DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR AUTHORIZATION FOR INCIDENTAL TAKE AND IMPLEMENTATION OF THE STANFORD UNIVERSITY HABITAT CONSERVATION PLAN

APRIL 2010

U.S. FISH AND WILDLIFE SERVICE

NOAA FISHERIES

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United States Fish and Wildlife Service,
National Oceanic Atmospheric Administration/
National Marine Fisheries Service
as Co-Lead Agencies

COVER SHEET

Draft Environmental Impact Statement for Authorization for Incidental Take and Implementation of the Stanford University Habitat Conservation Plan

NEPA Co-Lead Agencies:	United States Fish and Wildlife Service and National Oceanic and Atmospheric Administration – National Marine Fisheries Service
Type of Statement:	Draft Environmental Impact Statement

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Abstract:

The U. S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) (also collectively known as the Services) have received applications from the Board of Trustees of Leland Stanford Junior University (Stanford) for permits under the federal Endangered Species Act of 1973, as amended (ESA), to take certain federally protected species incidental to otherwise lawful activities. This Draft Environmental Impact Statement (EIS) addresses the potential environmental consequences that may occur if the applications are approved. The USFWS and NMFS are co-lead agencies under the National Environmental Policy Act (NEPA).

The Services received applications from Stanford for incidental take permits pursuant to Section 10(a)(1)(B) of the ESA. The incidental take permits (ITPs) would authorize incidental take of "Covered Species" on all of Stanford's lands, although the species mainly occur in the undeveloped portions. The Covered Species are the California tiger salamander (*Ambystoma californiense*; CTS), California red-legged frog (*Rana aurora draytonii*), San Francisco garter snake (SFGS), western pond turtle (*Actinemys marmorata)*, and steelhead (*Onchorhynchus mykiss*). As part of the ITP application process, Stanford prepared a habitat conservation plan (HCP) that specifies, among other things, (i) the impacts likely to result from the taking of the Covered Species and the measures Stanford will undertake to avoid, minimize, and mitigate such impacts, (ii) how the HCP would be funded, and (iii) alternatives to the proposed HCP. The proposed term of the permits is 50 years.

The Environmental Impact Statement examines the environmental effects of the Services' approval of the proposed permits (the Proposed Action), and the environmental effects of two alternatives to the Proposed Action, including the No Action Alternative and an HCP for CTS Only alternative.

The Proposed Action and alternatives would have no significant adverse effect on cultural resources, noise, hazardous materials/waste, public services, land use or socioeconomics. The Proposed Action and alternatives would have an unavoidable significant adverse effect on traffic because of existing conditions. Likewise, because of existing conditions, the Proposed Action and alternatives would have a significant unavoidable cumulative effect on traffic and on air quality (particulate emissions but not other pollutants).

Because of the comprehensive proposed Habitat Conservation Plan, the Proposed Action provides the greatest benefit to geology, water quality, and biology as compared to the No Action and HCP for CTS Only Alternatives. The Proposed Action is the preferred alternative.

Draft Environmental Impact Statement for Authorization for Incidental Take and Implementation of the Stanford University Habitat Conservation Plan

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ABBREVIATIONS

AAQS	National Ambient Air Quality Standards
AGB	Academic Growth Boundary
BAAQMD	Bay Area Air Quality Management District
BMP	best management practice
Cal-EPA	California Environmental Protection Agency
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
CO	carbon monoxide
CPM	Conservation Program Manager
CRLF	California red-legged frog
CRMP	Creek Resources Management Plan
CSC	California species of concern
CTS MA	California Tiger Salamander Management Area
CTS	California tiger salamander
dB, dB(A)	decibels, decibels A-weighted
DPS	Distinct Population Segment
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act (federal or state)
FAHCE	Fisheries Aquatic Habitat Conservation Enhancement
FDG	facility design guidelines
FEMA	Federal Emergency Management Agency
FPPA	Farmland Protection Policy Act
FSC	Federal species of concern
FT	Federal threatened
GUP EIR	General Use Permit Environmental Impact Report
GUP	General Use Permit
HCP	Habitat Conservation Plan
HCP/NCCP	Habitat Conservation Plan/Natural Communities Conservation Plan

HHC	Santa Clara County Historical Heritage Committee
ITA	Indian trust assets
ITE	Institute of Transportation Engineers
ITP	Incidental take permit
JSB	Junipero Serra Boulevard
MBTA	Migratory Bird Treaty Act
MROSD	Mid-Peninsula Regional Open Space District
NEPA	National Environmental Policy Act
NMFS	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OSHA	Occupational Safety and Health Administration
PAMC	Palo Alto municipal code
PM_{10} and $PM_{2.5}$	particulate matter, 2.5 or 10 microns in size
ROD	Record of Decision
ROI	Region of Influence
RWQCB	Regional Water Quality Control Board
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Plan
SCVWD	Santa Clara Valley Water District
SE	State endangered
SFPUC	San Francisco Public Utilities Commission
SHEP	Steelhead Habitat Enhancement Project
SLAC	Stanford Linear Accelerator Center
STOPPP	Stormwater Pollution Prevention Program
SU	Stanford University
SWPPP	Storm Water Pollution Prevention Plan
TDM	travel demand management
UBC	Uniform Building Code
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WPT	Western pond turtle

GLOSSARY

Alternatives – A range of reasonable options to address the identified problem or satisfy the stated need (see 40 CFR § 1502.14). The alternatives that are analyzed in the EIS include the Proposed Action (Preferred Alternative), No Action, and an HCP for California Tiger Salamander (CTS) Only.

Basin – The HCP identifies three geographic areas on Stanford lands that provide potential habitat for the Covered Species. The three basins are the (1) San Francisquito/Los Trancos Creek Basin; (2) Matadero/Deer Creek Basin; and (3) CTS Basin.

Best Management Practices (BMPs) – Measures incorporated into construction and maintenance projects that reduce environmental impacts of the project. These most often refer to measures used to reduce erosion and prevent water pollution.

Biological Opinion – A document that is the product of formal consultation between another Federal agency and the US Fish and Wildlife Service or the National Marine Fisheries Service, stating the opinion of the USFWS and/or NMFS on whether or not a Federal action is likely to jeopardize the continued existence of a federally listed species or result in the destruction or adverse modification of critical habitat.

California Environmental Quality Act (CEQA) – A legislative Act of the State of California (Pub. Res. Code § 21000 et seq.), requiring public agencies to review and disclose the environmental impacts of discretionary projects.

Central Campus CTS Management Area – Approximately 95 acres of Zone 1 and 2 California tiger salamander habitat north of Junipero Serra Boulevard, including Lagunita. This area will be subject to measures identified in the Central Campus CTS Management Plan.

Conservation Easement – Permanent restriction on the use of land pursuant to §§ 815 et seq of the California Civil Code.

Conservation Program – All of the conservation and management measures provided for under the Stanford University HCP to avoid, minimize, mitigate and monitor the impacts of take of the Covered Species (see chapter 4.0 of the HCP).

Conservation Program Manager (CPM) – The person at Stanford who will be responsible for managing and overseeing implementation of the HCP's Conservation Program.

Covered Activities -- Those specific activities identified in the HCP which will be authorized to take federally listed species under Section 10(a)(1)(B) of the Federal Endangered Species Act (see chapter 3.0 of the HCP).

Covered Species – Central California Coast steelhead, California red-legged frog, California tiger salamander, San Francisco garter snake and western pond turtle.

Critical Habitat – Section 4 of the Federal Endangered Species Act provides for designation of "critical habitat" for listed species when judged to be "prudent and determinable." Critical habitat includes geographic areas "on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection." Critical habitat may include areas not occupied by the species at the time of listing that are essential to the conservation of the species. Critical habitat designations affect only federal agency actions or federally funded or permitted activities.

CTS Account – A mitigation account to track the loss and conservation of California tiger salamander and San Francisco garter snake habitat (see chapter 4.3.3 of the HCP).

CTS Reserve – An area south of Junipero Serra Boulevard that contains breeding and aestivation habitat for the California tiger salamander and potential San Francisco garter snake habitat (see chapter 4.3.3.1 of the HCP).

Distinct Population Segment (DPS) – a population determined by USFWS or NMFS to be discrete from other populations, and significant to its taxon.

Enhancement – Manipulation of habitat in conserved areas to reverse the effects of previous disturbance, control exotic species, retain natural diversity, and improve habitat values for one or more of the Covered Species (see chapter 4 of the HCP).

General Plan – A comprehensive, long-term general plan for the physical development of the county or city, and of any land outside its boundaries which in the planning agency's judgment bears relation to its planning, as required by California Government Code § 65300.

General Use Permit (GUP) – A development permit issued in 2000 by Santa Clara County to Stanford.

Habitat Conservation Plan (HCP) – A habitat conservation plan or "HCP" must accompany an application for an incidental take permit. The purpose of an HCP is to ensure there is adequate minimization and mitigation of the effects of the authorized incidental take. (Addendum to the Endangered Species Habitat Conservation Planning Handbook 64 Fed. Reg. 11485-11490 (March 9, 1999))

Harm – A form of take under the federal Endangered Species Act; defined in federal regulations as an act that actually kills or injures fish or wildlife. Such acts may include significant habitat modification or degradation when it actually kills fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering.

Incidental Take Permit (ITP) – A permit issued by the USFWS and/or NMFS under Section 10 of the Federal Endangered Species Act to private parties undertaking otherwise lawful activities that might result in the take of an endangered or threatened species. Application for an incidental take permit requires preparation of a Habitat Conservation Plan by the permitee.

Lead Agency – The agency or agencies responsible for preparing the environmental impact statement (40 CFR 1508.16).

Management Zones – The HCP classifies Stanford's lands into four Management Zones according to the habitat value of the land, if any, to the Covered Species (see chapter 4.1 of the HCP).

Minimization Measures – Measures that Stanford will implement as part of the Conservation Program in order to avoid, minimize or mitigate the take of Covered Species (see chapter 4.2 of the HCP).

Mitigation – Planning actions taken to either avoid an impact altogether; minimize the degree or magnitude of the impact; reduce the impact over time; rectify the impact; or compensate for the impact (40 CFR 1508.20).

Mitigation Account – A system for tracking the loss and conservation of Covered Species' habitat. The proposed Stanford HCP includes two "Riparian Accounts" and a "CTS Account" (see chapter 4.3 of the HCP).

Mitigation Credits – Actions that "fund" the Mitigation Account. Credits are earned through permanent conservation easements and enhancement activities.

Monitoring and Management Plans – Individual plans associated with the monitoring and management of Covered Species habitat within the San Francisquito/Los Trancos creek conservation easement, the Matadero/Deer creek conservation easement, the California Tiger Salamander (CTS) Reserve, and the Central Campus CTS Area.

NOAA's National Marine Fisheries Service (NMFS) – A federal agency which conserves, protects and manages living marine resources, including Central California Coast steelhead.

Recovery Plan – A plan developed by the federal government describing reasonable actions to achieve the recovery and/or protection of federally-listed species (ESA Section 4(f)).

Riparian Account – A mitigation account that will be funded by placing a conservation easement over riparian habitat.

Section 10 – Refers to section 10(a)(1)(B) of the federal Endangered Species Act, which allows permits to be issued for incidental take of federally-listed species.

Services – The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS).

Special-Status Species – Plant and animal species that are listed as threatened or endangered by the State of California or the Federal government; are designated as species of special concern or fully-protected by the State of California; and/or are included in the California Native Plant Society's rare and endangered plant inventory.

Take – "…to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" with regard to endangered species. (Section 3(19) of the Endangered Species Act, 1973 as amended 1978)

Take Minimization Measures – See Minimization Measures.

U.S. Fish and Wildlife Service (USFWS) – A federal agency which conserves, protects and manages living terrestrial resources, including California red-legged frog, California tiger salamander, San Francisco garter snake and western pond turtle.

Wildlife Agencies – The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS).

1.0 SUMMARY

1.1 INTRODUCTION

The U. S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) (also collectively known as the Services) have received applications from the Board of Trustees of Leland Stanford Junior University (Stanford) for permits under the Federal Endangered Species Act of 1973, as amended (ESA), to take certain federally protected species incidental to otherwise lawful activities. This Draft Environmental Impact Statement (DEIS) addresses the potential environmental consequences that may occur if the applications are approved. The USFWS and NMFS are co-lead agencies under the National Environmental Policy Act (NEPA).

Stanford is a private entity that owns more than 8,000 contiguous acres in southern San Mateo County and northern Santa Clara County, California. Approximately 40 percent of the land has been intensively developed with urban facilities, including academic buildings, student and faculty housing, recreational facilities, administrative buildings, commercial and retail buildings, roads, sidewalks, an 18-hole golf course and golf driving range. In contrast, the other portions of the property are currently undeveloped or have only minor development.

The Services received applications from Stanford for incidental take permits pursuant to Section 10(a)(1)(B) of the ESA. The incidental take permits (ITPs) would authorize incidental take of ESA listed species on all of Stanford's lands, although only undeveloped lands provide habitat for the species. The listed species on Stanford's lands include the California red-legged frog (*Rana aurora draytonii*), California tiger salamander (*Ambystoma californiense*), San Francisco garter snake (*Thamnophis sirtalis tetrataenia*), and Central California Coast steelhead (*Onchorhynchus mykiss*). As part of the ITP application process, Stanford prepared a habitat conservation plan (HCP), which also includes protection measures for the western pond turtle (*Actinemys marmorata*[1]), which is currently not listed under the ESA. The listed and non-listed species are collectively known as the Covered Species. The HCP specifies, among other things: (i) the impacts likely to result from the taking of the Covered Species and the measures Stanford will undertake to avoid, minimize, and mitigate such impacts; (ii) how the HCP would be funded; and (iii) alternatives to the proposed HCP. The proposed term of the permits is 50 years.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

Certain areas of Stanford's property are occupied by or provide suitable habitat for species that are presently listed as threatened and endangered under the ESA or may become listed under the ESA (see the Figures in Chapter 4 for the location of these species). Normal, otherwise lawful operation of Stanford could result in take of the Covered Species, and Stanford needs a long-term, comprehensive solution that assures compliance with the ESA.

The Services need to ensure compliance with the ESA and continue to conserve the Covered Species and their habitats at Stanford within a comprehensive conservation program that improves habitat functions and connectivity. Specifically, as the Stanford tiger salamander

[1] The taxonomic name is based on California Department of Fish and Game Special Animals List, July 2009. It was previously *Clemmys marmorata*.

population is the last remaining population on the San Francisco Peninsula, USFWS has a desire to conserve salamanders at Stanford for its potential conservation value.

The purpose of the proposed federal action is to enable the permit applicant (Stanford) to continue academic activities, building construction, and operations and maintenance activities that are consistent with its long-term academic mission that provides protection and conservation of the Covered Species and allows some take of listed Species, as provided for under Section 10(a)(1)(B) of ESA.

The applicant's needs and goals for preparing an HCP, as summarized from Section 1.5 of the HCP (Institutional and Biological Goals), are to: (1) provide cost effective measures to avoid, minimize and mitigate the incidental take of listed and unlisted species that may occur during the present and future operation of Stanford University; (2) utilize Stanford's natural resources in a manner that preserves their utility for future generations; (3) build on past efforts to conserve Stanford's tiger salamander population and steelhead populations; (4) support Stanford's academic mission, maintain land use flexibility, and incorporate sustainable land use practices; and (5) obtain long-term assurances from the Services that Stanford is in compliance with the ESA.

1.3 THE PROPOSED ACTION AND ALTERNATIVES

The DEIS assesses three alternatives:

1. The Proposed Action (Preferred Alternative) is ITPs issued by USFWS and NMFS, which would result in the applicant's implementation of an HCP that provides a comprehensive Conservation Program intended for the benefit of steelhead, tiger salamander, red-legged frog, garter snake and pond turtle. The proposed HCP's Conservation Program includes take avoidance and minimization measures, monitoring and management of habitat, and permanent preservation of habitat as mitigation for the permanent loss of habitat (at a ratio concomitant with the quality of habitat lost). It applies to all of Stanford University. Implementation of the Proposed Action will result in the issuance of an incidental take permit by NMFS for steelhead and by the USFWS for tiger salamander, red-legged frog, garter snake, and if it becomes listed, the pond turtle. The Covered Activities include ongoing maintenance and operation of Stanford, up to 180 acres of future development on Stanford lands, and implementation of the Conservation Program.
2. The No Action alternative is USFWS and NMFS not issuing ITPS. The applicant would not implement the HCP. The potential take of listed species would be addressed on a project-specific basis. Incidental take permits may be issued later in response to project-specific applications.
3. The HCP for CTS Only alternative is the issuance of an ITP by USFWS for the tiger salamander only. The applicant would only implement the portion of the HCP that is associated with the tiger salamander, and the Covered Activities would include only those activities that affect tiger salamanders. A permit authorizing the incidental take of steelhead, red-legged frog, or garter snake would not be issued and the HCP for CTS Only alternative would not cover these species or the pond turtle. The take of steelhead, garter snake and red-legged frog would require separate permits to be issued by the Services on a project-specific basis.

Ongoing maintenance and operation of Stanford consists of water management, academic activities, maintenance and construction of urban infrastructure, recreational and athletic uses, general infrastructure, grounds and vegetation, and agricultural and equestrian leases, and commercial and institutional leases. Future development is estimated to include development of 30 acres of land under an approved General Use Permit from Santa Clara County, and up to an additional 150 acres of yet undefined development that could occur at Stanford over the next 50 years in locations that could result in the take of the Covered Species. Any future development that has not already received all other applicable land use entitlements would still require local approvals, and any applicable state or other Federal approvals.

The HCP divides Stanford's lands into four zones according to their relative habitat value for the Covered Species. Zone 1 (approximately 1,295 acres), supports or provides critical resources for one or more of the Covered Species. Zone 2 (approximately 1,260 acres), is occasionally occupied by, or occasionally provides some of the resources used by, one or more of the Covered Species and provides a buffer between Zone 1 habitat and less biologically sensitive areas. Zone 3 (approximately 2,446 acres), consists of generally undeveloped open space lands that have some biological value, but provide only limited and indirect benefit to the Covered Species. Zone 4 (approximately 3,187 acres), consists of urbanized areas that do not provide any habitat value for any of the Covered Species. The ITPs authorize the incidental take of Covered Species in Zone 4, primarily by authorizing Stanford to relocate any species that wander into the urbanized areas to an appropriate habitat area in Zone 1. However, there is no habitat in Zone 4, so development and ongoing urban activities in Zone 4 are not Covered Activities. As such, the DEIS does not analyze the impacts of development or ongoing maintenance and operations in Zone 4.

The HCP requires implementation of a wide range of conservation measures that will minimize the potential adverse effects of operating Stanford University on the Covered Species, including both ongoing operations and maintenance and future development. These measures are called Minimization Measures in the HCP and they apply to the activities that occur in Management Zones 1 and 2, and sometimes when they occur in Zone 3.

Under the Proposed Action, mitigation for incidental take would be accomplished through the on-site preservation, enhancement and management of habitat for the Covered Species. Stanford would earn mitigation "credits" for preserving, managing, and enhancing this habitat and would draw from these credits as development or other permanent land conversions of the habitat occur in the future. Pursuant to the HCP's Conservation Program, Stanford will record permanent conservation easements over Zone 1 lands to protect the habitat most important for the Covered Species.

Under the HCP for CTS Only alternative, the USFWS would issue an ITP that authorizes the incidental take of tiger salamander and Stanford would implement an HCP that covers only tiger salamander. Mitigation for the authorized take would be accomplished through the on-site preservation, enhancement and management of habitat for tiger salamander. Similar to the Proposed Action, Stanford would earn mitigation credits for preserving, managing and enhancing tiger salamander habitat and would draw from these credits when tiger salamander habitat is permanently converted in the future. The Services may authorize the take of other federally listed species on a project-specific basis. This may occur through the ESA's Section 7 consultation process when such activities require permits from the United States Army Corps of Engineers (Corps) (or other Federal agency), or under Section 10 if there is no Federal nexus.

Under the No Action alternative, Stanford would continue to operate the university and to build new facilities as needed, and the Services may issue incidental take authorization as needed through either the Section 7 consultation process or Section 10 of the ESA.

1.4 SCOPING

The Services held a public scoping meeting on September 21, 2006, at the Stanford campus and accepted public comments on the scope of the NEPA document and HCP. As described in more detail in the DEIS, during the scoping process, the Services received a number of comments from members of the San Francisquito Creek Joint Powers Authority (JPA). The JPA, in cooperation with the Corps, is currently pursuing the "Flood Damage Reduction and Ecosystem Restoration Project" for the San Francisquito Creek watershed. JPA member agencies raised questions about the effect of the proposed action on their flood reduction efforts and whether flood reduction improvements could be included as part of the proposed action. These concerns, and other issues raised by the public during scoping have been addressed in this DEIS.

1.5 ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION AND ALTERNATIVES

The direct, indirect and cumulative environmental effects of the three alternatives are described and compared in Chapter 5.

The Proposed Action's effects on the environment would be caused by the Covered Activities, which include ongoing operations and maintenance and future development as well as activities required in the HCP's Conservation Program. Conservation Program activities are typically environmentally beneficial, such as establishing conservation easements, removing barriers in the creeks, erosion control, bank stabilization, control of non-native species, and habitat restoration. Each of the alternatives would cover Stanford's ongoing operations and maintenance activities, and future development. The effects resulting from these activities are therefore generally very similar.

Based on data collected for the General Use Permit (GUP) Environmental Impact Report (EIR) and an assessment of the additional future development anticipated during the term of the ITPs, the future development covered by the ITPs may have unavoidable adverse traffic effects that could remain adverse even after project-specific mitigation measures are implemented. The effects associated with future development could also adversely affect air quality, hazardous materials, and historic resources; however these effects should be mitigated with conditions imposed on specific projects in future environmental review.

