow-off excavation; 3 excavations per year • Upland land covers include all land covers except the Riparian Forest and Scrub natural community land covers and the Reservoir land cover • Riparian land covers include all land covers in the Riparian Forest and Scrub natural community
Excavation—bank stabilization	• Identify acres of impact to aquatic habitats described in the Pipeline Maintenance Program EIR • Distribute acres of impact proportionally across all riparian land covers in the study area • Identify linear ft of stream impacts described in the Pipeline Maintenance Program EIR • Distribute linear ft of stream impacts to the streams, or riverine, land cover type	• Aquatic impacts assume 0.5 stabilizations per year; assumed to occur on each side of the channel; each side is 25 ft by 10 ft • Stream impacts assumes 0.5 bank stabilizations per year; each stabilization is 25 ft long

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
County Roads and Airports		
Road maintenance	• In GIS, identify County mountain roads • Apply a 10 ft buffer to County roads • Overlay on the land cover layer to assess acres of impact by land cover type	• Assume a 10 ft maintenance buffer (20 ft width) (D. Cameron pers. comm.) • Assume all roads outside of a planning limit of urban growth will be maintained (impacts of road maintenance inside the planning limit of urban growth is incorporated into the urban development impacts) • Most (65%) of County roads occur in the valley floor area where shoulders are highly disturbed and often lacking vegetation; most impacts associated with road maintenance will occur on the 35% of County roads that are mountain roads that have vegetation on either side; only maintenance of mountain roads is assumed to have impacts to natural land cover (D. Cameron pers. comm.) • Stream impacts for road maintenance are identified under In-Stream O&M for bridges
South County Airport	• In GIS, identify areas in the South County Airport that are not currently developed or proposed for development • Overlay area on land cover map • Exclude any in-stream areas • Subtract acres identified in Rural CIP projects from the total land assessed at the airport (first bullet) • Distribute remaining acres across land cover types in proportion to land cover type occurrence in the airport	• Lands identified in the South County Airport Master Plan as proposed avigation easements and proposed fee simple acquisition were not included in the analysis because these areas are not assumed to be affected by covered activities • Assume that all areas not identified for future permanent impacts will need to be maintained (mowed) • Assume that the County will avoid all impacts to in-stream areas
County Parks		
Trail maintenance	• In GIS, overlay the trail layer provided by the County on the land cover layer • Apply a 4 ft buffer • Assess acres of temporary impacts to land cover	• County Parks provided GIS for existing trails (J. Falkowski pers. comm. a) • Trails maintenance based on 4 ft buffer (8 ft total width) to both unpaved and paved County trails • Stream impacts are assessed under In-Stream O&M activities
Road maintenance	• In GIS, overlay the road layer provided by the County on the land cover layer • Apply a 8 ft buffer • Assess acres of temporary impacts to land cover	• County Parks provided GIS for existing paved and non-paved roads (J. Falkowski pers. comm. a) • Service Roads and Paved Roads maintenance based on an 8 ft buffer (16 ft width) • Stream impacts are assessed under In-Stream O&M activities
Parking lot maintenance	• In GIS, overlay the parking lot layer provided by the County on the land cover layer • Apply a 8 ft buffer around the perimeter of the lots • Assess acres of temporary impacts to land cover	• County Parks provided GIS for existing paved and unpaved parking lots (J. Falkowski pers. comm. b) • Paved and unpaved parking lots based on an 8 ft buffer around lot • No stream impacts are assumed

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Other		
Utility line operations and maintenance	• Convert 50 miles to ft • Multiply resulting number of ft by 15 ft width • Convert to acres • Distribute acres of impact	• 50 miles of lines maintained/replaced in the study area • Assume that 5 ft will be disturbed for excavating the utility; and 10 ft will be disturbed for access; total impact of 15 ft width • Assume that utility maintenance will proportionally impact all land cover types in the study area

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5g. Reserve System Permanent Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Implementing Entity and other Landowners that Implement Covered Activities within the Reserve System		
Installation of signage (boundary, landbank, etc.)	• Identify acres in the Reserve System in thousands • Multiply by 25% • Distribute acres of impact to the grassland land cover	• Assume that 0.25 acres per 1,000 acres of Reserve System will be affected by placement of signage • Assume that the signage will be sited on grassland land cover
Installation of new fences	• Approximately 278,000*2 sq ft • Convert to acres • Distribute acres of impact proportionally across all land cover types in the Reserve System	• Assume that 278,000 ft of new fences will be installed over the permit term; equal to 53 miles • Assume 2 ft wide permanent impact • Assume that fences will proportionally impact all land cover types in the Reserve System
Field facilities	• Identify number of facilities in Reserve System based on assumption • Multiply by 1 acre • Apply acres of impact to the grassland land cover	• Assume 1 facility per 10,000 acres of Reserve System • Assume 1 acre per facility will be affected • Assume that the facility will be sited on grassland land cover
Wells	• Identify number of wells in Reserve System based on assumption • Multiply by 0.1 • Distribute acres of impact	• Assume 1 well per 1,000 acres of Reserve System • Assume 0.1 acre per well will be affected • Assume that the wells will be sited on grassland land cover
Dirt Roads	• Approximately 40*5280*12 sq ft • Convert to acres • Distribute acres of impact proportionally across all land cover types in the Reserve System	• Assume 40 miles of dirt road will be constructed over the permit term • Assume 12 ft wide • Assume that dirt roads will proportionally impact all land cover types in the Reserve System
Paved Roads	• Approximately 12.5*5280*24 sq ft • Convert to acres • Distribute acres of impact proportionally across all land cover types in the Reserve System	• Assume 0.25 miles of paved road will be constructed per year; 12.5 miles total • Assume 24 ft wide area will be affected • Assume that paved roads will proportionally impact all land cover types in the Reserve System
New vehicle bridges	• Approximately 5*8*39 sq ft • Convert to acres • Distribute acres of impact proportionally across all riparian land cover types in the Reserve System	• “Bridges” includes all types of vehicle crossings including culverts • Assume 0.5 bridges every 5 years; 5 total • Assume 8 ft wide, and 39 ft long (based on average bridge width and length for County Parks bridges) • Assume that vehicle bridges will proportionally impact all riparian land cover types in the Reserve System • No permanent stream impacts are assumed as any new bridges built will be balanced with removal of an equal or greater amount of bridges