Certain ongoing operations at Stanford would be subject to Minimization Measures defined in the HCP's Conservation Program. Some or all of these Minimization Measures would also apply to ongoing activities under the HCP for CTS Only alternative, and similar measures may also be required as conditions of a project-specific ITP issued under the No Action alternative. The Proposed Action and alternatives would not authorize ongoing operations and maintenance, but would regulate the manner in which these activities are carried out to reduce the biological impacts of those activities.

The Conservation Program may have beneficial cumulative effects on biological resources, and generally will not have an adverse cumulative effect on other resources. However, the future development will contribute to existing cumulative effects associated with traffic in the local area and associated with particulate matter emissions in the San Francisco Bay Area Air Basin.

Implementation of the Conservation Program will have both short-term and long-term beneficial biological effects, and will result in minor irreversible or irretrievable effects associated with fuel use.

The Proposed Action is the preferred alternative. It will result in the least damage to the environment and provides benefits related to geology and soils, biological resources, and water quality. The Proposed Action has the advantage of a comprehensive Conservation Program that has broad environmental benefits.

2.0 PURPOSE AND NEED

The Services have received applications from Stanford for ITPs under the ESA to take certain federally protected species incidental to otherwise lawful activities. This DEIS addresses the potential environmental consequences of the proposed and alternative actions. The USFWS and NMFS are co-lead agencies under NEPA.

2.1 INTRODUCTION

The Services received applications from Stanford for ITPs pursuant to Section 10(a)(1)(B) of the ESA. The ITPs would authorize incidental take of ESA listed species on Stanford's lands. As part of the ITP application process, Stanford prepared an HCP that also includes protection measures for one non-listed species. Collectively, the listed and non-listed species are known as Covered Species. The HCP specifies, among other things: (i) the impacts likely to result from the taking of the Covered Species and the measures Stanford will undertake to avoid, minimize, and mitigate such impacts; (ii) how the HCP would be funded; and (iii) alternatives to the proposed HCP. The Services will determine whether the HCP meets issuance criteria, prepare an EIS and a Record of Decision, and decide whether to issue the requested ITPs.

Stanford is a private entity that owns more than 8,000 contiguous acres in southern San Mateo County and northern Santa Clara County, California, along the southeastern base of the Santa Cruz Mountains on the San Francisco Peninsula (Figure 2-1, Project Location). Stanford's property lies in the Matadero/Deer Creek and San Francisquito/Los Trancos Creek watersheds (Figure 2-2, Primary Watershed Basins).

Approximately 40 percent of Stanford's property has been intensively developed with urban facilities such as academic buildings, student and faculty housing, administrative buildings, commercial and retail buildings, roads, sidewalks, and a variety of recreational amenities such as playing fields, equestrian facilities, a golf course and golf driving range. In contrast, other portions of the property are currently undeveloped or have only minor development (Figure 2-3, Land Use).

The ITP applications request authorization for the incidental take of four federally listed species and for one currently unlisted species that may become listed within the 50-year permit period (Table 2-1). Table 2-1 identifies the "Covered Species" that would be covered under the Federal ITPs, their listing status and the agency that has, or would have, jurisdiction.

Table 2-1. Species That Would Be Covered Under Federal Incidental Take Permits

Covered Species Common Name (*Scientific Name*)	**Jurisdiction**	**Listing Status**
California red-legged frog (*Rana aurora draytonii*)	USFWS	Threatened
California tiger salamander (Central California DPS) (*Ambystoma californiense*)	USFWS	Threatened
San Francisco garter snake (*Thamnophis sirtalis tetrataenia*)	USFWS	Endangered

Table 2-1. Species That Would Be Covered Under Federal Incidental Take Permits		
Covered Species Common Name (*Scientific Name*)	**Jurisdiction**	**Listing Status**
Steelhead (Central California Coast DPS) (*Oncorhynchus mykiss*)	NMFS	Threatened
Western pond turtle (*Actinemys marmorata*)	USFWS	None

2.2 PURPOSE AND NEED FOR THE FEDERAL ACTION

Certain areas of Stanford's property are occupied by or provide suitable habitat for species that are presently listed as threatened and endangered under the ESA or may become listed under the ESA (see the Figures in Chapter 4 for the location of these species). Normal, otherwise lawful operation of Stanford could result in take of the Covered Species, and Stanford needs a long-term, comprehensive solution that assures compliance with the ESA.

The Services need to ensure compliance with the ESA and continue to conserve the Covered Species and their habitats at Stanford within a comprehensive conservation program that improves habitat functions and connectivity. Specifically, as the Stanford tiger salamander population is the last remaining population on the San Francisco Peninsula, USFWS has a desire to conserve salamanders at Stanford for its potential conservation value.

The purpose of the proposed federal action is to enable the permit applicant (Stanford) to continue academic activities, building construction, and operations and maintenance activities that are consistent with its long-term academic mission that provides protection and conservation of the Covered Species and allows some take of listed Species, as provided for under Section 10(a)(1)(B) of ESA.

The applicant's needs and goals for preparing an HCP, as summarized from Section 1.5 of the HCP (Institutional and Biological Goals), are to: (1) provide cost effective measures to avoid, minimize and mitigate the incidental take of listed and unlisted species that may occur during the present and future operation of Stanford University; (2) utilize Stanford's natural resources in a manner that preserves their utility for future generations; (3) build on past efforts to conserve Stanford's tiger salamander population and steelhead populations; (4) support Stanford's academic mission, maintain land use flexibility, and incorporate sustainable land use practices; and (5) obtain long-term assurances from the Services that Stanford is in compliance with the ESA.

2.3 REGULATORY CONTEXT

2.3.1 National Environmental Policy Act (NEPA)

The National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), requires that all Federal agencies proposing major actions with potential significant effects on the quality of the human environment prepare a detailed statement of environmental effects. The Services have concluded that an environmental impact statement review is appropriate for this proposed action.

2.3.2 The Endangered Species Act (ESA)

Section 9 of the ESA prohibits "take" of species that are listed as endangered, and Section 4 provides the Services with the discretion to extend all or some of those protections deemed necessary and advisable to provide for the conservation of threatened species. Take includes harassment, harm, pursuit, hunting, shooting, wounding, killing, trapping, capturing, or collecting a listed species, or attempting to engage in any such conduct. (16 USC §1538(19)) Harm is further defined in ESA implementing regulations as an act which actually kills or injures fish or wildlife, including significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering. (50 C.F.R. §17.3, and §222.102)

Under Section 10 of the ESA, non-federal entities can apply for an "incidental take permit" (ITP) exempting them from the "take" prohibition for scientific purposes to aid the species' survival, or for an "incidental take" authorization when the project or activity does not involve a federal action and the take is incidental to, and not the purpose of, an otherwise lawful activity. (16 USC §1539(a)(1)(A-B)) Section 10 and the Services' implementing regulations then define under what circumstances the Services will issue an ITP.

Under Section 10(a)(2)(A)(i-iv), no permit may be issued by the Services authorizing incidental take of listed species unless the applicant submits a conservation plan that specifies:

- the impact that will likely result from such taking;
- what steps the applicant will take to minimize and mitigate such impacts, and the funding that will be available to implement such steps;
- what alternative actions to such taking the applicant considered and the reasons why such alternatives are not being utilized; and
- such other measures that the Services may require as being necessary or appropriate for purposes of the plan.

Section 10(a)(2)(B), provides that the Services shall issue an ITP if the Services find, after opportunity for public comment, that:

- the taking will be incidental;
- the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking;
- the applicant will ensure that adequate funding for the plan will be provided;
- the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild;
- the measures, if any, required by the Services as being necessary or appropriate for purposes of the plan will be met; and

- the Services have received such other assurances as may be required that the plan will be implemented.

In 2000, the Services adopted a five-point policy designed to clarify certain elements of an HCP. 65 FR 35242-35257 (June 1, 2000). The five-point policy recommends that:

- an HCP include specific, measurable biological goals and objectives based on the best available scientific information;

- an HCP include an adaptive management provision;

- an HCP include a monitoring program to gauge the effectiveness of the plan in meeting the biological goals and objectives and the permittees compliance with the plan;

- the Services consider several factors to determine the appropriate duration of an ITP, including the duration of the covered activities and the expected effects on the covered species; and

- the Services expand public participation by providing a 60-day comment period for most HCPs.

The ESA's implementing regulations provide "no surprises" assurances. (50 CFR Part 17.22(b)(5), 17.32(b)(5); 50 CFR 222.307(g)). The no surprises rule assures private landowners that if "unforeseen circumstances" arise, the Services will not require the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond what is required by the ITP and associated HCP and Implementing Agreement without the permittee's consent. The government will honor these assurances as long as a permittee is implementing the terms and conditions of the HCP, permit, and other associated documents.

2.4 SCOPE OF DEIS ANALYSIS

This DEIS analyzes the potential direct, indirect and cumulative environmental effects of authorizing "take" of the Covered Species through issuance of the requested ITPs and applicant implementation of the proposed HCP. Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. The DEIS considers the physical, biological and socioeconomic effects of the Proposed Action and the alternatives in a study area that includes Stanford lands and immediately adjoining areas. The analysis of cumulative effects uses a broader study area, depending on the resource being assessed.

The DEIS addresses three alternatives: the Proposed Action, No Action, and an HCP for CTS Only. The resource areas analyzed for each alternative are associated with the physical environment (Geology and Seismicity, Cultural and Historical Resources, Hydrology and Water Quality, Air Quality, Noise, Traffic, Hazardous Materials/Waste, Public Services, and Land Use), the biological environment, and the socioeconomic environment. The resource areas of environmental justice and Indian Trust assets were not analyzed in depth because the preliminary analysis indicated these resources are not in the study area and would not be affected.

2.5 SCOPING AND PUBLIC PARTICIPATION

2.5.1 Notice of Intent

The Services published a Notice of Intent (NOI) in the Federal Register on September 11, 2006 (71 FR 53466) to provide notice of the preparation of an environmental document, announce the initiation of a public scoping period, obtain information to assist the Services in determining whether to prepare an EIS or Environmental Assessment (EA), and to obtain suggestions on the scope and issues to be included in the environmental document. The NOI provided information on the background and purpose of the Proposed Action and provided details for the public scoping meeting, and comment period.

2.5.2 EIS Scoping and Public Participation

In addition to the publication of the NOI, meeting notifications via email and regular mail were sent to 24 local entities and public officials, and the scoping meeting was advertised in the September 15, 2006 issue of the Palo Alto Weekly newspaper.

The Services held a public scoping meeting on September 21, 2006, at the Stanford campus, Jordan Hall, 450 Serra Mall, Building 420, Room 040, Stanford, California. Members of the public were given an opportunity to provide oral comments. Eight oral comments were received.

The scoping period began with publication of the NOI on September 11, 2006, and officially ended on October 11, 2006; however comments were accepted through October 31, 2006. A total of 11 separate comment letters were received from public agencies, organizations, and individuals.

Comments regarding the environmental document included general comments regarding the contents, including information regarding future development and the relationship between the proposed HCP and other local plans that were being developed; recommendations to prepare an EIS rather than an EA; recommendations to expand the scope of the impact analysis; and the scope of the alternatives. A copy of the Scoping Report, which includes copies of the comment letters, is attached as Appendix A.

An issue identified during the NEPA scoping process involved the "Flood Damage Reduction and Ecosystem Restoration Project" being pursued by the San Francisquito Creek Joint Powers Authority (JPA) and U.S. Army Corps of Engineer (Corps). The Corps, JPA, and local entities that are members of the JPA or which may benefit from the flood control project asked that the HCP not prevent or limit the consideration by the JPA and Corps of specific flood control solutions involving Stanford lands, including the construction of detention facilities on Stanford lands or modifications to Searsville Dam or Reservoir for flood control purposes. Some commenters requested that the HCP's Covered Activities include consideration of future flood reduction facilities. Stanford is not currently considering flood reduction facilities on Stanford lands. While the JPA and the Corps are conducting multi-disciplinary regional studies for flood reduction, it was determined that sufficient information is not currently available to include flood reduction as a Covered Activity. Moreover, Stanford has not requested coverage for flood

reduction facilities under the HCP. The HCP does not preclude the development of flood reduction facilities under a separate permitting action in the future.

Another issue raised by commenters, concerned with steelhead, asked that modifications to Searsville Dam or Reservoir for habitat purposes and fish passage be considered in the HCP. Searsville Dam and Reservoir are located on San Francisquito Creek. The dam was built in 1892 and has trapped a significant amount of silt, reducing its flood control capacity. Other than on-going operation and maintenance, no other Covered Activities are proposed for Searsville Dam. However, Stanford has committed in the HCP (Section 4.2.1) to allocate $100,000 to study the technical feasibility of fish passage alternatives at Searsville Dam, and the results of this study will be incorporated into any proposed future dam modification project.

2.5.3 Draft EIS Public Review

In accordance with NEPA, the Draft EIS has been circulated for public review and comment. The public review period was initiated with the publication of a Notice of Availability (NOA) in the Federal Register, and will run for 90 days from publication of the NOA. During the public review period, a public meeting will be conducted. The review period will provide the public and Federal, state, and local agencies with an opportunity to comment on the Draft EIS. Comments will be responded to in the Final EIS.

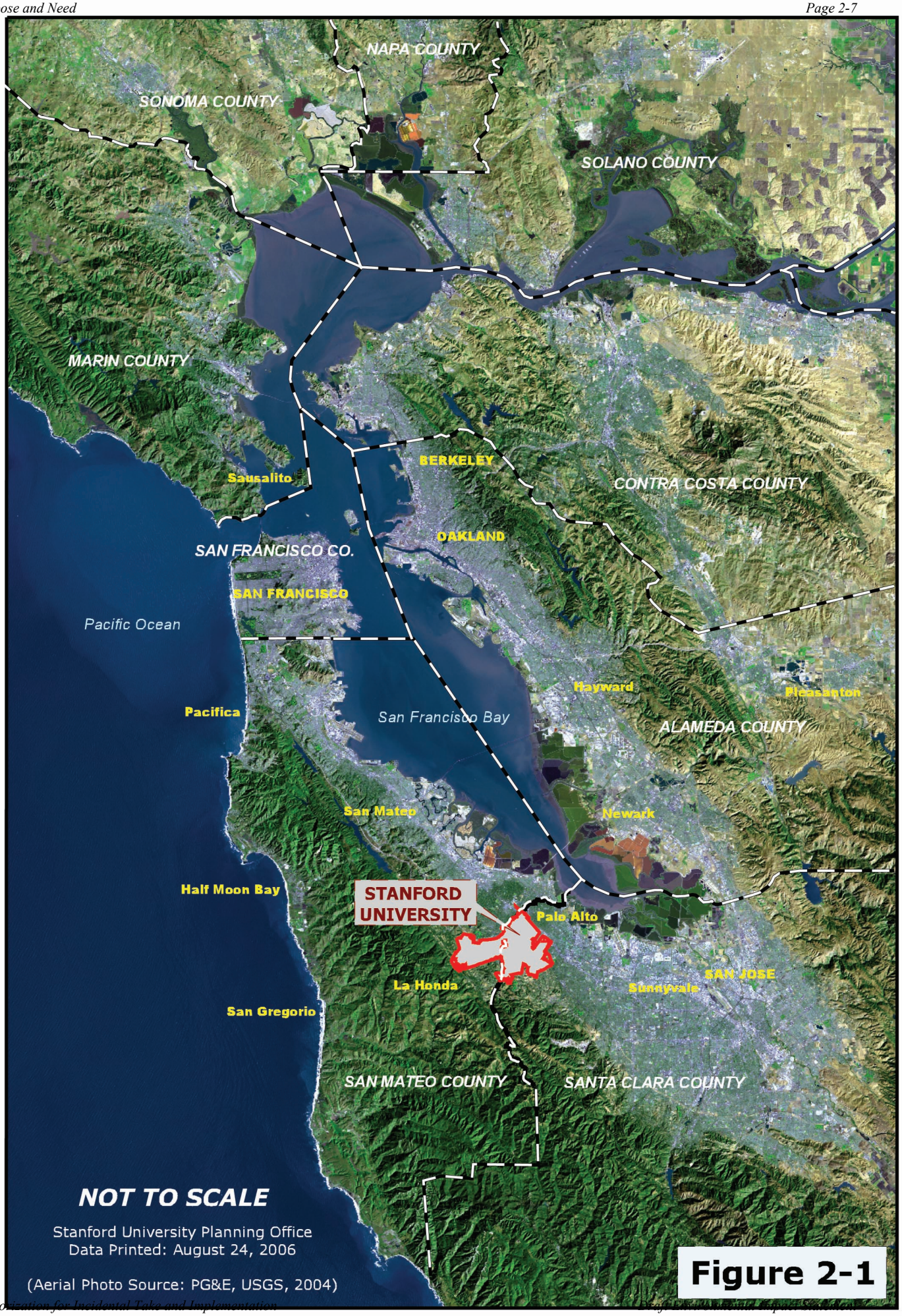
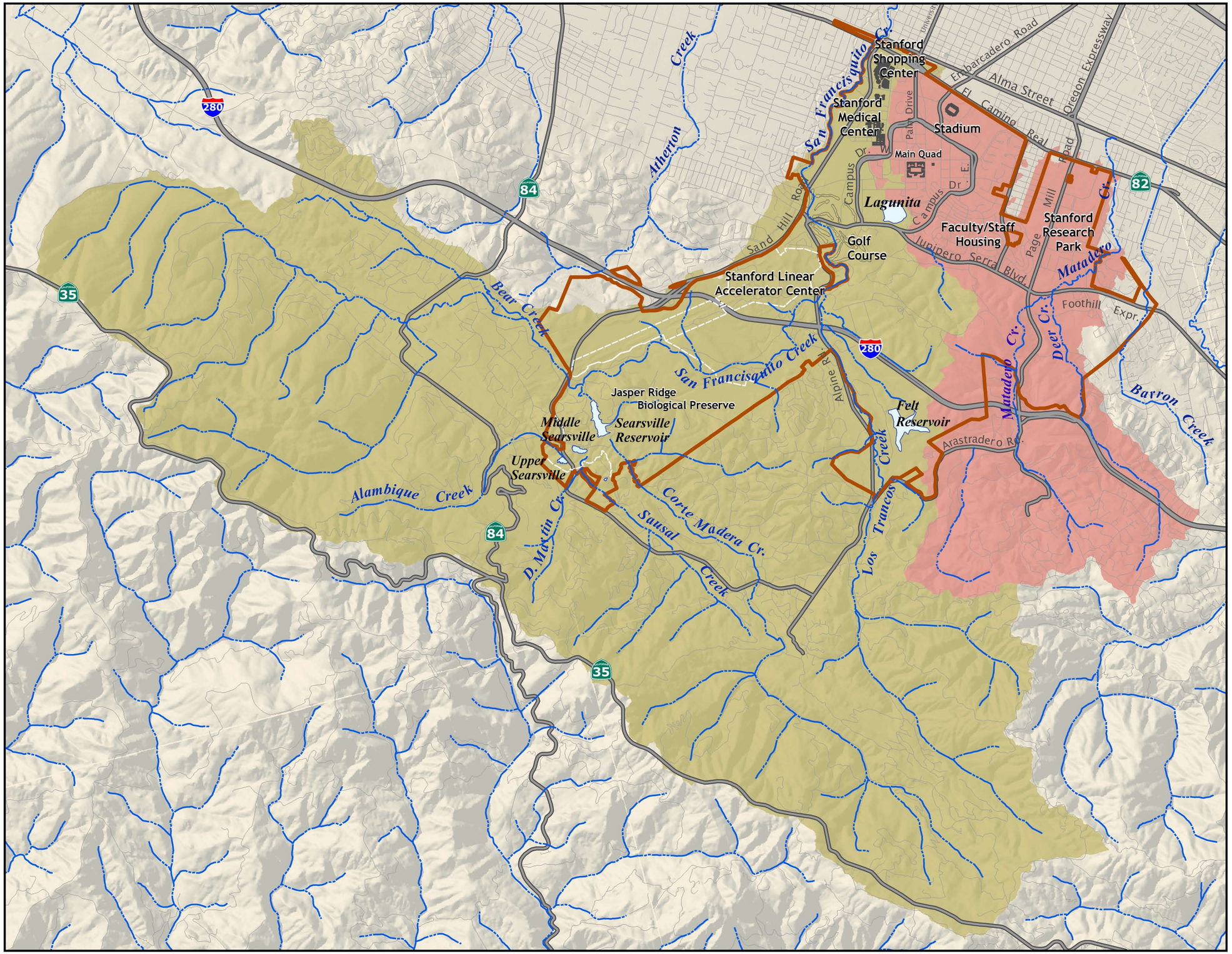

NAPA COUNTY
SONOMA COUNTY
SOLANO COUNTY
MARIN COUNTY
BERKELEY
Sausalito
CONTRA COSTA COUNTY
OAKLAND
SAN FRANCISCO CO.
SAN FRANCISCO
Pacific Ocean
Hayward
Pleasanton
Pacifica
San Francisco Bay
ALAMEDA COUNTY
San Mateo
Newark
Half Moon Bay
STANFORD UNIVERSITY
Palo Alto
SAN JOSE
La Honda
Sunnyvale
San Gregorio
SAN MATEO COUNTY
SANTA CLARA COUNTY
NOT TO SCALE
Stanford University Planning Office
Data Printed: August 24, 2006
(Aerial Photo Source: PG&E, USGS, 2004)

Figure 2-1



Stanford University HCP Environmental Impact Statement

Primary Watershed Basins

- Stanford Boundary
- Matadero Creek
- San Francisquito Creek

Note:
Complete stream basins not shown. Depicted are those primary basin areas that are adjacent to, within or upstream of Stanford University lands.

Sources:
Watershed: USGS, 1991, Nolte, 1999, SU/PO, 2004
Additional S.F. Creek drainage: Nolte, 1999
Creeks: US Geological Survey, 1991

Disclaimer:
This map was produced by the SU Planning Office. While generally accurate, this map may not be completely free of error. The information is derived from a variety of sources deemed reliable, but subject to recurrent change and Stanford does not warrant the accuracy and completeness of these data.