Table 4-5g. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Vehicle bridge replacement	• Approximately 10*2*39 sq ft • Convert to acres • Distribute acres of impact proportionally across all riparian and California annual grassland land cover types in the Reserve System	• Assume 1 replacement every 5 years; 10 total • Assume replacement bridges are 2 ft wider than existing bridges and 39 ft long • Assume that bridges will proportionally impact all riparian and California annual grassland land cover types in the Reserve System • No permanent stream impacts are assumed as any new impacts will be balanced with removal of an equal or greater amount of streams
Trail bridges	• Approximately 25*8*39 sq ft • Convert to acres • Distribute acres of impact proportionally across all riparian land cover types in the Reserve System	• Assume 2.5 bridges every 5 years; 25 total • Assume 8 ft wide and 39 ft long (based on average bridge width and length for County Parks bridges) • Assume that vehicle bridges will proportionally impact all riparian land cover types in the Reserve System • No permanent stream impacts are assumed as any new bridges built will be balanced with removal of an equal or greater amount of bridges
Trails	• Approximately 126*5280*5 sq ft • Convert to acres • Distribute acres of impact proportionally across all land cover types in the Reserve System	• Assume 126 miles total trials will be built in the Reserve System • Assume a 5 ft width will be affected • Assume that trails will proportionally impact all land cover types in the Reserve System
Trailhead facilities	• Identify number of trailhead facilities in Reserve System based on assumption • Multiply by 5 acres • Apply acres of impact to the grassland land cover	• Assume 1 trailhead facility per 5,000 acres of Reserve System • Assume 5 acres per facility will be affected • Assume that trailhead facilities will be sited on grassland land cover

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description or Key Assumptions column).

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive of all covered activities. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5h. Reserve System Construction Temporary Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Implementing Entity and other Landowners that Implement Covered Activities within the Reserve System		
Installation of signage (boundary, landbank, etc.)	No impacts assessed	• Assume that each project site is very small; no construction impacts assumed
Installation of new fences	• Temporary impacts are equal to permanent impacts	• An area equal to permanent impact is assumed for temporary construction impacts • Assume that 278,000 ft of new fences will be installed over the permit term; equal to 53 miles • Assume 2 ft wide permanent impact • Assume that fences will proportionally impact all land cover types in the Reserve System
Field facilities	• Approximately 10*220*4 sq ft per facility • Multiply by number of facilities • Convert to acres • Distribute acres of impact	• Assume 1 facility per 10,000 acres of Reserve System • Assume a 10 ft buffer around a 1 acre footprint will be affected; and acre is approximately 220 ft by 220 ft • Assume that the facility will be sited on grassland land cover
Wells	• Approximately 10*22*4 sq ft per well • Multiply by number of wells • Convert to acres • Distribute acres of impact	• Assume 1 well per 1,000 acres of Reserve System • Assume a 10 ft buffer around a 0.1 acre per well will be affected; 1/10 acre is approximately 22 ft by 22 ft • Assume that the wells will be sited on grassland land cover
Dirt roads	• Temporary impacts are equal to 5/6ths of the permanent impacts	• Assume 40 miles of ranch road will be constructed over the permit term • Assume 5 ft construction buffer (10 ft width) • Assume that dirt roads will proportionally impact all land cover types in the Reserve System
Paved roads	• Temporary impacts are equal to 5/12ths of the permanent impacts	• Assume 0.25 miles of paved road will be constructed per year; 12.5 miles total • Assume 5 ft wide buffer (10 ft width) will be affected • Assume that paved roads will proportionally impact all land cover types in the Reserve System
New vehicle bridges	• Temporary land cover impacts are equal to permanent impacts • Multiply the width of each crossing by the number of crossings to get the total linear ft of temporary stream impact	• "Bridges" includes all types of vehicle crossings including culverts • An area equal to permanent impact is assumed for temporary construction impacts • Assume 0.5 bridges every 5 years; 5 total; • Assume 8 ft wide, and 39 ft long (based on average bridge width and length for County Parks bridges) • Temporary stream impacts are assumed to equal the width of the crossing

Table 4-5h. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Vehicle bridge replacement	• Temporary land cover impacts are equal to permanent impacts • Multiply the width of each crossing by the number of crossings to get the total linear ft of temporary stream impact	• "Bridges" includes all types of vehicle crossings including culverts • An area equal to permanent impact is assumed for temporary construction impacts • Assume 1 bridge replacements every 5 years; 10 total • Assume replacement bridges are 2 ft wider than existing culverts and 39 ft long • Temporary stream impacts are assumed to equal the width of the crossing
Trail bridges	• Temporary land cover impacts are equal to permanent impacts • Multiply the width of each crossing by the number of crossings to get the total linear ft of temporary stream impact	• An area equal to permanent impact is assumed for temporary construction impacts • Assume 2.5 bridges every 5 years; 25 total; • Assume 8 ft wide and 39 ft long (based on average bridge width and length for County Parks bridges) • Temporary stream impacts are assumed to equal the width of the crossing
Trails	• Multiply permanent impacts by 10%	• Assume construction impacts are equal to 10% of the project footprint • Assume that trails will proportionally impact all land cover types in the Reserve System
Trailhead facilities	• Approximately 10*475*4 sq ft per facility • Multiply by number of facilities • Convert to acres • Distribute acres of impact	• Assume 1 trailhead facility per 5,000 acres of Reserve System • Assume a 10 ft buffer around a 5 acre footprint will be affected; 5 square acres is approximately 475 ft by 475 ft • Assume that trailhead facilities will be sited on grassland land cover