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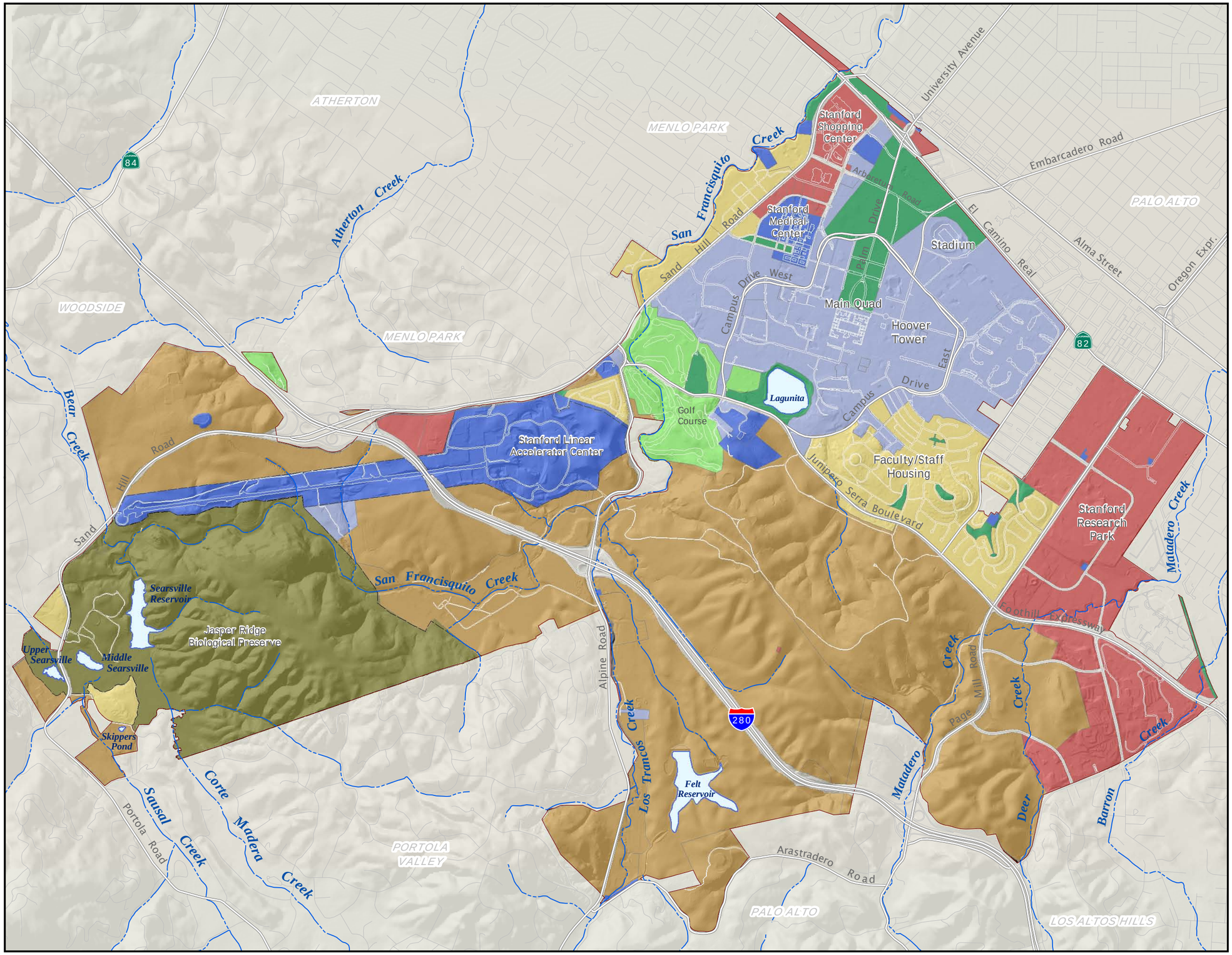
Miles

Stanford University Land Use & Env. Planning
Date Printed: March 14, 2007

Figure 2-2



Stanford University HCP Environmental Impact Statement

Land Use

- Academic
- Academic Reserve
- Biological Preserve
- Commercial
- Institutional
- Open Space
- Recreation
- Residential

hectare

100
25
4
acres

Sources:
Land Use: Stanford University Planning Office, 2006
Creeks: US Geological Survey, 1991

Disclaimer:
This map was produced by the SU Planning Office. While generally accurate, this map may not be completely free of error. The information is derived from a variety of sources deemed reliable, but subject to recurrent change and Stanford does not warrant the accuracy and completeness of these data.

Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1
Miles

Stanford University Land Use & Env. Planning
Date Printed: March 14, 2007

Figure 2-3

3.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action and nine potential alternatives to the Proposed Action. Two of these alternatives were carried forward for detailed evaluation and comparison to the Proposed Action in the DEIS, and seven were not evaluated for reasons explained in Section 3.3. The analyzed alternatives include the "Proposed Action," a "No Action alternative," and an "HCP for CTS Only alternative." A comparison of the features of the alternatives selected for detailed evaluation is included in this chapter (Section 3.2.3).

3.1 PROPOSED ACTION (PREFERED ALTERNATIVE)

The USFWS and NMFS are considering the issuance of ITPs for take of federally listed species at Stanford University associated with the operation, maintenance, and a specified amount of future development on Stanford-owned lands. Two permits would be issued, one from each federal agency. The permits would each have a 50-year term.

The Covered Species are the California tiger salamander, California red-legged frog, Central California Coast steelhead, San Francisco garter snake and Western pond turtle. The permit from NMFS would authorize the incidental take of steelhead, while a permit from the USFWS would cover the other ESA listed species. The pond turtle is not currently listed as threatened or endangered, but may become federally listed within the proposed 50-year term of the permits. Take authorization for the turtle will not become effective until the turtle is listed.

An HCP was submitted with the ITP applications, as required. The complete HCP is attached to the DEIS in Appendix B. The HCP describes the activities that would be covered by the ITPs, the species for which take would be authorized by the ITPs, measures that would avoid or minimize the adverse effects of the covered activities, and measures to mitigate the effects of the permitted take through the preservation, enhancement and management of habitat for the Covered Species. The Covered Activities and proposed Conservation Program are described below.

3.1.1 Covered Activities

The Covered Activities include ongoing maintenance and operations, a specified amount of future development where these activities could result in take of the Covered Species, and implementation of the Conservation Program.

3.1.2 Ongoing Maintenance and Operations

Stanford engages in certain ongoing activities that could result in the take of the Covered Species. The ITPs would authorize take that occurs incidental to carrying out these otherwise lawful activities. These ongoing activities are described in detail in Section 3.0 of the HCP (see DEIS Appendix B), and are listed below:

- *Water management*, including non-potable water diversions, storage facilities, and distribution infrastructure, creek monitoring, potable water distribution, and water wells;

- *Creek maintenance,* including bank stabilization activities and removal of flood hazards;
- *Academic activities,* including invasive and non-invasive field studies and research, teaching, monitoring and observation, and operation/maintenance of academic buildings;
- *Utility Installation and Maintenance,* including existing utilities and installation of new utilities;
- *General infrastructure,* including utilities, roads, bridges, fences, stormwater detention, and other general improvements;
- *Recreation and athletic uses,* including Stanford golf course and driving range, reservoir-related recreation, and recreational routes;
- *Grounds and vegetation,* including fire control and public safety, and grounds maintenance;
- *Agricultural and equestrian leaseholds,* including horse boarding, pasturing, and trail riding, agricultural facilities (nurseries and croplands), and grazing;
- *Commercial and institutional leaseholds,* including commercial and institutional facilities and similar urbanized facilities. However, operations at the SLAC National Accelerator Laboratory[1] are not a Covered Activity.

3.1.2.1 Future Development

The HCP anticipates that Stanford will need to build new academic facilities and housing over the next 50 years that could result in take of the Covered Species. Up to 180 acres of future development is included in the HCP as a Covered Activity; it includes both development approved under a General Use Permit approved by Santa Clara County in 2000, and other development anticipated to be needed during the life of the HCP to accommodate Stanford's operational needs (Table 3-1).

In 2000, Santa Clara County approved a certain amount of new development of academic and residential facilities on Stanford's lands, through issuance of a General Use Permit (GUP) and approval of an accompanying Environmental Impact Report. The development approved by the GUP will likely be completed within approximately 10 to 20 years of its approval (by 2020). Under the GUP, Stanford could develop approximately 30 acres of land that is occupied by the Covered Species or that provides potential habitat for the Covered Species. The remainder of the allowed academic, academic support, and residential development allowed under the GUP would occur in the urbanized central campus, which does not contain any Covered Species habitat.

The HCP also includes, as a Covered Activity, potential future development over the 50-year term of the HCP that is beyond that already approved by the GUP. No specific future

[1] Formerly known as Stanford Linear Accelerator Center (SLAC)

development beyond the GUP development has been identified, defined, or received local land use approval.

The HCP divides the project area into four Management Zones according to habitat value. The HCP projects how the future development would likely be distributed between Zones 1, 2 and 3, which have habitat value. Zone 4 is fully developed and does not have habitat value; it is covered in the event the Covered Species wander into this area. Approximately 15 acres of undefined future development would occur in Zone 1, 30 acres in Zone 2, and 105 acres in Zone 3. (See Figure 3-1 Possible Location of Assumed Development and Table 3-1 Summary of Future Development in Management Zones 1, 2 and 3). The total amount of estimated future development in Zones 1 through 3 during the 50-year term of the HCP is summarized as follows:

Based on current planning principles of density and building efficiency, as well as economic and research uncertainties, the HCP forecasts that Stanford could develop 1-3 acres per year of land that provides habitat for, or is occupied by, the Covered Species. Development at this rate would result in the development of 50-150 acres over the 50-year life of the HCP, in addition to the 30 acres of development that has already been approved by the County of Santa Clara as part of the GUP. Future development likely would not occur in regular increments annually, but will more likely occur as a 30-acre project every decade or a 15-acre project every 5 years, at a maximum. It could also occur as small operational projects (such as a new recreational route) that result in a permanent conversion of habitat.

Assuming a typical suburban campus development density of 0.25 Ground Area Coverage and two-story buildings, 1-3 acres would support 20,000 to 60,000 gross square feet (gsf) of academic development. Assuming a housing density of 4-5 single-family units per acre, 1-3 acres would support 4-15 housing units each year. Thus, during the life of the HCP, approximately 1,000,000 to 3,000,000 gsf of academic development, or 200-750 single-family housing units, or some combination of the two (e.g., 1,000,000 gsf of academic development and 400-500 housing units) could occur. (HCP, Ch. 3).

The incidental take associated with the future development described above would be covered by the ITPs, but any new development will still require local approvals, and any applicable state or other Federal approvals. Issuance of the ITPs does not mean that the development is approved for construction.

Table 3-1. Summary of Future Development in Management Zones 1, 2 and 3				
	Zone 1 (acres)	**Zone 2 (acres)**	**Zone 3 (acres)**	**Total (acres)**
Development under GUP	15	15	0	30
Development beyond GUP	5 to 15	10 to 30	35 to 105	50 to 150
Total Development	20 to 30	25 to 45	35 to 105	80 to 180
Total acres in Habitat Zone	1,295	1,260	2,446	5,001
Percent Developed	2%	2-4%	1-4%	2-4%

3.1.2.2 Conservation Program Activities

The Conservation Program describes the actions that will be taken to meet the biological goals and objectives of the HCP. It includes permanent preservation of habitat important to the survival of the Covered Species, long-term management and monitoring of habitat, habitat enhancements, and a commitment to future habitat preservation and management, all intended to increase the likelihood of persistence of the Covered Species at Stanford. The Conservation Program provides a significant contribution to the overall recovery of the Covered Species. Under the Conservation Program, at least 770 acres of habitat for the Covered Species will be actively managed, monitored, and enhanced, and a comprehensive set of "Minimization Measures" will be used to reduce the potential effects of the Covered Activities on the Covered Species. Specific avoidance/minimization, as well as management and monitoring activities that will benefit the Covered Species are summarized below. The Conservation Program includes the protection of 360 acres along the creek zones in conservation easements that will preserve the habitat in perpetuity. The conservation easements will be established within one year of issuance of the ITPs.

Chapter 4.0 of the HCP (see Appendix B of this DEIS) provides a detailed description of the Conservation Program, which is summarized here. The Conservation Program includes six primary components:

- creation of Management Zones;
- implementation of measures to avoid or minimize the potentially adverse effects of the Covered Activities on the Covered Species;
- preservation, monitoring, and management of biologically sensitive areas;
- use of a Mitigation Account system;
- use of Adaptive Management techniques to adjust management techniques as needed; and

- implementation of a comprehensive monitoring program that will generate data regarding the Covered Species, measure the HCP's success in achieving its biological goals and objectives, and promote adaptive management by providing an important feedback loop.

A university staff position will be created and funded for a Conservation Program Manager (CPM). The CPM will be responsible for the day-to-day implementation of the HCP, review activities that could result in the take of Covered Species, and recommend modifications that will reduce or prevent take.

3.1.3 Creation of Management Zones

The HCP divides the 8,180 acres of Stanford land at and around the university campus into four zones according to their relative habitat value for the Covered Species (See Figure 3-1, Management Zones). Zone 1 (approximately 1,295 acres) supports, or provides critical resources for, one or more of the Covered Species. Zone 2 (approximately 1,260 acres) is occasionally occupied by, or occasionally provides some of the resources used by, one or more of the Covered Species. Zone 3 (approximately 2,446 acres) consists of generally undeveloped open space that has some biological value, but provides only limited and indirect benefit to the Covered Species. Zone 4 (approximately 3,187 acres) consists of urbanized areas that do not provide any habitat value for any of the Covered Species. The ITPs authorize the take of Covered Species in Zone 4, primarily in authorizing Stanford to relocate any species that wander into the urbanized areas to an appropriate habitat area in Zone 1. However, there is no habitat in Zone 4, so development and ongoing urban activities in Zone 4 are not Covered Activities. As such, the DEIS does not analyze the impacts of development or ongoing maintenance and operations in Zone 4.

The land in Zones 1, 2, and 3 is then divided into three "Basins" that relate to habitat management: San Francisquito/Los Trancos Creek Basin; Matadero/Deer Creek Basin; and CTS Basin. The San Francisquito/Los Trancos Creek Basin contains potential habitat for steelhead, red-legged frog, garter snakes and pond turtle. The Matadero/Deer Creek Basin contains potential habitat for the red-legged frog and garter snakes, and the CTS Basin contains potential habitat for the tiger salamander and garter snakes.

3.1.4 Measures to Minimize the Potentially Adverse Effects of the Covered Activities

The HCP requires implementation of a wide range of conservation measures that will minimize the potential adverse effects of operating Stanford University on the Covered Species, including both ongoing operations and maintenance and future development. These measures are called Minimization Measures in the HCP and they apply to the activities that occur in Management Zones 1 and 2, and sometimes when they occur in Zone 3.

The Minimization Measures are included in Chapter 4 of the HCP, which is attached to the DEIS as Appendix B. There are measures specified for the Covered Activities, including water management, creek maintenance activities, academic activities, general infrastructure, recreation and athletics, grounds and vegetation maintenance, equestrian and agricultural leaseholds, commercial and institutional leaseholds, and future development.

In general, the Minimization Measures that apply to ongoing operations and maintenance direct how and when the operations will occur to prevent or reduce take. For example, the Minimization Measures for several activities related to water management and creek maintenance activities require regular worker education regarding the possible presence of Covered Species, the use of bio-engineered bank stabilization and other environmentally responsible methods for conducting in-stream work, pre-construction surveys, and performing water related repair and maintenance during the dry season. Minimization Measures direct academic activities away from biologically sensitive areas and when academic resources are studied in biologically sensitive areas, the Minimization Measures provide for the use of barriers to exclude Covered Species. The HCP's Minimization Measures also limit the expansion of facilities in biologically sensitive areas, and recommend moving facilities further from the creeks to reduce existing effects. Other measures, applicable to the golf course and agricultural tenants, prohibit landscaping with plants that are considered invasive species, and provide buffers between the creeks and new ornamental plantings. Minimization measures are also included for activities that result in ground disturbance. Some activities will also be reviewed by the CPM before they are started to further reduce the potential for take of the Covered Species.

The HCP also establishes general Minimization Measures applicable to future development. These direct development away from biologically sensitive habitat in Zones 1 and 2 and generally protect the Covered Species during any future development with measures such as conducting pre-construction surveys, having biological monitors present, restricting vehicle speed, and requiring that excess asphalt used during construction be removed at the end of construction.

In addition to the Minimization Measures, all permanent loss of habitat in Zones 1, 2, and 3 will be mitigated by the Mitigation Accounts described below.

3.1.5 Establishment of Mitigation Accounts

Under the HCP, the permanent loss of habitat will be mitigated by recording permanent conservation easements over biologically sensitive habitat, managing the preserved habitat, and enhancing or creating habitat for the Covered Species. The accounts will be established and funded by credits earned by conservation easements or when habitat is enhanced or created. Credits would be withdrawn whenever Zone 1 or 2 habitat or land in Zone 3 is permanently converted to other uses or becomes unsuitable as habitat for the Covered Species as a result of the Covered Activities. The permanent loss of habitat will most often be associated with future development; however, ongoing Covered Activities, such as bridge repairs, may also result in the conversion of habitat that requires a withdrawal of credits. As part of the HCP's implementation, conservation easements will protect approximately 360 acres of creek channels, banks and adjacent riparian areas within 1 year of the Services' issuing ITPs (see HCP sections 4.3.1.1 and 4.3.2.1). Therefore, habitat will be preserved, and an active management plan implemented before any habitat is permanently lost. The HCP includes a mitigation account system that will (1) track mitigation lands (and associated mitigation credits) that are preserved at the outset of HCP implementation; (2) track credits earned by future preservation, habitat enhancement or creation; and (3) continuously track the utilization of the mitigation credits over time.

To track the mitigation for the permanent loss of habitat for the Covered Species, the HCP creates two "Riparian Accounts": the San Francisquito/Los Trancos Riparian Account, and the Matadero/Deer Riparian Account. Each of the Riparian Accounts will initially be established by recording permanent conservation easements over large areas of Covered Species habitat. Each acre of habitat preserved in these conservation easements will count as one "credit" in the corresponding mitigation account. The Accounts are not synonymous with the easements; rather the credits created by recording the conservation easements will stock the Accounts.

3.1.5.1 General Information about the Conservation Easements

As part of the HCP's implementation, conservation easements will be created pursuant to Section 815 of the California Civil Code, and Stanford may form a qualified non-profit land trust to hold the San Francisquito/Los Trancos Easement, Matadero/Deer Easement and any subsequent conservation easements granted in accordance with Section 4.3 of the HCP. Under the Civil Code, only tax exempt non-profit entities whose primary purpose is the preservation, protection, or enhancement of land are eligible to hold conservation easements. The USFWS and NMFS will be third-party beneficiaries of the conservation easements with the right to enforce the terms of the conservation easements.

Stanford will relinquish any future rights to develop the conservation easement areas and alterations to the topography of the easement areas are generally restricted unless it is for the benefit of the Covered Species. Stanford will be allowed to continue to access existing improvements through the easement areas or to operate and maintain any utilities or other improvements that are within the conservation easements, but new improvements will generally be prohibited.

The conservation easements will require active management and monitoring of the conserved areas for the benefit of the Covered Species in accordance with easement area specific management plans (see HCP sections 4.3.1.2 and 4.3.2.2). This includes, but is not limited to, regular surveys for the Covered Species, habitat surveys, water quality monitoring, providing data flow information, invasive species control, and habitat improvements. Habitat improvements include the creation of new off-channel red-legged frog breeding ponds, revegetating eroded channels, anchored basking platforms, installing new water quality monitoring stations, and other habitat improvements (see HCP sections 4.3.1.2 and 4.3.2.2). Areas that have been preserved through a conservation easement will remain protected and managed in perpetuity.

3.1.5.2 CTS Account

Under the HCP, the permanent loss of tiger salamander and non-riparian garter snake habitat also will be mitigated through permanent conservation easements in the foothills. The CTS Account will be used to track the mitigation for the permanent loss of tiger salamander and garter snake habitat and the preservation and enhancement of tiger salamander and garter snake habitat. The HCP requires that a "CTS Reserve" area be established within a year of HCP/ITP approval. The "CTS Reserve" area covers approximately 315 acres of currently occupied and potential tiger salamander habitat, including eight new breeding ponds that were built during the preparation of the HCP. To date, tiger salamander reproduction has been documented in two of the eight new breeding ponds. The ponds, presence of amphibian prey, and grasslands in the CTS Reserve also

provide high quality garter snake habitat. The CTS Reserve is located in the foothills, south of Junipero Serra Boulevard.

Although activities, such as development, will be restricted within the CTS Reserve under the HCP, easements will not be recorded over the CTS Reserve at the outset of the HCP's implementation, but would be recorded as impacts to tiger salamander and non-riparian garter snake habitat occur. Like the riparian easement areas, the CTS Reserve will be actively monitored and managed before there is any loss of habitat, under a CTS Reserve Monitoring and Management Plan. The CTS Reserve will be used to mitigate for any future losses of Zone 1, 2 and 3 habitat caused by Stanford within the CTS Basin.

Activities in the CTS Reserve Monitoring and Management Plan are described in section 4.3.3.2 of the HCP, and include regular monitoring for tiger salamanders and garter snakes and their habitat, building debris piles to attract ground squirrels as their burrows provide refugia, implementing a mowing regime to enhance grassland habitat, new amphibian tunnels to facilitate tiger salamander dispersal across Junipero Serra Boulevard, and other management actions. The CTS Reserve serves two purposes in the HCP. The first is to achieve the biological goal of establishing primary, sustainable tiger salamander breeding habitat away from the urban part of the campus that currently acts as a population sink. The other is to provide a means for mitigating the permanent loss of tiger salamander and garter snake habitat.

In addition, 95 acres of land located around Lagunita will be managed in accordance with a "Central Campus CTS Management Plan" (see HCP section 4.3.3.4). Tiger salamanders currently reproduce in Lagunita, and managing the central campus area will therefore benefit the existing tiger salamander population and further reduce the possible take of the existing tiger salamander population while a new population is established in the CTS Reserve. Garter snakes are sometimes found around Lagunita, although the habitat is heavily impacted by human use. Garter snakes are also addressed in the Central Campus CTS Management Plan. The area that is subject to the Central Campus CTS Management Plan is called the Central Campus CTS Management Area. The Central Campus CTS Management Plan is described in section 4.3.3.4 of the HCP, and includes surveys to monitor the status of tiger salamander and garter snakes and their habitat, the removal of non-native species that are harming tiger salamander or garter snakes, restrictions on the use of biocides, and on mechanical control of vegetation, retrofitting of ill-fitting utility box covers that could result in entrapment, prohibition of feral cat feeding stations, prohibition of off-road vehicle use, and a worker education program. Implementation of the Central Campus CTS Management Plan does not earn any credits in the CTS Account.

3.1.5.3 Enhancement Activities

Credits can also be earned by enhancing existing habitat or creating new habitat for the Covered Species. Several potential enhancements are described in the HCP (Table 4-2), and are included in Table 3-2. The credits earned by the creation or enhancement of habitat will be deposited into the Mitigation Accounts. The number of credits earned and the Mitigation Account the credits are deposited into depend upon several factors, including the Covered Species that will be benefited, the benefit to the species, and the cost of creating or enhancing the habitat. Plans showing the specific enhancement and anticipated level of credits for the enhancement generally must be approved by the Services (see HCP section 4.3). Table 3-2 provides examples of potential enhancements and the level of credit that would be awarded.

Table 3-2. Examples of Preservation or Enhancement Activities that could earn Additional Mitigation Credits

Preservation or Enhancement	Credits Earned	Account Credited
Record conservation easement over additional habitat within the Matadero/Deer Creek Basin	1 credit for each acre of habitat.	Matadero/Deer Riparian Account
Record conservation easement over additional habitat within the San Francisquito/Los Trancos Creek Basin	1 credit for each acre of habitat.	San Francisquito/Los Trancos Riparian Account
Record conservation easement over habitat within the CTS Reserve	1 credit for each acre of upland habitat. 25 credits for each acre of breeding habitat	CTS Account
Improve steelhead habitat by increasing the minimum bypass flow rates in Los Trancos Creek (above SHEP[2] standards) by permanent changes to diversion operations	5-50 credits per cfs increase depending on the benefits (e.g., higher credit amount for increasing bypass after the attraction flow)	San Francisquito/Los Trancos Riparian Account
Improve steelhead habitat by increasing the minimum bypass flow rates in San Francisquito Creek (above SHEP standards) by permanent changes to diversion operations	5-50 credits per cfs increase depending on the benefits (e.g., higher credit amount for increasing bypass after the attraction flow)	San Francisquito/Los Trancos Riparian Account
Expand riparian areas around the creeks by removing existing structures and planting riparian vegetation	3 credits for each restored acre	San Francisquito/Los Trancos Riparian Account if enhancement is to Los Trancos, San Francisquito, Corte Madera, Sausal or Bear creek Matadero/Deer Riparian Account if enhancement is to Matadero or Deer creeks
Remove partial in-stream barriers that have a net adverse affect on steelhead, such as preventing dispersal, outside of Stanford lands	5 credits for removals downstream of Stanford and 1 credit for upstream removals	San Francisquito/Los Trancos Riparian Account if enhancement is to off-site portions of Los Trancos, San Francisquito, Corte Madera, Sausal or Bear creeks Matadero/Deer Riparian Account if enhancement is to off-site portion of Matadero or Deer creeks

[2] Steelhead Habitat Enhancement Project

Table 3-2. Examples of Preservation or Enhancement Activities that could earn Additional Mitigation Credits

Preservation or Enhancement	Credits Earned	Account Credited
Repair and stabilize the creek banks using bio-engineered stabilization[3] methods to pro-actively remediate erosion and bank stabilization problems that are not associated with a new project or is not conducted to protect existing Stanford infrastructure	1 credit per 200 feet of fixed bank	San Francisquito/Los Trancos Riparian Account if enhancement is to Los Trancos, San Francisquito, Corte Madera, Sausal or Bear creek Matadero/Deer Riparian Account if enhancement is to Matadero or Deer creeks
Restore the natural geomorphology of stream channels through replacement of existing hardscape with bio-engineered stabilization methods	1 credit per 200 feet of fixed bank	San Francisquito/Los Trancos Riparian Account if enhancement is to Los Trancos, San Francisquito, Corte Madera, Sausal or Bear creek Matadero/Deer Riparian Account if enhancement is to Matadero or Deer creeks

3.1.6 Use of Mitigation Account Credits

In order to have mitigation occur where it will best off-set the loss of habitat, the HCP also divides all Zone 1, 2 and 3 land into three basins: the (1) San Francisquito/Los Trancos Creek Basin; (2) Matadero/Deer Creek Basin; and (3) California Tiger Salamander (CTS) Basin. The Basins are shown on Figures 3-2, 3-3, and 3-4, respectively. The conservation easements that fund the Riparian Accounts are also shown on Figures 3-2 and 3-3. The area of the CTS Reserve and the Central Campus CTS Management Area are shown on Figure 3-4.

Any project that permanently converts Zone 1, 2 or 3 land within the San Francisquito/Los Trancos Creek Basin will withdraw credits from the San Francisquito/Los Trancos Riparian Account. Similarly, credits will be withdrawn from the Matadero/Deer Riparian Account for the permanent loss of Zone 1, 2, or 3 land within the Matadero/Deer Creek Basin, and credits will be withdrawn from the CTS Account for any permanent loss of Zone 1, 2, or 3 land within the CTS Basin.

The number of credits withdrawn for any particular project will depend on the size of the project and in which Zone it occurs. For example, development in Zone 1 will require 3 credits for every acre that is developed and development in Zone 2 will require 2 credits for every acre developed. Development in Zone 3 will require 0.5 of credit for every acre developed. As mentioned earlier, the Zones are defined according to the habitat value for the Covered Species, with Zone 1 having the highest value.

[3] Bioengineering techniques emphasize the use of natural and local building materials, e.g. stone, gravel, sand, soil, wood, branched logs, and native plants. Typical bioengineering practices include: brush layering, brush mattresses, brush walls/bundles, hand seeding or hydro-seeding, incorporation of large woody debris, and live staking. Rip-rap, rock, and other hardscape materials will only be used where required (e.g., areas of high scour).

3.1.6.1 Covered Species Monitoring Program

Section 4.6 of the HCP includes a detailed monitoring program to assess the status of the Covered Species and their habitat in the HCP area, and contribute to the body of knowledge about these species. Red-legged frogs, tiger salamanders, steelhead and pond turtles have been monitored many times at Stanford. The monitoring program was developed based in part on techniques that have proven effective in monitoring these species, prior survey results, historical records, and the presence of potentially suitable habitat. The HCP identifies specific areas that will be monitored, which includes areas that currently do or may support the Covered Species, and specific monitoring methods. For example, the population of the Covered Species will be assessed by visual surveys, trapping, electrofishing, and fish monitoring/counting devices. Habitat conditions will be assessed by evaluating a number of factors, including the presence of sufficient prey, cover, and water conditions. The methods proposed are the currently accepted scientific protocol for monitoring of these species and their habitat, and through the HCP's adaptive management program, Stanford may modify the monitoring techniques in response to new scientific information or technologies during the term of the ITPs.

Garter snakes at Stanford are not as well understood as the other Covered Species (see HCP section 4.6.5). Surveys for garter snakes have been conducted infrequently, and there is some historical data indicating potential habitat areas. As such, baseline distribution surveys will be conducted for the garter snake, and based on those data, a final monitoring plan will be prepared and implemented.

The HCP includes a section on Adaptive Management (described further below) that allows for modification of the monitoring program's methodologies in response to new scientific information or technologies.

3.1.7 Adaptive Management

The adaptive management provision in the HCP provides flexibility in implementing the HCP in response to changing conditions or new scientific knowledge (see HCP section 4.5). The adaptive management section of the HCP describes the ground rules for what measures can be taken, and when Stanford must consult with the Services.

Key features of the HCP's adaptive management are:

- Iterative decision-making (evaluating results and adjusting actions on the basis of what has been learned through monitoring);
- Feedback between monitoring and decisions (learning); and
- Measuring the success of the Conservation Program in light of the HCP's Biological Goals and Objectives.

The adaptive management section of the HCP addresses the following scenarios:

- The need to modify the Conservation Program to reflect new scientific or technical information or due to minor changes or additions to Covered Activities that do not result in significant impacts;

- revisions to the conservation measures (including the Monitoring and Management Plans, the species monitoring methods, and the Minimization Measures) in response to new scientific or technical information and/or population declines and in consultation with the Services;

- testing new management techniques for improving the survival of the Covered Species; and

- the re-introduction of Threatened or Endangered species.

3.2 ALTERNATIVES

Two alternatives were retained for analysis in addition to the Proposed Action described in section 3.1: the No Action Alternative, and the HCP for CTS Only Alternative. Other alternatives that were evaluated but rejected from further consideration are described in section 3.3.

3.2.1 No Action Alternative

The No Action alternative for this project means that the proposed ITPs and supporting HCP would not be approved. Ongoing activities or future development that would result in the take of federally listed species could be permitted on a project-by-project basis through either Section 7 or Section 10 of the Federal Endangered Species Act. Additional project-specific environmental analysis may be required for those actions and would be completed as necessary. A no action alternative in which no take of federally listed species occurs is not realistic because many of the everyday activities that Stanford engages in to operate in a safe manner may result in the take of listed species (see Section 3.3.1 for a further description of the No Take alternative).

In general, incidental take authorization would only be required for development projects or activities in Zones 1 and 2, which are known to support listed species or their habitat. Zone 3 and Zone 4 do not support the Covered Species or contain suitable habitat for the species. Because these areas do not support the Covered Species, an incidental take permit for future development and activities that occur solely in these zones would not be required.

Any projects or activities in Zones 1 or 2 that require a Federal permit or involve Federal funding must request incidental take authorization through the Section 7 consultation process. It is anticipated that only a small percentage of Stanford's activities that would result in take have a Federal nexus, mostly relating to obtaining Corps permits (e.g., creek bank maintenance work, sediment removal, and levee and berm repair). Use of the Section 7 process, therefore, may apply to any activities that affect streams, creeks, and other jurisdictional waters, such as

wetlands.[4] The Section 7 permitting process would not be available for any projects or ongoing activities that occur solely in upland areas unless a Federal nexus (such as grant funding) exists.

Under the No Action alternative, project-specific permits would only be issued for take of federally listed species. Impacts on the pond turtle could be addressed on a project-by-project basis through the process of environmental review required by the California Environmental Quality Act (CEQA). Many of the ongoing operations and maintenance activities do not require review under CEQA, and therefore effects on the pond turtle from those ongoing activities would generally not be regulated.

For the No Action alternative, the total anticipated future development would be equivalent to the Proposed Action (see Table 3-1). Under the No Action alternative, the ongoing activities and future development that occurred in Zones 1 and 2, and which could not avoid take, and thus require a permit, would likely be subject to minimization measures and mitigation. Minimization measures could be similar to the measures identified in the HCP (e.g., pre-construction surveys). Consistent with current permitting practices, the Services would also likely require Stanford to record conservation easements to offset any permanent losses of habitat, and to monitor and manage easement areas in accordance with a long-term habitat management and monitoring plan. Reasonably expected preservation ratios for the permanent loss of habitat in Zones 1 and 2 are 3:1 and 2:1, respectively. Based on typical mitigation ratios and anticipated future loss of habitat in Zones 1 and 2 over the next 50 years, future permits would likely result in the preservation of 165 to 235 acres. Future development in Zone 3 is anticipated to affect 35 to 105 acres, but no incidental take permits and accompanying mitigation would be required since Zone 3 does not currently support or provide suitable habitat for any federally listed species. Future development would also be subject to review under CEQA.

Under the No Action alternative where each project that affects federally listed species is permitted individually, several minimization measures similar to those in the HCP would likely be required through site-specific permits under the ESA and environmental review under CEQA. Minimization measures could apply to both the ongoing Covered Activities and specific development proposed in the future that affects federally listed species and requires a permit or environmental review. The measures may include:

- appropriate protocol and pre-construction surveys for Covered Species in the area affected by the project;

- minimizing the area of disturbance that could affect federally listed species (e.g., Zones 1 and 2 on the project site) through design and with construction practices such as staging heavy equipment away from riparian vegetation and tiger salamander breeding habitat, maintaining equipment offsite to avoid oil and fuel spills, requiring double containment for fuels, restricting vehicle speed to 10 mph, removing excess construction materials at

[4] An example of a project with a Federal nexus is the Steelhead Habitat Enhancement Project (SHEP). The habitat enhancement activities required a permit from the US Army Corps of Engineers, and because these activities and current diversions affect steelhead, the Corps consulted with NMFS under Section 7 of the ESA. The permit issued by the Corps incorporates a Biological Opinion prepared by NMFS that authorizes the incidental take of steelhead provided certain operational and minimization measures are implemented.

completion, and worker education regarding sensitive habitat, species and the pertinent laws;

- minimizing disturbance could entail limiting maintenance work and installation of new facilities (such as utilities) to already disturbed areas or corridors when possible;
- site-specific identification and avoidance of sensitive habitat whenever feasible in construction, academic activities, and recreational uses;
- use of on-site biological monitors during construction when impacts to federally listed species could occur (i.e., Zones 1 and 2);
- installing drift or plywood fences prior to construction in areas occupied by tiger salamander, red-legged frog or garter snake in order to prevent dispersal into the construction site;
- salvage of individual Covered Species from construction zones;
- use of low impact work measures such as hand tools rather than heavy equipment where tiger salamander, garter snake and red-legged frog occur and where practical for the task;
- timing maintenance/construction to periods when the Covered Species are least likely to be affected, such as during low flow or dry periods;
- restoration of areas of temporary disturbance caused by the project using native plant species;
- erosion control in areas disturbed by grading for the project to prevent adverse effects on aquatic habitats for red-legged frog, garter snake and steelhead;
- restricting new curbs and streetlights where they may adversely affect tiger salamander;
- limiting vegetation trimming in riparian zones at the project site to minimize adverse effects on steelhead garter snake and red-legged frog;
- prohibiting feeding of feral cats;
- limiting ground animal control programs within open space areas that are part of specific project sites;
- limiting the use of discing for vegetation control if the discing could result in take of tiger salamander, other federally listed species, or garter snakes.

Under the No Action Alternative, each ongoing Covered Activity or future development project would be addressed individually and would not benefit from a cohesive conservation effort or the oversight of a Conservation Program Manager. The mitigation would occur when the individual permits are issued, rather than in advance of take as planned under the Proposed Action, and the mitigation likely would be site-specific rather than area-wide. Therefore, under the No Action

alternative, conservation easements would not be recorded over San Francisquito, Los Trancos, Deer, and Matadero creeks in advance of any future development. Adaptive management may be included in future project-specific HCPs (under Section 10 of the ESA), but would not be included in take authorization granted through Section 7 of the ESA. Some project-related habitat enhancement may be required for individual take authorization.

Under this alternative, the Services would have to find that take (with mitigation) would not jeopardize the continued existence of the federally listed species before issuing a project specific ITP or Section 7 take authorization statement. The contribution of this alternative to overall recovery of the species is unknown.

3.2.2 HCP for CTS Only

Under this alternative, the USFWS would issue an ITP for take of the tiger salamander, and Stanford would prepare an HCP for CTS only in support of the permit application. Steelhead, garter snake, and red-legged frog would be addressed on a project-by-project basis through Section 7 or Section 10 of the ESA. Because it is not currently a listed species, the pond turtle could be addressed on a project-by-project basis through environmental review required by CEQA.

This alternative would apply to a more limited scope of activities and geographic area than the Proposed Action. The geographic area would include the CTS Basin, which includes lands around Lagunita, the golf course/driving range and portions of the foothills south of Junipero Serra Boulevard (JSB), in the area that is designated as the CTS Reserve in the HCP (see Figure 3-4).

Under this alternative, the Covered Activities would be limited to those that occur in the CTS Basin, which include the following:

- *Water management*, including filling/draining protocols for Lagunita, Lagunita drain maintenance, minor and major repairs of the Lagunita berm (dam), and operation/repair of wells (if any) in the CTS Basin;

- *Academic activities*, including field studies, teaching, and research;

- *Urban infrastructure*, including repair and maintenance of irrigation facilities, installation of new irrigation facilities, utilities maintenance and upgrade activities in the CTS Basin;

- *Recreation and athletic uses*, including Stanford Golf Course and Driving Range maintenance (mowing, fertilization), periodic redesign of golf course holes within the existing footprint, golf ball collection, Lagunita-related recreation, and recreational routes in the CTS Basin;

- *General management and maintenance* in the CTS Basin, including planting, weeding, mulching, mowing/vegetation control, and animal pest control (such as ground squirrel control on the Lagunita berm);

- *Leaseholds* including activities associated with independent research institutions such as exterior building maintenance, repair and modification, landscaping, and utility repair and maintenance; and

- *Future development* under the 2000 GUP and beyond, where development within the CTS Basin would be a Covered Activity under this alternative, but development outside of the CTS Basin would be addressed separately.

The HCP for CTS Only alternative would contain all of the conservation measures contemplated under the proposed HCP that pertain to tiger salamander and its habitat including the establishment of the CTS Reserve south of JSB and implementation of the CTS Reserve Monitoring and Management Plan, and implementation of the Central Campus CTS Management Plan for lands around Lagunita, as described in Chapter 4.0 of the HCP. These plans are described below.

Under the CTS Reserve Monitoring and Management Plan, Stanford would preserve and enhance the quality of potential and existing tiger salamander habitat within a CTS Reserve (south of JSB). The CTS Reserve includes 315 acres and contains eight newly constructed tiger salamander breeding ponds, two of which have had documented reproduction of tiger salamander. The Monitoring and Management Plan activities would include surveys to monitor the status of the tiger salamander and its habitat, controlling non-native species that are adversely affecting tiger salamander, sharing monitoring results with the USFWS and other interested agencies, modifying the tiger salamander ponds as necessary to benefit the species, providing supplemental water during drought, enhancing surrounding habitat by mowing and encouraging ground squirrels as their burrows provide refugia, maintaining suitable habitat within 150 feet of the ponds, maintaining at least three amphibian tunnels under Junipero Serra Boulevard, limiting recreational access in the CTS Reserve, prohibiting dogs and feral cat feeding stations in the CTS Reserve, discontinuing all ground animal control in the CTS Reserve, prohibiting development (buildings) in the CTS Reserve, providing a worker education program about tiger salamander, and preparing a plan for the perpetual monitoring and management of all habitat that is permanently preserved in the CTS Reserve.

The CTS Reserve would be used to mitigate for any future losses of Zone 1, 2 or 3 habitat caused by Stanford in the CTS Basin. As with the Proposed Action, under the HCP for CTS Only alternative, credits to the CTS Account will not be earned until lands in the CTS Reserve are permanently preserved under conservation easement(s).

To address ongoing operations and maintenance around Lagunita (i.e., north of Junipero Serra Boulevard), Stanford would implement the requirements of the Central Campus CTS Management Plan, which is described in Section 4.3.3.4 of the HCP and above under "CTS Account". The Central Campus CTS Management Plan will govern the management of the approximately 95 acres of Zone 1 and 2 tiger salamander habitat north of Junipero Serra Boulevard, including Lagunita (i.e., the "Central Campus CTS Management Area", see Figure 3-4).

Under the HCP for CTS Only alternative there would be a Conservation Program Manager, and the Take Minimization Measures from the HCP (adapted for tiger salamander) would apply to Stanford's ongoing operations and maintenance in the CTS Basin, including such measures as

conducting routine maintenance of Lagunita Reservoir during the dry season in consultation with the Conservation Program Manager, educating workers about tiger salamander and garter snakes, securing open pits at the end of the work day, and restoring any areas disturbed by work associated with infrastructure, among others (HCP section 4.2). These Minimization Measures apply only in Zones 1 and 2 within the CTS Basin unless the Measure specifically states that it applies in Zones 3 or 4 of the CTS Basin. Outside of the CTS Basin, Minimization Measures would be applied on a project-specific basis and there would not be a coordinated minimization and avoidance strategy for riparian species.

Under the HCP for CTS Only alternative, the tiger salamander population would be monitored in the same way as for the Proposed Action, including rainy season night surveys of salamander dispersal routes, egg mass surveys, larval surveys, and general wetland and upland surveys. (HCP at 4.6.4).

Future development in the CTS Basin would be mitigated in the same way as described in the Proposed Action. To mitigate for the permanent loss of Zone 1, 2 or 3 habitat within the CTS Basin, Stanford would either withdraw credits from the CTS Account (if credits have been accrued), or would record a conservation easement over habitat within the CTS Reserve south of JSB to earn credits.

The mitigation ratios would depend on the Management Zone that is affected by the permanent development. Every acre of Zone 1 habitat that is permanently converted would require three mitigation credits, every acre of Zone 2 habitat would require two mitigation credits, and every acre within Zone 3 would require 0.5 mitigation credits. Development in Zone 4 would not adversely affect the tiger salamander, because Zone 4 does not provide suitable habitat. Therefore, no mitigation credits would be required for development in Zone 4.

The total anticipated future development in the CTS Basin under this alternative would be the same as under the Proposed Action (see Table 3-1). Future development and other land conversions within the CTS Basin would be permitted through the HCP for CTS Only. Projects in Zones 1 and 2 that would result in the take of other federally listed species would be permitted separately on a project-specific basis. Similarly, ongoing operations and maintenance activities in Zones 1 and 2, that could take other listed species, would be permitted on a project-specific basis, as described under the No Action alternative.