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive of all covered activities. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-6. Covered Plant Occurrences and Estimated Permanent Impacts from Covered Activities

Species Name	Number of Extant Occurrences in California[1]	Number of Known Occurrences in Study Area[1,2]	Study Area Occurrences in Type 1 Open Space[3]	Study Area Occurrences in Type 1, 2, or 3 Open Space[3]	Permanent Impact Limit if No Additional Occurrences Found[4]	Impact Proportion on Known Study Area Occurrences (%)	Total Permanent Impact Limit if Additional Occurrences are Found and Protected in Study Area[5]
Tiburon Indian paintbrush	9	2	0	2	0[6]	N/A	0
Coyote ceanothus	3	3	0	2	0[7]	N/A	0
Mt. Hamilton thistle	48	40	2	15	6	15%	8
Santa Clara Valley dudleya	209	207	2	72	11	5%	14
Fragrant fritillary	59	8	0	4	1	13%	3
Loma Prieta hoita	26	14	1	10	0	0%	2
Smooth lessingia	39	39	3	18	6	15%	9
Metcalf Canyon jewelflower	11	10	1	3	2	20%	2
Most beautiful jewelflower	86	39	3	22	6	15%	8
Total	**490**	**362**	**12**	**148**	**32**	**9%**	**46**

Notes:

[1] Includes all CNDDB occurrences except those classified as "extirpated." See Chapter 3 and Chapter 5 for a complete list of data sources.

[2] For the purposes of this Plan and the analyses, occurrences are equivalent to populations for all species except for Mt. Hamilton thistle, Santa Clara Valley dudleya, and smooth lessingia. Populations may be redefined during implementation based on field monitoring and other data.

[3] Occurrences that are only partially in open space are not included in totals.

[4] This column provides the limit of impacts by number of occurrences allowable under the Habitat Plan. Impact is defined as a permanent loss of an entire occurrence or a partial loss that results in a reduction of viability (as further described in Chapter 6, Condition 20). See text for methods to determine whether partial impacts to an occurence will be counted against the impact limit. The impact limit assumes that no new occurrences of the species are discovered during the permit term and that occurrences impacted are in worse condition than those protected within reserves (See Section 5.3.1. for a discussion on incorporating covered plant species into the Reserve System). Impact limits were determined based on estimated impacts of covered activities. In some cases, impacts were capped to ensure regulatory standards are met.

[5] Impact limits in this column are the total allowable impacts if additional natural occurrences (i.e., not created populations) are discovered and protected in reserves. Protected occurrences must be of higher conservation value than impacted occurrences. New occurrences must be found and protected before impacts occur. See Chapter 5 and Table 5-16 for protection ratios that must occur in order for impact limits to be increased.

[6] Loss of a population of this species is not allowed or needed due to covered activities. Impact is allowed to a portion of one population due to management actions within the Reserve System (e.g., prescribed burning) or inadvertent trampling due to livestock grazing.

[7] Impacts are allowed to no more than 3,650 individuals or 5% of the individuals in the population adjacent to Anderson Dam, whichever is smaller.

Table 4-7. Assumptions of Land Cover Imperviousness

Land Cover Type	Impervious Assumption[1]
California Annual Grassland	1
Non-serpentine native grassland (not mapped)	n/a
Serpentine Bunchgrass Grassland	1
Serpentine Rock Outcrop / Barrens	100
Serpentine Seep	0
Rock Outcrop	100
Northern Mixed Chaparral / Chamise Chaparral	1
Mixed Serpentine Chaparral	1
Northern Coastal Scrub / Diablan Sage Scrub	1
Coyote Brush Scrub	1
Valley Oak Woodland	1
Mixed Oak Woodland and Forest	1
Blue Oak Woodland	1
Coast Live Oak Forest and Woodland	1
Foothill Pine - Oak Woodland	1
Mixed Evergreen Forest	1
Willow Riparian Forest and Scrub	1
Central California Sycamore Alluvial Woodland	1
Mixed Riparian Forest and Woodland	1
Redwood Forest	1
Ponderosa Pine Woodland	1
Knobcone Pine Forest	1
Coastal and Valley Freshwater Marsh	0
Seasonal Wetland	0
Pond	0
Reservoir	0
Orchard	2
Vineyard	10
Grain, row-crop, hay and pasture, disked/ short-term fallowed	2
Agriculture developed / Covered Ag	70
Urban - Suburban	35
Rural - Residential	10
Golf Courses / Urban Parks	3
Landfill	20
Ornamental Woodland	1
Barren	1
Streams (miles)	0
Total	

[1] In a range of 0 (least impermeable) to 100 (most impermeable). Based on Center for Watershed Protection imperviousness classifications for land cover.