As noted in the discussion of the No Action alternative, permits issued for take of other listed species on a project-by-project basis would likely only be obtained for activities occurring in Zones 1 and 2 that are anticipated to result in take. Those permits could require mitigation similar to that described in the Proposed Action for Zones 1 and 2.

Under the HCP for CTS Only alternative, the ITP process would be streamlined because there would only be one Federal agency involved (the USFWS) and one ITP. However, this alternative would not provide a comprehensive program that addresses all of the listed species or provide assurances that Stanford is complying with the ESA for all listed species. While there would be a Conservation Program Manager for activities affecting tiger salamander, there would not be a similar coordinated review of projects affecting steelhead, red-legged frog, pond turtle, or garter snakes. Similar to the No Action alternative, projects affecting other listed species would be mitigated when the individual permits are issued, rather than in advance of take as

planned under the Proposed Action. Individual take authorization would not be required for the pond turtle unless it is listed in the future.

The HCP for CTS Only would include an adaptive management provision, which means that the tiger salamander minimization measures and monitoring could evolve. Similar to the No Action alternative, adaptive management may be included in future project-specific HCPs for the other listed species, but would not be included in any project-specific take authorization permitted through Section 7 of the ESA. Tiger salamander enhancements implemented as part of this alternative would benefit garter snakes located in the foothills and Lagunita area, but this alternative would not enhance habitat for any riparian species.

Under the HCP for CTS Only alternative, conservation easements would not be recorded over San Francisquito, Los Trancos, Deer, and Matadero creeks in advance of any future development. Conservation easements may be required to mitigate for future development that affects creek zones through project-by-project approvals, but they would likely be smaller than those in the proposed HCP, and would be implemented piecemeal as development that results in take occurs. The amount of riparian habitat preserved and managed would depend upon the amount of habitat lost.

Under this alternative, the USFWS would have to find that an ITP for tiger salamander complied with Section 10 and its implementing regulations. This alternative provides a significant contribution to the recovery of the tiger salamander, but little or no contribution to the recovery of any other listed species.

3.2.3 Comparison of the Primary Features of the Alternatives Retained for Consideration

The primary features of the alternatives retained for consideration are compared in Table 3-3. For example, under the Proposed Action, the ITPs would cover all of Stanford University whereas under the No Action Alternative incidental take authorization would be issued project-by-project. A comparison of the environmental effects of these alternatives is provided in Chapter 6.

Table 3-3. Comparison of the Primary Features of the Alternatives Retained for Consideration

Feature	Proposed Action Alternative	No Action Alternative	HCP for CTS Only Alternative
Incidental Take Permit	Stanford-wide ITPs issued by USFWS and NMFS	Incidental take authorization may be granted on a project-specific basis through Sections 7 or 10 of the ESA.	ITP issued by USFWS for take of tiger salamander; individual incidental take authorization may be granted on a project-specific basis by NOAA fisheries/ USFWS for activities resulting in take of other listed species.
Covered Species habitat preservation and management	Stanford would actively manage a minimum of 770 acres of Zone 1 habitat with 360 of	Future avoidance, minimization and/or mitigation could be required by Services through individual Section	Stanford would place 315 acres in a CTS Reserve and monitor and manage 95 acres under a Central Campus CTS Management Plan; future riparian avoidance, minimization, and/or

Table 3-3. Comparison of the Primary Features of the Alternatives Retained for Consideration

Feature	Proposed Action Alternative	No Action Alternative	HCP for CTS Only Alternative
	the 770 acres permanently conserved within 1 year of issuance of the ITPs	7 and Section 10 authorizations. Based on typical mitigation ratios and anticipated future loss of habitat in Zones 1 and 2 over the next 50 years, future permits would likely result in the preservation of 165 to 235 acres.	mitigation could be required by the Services through individual Section 7 and Section 10 authorizations and the amount of riparian habitat preserved and managed would depend upon amount of habitat lost.
Permanent loss of Zone 1 habitat through future development	Anticipated 20-30 acres	Anticipated 20-30 acres	Anticipated 20-30 acres
Permanent loss of Zone 2 habitat through future development	Anticipated 25-45 acres	Anticipated 25-45 acres	Anticipated 25-45 acres
Future development of Zone 3 land	Anticipated 35-105 acres; mitigation required	Anticipated 35-105 acres but no incidental take authorization (and accompanying mitigation) likely required	Anticipated 35-105 acres but no incidental take authorization (and accompanying mitigation) likely required
Adaptive management	Adaptive management applied through a comprehensive Conservation Strategy, with commitments to monitoring and changes to management practices if needed	Adaptive management may be included in future project-specific HCPs; take authorizations granted through Section 7 do not include adaptive management	Adaptive management for tiger salamander applied through a tiger salamander only conservation strategy, with commitments to monitoring and management and changes to management practices if needed, which may also benefit garter snakes. Adaptive management for riparian habitats/species may be included in future project-specific HCPs; take authorizations granted through Section 7 do not include adaptive management.
Guidelines/ protocols to minimize impacts from ongoing activities	Comprehensive Conservation Strategy that includes feasible Minimization Measures for all of the Covered Activities	Some avoidance measures would be implemented to avoid unauthorized take; Minimization Measures applied on a project-by-project basis through individual take authorizations; no coordinated minimization and avoidance strategy	Conservation strategy for tiger salamander only that includes feasible Minimization Measures for Covered Activities within tiger salamander habitat (that will also benefit garter snakes); some avoidance measures would be implemented to avoid unauthorized take; and Minimization Measures applied on a project-by-project basis through individual take authorizations; no coordinated

Table 3-3. Comparison of the Primary Features of the Alternatives Retained for Consideration

Feature	Proposed Action Alternative	No Action Alternative	HCP for CTS Only Alternative
			minimization and avoidance strategy for riparian species
Contribution to Covered Species persistence at Stanford	Conservation Strategy includes permanent preservation of highly sensitive habitat, long-term management and monitoring of habitat, habitat enhancements, and commitment to future habitat preservation and management on-site; increased likelihood of persistence of the Covered Species at Stanford.	As part of any future Section 7 or Section 10 take authorizations, Services must find that take (with minimization or mitigation, respectively) would not jeopardize the continued existence of listed species. Future mitigation implemented as part of individual take authorizations may result in piecemeal preservation and management of habitat that is loosely coordinated, if at all. It is unknown how much mitigation associated with individual take authorizations will contribute to the persistence of the Covered Species at Stanford, but it is likely to be less than the comprehensive Conservation Program under the Proposed Action.	Will contribute to tiger salamander persistence at Stanford, and benefit garter snake that may contribute to garter snake persistence at Stanford. As part of any future Section 7 or Section 10 take authorizations, Services must find that take (with minimization or mitigation, respectively) would not jeopardize the continued existence of listed species, but authorization would not necessarily contribute to the Covered Species persistence at Stanford. Future mitigation implemented as part of individual take authorizations for other listed species may result in piecemeal preservation and management of habitat that is loosely coordinated, if at all. It is unknown how much mitigation associated with individual take authorizations will contribute to the persistence of riparian listed species at Stanford, but it is likely to be the same as the No Action alternative and less than the Proposed Action.
Enhancement of Covered Species habitat at Stanford	Comprehensive Conservation Strategy that includes a variety of long-term enhancement activities (see Table 3-2).	Unknown; some habitat enhancement may be required pursuant to individual take authorizations	Enhancement of habitat in the CTS Basin to the benefit of tiger salamander (and potentially benefit garter snakes); unknown habitat enhancement for riparian species but some enhancement may be required pursuant to individual take authorizations
Contribution to the recovery of the Covered Species	Contributes to recovery of steelhead, garter snake, red-legged frog, tiger salamander and pond turtle.	Unknown	Provides a contribution to the recovery of tiger salamander; little or no contribution to the recovery of steelhead, garter snake, red-legged frog, or pond turtle.

3.3 ALTERNATIVES NOT SELECTED FOR DETAILED EVALUATION

The following alternatives were considered but were not brought forward for detailed analysis because they were found to be very similar to another alternative selected for detailed analysis, did not meet the purpose and need for the Proposed Action, were not feasible, or they did not meet the ITP issuance criteria.

3.3.1 No Take Alternative

A "No Take" alternative would restrict or prevent Stanford's activities in Zones 1 and 2 related to the following:

- academic activities including field studies in biology, geology, archeology, engineering, photography and arts;
- maintenance of the urban infrastructure, including utilities, private roads and bridges, fences and buildings;
- water diversions that do not already have take authorization;
- recreation and athletics, including the golf course and driving range, trail use;
- grounds maintenance, including brush and weed control for fire hazard;
- activities related to leaseholds on Stanford land; and
- future campus development.

The restriction or prohibition of these activities would result in adverse health, safety, and public service effects on Stanford and the surrounding communities, making a No Take alternative impractical. For example, without an incidental take permit Stanford's ability to conduct dam safety repairs at Lagunita could be compromised. If maintenance is prevented, public safety could be at risk from unmaintained roads, dams, utilities, fences, and fire and pest control. The restrictions could also prevent Stanford from engaging in the ordinary academic activities associated with the operation of a university. For these reasons a strict "no take" alternative was not selected for further evaluation.

3.3.2 Take from Existing Operations Only

Under this alternative, an HCP would be developed and ITPs issued for existing operations and maintenance activities only. The HCP would not cover any future development. The amount of future development would be the same under this alternative as for the Proposed Action. Future development that results in take of the Covered Species would be addressed through project-specific permitting under Sections 7 or 10 of the ESA.

Under this alternative, no land would be set aside at the outset of the term of the permit. Specific ratios for loss of habitat may still apply, but only to that habitat permanently removed for operations and maintenance (a service road, for example). For other activities not covered by the

HCP, Stanford would consult with the wildlife agencies on a project-by-project basis and mitigate separately for each project. The Take Minimization Measures in the HCP that apply to operations and maintenance may also be applied on a project-by-project basis as part of permit requirements.

This alternative was not retained for analysis because it is similar to the No Action alternative that is considered in detail. This alternative postpones mitigation for future development, and provides less certainty for Stanford University planning because the future mitigation is uncertain and therefore does not meet the project purpose and need.

3.3.3 Ongoing Operations and GUP Development Only

Under this alternative, an HCP would be developed and ITPs issued only for ongoing operations and maintenance activities and future development that was already approved by Santa Clara County under the 2000 General Use Permit (GUP). Future development under the GUP could result in the loss of 30 acres of tiger salamander and garter snake habitat, but will not affect red-legged frog or steelhead habitat (See Figure 3-5, Possible Location of Assumed Development). Based on current planning principles of density and building efficiency, the HCP anticipates that Stanford will need to develop up to 45 acres of land beyond the GUP that provides habitat for the tiger salamander, garter snake, red-legged frog, and steelhead. Under this alternative, any future development beyond the GUP that resulted in the take of these species would not be covered by the HCP and would require project-specific permitting under Sections 7 or 10 of the ESA.

No land would be set aside at the outset of the term of the permit, but an approximately 100-acre CTS Reserve would be created that could be used to mitigate for the GUP development. Permanent conservation easements would be recorded within the CTS Reserve as the GUP development occurred. Because this alternative would not cover any permanent loss of riparian habitat, no riparian land would be set aside at the outset. Specific ratios for loss of habitat may still apply to ongoing operations and maintenance activities that permanently remove habitat, such as the construction of a service road. However, any future development beyond the GUP that affects the listed species would not be covered by this alternative and would require a project-specific permit and mitigation. Stanford would consult with the wildlife agencies on a project-by-project basis and mitigate separately for each project.

As described in the Proposed Action, ongoing operations and maintenance activities may temporarily affect the tiger salamander, red-legged frog, garter snake and steelhead. Therefore, this alternative would include the take Minimization Measures described for the Proposed Action. In addition, this alternative would include a Central Campus CTS Management Plan to mitigate for the impacts of the ongoing activities on the tiger salamander.

This alternative also postpones mitigation for much of the future development projected in the HCP, and provides less certainty for Stanford University planning because the amount of future mitigation is unknown. This alternative also would not support Stanford's need to meet future growth and accomplish its long-term academic mission. It was therefore not selected for further evaluation.

3.3.4 Participation in Santa Clara Valley Habitat Plan HCP/NCCP

Under this alternative, the Services would not consider ITP applications from Stanford, and activities on Stanford lands that result in take of listed species would be authorized by permits issued to Santa Clara County as part of the Santa Clara Valley Habitat Conservation Plan/Natural Communities Conservation Plan (HCP/NCCP). Santa Clara County is preparing an HCP/NCCP for several thousand acres of land within the County and plans to submit ITP applications to the Services authorizing the take of steelhead, red-legged frog, tiger salamander, and pond turtle. The garter snake is not a covered species in the Santa Clara County HCP/NCCP. The boundaries of the County's proposed HCP/NCCP do not include Stanford. In order to cover Stanford's lands and Stanford's activities, the boundary of the proposed HCP/NCCP would have to be extended to include Stanford lands in Santa Clara County and San Mateo County and the scope of the HCP/NCCP would have to be expanded to include Stanford's specific activities and the garter snake.

The County's proposed HCP/NCCP will address site-specific impacts, and provides site-specific take minimization measures for a variety of activities. If the geographic boundary and scope of the County's HCP/NCCP were extended to include Stanford, and Stanford was covered under the HCP/NCCP rather than its own, it is likely that the minimization and mitigation for Stanford's activities would be the same or very similar to those in the Proposed Action, particularly since Stanford lies at the northern end of the Santa Clara valley and local mitigation that addresses local physical conditions is biologically important.

This alternative was not retained for detailed analysis because it would likely not meet the applicant's time schedule. In addition, this alternative may not be feasible because the geographic scope of the County HCP/NCCP would need to be changed in order to include Stanford, including Stanford's lands located in another county, San Mateo County.

3.3.5 HCP Using All Off-site Mitigation

Under this alternative conservation program, the effects of Stanford's ongoing Covered Activities on the Covered Species would be reduced by implementation of the Minimization Measures described in the proposed HCP (see Chapter 4 of the HCP), while the permanent loss of habitat would be mitigated off-site. Instead of placing conservation easements over Stanford lands, Stanford would either: 1) purchase credits in an approved mitigation bank; 2) acquire, preserve and manage habitat in the region; or 3) contribute funds to another entity for the purpose of acquiring, enhancing, or managing habitat for the Covered Species. Off-site mitigation would occur as Stanford lands are developed. Mitigation in advance would not occur unless it made sense logistically to secure mitigation bank options or larger areas of habitat for future use.

The mitigation accounting system would differ from the Proposed Action because this alternative would not include the onsite conservation easements or enhancements used to fund the mitigation accounts. The monitoring and management plans for San Francisquito/Los Trancos creeks, Matadero/Deer creeks, and the CTS Basin would not be implemented. Conservation easements would not be recorded. Instead, all mitigation for the permanent loss of habitat would occur off-site, and the mitigation accounting system would need to be negotiated with the USFWS and NMFS based on the suitability of off-site mitigation.

For this alternative, the Covered Activities would be the same as for the Proposed Action. Hence, the projections of future development and the ongoing operations and maintenance activities would be the same as the Proposed Action.

This alternative was rejected from consideration because Stanford supports the only remaining tiger salamander population on the Peninsula. Failing to conserve that population could result in jeopardy to the species. As such, the USFWS could not issue an ITP for the tiger salamander under this alternative. That in turn, would not meet Stanford's needs and goals of conserving the species and securing an ITP, or the USFWS' need and goals to conserve the species.

3.3.6 HCP That Covers Modifications to Searsville Dam and Reservoir for Flood Control

The Services considered an alternative that addresses regional flood control, through the modification of Searsville, because members of the San Francisquito Creek Joint Powers Authority (JPA) suggested an alternative that addresses regional flood control during the scoping process for the DEIS. Under this alternative, the Services would consider issuing ITPs that included modification of Searsville Dam and Reservoir for regional flood control purposes as one of the Covered Activities.

San Francisquito Creek has had a history of flooding below Searsville Reservoir and Dam and adjacent communities have expressed concern about future flooding of the creek. In order to address the community concerns regarding flooding as well as environmental preservation along San Francisquito Creek, local land use agencies created the JPA, which is comprised of the cities of Palo Alto, Menlo Park, East Palo Alto, the Santa Clara Valley Water District, and the San Mateo County Flood Control District. Stanford University and the San Francisquito Watershed Council are non-voting members of the JPA.

In 2002, Congress authorized the San Francisquito Creek Study (the "Feasibility Study") to be conducted under the direction of the U.S. Army Corps of Engineers (Corps). The Feasibility Study is a joint effort by the Corps and the JPA to address flooding problems on San Francisquito Creek. The Feasibility Study is intended to identify and evaluate potential plans to help alleviate flooding problems, as well as address environmental degradation of the watershed and potential ecosystem-compatible recreational opportunities. The April 11, 2006 Notice of Intent (NOI) to conduct a scoping meeting on the Feasibility Study identified dozens of potential alternative actions, though no specific improvements were identified.

The alternatives identified in the NOI included: a non-structural alternative (warnings, evacuation, relocation); downstream fluvial flooding actions near the creek mouth; tidal flooding actions at the creek mouth; downstream ecosystem restoration actions; upstream fluvial flooding actions (including possible upland detention basins or modifications to existing reservoirs); and upstream ecosystem restoration actions (including the possible removal of steelhead migration barriers). Some of these alternatives could be applied on Stanford lands. For example, the Feasibility Study could evaluate the removal of Searsville Dam, modification of Searsville Dam and Reservoir by excavating the basin and converting the Dam to a flood control facility, likely as a "check dam," widening the channel of San Francisquito Creek, or the construction of an upland off-stream detention basin on Stanford's lands. The Feasibility Study will involve detailed studies of the viable alternatives and an assessment of the potential environmental effects of each alternative.

In 2002, the Corps anticipated that the Feasibility Study would take from 3 to 5 years to complete, provided that funds are available on an annual basis to continue a “fast pace” of work. However, the pace has been slower, and it is now expected to take up to 11 years to complete.

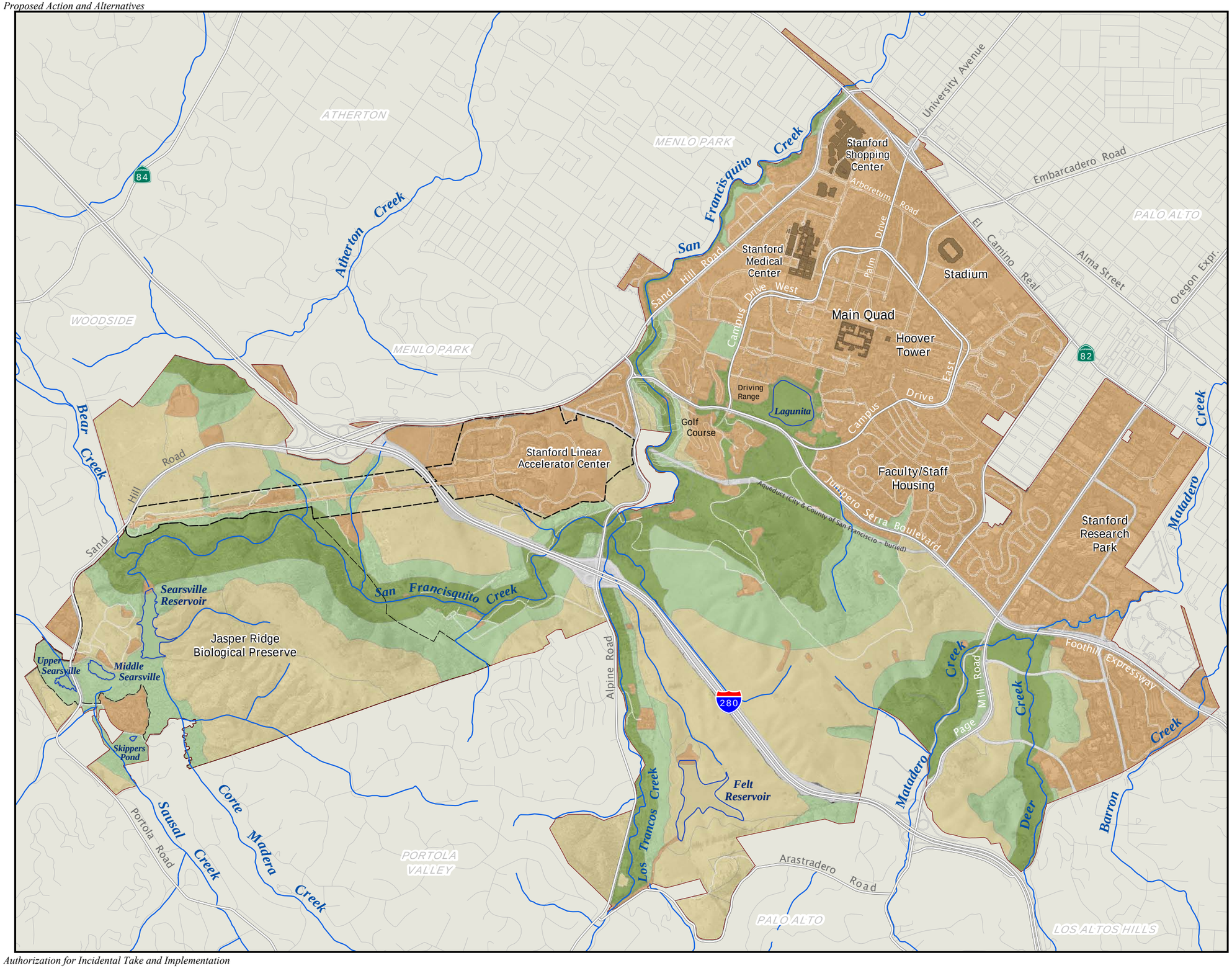
In the meantime, at the November 2008 JPA Management Team meeting, a subgroup recommended that the JPA hire a consultant to explore and refine options for flood protection through various alternatives including downstream capacity increase and upland retention/detention. The subgroup recommended that the consultant engaged for the initial technical analysis of an implementation project downstream of Highway 101 also provide an analysis of the upper watershed topography suitable for water storage during a major storm. The "upstream" task performed by the consultant would provide information to the JPA on the following:

- The feasibility of upland detention and identification of the largest potential retention/detention locations, based on topography and diversion constraints;
- Conceptual drawings of the proposed project;
- Retention/detention capacity and relative protection benefits; and
- Preliminary estimates for the costs of planning, design, environmental review and construction.

To date, no specific flood control options have been conceptually engineered, much less analyzed for feasibility. As such, the solutions to regional flood control in the San Francisquito Creek watershed are still speculative, and involve numerous stakeholders who are not currently applying for an ITP.

Flood control is a regional issue that is currently being addressed by another Federal agency (the Corps) and all of the stakeholders (not just Stanford) through a comprehensive and long-term planning process. The range of measures (all of which are still conceptual at this point) that will be considered and evaluated for feasibility through that process is enormous. Future regional flood control actions that are undertaken, funded, or permitted by the Corps will be subject to a Section 7 consultation between the Corps and one or both of the Services. At that time, the Services can evaluate the effect that specific proposed regional flood control activities will have on listed species.

This alternative was rejected from further consideration because the potential for future modifications of Searsville Dam and Reservoir for flood control purposes is speculative. No specific possible modifications have even been evaluated for their feasibility. Also, such hypothetical modifications are simply one of a large array of flood control concepts which the Corps and JPA will be analyzing and considering in the future. That analysis is complicated, and may take a decade to complete by various technical experts. As a result, it is not possible at this time to evaluate any flood control modifications at Searsville in this DEIS. Moreover, any flood control modifications to Searsville Dam and Reservoir that the Services selected to study as part of this DEIS could conflict with other flood control measures that the Corps and the stakeholders will evaluate.



Stanford University HCP Environmental Impact Statement

Management Zones

- Zone 1
- Zone 2
- Zone 3
- Zone 4

hectare

100
25
4
acres

Sources:
HCP Zones: Stanford University Campus Biologist, 2006
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

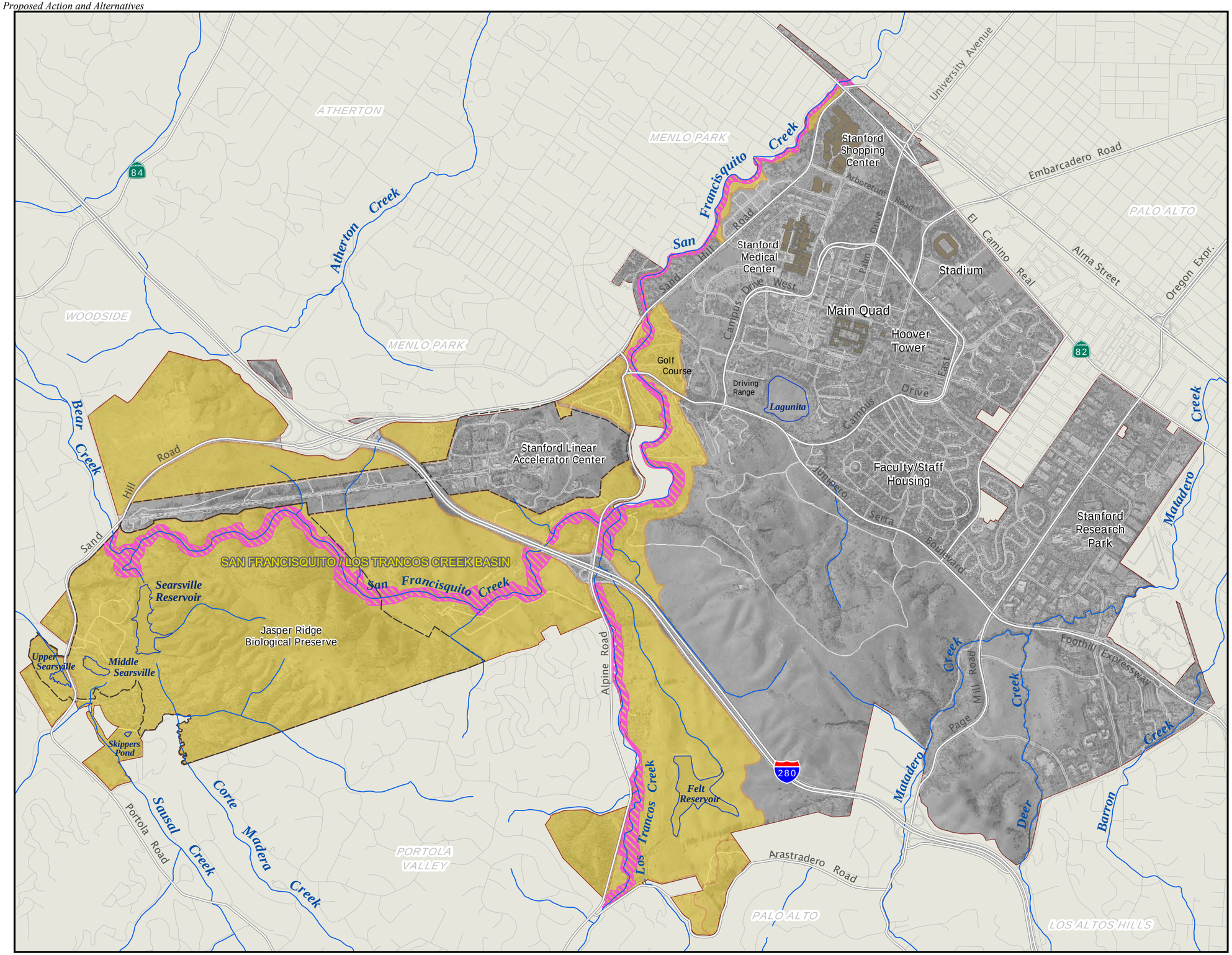
Disclaimer:
This map was produced by the SU Planning Office. While generally accurate, this map may not be completely free of error. The information is derived from a variety of sources deemed reliable, but subject to recurrent change and Stanford does not warrant the accuracy and completeness of these data.

Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1
Miles

Stanford University Land Use & Env. Planning
Date Printed: March 14, 2007

Figure 3-1



Stanford University HCP Environmental Impact Statement

San Francisquito / Los Trancos Creek Basin

San Francisquito / Los Trancos Creek Easement

Boundary of Mitigation Basin

hectare

100
25
4
acres

Sources:
Reserves: Stanford University Campus Biologist, 2006
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

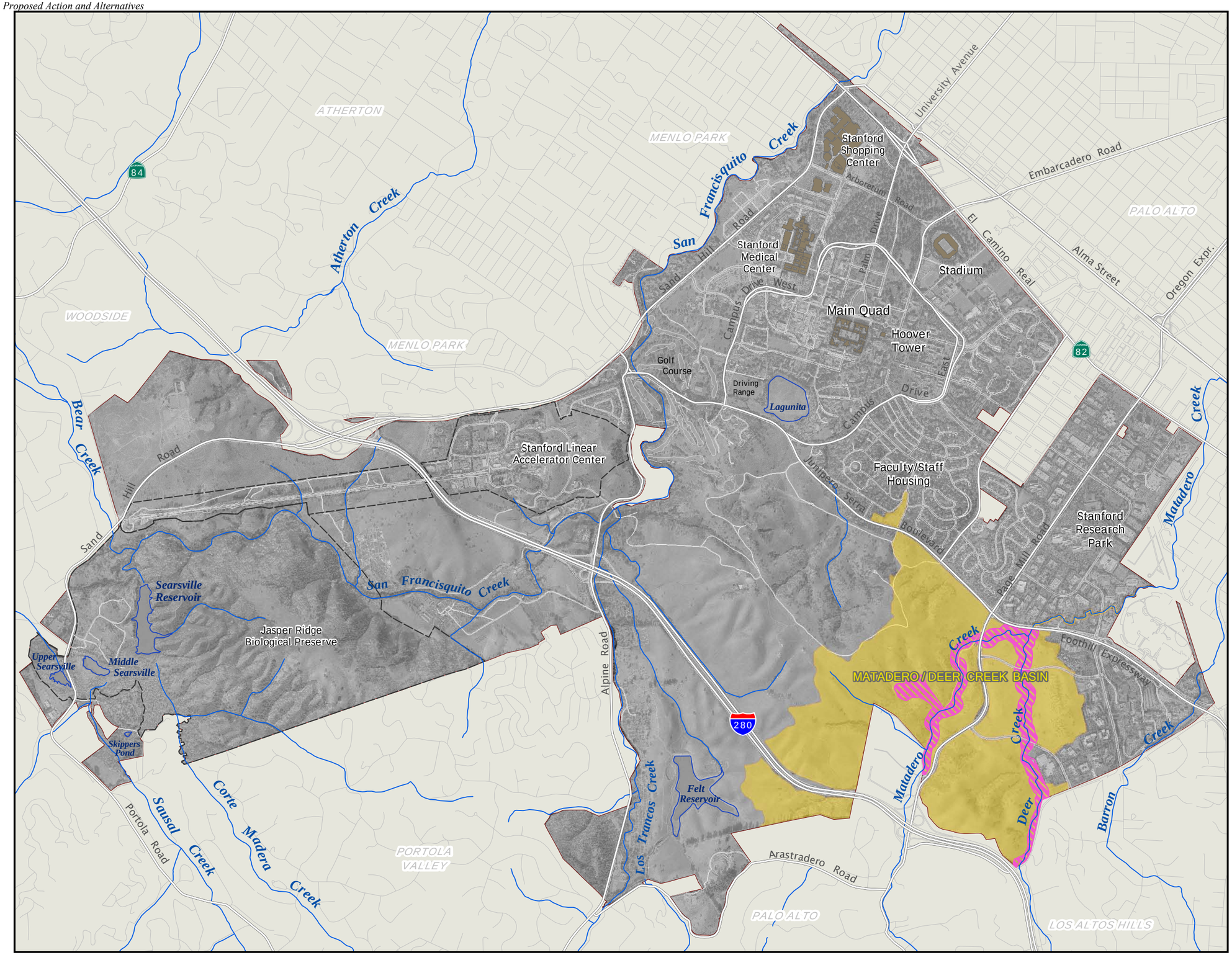
Disclaimer:
This map was produced by the SU Planning Office. While generally accurate, this map may not be completely free of error. The information is derived from a variety of sources deemed reliable, but subject to recurrent change and Stanford does not warrant the accuracy and completeness of these data.

Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1
Miles

Stanford University Land Use & Env. Planning
Date Printed: March 14, 2007

Figure 3-2



Stanford University HCP Environmental Impact Statement

Matadero / Deer Creek Basin

- Matadero/Deer Creek Easement
- Boundary of Mitigation Basin

hectare

100

25

4

acres

Sources:
Reserves: Stanford University Campus Biologist, 2006
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

Disclaimer:
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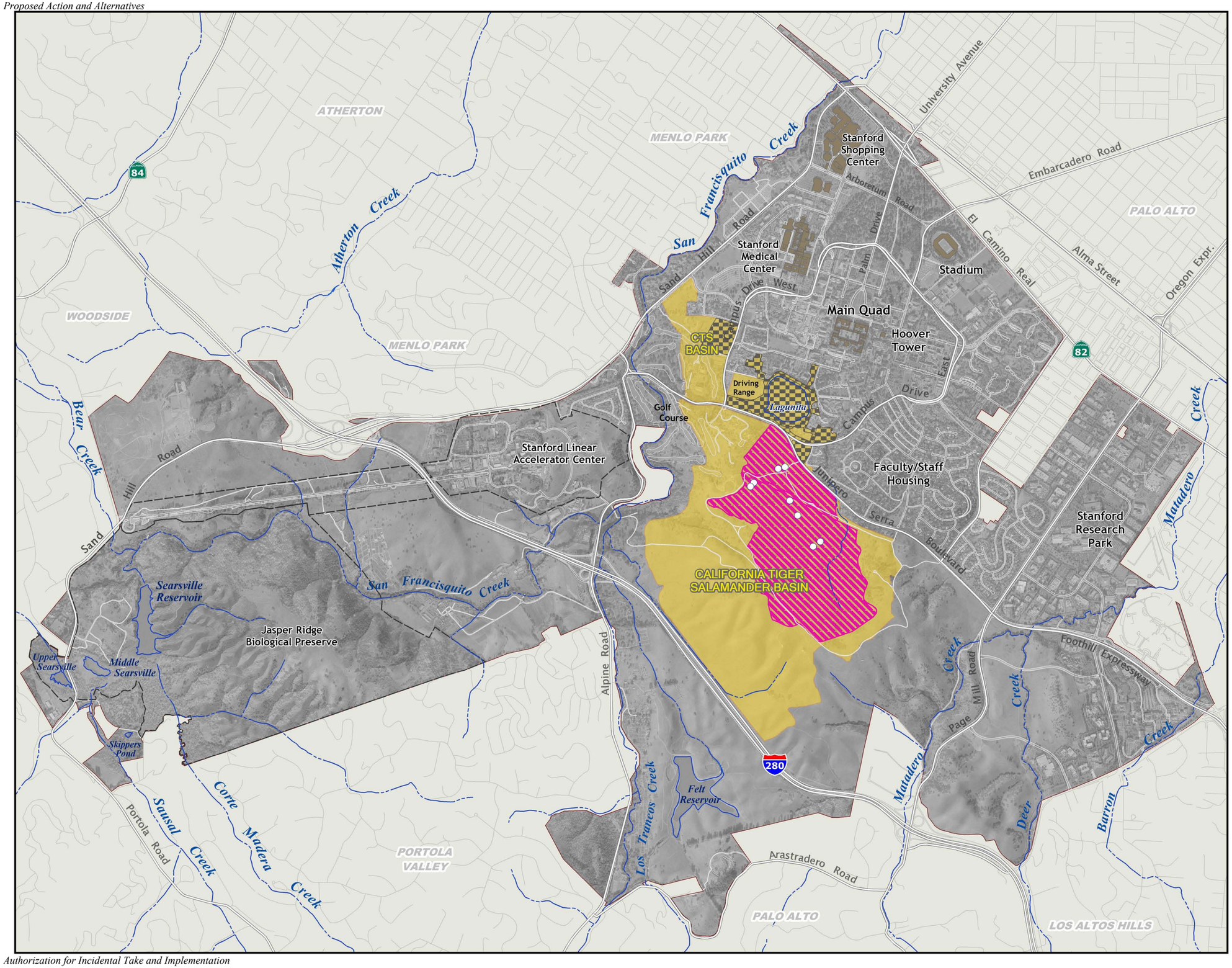
Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1

Miles

Stanford University Land Use & Env. Planning
Date Printed: March 14, 2007

Figure 3-3



Stanford University HCP Environmental Impact Statement

CTS Basin

- California Tiger Salamander (CTS) Reserve
- Central Campus CTS Management Area
- Boundary of Mitigation Basin
- Recently Established Ponds

hectare

100 × 100 = 25 acres

4 acres

Sources:
Reserves: Stanford University Campus Biologist, 2006
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

Disclaimer:
This map was produced by the SU Planning Office. While generally accurate, this map may not be completely free of error. The information is derived from a variety of sources deemed reliable, but subject to recurrent change and Stanford does not warrant the accuracy and completeness of these data.

Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1
Miles

Stanford University Land Use & Env. Planning
Date Printed: March 14, 2007

Figure 3-4

Stanford University HCP Environmental Impact Statement

Possible Location of Assumed Development

No Build Area Under HCP
(easement, mitigation reserve, continued operation of Lagunita)

Zone 1 (1,295 acres)
20-30 acres could be developed within zone

Zone 2 (1,260 acres)
25-45 acres could be developed within zone

Zone 3 (2,446 acres)
35-105 acres could be developed within zone

hectare
100
15
5
acres

Sources:
HCP Zones: Stanford University Campus Biologist, 2006
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

Disclaimer:
This map was produced by the SU Planning Office. While generally accurate, this map may not be completely free of error. The information is derived from a variety of sources deemed reliable, but subject to recurrent change and Stanford does not warrant the accuracy and completeness of these data.

Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1
Miles

Stanford University Planning Office
Date Printed: August 24, 2006

Figure 3-5

4.0 AFFECTED ENVIRONMENT

This chapter provides a description of the physical, biological and socioeconomic environment that may be affected by implementation of the Proposed Action or the alternatives.

Under Section 4.1 Physical Environment, the DEIS describes the setting for the following resources: geology and seismicity, cultural and historical resources, hydrology and water quality, air quality, noise, traffic, hazardous materials/waste, public services, and land use. In Section 4.2, Biological Environment, the DEIS describes the habitats present, the covered species, other special-status species, and wildlife present in the affected area. In Section 4.3 Socioeconomic Environment, the DEIS describes existing employment, housing and revenue sources. Sections 4.4 and 4.5 describe environmental justice and Indian trust assets.

4.1 PHYSICAL ENVIRONMENT

4.1.1 Geologic Hazards, Seismicity and Soils

4.1.1.1 Geologic Hazards and Regulations Governing Development in Hazard Zones

The primary geologic hazards within the study area include the potential for earthquake induced ground shaking, fault rupture, deformation, slope instability, liquefaction, and dam failure (Figure 4-1, Geologic Hazards).

Geologic Hazard Considerations for Building Permits. Stanford's Facilities Department maintains Facility Design Guidelines (FDG) which is a set of guideline design documents, technical specifications, and detail drawings to be used by architects, consultants and contractors in the design and construction of new and remodeled buildings and infrastructure on the Stanford campus. The FDG implement applicable local and state construction and building codes. The FDG are contained in Section 01030-G of the General Administrative Guidelines and are available on Stanford's website at http://facilities.stanford.edu/fdcs/.

At Stanford, work conducted within creeks is typically done using best management practices (BMPs) set forth under the Santa Clara Valley Water District (SCVWD) stream maintenance program. These BMPs cover timing of work, equipment, bank management techniques, vegetation removal, sedimentation and erosion controls, de-watering, etc. The primary purpose of the BMPS is to minimize impacts on the natural environment. The SCVWD BMPs are available on their website: www.valleywater.org.

Santa Clara and San Mateo counties, Woodside, Portola Valley, Palo Alto, and Menlo Park consider geologic hazards through their building permit process by requiring geotechnical reviews or reports for projects in hazard-prone areas. All new construction is required to conform to the most current Uniform Building Code (UBC) (International Conference of Building Officials, 1997 and California Amendments, 1998).

Santa Clara County Hazard Zone Maps. The County Geologist with the Santa Clara County Planning Office maintains geologic hazard maps that delineate known hazard areas. These hazard areas include the Alquist-Priolo Earthquake Fault Zones (known as Special Studies Zones

prior to 1994) originally established by the State. Map zones for high risk geologic hazard areas indicate high susceptibility to land sliding, compressible soils, liquefaction, and fault rupture. Project plans are evaluated for susceptibility to these hazards as part of the permit review process.

Projects located within high hazard zones are required to have an engineering geologic report submitted to the County Geologist for review prior to project approvals. Requirements for mitigation of identified geologic hazards are incorporated into conditions of approval. At Stanford, the mapped zones include zones of land sliding and liquefaction. Landslide hazard zones in Management Zones 1, 2, and 3 were mapped near Matadero and Deer Creeks in the vicinity of Highway 280 and Page Mill Road. A landslide hazard zone north of Junipero Serra Boulevard extending east and west of Page Mill Road in Management Zone 4 was also identified (Santa Clara County Geologic Hazard Zones maps, 2002). No compressible soil zones are shown on the Santa Clara County Geologic Hazard Zone maps as occurring on Stanford University lands.

San Mateo County Hazard Zone Maps. The San Mateo County Planning Department maintains geologic hazard maps that delineate known hazard areas. Hazard areas found on Stanford lands within San Mateo County include Alquist-Priolo Earthquake fault zones (Searsville area), areas of high landslide susceptibility (several pocket areas), potential liquefaction zones (along the San Andreas fault zone and San Francisquito and Los Trancos Creeks), debris flow areas (western portions of San Francisquito and Los Trancos Creeks), FEMA flood zones (around the Searsville area and along San Francisquito Creek), hazardous fire areas, and dam failure inundation areas (areas below Searsville, Felt, and Lagunita reservoirs). Since many of these hazards occur along the creeks, much of the lands within Management Zones 1 and 2 also contain these hazards. Project plans are evaluated for susceptibility to these hazards as part of the building permit review and approval process.

State of California Seismic Hazard Zones. The Palo Alto Quadrangle of the State of California Seismic Hazard Zones maps shows areas susceptible to liquefaction surrounding the San Francisquito, Matadero, and Deer Creek drainages located within Management Zones 1 and 2. Areas of liquefaction are also shown in Habitat Zone 4 under Highway 280 east of Alpine Road. Areas susceptible to earthquake induced landslides include upland areas of the San Francisquito, Matadero and Deer Creeks and lower elevations of Jasper Ridge. Potential landslide areas are also dispersed between Highway 280 and Junipero Serra Boulevard in Management Zones 2 and 4.

4.1.1.2 Seismic Setting

Stanford University lands lie at the boundary of the San Francisco Bay alluvial plain and the foothills of the Santa Cruz Mountains, within the San Andreas Fault Zone. Three major active branches of this fault system, the San Andreas Fault, the Hayward Fault, and the Calaveras Fault, are located close enough to Stanford to produce strong seismic ground motion in the study area. Figure 4-2, Fault Zones, shows the location of the study area relative to the major faults. It has been estimated that there is a 62 percent chance of at least one magnitude 6.7 or greater earthquake striking somewhere in the San Francisco Bay Region before 2032 (Michael, et al. 2003).

At Stanford, the San Andreas Fault system has been mapped passing through the western-most portion of Jasper Ridge Biological Preserve in the vicinity of Sausal Creek and Searsville Reservoir (Management Zones 2 and 3) (see Figure 4-3, Geologic Faults).