Table 4-8. Results of Impervious Surface Analysis

Watershed and sub-watershed	Acres in Study Area	Est. Current Impervious Surfaces (acres)	Est. Current Impervious Surfaces (%)	Est. Impervious Surfaces at Buildout (acres)	Est. Impervious Surfaces at Buildout (%)	Est. Change (acres)	Est. Change (%)
Study Area	460,205.4	38,381.8	8.3%	44,105.4	9.6%	5,724	14.9%
San Francisco Bay Watershed							
Coyote sub-watershed							
Above Anderson Dam	86,188	1,125	1.3%	1,383	1.6%	258	22.9%
Below Anderson Dam	91,496	12,531	13.7%	14,016	15.3%	1,485	11.8%
Guadalupe sub-watershed							
Above Guadalupe, Almaden, and Calero Dams	6,363	92	1.5%	139	2.2%	47	50.9%
Below Guadalupe, Almaden, and Calero Dams	52,438	13,585	25.9%	14,041	26.8%	456	3.4%
Monterey Bay Watershed							
Llagas sub-watershed							
Above Chesbro Dam	12,234	164	1.3%	227	1.9%	62	38.0%
Below Chesbro Dam	53,131	6,017	11.3%	8,499	16.0%	2,481	41.2%
Pacheco sub-watershed							
Above Pacheco Dam	26,048	274	1.1%	277	1.1%	3	1.1%
Below Pacheco Dam	53,591	674	1.3%	687	1.3%	13	2.0%
Uvas sub-watershed							
Above Uvas Dam	19,441	251	1.3%	276	1.4%	24	9.7%
Below Uvas Dam	36,379	1,224	3.4%	2,027	5.6%	803	65.6%

Note: This analysis assumes that all interim projects (those projects entitled for development in advance of Plan implementation) that are located inside the planning limits of urban growth will be developed to the equivalent of the urban-suburban land cover type and that all interim projects located outside the planning limit of urban growth will be developed to the equivalent of the rural-residential land cover type.

Table 4-9. Estimated Impacts to Critical Habitat

Species and Habitat Type	Total Critical Habitat in Study Area (acres)	Permanent Impact to Critical Habitat from Covered Activities (acres)	Proportion (%)	Temporary Impact to Critical Habitat from Covered Activities (acres)	Proportion (%)
Bay Checkerspot Butterfly					
Estimated Modeled Habitat overlapping Critical Habitat	7,616	<300[1, 2]	4%	49	<1%
Estimated Critical Habitat outside Modeled Habitat[3]	8,985	437[4]	49%	76	<1%
Maximum Allowable Impact to Total Critical Habitat	16,601	<550[2]	3%	86[5]	<1%
California Tiger Salamander					
Estimated Modeled Breeding Habitat overlapping Critical Habitat	92	1	1%	0	<1%
Estimated Modeled Non-Breeding Habitat overlapping Critical Habitat	27,235	263	1%	119	<1%
Estimated Critical Habitat outside Modeled Habitat[3]	769	8	1%	6	<1%
Maximum Allowable Impact to Total Critical Habitat	28,096	272	1%	125	<1%
California Red-Legged Frog					
Estimated Modeled Primary Habitat overlapping Critical Habitat	2,964	21	<1%	11	<1%
Estimated Modeled Secondary Habitat overlapping Critical Habitat	146,452	1,002	<1%	265	<1%
Estimated Critical Habitat outside Modeled Habitat[3]	1,546	12	<1%	5	<1%
Maximum Allowable Impact to Total Critical Habitat	150,962	1,035	<1%	277[5]	<1%

Notes:

[1] Allowable permanent impact to Bay checkerspot butterfly critical habitat is capped below the estimated impact to account for the cap on impacts to Bay checkerspot butterfly modeled habitat in this Plan. This acreage is a cap, not an estimate.

[2] Impacts to modeled primary Bay checkerspot butterfly habitat are capped at 300 acres and impacts to serpentine bunchgrass grassland are capped at 550 acres.

[3] "Critical Habitat outside Modeled Habitat" is critical habitat area that does not overlap with habitat modeled for the Plan. Critical habitat is identified separately from modeled habitat because critical habitat is a relatively broad estimation based on "physical or biological features that are essential to the conservation of the species... if those features may require special management considerations or protection" (73 FR 50417). The modeling conducted for this Plan was done at a finer resolution than the critical habitat designation.

[4] Impacts to Bay checkerspot butterfly critical habitat could occur outside of modeled habitat on land cover types without impact caps. As such, allowable impacts to critical habitat outside of modeled habitat may be higher than allowed on modeled habitat. The cumulative cap on critical habitat is 550 acres.

[5] Allowable temporary impact to Bay checkerspot butterfly critical habitat and California red-legged frog critical habitat is capped below the estimated impact to hold impact levels constant with the Public Draft. Temporay impacts increased slightly due to the re-allocaiton of impacts to other locations in the study area due to the removal of State Parks lands from the impact analysis. This acreage is a cap, not an estimate.

Data sources: U.S. Fish and Wildlife Service 2005 (California tiger salamander), 2008 (Bay checkerspot butterfly), 2010 (California red-legged frog).