Other faults that can produce ground-shaking on Stanford lands include the San Gregorio Fault, the Monte Vista/Berrocal Fault, and the Calaveras or Hayward Fault Zones in the east bay. Faults that cross Stanford lands include Frenchman's Road Fault, Stanford Fault, San Juan Hill Fault, and the Basalt Quarry faults. These are not considered to be active because they have not shown seismic displacement within the last 2,000 years (GUP EIR, 2000). The Stock Farm Monocline, which is located in Management Zone 4, is highlighted on the Santa Clara County Geologic hazard map as an area capable of producing minor ground deformation in conjunction with displacement along other faults in the area. Additional information on these faults can be found in the Stanford University General Use Permit Environmental Impact Report.

4.1.1.3 Soils

There are many soil types on Stanford lands. Most have low to moderate erodibility, but there are a few areas with highly erodible soils. Measures to reduce or prevent erosion are normally required of development under a local stormwater pollution prevention program. Prime Farmland, Unique Farmland, Farmland of Statewide Importance, and Farmland of Local Importance are also designated on Stanford lands, and comprise about 200 acres (Figure 4-4, Farmland).

Federal actions that result in the irreversible conversion of Farmland (Prime, Unique, Farmland of Statewide or Local Importance) to non-agricultural use are subject to the Farmland Protection Policy Act (FPPA). The FPPA is intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to non-agricultural uses, however, the FPPA does not authorize the Federal government to regulate the use of private or non-Federal land or, in any way, affect the property rights of owners. Farmland definitions are provided below:

Prime Farmland – Land designated as having the best combination of physical and chemical characteristics for the production of crops. It has the soil quality, growing season and moisture supply needed to produce sustained high yields of crops when treated and managed, including water management, according to current farming methods. Prime Farmland must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date. It does not include publicly owned lands for which there is an adopted policy preventing agricultural use.

Unique Farmland – Unique Farmland is land which does not meet the criteria for Prime Farmland or Farmland of Statewide Importance and that is currently used for the production of specific high economic value crops (as listed in the last three years of California Agriculture produced by the California Department of Food and Agriculture). It has the special combination of soil quality, location, growing season and moisture supply needed to produce sustained high quality or high yields of a specific crop when treated and managed according to current farming methods. Examples of such crops may include oranges, olives, avocados, rice, grapes, and cut flowers. It does not include publicly owned lands for which there is an adopted policy preventing agriculture use.

Farmland of Local Importance – Land of importance to the local economy, as defined by each county's local farm advisory committee and adopted by its Board of Supervisors. Farmland of Local Importance is either currently producing, or has the capability of production, but does not meet the criteria of Prime Farmland, Farmland of Statewide Importance, or Unique Farmland.

Farmland of Statewide Importance – Farmland of Statewide Importance is land other than Prime Farmland which has a good combination of physical and chemical characteristics for the production of crops. It must have been used for the production of irrigated crops within the last three years. It does not include publicly owned lands for which there is an adopted policy preventing agricultural use.

4.1.2 Cultural and Historical Resources

The affected environment for cultural and historic resources includes Stanford University and immediate environs. Cultural resources refer to pre-historic finds, including fossils and Native American resources. For these resources it is important to understand what finds have been made in the immediate area, including on and off campus, because similar resources could be unearthed during activities related to the HCP. Historic resources include buildings, structures and sites. While there is a concentration of potential historic resources in the central campus area, there are also resources in the less developed lands currently under agricultural or open space uses. Many historic resources relate to the establishment of Stanford University or other local history.

The information provided in the discussion of the affected environment was derived from the Stanford Community Plan/General Use Permit EIR, Historic and Archaeological Resources. The information on the presence of cultural and historic resources within the HCP Management Zones was obtained from Laura Jones, Director of Heritage Services and University Archaeologist for Stanford University.

4.1.2.1 Historic Sites at Stanford

The Santa Clara County Historical Heritage Commission (HHC) oversees the protection of historical resources throughout the unincorporated areas of Santa Clara County. The Santa Clara County Heritage Resource Inventory (County Inventory) is the official listing of historic sites and is maintained by the Commission. San Mateo County does not maintain an inventory; potential historic and prehistoric sites are reviewed by the San Mateo County Planning Office.

The Santa Clara County Inventory consists entirely of sites that have been listed, or determined to be eligible for listing, on the National Register of Historic Places and/or the California Register of Historical Resources. As of May 2000, the Inventory included 21 resources located on Stanford lands within Santa Clara County. The Inventory does not provide a comprehensive or exhaustive inventory of historic resources at Stanford. Historic sites on campus are mainly located in Management Zone 4 (Figure 4-5, Historic Resources Inventory with Management Zones). There are a number of potential historic resources in Management Zones 1, 2 and 3 – farm houses, barns, bridges, Searsville dam, Felt Reservoir dam and some historic archaeological sites as well.

Stanford adopted policies to protect archaeological resources in 1986, and maintains a professional staff position (University Archaeologist), collections and archives on its archaeological resources. Procedures have already been put in place to assure that all routine ground disturbing activities are conducted in a manner that avoids impacts to known cultural resources. These procedures include the following:

1. design the project or activity to avoid known resources,
2. conduct archaeological testing for unknown resources,
3. comply with the Secretary of the Interior's standards for the treatment of historic properties (Weeks and Grimmer 1995),
4. if cultural resources are discovered, minimize further disturbance,
5. if impacts cannot be avoided, develop site-specific mitigation measures in consultation with local permitting agencies.

4.1.2.2 Archaeology

All surface areas of Stanford University have been surveyed for archaeological sites. As of October 2005, 65 prehistoric archaeological sites (including isolates, lithic scatters, millingstone/petroglyphs, and occupation sites) have been identified and mapped (L. Jones pers. comm.). A comprehensive inventory of these sites is maintained by the Campus Archaeologist. Site records are also on file with the Northwest Information Center of the California Historical Resources Inventory at Sonoma State University. Roughly 50 of the 65 prehistoric sites are situated along the creek corridors in Zone 1 and many extend into the expanded creek buffers of Zone 2. The sites are mostly Ohlone Indian "occupation sites and cemeteries." There also are a few "bedrock features" located in these Zones.

4.1.2.3 Paleontology

Most of the paleontological remains in the Stanford area are small marine fossils such as clams and snails. Stanford lands also contain old quarries, creek beds, cut slopes and rock outcroppings which are of geological interest and educational value. The best exposed rock formations are along Arastradero Road.

The Berkeley Museum has recorded four paleontological sites on or near Stanford lands (EIP 1989:15-7). The most important of these is a site near the SLAC National Accelerator Laboratory where a *Paleoparadoxia* (an extinct marine mammal of the order Desmostylia) was uncovered during excavation. It is the best-preserved and most complete *Paleoparadoxia* skeleton found outside of China. The other three sites contained bones of a seal-like mammal called *Allodesmus* and the remains of other marine mammals. In addition, a feature containing fossilized remains of terrestrial fauna from a much later period (Pleistocene) was encountered in a deep excavation near the Stanford Medical Center (L. Jones, University Archaeologist, pers. comm.).

The United States Geological Survey (USGS) recorded three additional fossil discoveries on or near Stanford. These include a large mastodon tusk found in the bank of San Francisquito Creek,

and fragments of petrified mastodon and/or dinosaur bone near Junipero Serra Boulevard and along Foothill Expressway. Isolated fragments of fossil ribs and lower limbs from late Pleistocene mammals have also been discovered in various locations and have been collected and catalogued by Stanford.

4.1.3 Hydrology and Water Quality

The existing surface drainage, water diversions, groundwater hydrology and water quality are described here. The affected environment is limited to Stanford lands except where noted. Water supply is addressed under Public Services.

4.1.3.1 Existing Conditions

Watersheds. Most of Stanford's lands (5,960 acres out of 8,180 acres) are located within the San Francisquito Creek watershed. The main drainages in this area include San Francisquito and Los Trancos creeks. Other surface waters in this watershed are Felt Reservoir, Searsville Reservoir, and Lagunita. San Francisquito and Los Trancos creeks flow in a northerly or northeasterly direction from the Santa Cruz Mountains to San Francisco Bay. San Francisquito Creek forms the boundary between San Mateo and Santa Clara counties. There are several off-site tributaries that drain into the San Francisquito Creek watershed including West Union Creek and Dry Creek that flow into Bear Creek; McGarvey Gulch Creek and Squealer Gulch Creek that flow into West Union Creek, and Bear Gulch Creek which flows into Bear Creek.

Roughly 2,100 acres of Stanford University lands are located within the Matadero Creek watershed. The primary drainage is Matadero Creek, which flows in a northeasterly direction through Stanford University and Palo Alto to San Francisco Bay. Deer Creek and Arastradero Creek are tributary to Matadero Creek. The downstream portion of Matadero Creek is channelized in Palo Alto.

In addition, the remaining small portions of Stanford are within the Barron Creek watershed and the Atherton Creek watershed. Barron Creek flows through the Stanford Research Park on the extreme eastern portion of Stanford lands. Atherton Creek flows near the Highway 280/Sand Hill Road interchange. All watersheds drain to the San Francisco Bay.

The approximate watershed boundaries within the study area are shown in Figure 2-2 (Primary Watershed Basins in Chapter 1 of the DEIS). Note that the creeks included in the hydrology discussion are just those tributaries that are on the Stanford lands. There are off-site tributaries that flow into the primary creeks as well.

Generally, Stanford's lands slope in a northerly direction with elevations ranging from approximately 690 feet on the southwest portion in Jasper Ridge Biological Preserve, to approximately 40 feet on the north near El Camino Real. Average annual precipitation maps show that Stanford land receives between 15 and 20 inches of rain per year (Western Regional Climate Center, 2006).

4.1.3.2 Groundwater

Stanford is underlain by both an unconfined zone (where groundwater recharge can occur) and a confined zone (where recharge cannot occur). The confined zone contains a naturally occurring impermeable layer preventing water movement from the ground surface to the aquifer. The unconfined zone at Stanford is relatively small, consisting of a swath of land between the main quad and Junipero Serra Boulevard, stretching west to Sand Hill Road and east to Stanford Avenue. The eastern portion of the unconfined zone south of the main quad is within Management Zone 4. The western portion of the unconfined zone includes Lagunita and the golf course in Management Zones 1, 2, 3, and 4. The remainder of Stanford land is within the confined zone.

4.1.3.3 Hydrology and Flooding

Because changes in runoff and flow pattern from development can result in downstream flooding, the affected environment for flooding is extended to include downstream areas that drain runoff from Stanford's land to San Francisco Bay.

Historically, both San Francisquito Creek and Matadero Creek have flooded. Even without significant development, San Francisquito Creek overtopped its banks eight times between 1910 and 1972 (Northwest Hydraulic Consultants 2004). The most recent flood occurred in 1998 with a peak of 7,200 cubic feet per second (cfs) at the Stanford University gage and resulted in significant flooding downstream of Middlefield Road (Jones & Stokes 2006). Over 1,700 residential and commercial buildings were affected and caused more than $26.6 million in property damages (Federal Register, 2006b).

While the floods are usually in the downstream reaches, San Francisquito Creek did flood once near Alpine Road in 1982. Currently, the reaches of San Francisquito Creek between El Camino Real and San Francisco Bay are designated as flood zones that can overflow during the 100-year flood (SCVWD, 2006).

Santa Clara County approved a Storm Water Detention Plan which was developed by Stanford for the Matadero Creek watershed. Stanford is responsible for implementing phased measures consistent with the plan prior to development of new impervious cover within the Matadero Creek watershed (Santa Clara County, 2006). Stanford constructed storm water detention basins near El Camino Real and Serra Street in 2001 to detain peak flows in Matadero Creek.

Stanford and Santa Clara County reached an agreement on the approach and engineering design criteria for detention provisions to avoid increases in peak runoff flow rate from Stanford in the San Francisquito Creek watershed. As a condition of GUP approval, Stanford was required to implement a storm drainage master plan, and to date Stanford has offset anticipated runoff from a substantial portion of its future development under the 2000 GUP in compliance with Conditions of Approval N.2 and N.3 (Santa Clara County, 2006) through construction of storm water detention basins in 2003.

Future development beyond what has been approved by the GUP is required to comply with the Santa Clara Valley Urban Runoff Pollution Prevention Program and San Mateo Countywide Water Pollution Prevention Program (SMCWPPP). Municipalities in these programs share

common NPDES permits in order to discharge storm water into San Francisco Bay. Developments in the jurisdiction of either program are subject to provision C.3 of the NPDES permit. Provision C.3 applies to new development or redevelopment creating or replacing over 10,000 square feet of impervious surface. The provision requires projects to incorporate site design, source control measures, and storm water treatment Best Management Practices into the project design. Projects subject to SCVURPPP or SMCWPPP that disturb one or more acres could also be subject to Hydromodification Management Plan requirements to prevent changes in runoff or flow pattern as a result of development.

4.1.3.4 Water Quality

Surface Water. Storm water quality was analyzed in the Stanford GUP EIR. Samples taken from 1993 to 1999 showed pollutant concentrations that were typical for urban areas. However, San Francisquito Creek and Matadero Creek are on the 2006 CWA Section 303(d) list of water quality limited segments (SWRCB, 2006). San Francisquito Creek is listed as polluted by diazinon and sedimentation/siltation. The potential sources of contamination for diazinon were identified as urban runoff/storm sewers and the source for sedimentation/siltation was identified as nonpoint source. Matadero Creek is also on the list as impaired by diazinon from urban runoff/sewers. Los Trancos and Deer creeks are not listed on any CWA 303(d) lists.

In addition to minimizing hydromodification, the NPDES permits for the SCVURPPP and San Mateo Countywide SMCWPPP aim to reduce pollution in urban runoff to the maximum extent practicable by using regulatory, monitoring and outreach measures to improve surface water quality.

Groundwater Quality. The analysis of three wells studied for the GUP EIR found that groundwater at Stanford is potable. The constituent concentrations were in compliance with primary domestic water quality standards (safe to drink) for nitrate and the secondary domestic water quality drinking water (consumer acceptance limits) for the other nine constituents typically measured.

Water Quality Protections. Stanford lands include agricultural and equestrian leaseholds that have the potential to impact surface water quality. Stanford requires the lessees to adhere to Best Management Practices (BMPs) for management of animal waste, compost and sediment in order to protect creek water quality. The BMPs address animal washing; horse boarding, pasturing and training; stockpiling of animal waste, compost or nursery-container materials; disposing of animal waste; land application of manure and compost; maintaining unpaved roads adjacent to creeks; and other sediment-producing activities adjacent to creeks.

At the Stanford Golf Course, integrated pest management is used for golf course maintenance. Pesticides for weed and insect control are used as a last resort and in accordance with all State and local pest control regulations. Spot treatment is used rather than broadcast methods, a naturalized buffer is maintained along the creek, and the “roughs” have been naturalized to provide understory vegetation for wildlife. Fertilizers are not applied during the rainy season because they could be transferred away from the golf course in storm water. When grading is necessary, standard BMPs are implemented to protect water quality.

In addition to the BMPs, lessees in Portola Valley and Woodside must comply with ordinances pertaining to stables. Limitations on construction near creeks are also imposed by Portola Valley, Santa Clara County, and San Mateo County. These controls are in place in order to protect the riparian habitats and water quality. Local creek protection policies that also protect water quality are listed in Table 4-1.

Bank Stabilization and Erosion. The areas on Stanford's lands that are most prone to erosion are located along the creeks. Stanford conducts both routine and emergency creek maintenance work in and around all of the creeks on its property (including Deer, Matadero, Los Trancos, San Francisquito, Corte Madera, Bear, and Sausal). Routine maintenance consists of debris removal, including compliance with requests from the Santa Clara Valley Water District to remove downed trees and other debris from the creeks. This work is typically conducted during periods of low flow, but if an emergency arises, work in the creek can occur at any time of the year. Tree snags and other debris are removed only if they are disrupting the free flow of water or are causing undo erosion.

Bank stabilization regularly occurs in the more urbanized areas of campus, such as areas near the Oak Creek Apartments and the Children's Health Council along San Francisquito Creek, near the Ladera Tennis Club along Los Trancos Creek, and near the Stanford Research Park along Matadero Creek. Recent bank stabilization efforts at Stanford have involved sinking pillars into the existing bank, with little structural work done on the surface. In a number of locations, however, gabions, rip-rap, and concrete aprons are present. These older types of bank stabilization methods have a tendency to fail, and future repair work is therefore anticipated as a Covered Activity in the HCP.

4.1.3.5 Water Diversion

Stanford University has diverted water from Los Trancos Creek and from San Francisquito Creek since the early 1900s. The diverted water is used primarily for irrigation of the Stanford golf course, athletic fields, and campus landscaping, as well as for environmental, recreational, aesthetic and groundwater recharge purposes. In an emergency, this water could supply domestic and municipal water to the campus and surrounding communities.

Stanford diverts creek flow up to 40 cubic feet per second (cfs) from Los Trancos Creek (the capacity of the flume). The water is diverted to Felt Reservoir for storage. Because Felt Reservoir is part of Stanford's "Lake" water system, existing pipelines and canals allow water from the Los Trancos diversion to be conveyed to Lagunita. On San Francisquito Creek, Stanford operates the San Francisquito Creek Pump Station, which consists of two sets of pumps. One set of pumps diverts water to Lagunita, at a maximum rate of 4 cfs. The other set of pumps diverts water to the Lake water system that extends from Felt Reservoir down to Stanford lands. This set of pumps is currently being modified under the SHEP to increase its pumping capacity from 4 cfs to 8 cfs.

Because of concerns that the diversion facilities were barriers to migrating fish, Stanford installed a fish ladder at the Los Trancos Diversion facility in 1995. The listing of steelhead as a threatened species in 1997 prompted the fisheries agencies to request modification of the Los Trancos facility to further reduce impacts to steelhead. Stanford responded by developing the SHEP which improved the fish ladder and fish screen at the Los Trancos Diversion as well as

improved the fish screen and pumping facilities at the San Francisquito Pump Station. The SHEP also includes improved bypass flows to protect the stream and aquatic habitat downstream of the water diversion facilities. Stanford has obtained permits for construction of the modified diversion facilities from the Corps pursuant to the Clean Water Act and from the California Department of Fish and Game pursuant to Section 1602 of the Fish and Game Code. Construction of the SHEP started in 2009.

The Biological Opinion for the Steelhead Habitat Enhancement Project is provided in Appendix A of the HCP (Appendix B of the DEIS).

4.1.4 Air Quality

This section describes the ambient air quality for the San Francisco Bay Area Air Basin where Stanford University is located.

Air quality is influenced greatly by the sources of emissions and various climatic and topographic conditions. Stanford lies in the Santa Clara Valley, which has high potential for air pollution based on topography, wind patterns, and the high amount of vehicle use.

Stanford is within the San Francisco Bay Area Air Basin of the Bay Area Air Quality Management District (BAAQMD). BAAQMD monitors and enforces district, state of California, and National ambient air quality standards.

4.1.4.1 National and State Ambient Air Quality Standards

National Ambient Air Quality Standards (AAQS) were established by the EPA to set maximum legally allowable concentrations for six pollutants, called criteria pollutants. These six criteria pollutants are ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide and lead. State AAQS were established by the California Air Resources Board for the six criteria pollutants and also include limits for visibility reducing particles, sulfates, hydrogen sulfides and vinyl chloride. The BAAQMD operates a network of monitoring sites in the area and maintains a database of air quality data collected from these monitoring locations. The closest monitoring site is located 5 miles north in Redwood City.

The San Francisco Bay Air Basin is an attainment area for all national AAQS set forth in the Federal Clean Air Act with the exception of ozone. In June 2004, the Bay Area was designated a marginal nonattainment area for the national 8-hour ozone standard. With regard to state AAQS, the basin also exceeds the more stringent State AAQS for ozone and fine particulate matter (PM_{10} and $PM_{2.5}$). All other pollutants are designated as “attainment” or “unclassified” for Federal and state AAQS. Air quality standards are typically exceeded when weather conditions are conducive to high pollution levels. These include cold windless nights (for PM_{10}) and hot sunny afternoons (for ozone).

4.1.4.2 Historic Context and Future Trends

Despite an increasing population, the San Francisco Bay Area Air Basin has seen a significant decrease in most air pollutants affecting local air quality since 1975. This is a result of numerous regulations on stationary and mobile source emissions and toxic emissions. Considerable

decreases have been achieved for Total Organic Gases (TOG; gaseous organic compounds, including reactive organic gases and relatively unreactive organic gases such as methane), Reactive Organic Gases (ROG; classes of organic compounds that react more rapidly in the atmosphere to form photochemical smog or ozone), nitrogen oxides (NOx), sulfur oxides (SOx) and carbon monoxide (CO). Particulate matter (PM_{10} and $PM_{2.5}$) emissions have remained largely unchanged.

Between 1975 and 2005, TOG were reduced by 736 tons per day, ROG were reduced by 980 tons per day, NOx was reduced by 432 tons per day, SOx by 161 tons per day, and CO by 6,633 tons per day. Past, current, and future estimates for PM10 and PM2.5 show pollutant levels slightly increasing over time. Mobile sources of pollution (e.g., cars, construction equipment) are a main source of PM10 pollution. Despite increased regulations on these sources, the increases in population, number of miles driven, and number of cars over time has still resulted in increases in PM10 levels in the air basin.

Table 4-2 shows average annual past and current emissions and future estimated emissions, in tons per day (excluding natural sources). The information is also displayed graphically in Figures 4-6 (Average Annual Forecasted Emissions) and 4-7 (Annual Average CO Emissions). Although overall emissions have improved over time, the air basin remains out of compliance for particulate matter and ozone emissions.

In 1996, the San Francisco Bay Area Air Basin experienced 34 days where the state 1-hour ozone standard was exceeded. In 2005 (the most recent data available), the air basin experienced nine days where the state 1-hour ozone standard was exceeded.