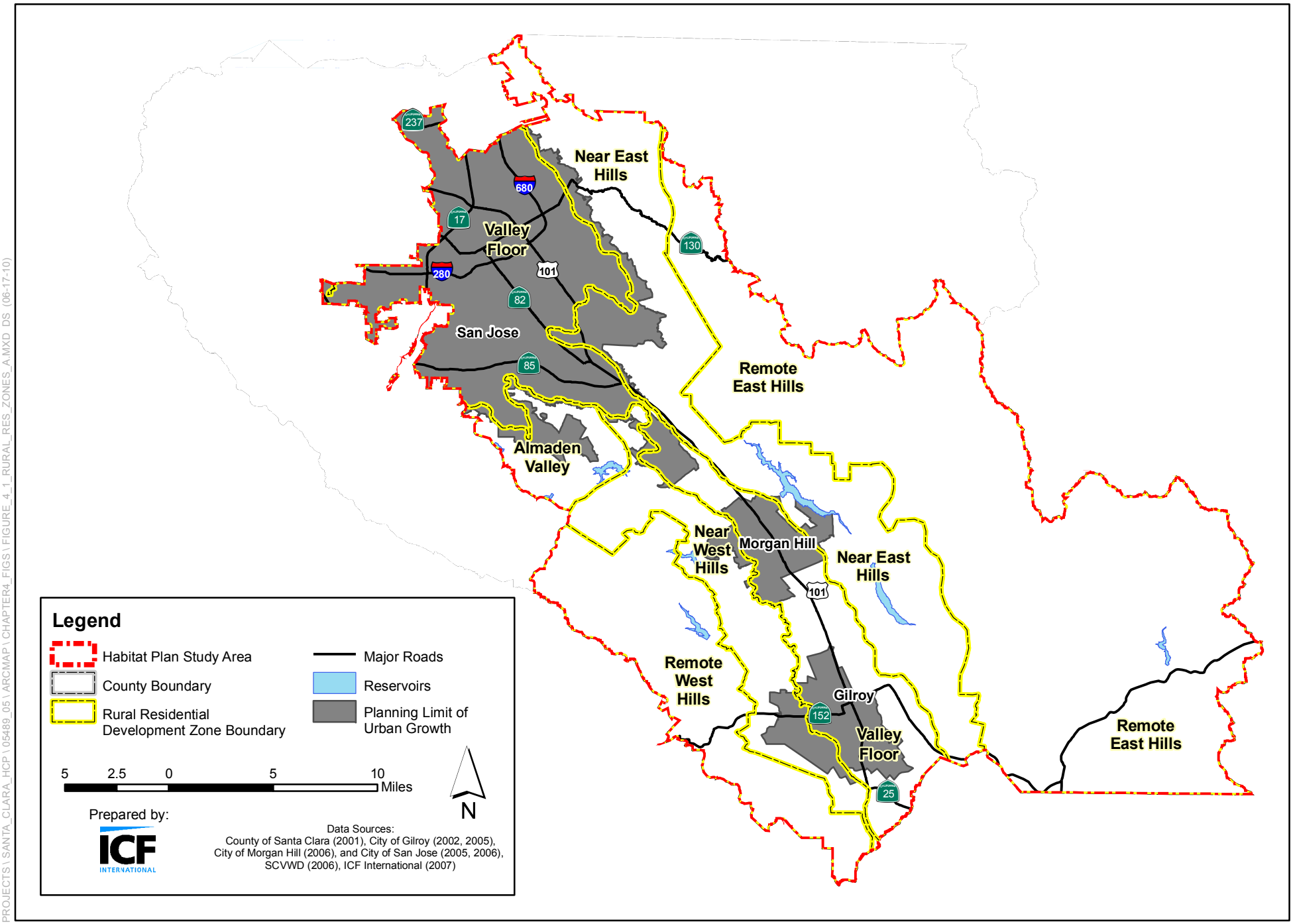

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Figure 4-1
Rural Development Zones Used in the Impact Analysis

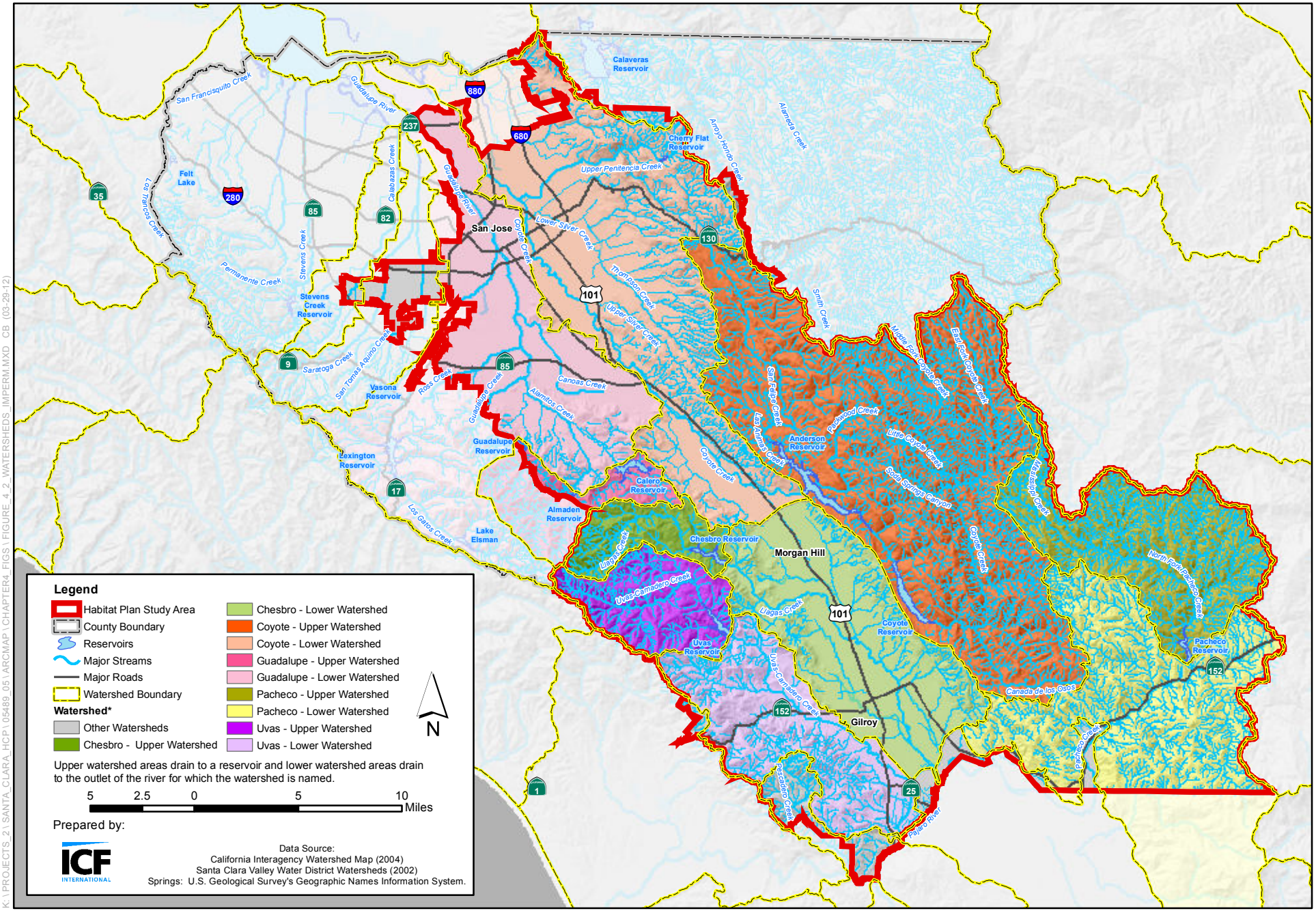

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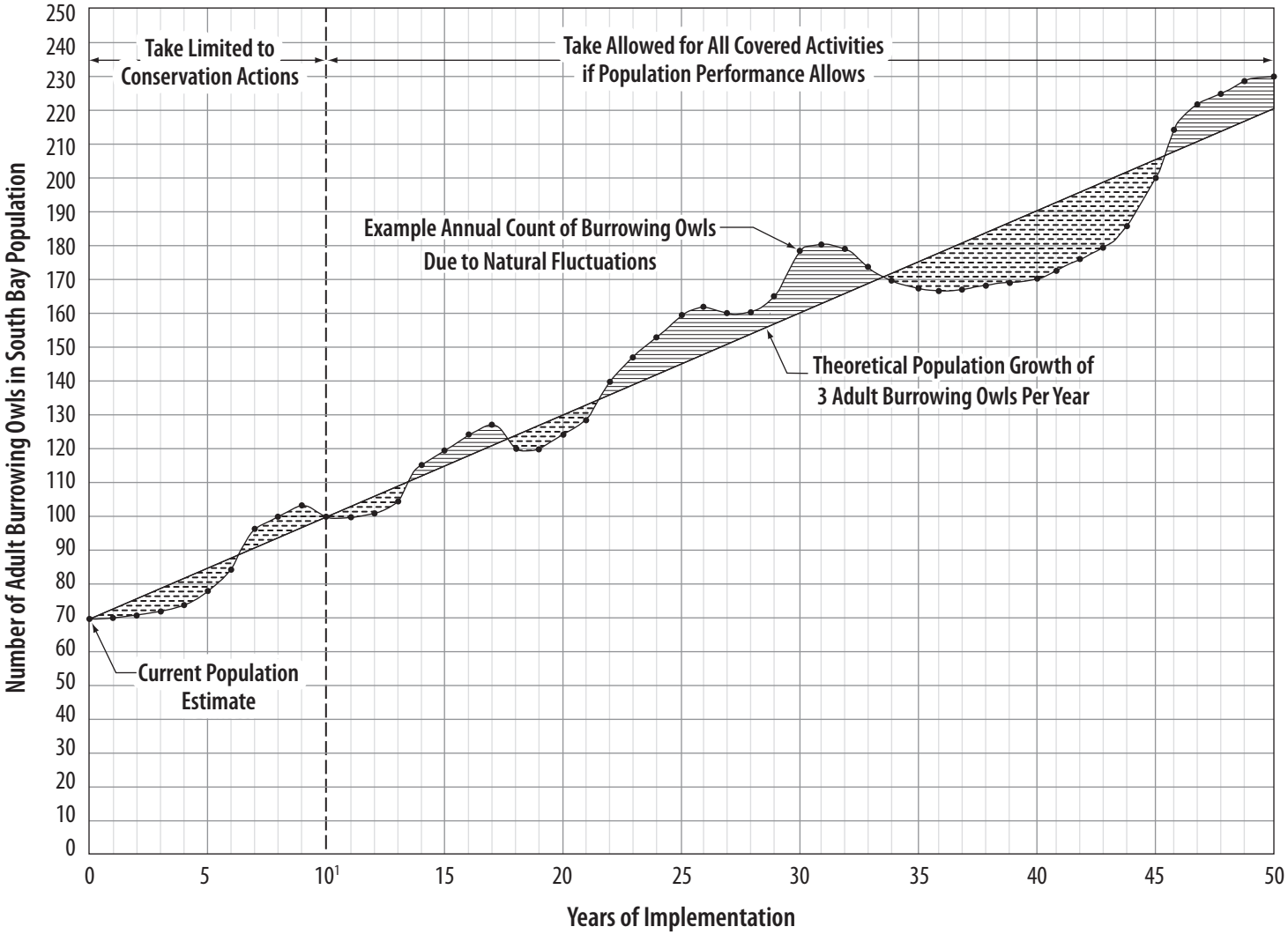
Figure 4-2
Habitat Plan Watersheds Assessed for Impervious Surface Analysis



Take only for conservation actions (capture, harm, harassment).

Take allowed for death, injury, capture, harm, and harassment (including passive relocation/eviction during the non-breeding season) at a level that would not drop the number of owls below the assumed growth rate.

1. No take will occur before year 10 except when related to conservation actions.

Graphics ... 05489.05 (03-12) AB

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Figure 4-3
Illustration of Burrowing Owl Take Allowance

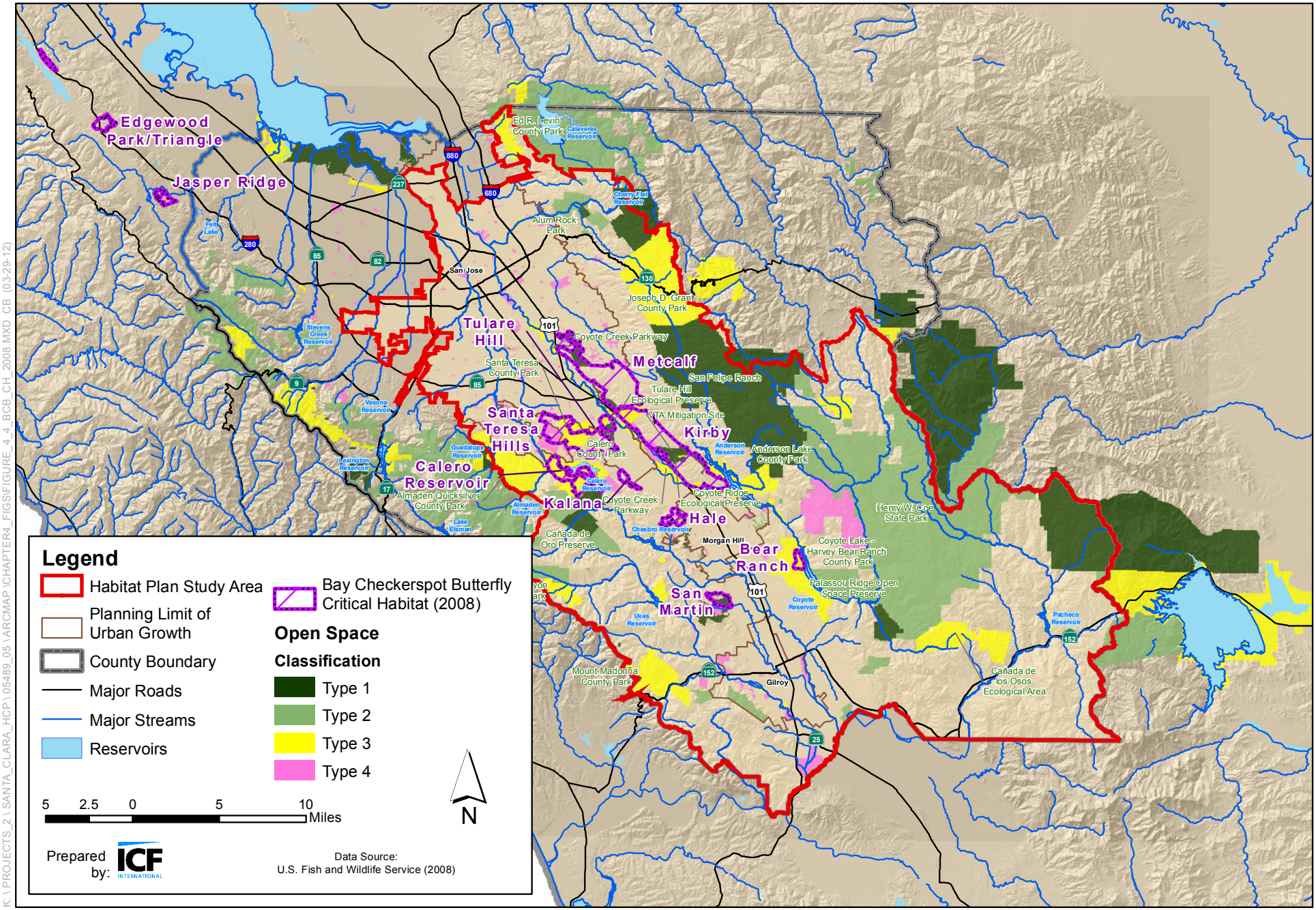

Figure 4-4
Bay Checkerspot Butterfly Critical Habitat within the Study Area

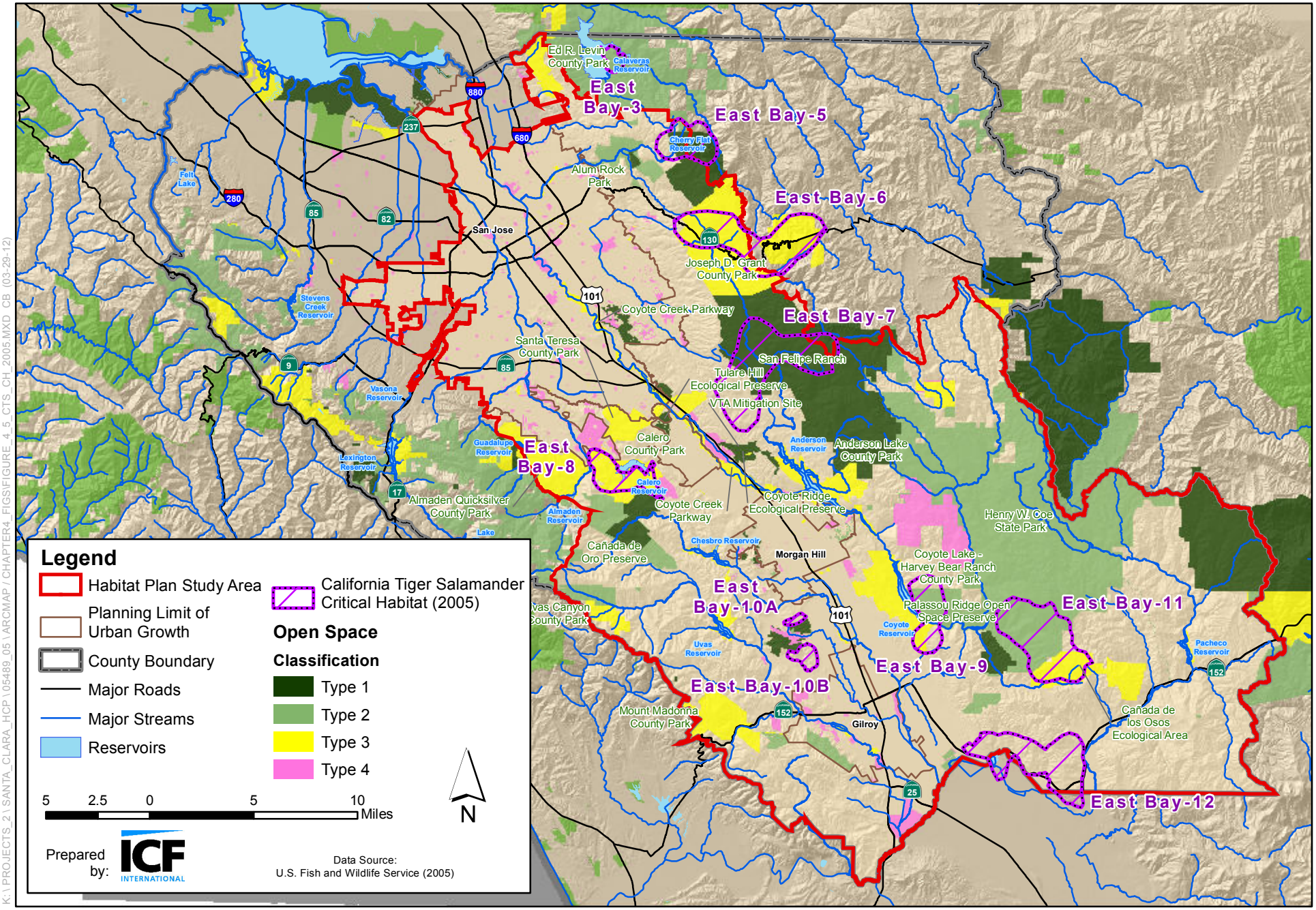

Figure 4-5
California Tiger Salamander Critical Habitat within the Study Area

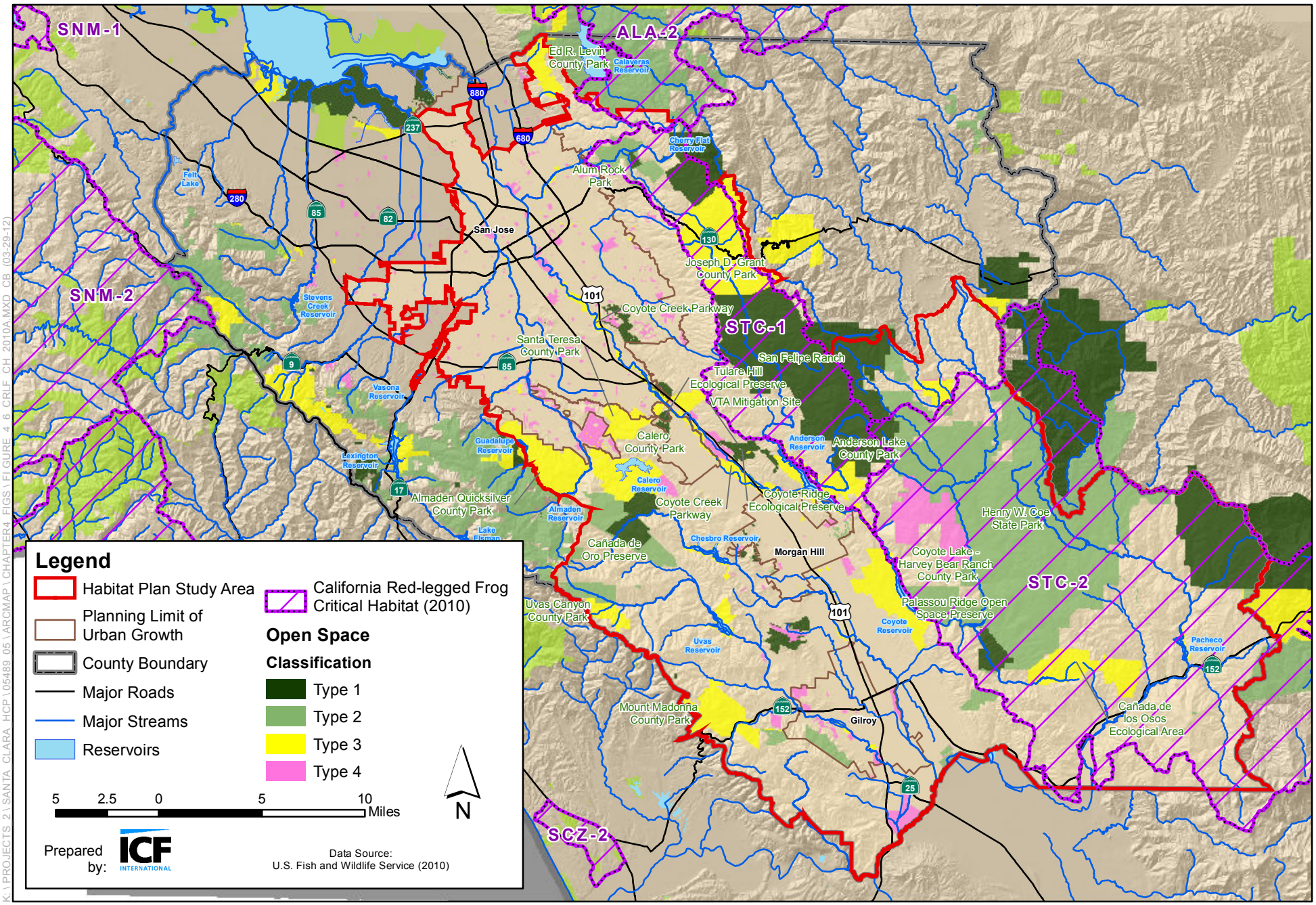

Figure 4-6
California Red-legged Frog Critical Habitat within the Study Area