The California Clean Air Act requires air basins in non-attainment for the state 1-hour ozone standard to prepare a plan to describe how the air basin will achieve compliance with the standard as expeditiously as practicable. For the San Francisco Bay Area, this document is the 2005 Ozone Strategy prepared by the BAAQMD, the Metropolitan Transportation Commission (MTC), and the Association of Bay Area Governments (ABAG). The 2005 Ozone Strategy documents the implementation of various control strategies through Air District regulations, incentive programs, and transportation programs to improve local air quality and reduce transport of pollution to neighboring air basins.

Mobile source emissions from on-road vehicles emit a large percentage of ozone precursors (ROG and NOx). In the summer of 2005, on-road vehicles emitted 285 tons or 53 percent of NOx emissions and 144 tons or 36 percent of ROG emissions per day (BAAQMD 2006). The 2001 Regional Transportation Plan (RTP) for the San Francisco Bay Area specifies how funds for transportation improvements will be spent over the next 25 years. The Federal Clean Air Act requires regional transportation plans to conform to the Federal ozone attainment plan, that is, the proposed improvements cannot contribute to a violation of Federal air quality standards. The Transportation Air Quality Conformity Analysis (MTC 2002) reviews the transportation emission budgets that are the basis for the conformity analysis and then compares the projected motor vehicle emissions from the 2001 RTP to this budget. An emission budget is the amount of a particular pollutant which is associated with attaining the Federal air quality standard, and future on road motor vehicle emissions must be lower than this budget to conform.

4.1.5 Noise

This section describes the existing noise environment, including the primary sources of noise at Stanford. It also explains the location of the Management Zones relative to the primary noise sources.

4.1.5.1 Noise Terminology

Decibels and A-weighted Decibels. Noise is often defined as unwanted sound. Research on human hearing has shown that a 3-decibel (dB) increase in sound is barely noticeable, but a 10-dB increase would be perceived as twice as loud. Noise measurements are given a frequency-dependent adjustment called "A-weighting" in order to more closely mimic how humans hear. A-weighted sound levels are termed "dBA" or "dB(A)."

Noise in the Environment. How well the sounds (dBA) are heard depends on what the surrounding environment is like. Noise levels usually change continuously during the day, and can have a daily, weekly, and yearly pattern. The most common ways to describe noise in terms of the existing environment are called the energy equivalent sound level (L_{eq}), the maximum noise level (L_{max}), and the day-night average sound level (L_{dn}).

Because environmental noise varies with time, it is beneficial to define certain measurement terms to characterize this fluctuating quantity. The true energy average level over a specific period is defined as the equivalent sound level, abbreviated as L_{eq}. It is the sound level during an interval that is equivalent to a perfectly constant level containing the same acoustic energy over the same interval. Hence, L_{eq} provides a measure of the true energy average sound level in an area and includes all sporadic or transient events.

The L_{dn} is the average A-weighted sound level over a 24-hour period with a 10-dB adjustment added to the sound level between 10:00 PM and 7:00 AM. The adjustment accounts for quieter nighttime hours and increased human sensitivity to sound.

4.1.5.2 Existing Noise and Sources

The noise environment at Stanford was assessed in 2000 for the GUP EIR. At that time the measured existing background noise levels were generally within the expected range of the land use where the noise was measured (e.g., urban daytime, commercial area near heavy traffic). The primary source of noise in the Stanford area is from local roadways including: Junipero Serra Boulevard, Sand Hill Road, Page Mill Road/Oregon Expressway, El Camino Real, Embarcadero Road, University Avenue, Alpine Road and Interstate 280. Based on the L_{eq} data taken at five monitoring stations, noise from traffic varied from 57 dBA (typical urban daytime) to 72 dBA (commercial area with heavy traffic). The highest L_{eq} which was 72 dBA was measured in the El Camino Real area (Management Zone 4).

Management Zones 1, 2 and 3 are located in quieter environments than Management Zone 4, where most campus development is located. The primary noise sources in Management Zones 1, 2 and 3 are the county and state roadways around Stanford mentioned above; Junipero Serra Boulevard, Sand Hill Road, Page Mill Road/Oregon Expressway, El Camino Real, Embarcadero Road, University Avenue, Alpine Road and Interstate 280. Sensitive noise receptors in these areas consist of scattered residential use and recreational routes.

Highway 280 near Alpine Road crosses Management Zones 1 and 2 of San Francisquito and Los Trancos Creeks. The remaining length of Highway 280 on Stanford land traverses Management Zone 3. Junipero Serra Boulevard/ Foothill Expressway is bounded on the north by Management Zone 4 until the length between Lagunita and Sand Hill Road where the area varies between Management Zones 1, 2 and 3. The area south of Junipero Serra/ Foothill Expressway between Deer Creek and Sand Hill Road is designated as Management Zones 1, 2, and 3. Foothill Expressway south of the Deer Creek stream area is designated Management Zone 4. Much of Sand Hill Road abuts Management Zone 4 except near the golf course where portions of Management Zones 1, 2, and 3 are adjacent to the road. Alpine Road parallels and crosses Management Zone 1. All other major roads that affect the noise environment at Stanford are adjacent to Management Zone 4.

Besides traffic, other significant noise sources noted in the GUP EIR included Caltrain, air conditioning units, heaters, emission stacks, scattered construction activities, and vehicle noise from parking lots. These sources are concentrated in Management Zone 4.

4.1.5.3 Noise Regulations

Santa Clara and San Mateo counties, the cities of Menlo Park and Palo Alto, and the towns of Portola Valley and Woodside all have Noise Elements in their General Plans as well as Noise Ordinances to protect the public from potentially excessive noise. A section on vibration is also included in the Santa Clara County Noise Ordinance. While the noise element is generally used as a planning guideline, a noise ordinance is legally enforceable. The noise ordinances generally establish acceptable noise levels based on land use and time of day and detail restrictions on noise and noise making devices as well as establish exceptions.

4.1.6 Traffic

The affected environment for traffic includes roads at Stanford and in the adjacent Menlo Park and Palo Alto areas (see Figure 4-8, Roadways and GUP EIR Traffic Study Intersections). In 2000, a comprehensive traffic study was conducted for the GUP application, and the results of that traffic study were included in the GUP EIR. The analysis indicates traffic conditions resulting from GUP buildout, which is expected to occur within the timeframe of HCP implementation. The GUP EIR assessed impacts at 43 intersections. The EIR also addressed public transportation, bicycle and pedestrian transportation, arterial roadways, intersections, freeways, and transportation demand management strategies. The results of that traffic study provide the baseline for this DEIS when evaluating the potential direct and indirect effects of the Proposed Action and the alternatives on traffic, although only about 30 percent of the GUP development has occurred (Santa Clara County, 2009),

The GUP EIR determined that there were significant, unavoidable traffic impacts associated with GUP-related land development. The GUP traffic study projected a net increase in vehicular traffic of 129 inbound trips and 182 outbound trips in the AM peak hour and 347 inbound trips and 450 outbound trips in the PM peak hour. These totals represent trips associated with academic facilities; new on-campus housing units for undergraduate and graduate students, hospital residents/post doctorates, faculty and staff; and a potential arena and performing arts center.

The GUP traffic study proposed a phased mitigation program that includes intersection capacity expansion (Tier 1 and Tier 2), traffic monitoring and travel demand management. The first measure is the "Tier 1 Intersection Capacity Expansion" at selected intersections. Following that, Stanford would undertake a program of traffic monitoring and travel demand management (TDM). The objective of the program would be to modify the travel behavior of students and Stanford employees such that there would be as few as possible "net new trips" occurring as a result of GUP-authorized land development at Stanford. The number of "net new trips" is defined as the increase in automobile trips during peak commute times in the peak commute direction as counted along a defined cordon around the central campus. Santa Clara County is monitoring compliance.

The final mitigation measure is the Tier 2 Intersection Capacity Expansion. These improvements would require Stanford to contribute its fair share to improving selected intersections in other jurisdictions. The Tier 2 intersection improvements would only be required if trip reduction monitoring determines that Stanford commute trips are increasing by 1 percent or more for any two of three consecutive years.

The GUP traffic study concluded that despite the proposed program of intersection improvements and trip reduction measures, it was not possible to definitively determine that intersection levels of service would be reduced to less than significant levels. Therefore, the projected traffic impacts were determined to be significant and unavoidable.

The final Conditions of Approval for the Stanford University General Use Permit include conditions of approval that apply to traffic. These generally include:

- Modification of specified intersections
- Continued compliance with transportation requirements established through the 1989 General Use Permit in order to continue mitigating for the population added to the campus under that use permit
- A program of "no net new commute trips"; if not successful, additional intersection mitigation would be required.
- Traffic level monitoring to determine change in net commute trips
- Participation in neighborhood traffic studies
- Project-specific traffic studies for certain development included in the GUP
- Management of construction traffic
- Preparation of a Special Events Traffic Management Plan
- Participation in regular multi-jurisdictional meetings regarding traffic issues on Stanford Avenue and Junipero Serra Boulevard.

4.1.7 Hazardous Materials/Waste

This section defines hazardous materials and hazardous waste, and describes the presence, handling, and use of hazardous materials and hazardous waste at Stanford. Applicable regulations are also described.

A material is considered hazardous if it appears on a list of hazardous materials prepared by a Federal, state, or local agency, or if it has characteristics defined as hazardous by such an agency. Chemical and physical properties such as toxicity, ignitability, corrosivity, and reactivity cause a substance to be considered hazardous. These properties are defined in the California Code of Regulations (CCR), Title 22, Sections 66261.20-66261.24. A "hazardous waste" is any hazardous material that is discarded, abandoned, or recycled. The criteria that render a material hazardous also make a waste hazardous (California Health and Safety Code, Section 25117).

Various Federal and state agencies exercise regulatory authority over the use, generation, transport, and disposal of hazardous substances. The primary Federal regulatory agency is the Environmental Protection Agency (EPA). The primary California state agency is the California Environmental Protection Agency (Cal-EPA), which may delegate enforcement authority to local agencies. The use and handling of hazardous materials are subject to numerous state, county and Federal laws. A description of these various laws and regulations can be found in the Stanford General Use Permit EIR.

The California Accidental Release Prevention law requires the preparation of a Risk Management Plan for facilities that handle more than a threshold quantity of a regulated substance. The list of regulated substances and their threshold quantities can be found in CCR Title 19, and can be downloaded from the California Emergency Management Agency (CalEMA) website. The main components of a risk management plan are: hazard assessment, prevention, and emergency response.

There are no known hazardous waste sites within Management Zones 1, 2, or 3. Hazardous materials and their use mainly occur on the main campus (Management Zone 4) within laboratories and environmental and sanitary service areas, all of which are managed in accordance with applicable Federal, state and local laws. Compliance with these laws and regulations is accomplished through various Stanford environmental health and safety departments, programs, and policies (see Table 4-3, Stanford Environmental Health and Safety Departments, Programs and Policies).

4.1.8 Public Services

Most of the utilities and services provided at Stanford University (Management Zone 4) are operated and maintained by Stanford, including electricity, water, and police services. Other services are provided through contracts with outside providers, such as the Palo Alto Fire Department. Utilities and services outside of the main Stanford campus in Management Zones 1, 2, and 3 include police, fire, schools, solid waste, wastewater, electricity and gas. These are supplied by various private and municipal residential and commercial utility service providers and are shown in Table 4-4 Public Services.

Water Supply System

Stanford obtains drinking and irrigation water from a number of sources in order to maintain reliability, flexibility and cost efficiency. Potable, chloraminated water is provided by the San Francisco Public Utilities Commission (SFPUC). Stanford also maintains groundwater wells that can supply potable water. There is also a non-potable water supply made up of water diversions from Los Trancos Creek, San Francisquito Creek, and Searsville Reservoir (Figure 4-9). The non-potable supply is used for irrigation and fire control, but could also be treated and used for drinking water.

Similar to a city, water management facilities at Stanford involve many components, including devices for monitoring and diverting creek water, over 200 miles of water and drainage pipes, reservoirs, dams, deep wells, open channels, fire hydrants, manholes, and meters.

Stanford's current allocation of potable water from the SFPUC is 3.033 million gallons per day (mgd). In the 2000 GUP EIR, GUP related development was projected to increase average daily consumption of water by 0.61 mgd to 3.21 mgd, which would exceed the allocation. The EIR identified that a minimum decrease in use of 0.18 mgd, (a 6 percent decrease in average daily consumption), would be needed to remain within the current allocation. In order to achieve this decrease in average daily consumption Stanford implemented a Water Conservation and Recycling Master Plan (Maddus Water Management and Stanford University, 2003). Stanford's average consumption in 2000 was 2.6 mgd. Its current average usage is 2.2 mgd, representing a 15.4 percent decrease in consumption since 2000.

Other Public Services

The Palo Alto Fire Department is under contract with Stanford to provide primary fire protection to most of the unincorporated Stanford lands. The Woodside Fire Protection District provides first response for Guernsey Field (Horse Park at Woodside on portion of Stanford land north of Sand Hill Road) and Jasper Ridge Biological Preserve. Other services and service providers for the various municipalities and Management Zones including police, fire, schools, solid waste, water, wastewater, electricity, and gas are listed in Table 4-4, Public Service Providers.

4.1.9 Land Use

This section describes Stanford's current land uses and the governmental jurisdictions that regulate Stanford's use of its lands, including potential future land uses. Potential future land uses are subject to the general plan designations and zoning ordinances described in this section. The relationship between Stanford's current and potential future land uses and the Management Zones described in the HCP is also described.

4.1.9.1 Regulatory Framework

Six local governmental entities have jurisdiction over Stanford University's land uses: Santa Clara and San Mateo counties, the cities of Palo Alto and Menlo Park, and the towns of Portola Valley and Woodside (see Figure 4-10, Governmental Jurisdictions). Santa Clara County and San Mateo County regulate Stanford's land uses within the unincorporated areas of the counties.

The cities and towns regulate land uses within their respective borders. The distribution of Stanford's lands in each of the six jurisdictions is listed in Table 4-5, Distribution of Stanford Lands across Jurisdictions.

Stanford's land uses are subject to regulation by applicable general plans and zoning ordinances that are mandated by state law. These include the following:

- Santa Clara County General Plan (1995)/Stanford Community Plan (2000)
- Santa Clara County Zoning Ordinance (2003)
- San Mateo County General Plan (1986) and Zoning Regulations (2002)
- City of Palo Alto Comprehensive Plan (1998) and Zoning Code (1978) and updates
- City of Menlo Park General Plan (1994) and Zoning Ordinance (2006)
- Town of Portola Valley (1998) and Municipal Code
- Town of Woodside (1988) and Municipal Code

4.1.9.2 Existing Land Uses

The existing land uses on Stanford lands are reflected in Figure 4-11 (Existing Land Use in Habitat Management Zones). The descriptions in the HCP correspond to how Stanford currently uses the lands, for example for academic use, open space or income-producing commercial use. Eight categories are shown, and these are defined below. The HCP describes current land uses and does not designate any of Stanford's lands for future land uses. Potential future uses are subject to the general plans and zoning ordinances of the six jurisdictions that have land use authority over Stanford.

Stanford's current land uses include the following:

Academic. These lands are currently developed and actively used for academic activities. Most of this use is located in the central campus, and all areas shown as Academic are in Management Zone 4.

Academic Reserve. These lands are currently undeveloped or contain a small amount of developed area and are held in reserve for future academic-related land uses. Academic Reserve lands lie mainly to the south of the central campus, throughout the foothills and contain Management Zones 1, 2 and 3 and small areas of 4.

Biological Preserve. These lands are within the boundary of the Jasper Ridge Biological Preserve, at the western edge of Stanford. Jasper Ridge Biological Preserve contains Management Zones 1, 2 and 3 and small areas of 4.

Commercial. Lands currently developed with income-producing commercial uses, including the Stanford Research Park, Stanford Shopping Center, and the Rosewood Hotel located at Sand Hill Road and I-280. All of the land in commercial use is in Management Zone 4.

Institutional. These are lands that are currently developed with institutions that have academic affiliations, and include the SLAC National Accelerator Laboratory, the Stanford Medical Center, and the Carnegie Foundation. The Stanford Medical Center is located in Management Zone 4. The SLAC National Accelerator Laboratory contains Management Zones 2, 3 and 4, and the Carnegie Foundation is located in Management Zone 4 adjacent to Management Zone 1.

Open Space. These open spaces are the open spaces in the central campus area. They include lands that are essential to the historic farm and character of the campus, and designated parks within residential neighborhoods. Most of these lands contain Management Zone 4, with the important exception of the open space next to Lagunita that contains Management Zone 1.

Recreation. Lands available for public recreational use include the driving range, golf course, and recreational routes and trails (Figure 4-12, Recreational Uses). Stanford allows recreational use of private service roads in the foothills south of Junipero Serra Boulevard commonly called the Dish Trail. In addition, under the final conditions of the GUP, Stanford is required to dedicate easements for, develop, and maintain two public trail alignments. These alignments connect to regional trails and are important for the completion of the Santa Clara County Countywide Trails Master Plan. The Stanford Golf Course and driving range are located on the west side of campus, near the intersection of Junipero Serra Boulevard and Alpine Road.

The Dish Trail is located in Management Zones 1, 2 and 3, and traverses the CTS Reserve. The two public trail alignments are on the west and east sides of the Stanford foothills. On the west side the trail generally follows the alignment of Los Trancos and San Francisquito creeks and then turns east along Sand Hill Road. This trail is in or adjacent to portions of all four Management Zones. The public trail on the east side generally follows Page Mill Road and Arastradero Road; it is also in or adjacent to all four Management Zones, it crosses Matadero Creek twice and parallels a short section of Deer Creek.

The Stanford Golf Course contains land from all four Management Zones. Most of the golf course contains Zone 4; areas adjacent to San Francisquito Creek contain Management Zones 1, 2 and 3.

Residential. These lands are currently developed with housing, and are all in Management Zone 4.

The existing land uses also include leaseholds for the institutional, commercial and residential uses described above, as well as equestrian and agricultural uses. Leaseholds on Stanford lands are described in the HCP in Chapter 3.8, and are shown in Figures 4-13, Leaseholds: Agricultural and Equestrian, and Figure 4-14, Leaseholds: Commercial/Institutional. Land uses in the leaseholds include agriculture (seasonal crops, vineyard, plant production/wholesale nursery), equestrian (horse boarding and training, open pasture, trails), grazing (cattle), institutional (SLAC National Accelerator Laboratory; independent research institutions in the Lathrop district), and commercial (Stanford Research Park, Stanford University Medical Center, Stanford Shopping Center, commercial housing). Management Zones 1, 2 and 3 and small portions of 4 include agricultural, equestrian, institutional and grazing leaseholds.

Existing Land Uses by Jurisdiction and Management Zone. All of the jurisdictions contain some amount of Management Zones 1, 2 and 3.

Unincorporated Santa Clara County. This includes the core campus area and most of the foothills east of Alpine Road. Existing land uses in these areas are Academic, Academic Reserve, Institutional, Open Space, Recreation, and Residential (Figure 2-3, Land Use).

Unincorporated San Mateo County. This area lies east of Los Trancos Creek and the portion of San Francisquito Creek downstream of the confluence with Los Trancos Creek. The land uses are predominantly Biological Preserve (Jasper Ridge) and Academic Reserve. There is also Institutional use (SLAC National Accelerator Laboratory), and small areas of Academic and Open Space uses.

City of Palo Alto. These lands include the Stanford Research Park, an area south of Felt Lake, and the Stanford Hospital and Stanford Shopping Center complex. The land uses in these areas are primarily Commercial, but also include Institutional, Residential, and Open Space. Palo Alto lands are located on the northwest and the southeast sides of the central campus (Figure 4-10 Governmental Jurisdictions).

Town of Woodside. A small portion of western Stanford lies in the Town of Woodside, near Searsville Reservoir. Land uses are currently Biological Preserve, Residential, and Academic Reserve.

Menlo Park. A small amount of Stanford land lies in Menlo Park to the north along Sand Hill Road. The current Menlo Park land uses are Commercial, Open Space, Institutional, Recreation, and Residential.

Portola Valley. Portola Valley has jurisdiction over a triangular shaped area near the intersection of Arastradero Road and Alpine Road. Portola Valley's jurisdiction extends on both sides of Alpine Road and thus includes a section of Los Trancos Creek.

Adjacent Land Uses. Stanford University is surrounded by residential, commercial, office park, agricultural uses, and an interstate freeway. Land uses bordering Stanford's Santa Clara County lands are primarily residential, with some commercial uses along El Camino Real. Those in San Mateo County are agricultural, low-density residential and include a small commercial area on Alpine Road in the community of Ladera. Interstate 280 crosses the Stanford foothills. Low-density residential and agricultural uses occur in the foothills in the adjacent towns of Los Altos Hills, Palo Alto, Portola Valley and Woodside. Higher-density residential, commercial and office park uses border the campus in Palo Alto near El Camino Real. There is also higher density residential development north of Stanford in Menlo Park.

4.1.9.3 Potential Future Land Uses based on General Plan Designations and Zoning

Each of the six jurisdictions has zoned Stanford's lands differently in their zoning ordinances and also designate Stanford's land for different land uses within their respective general plans. These are described below for each jurisdiction.

Future development in Zones 1, 2 and 3 at Stanford includes development currently authorized under the General Use Permit issued by Santa Clara County in 2000 and future development that could reasonably occur in Management Zones 1, 2 and 3 beyond the GUP and within the 50-year timeframe of the HCP. This future development beyond the GUP is described in the HCP

(Section 3.10.2) as totaling 50 to 150 acres, which could support between 1 and 3 million gross square feet of academic development or 200 to 750 single-family housing units, or a combination of the two, in the 50-year term of the HCP.

Whatever development occurs in the future would need to be consistent with the applicable general plan designations and zoning, as well as with the Minimization Measures described in the HCP. Such development would also undergo separate environmental review in the jurisdiction where it is located.

4.1.9.3.1 Santa Clara County

The 1995 Santa Clara County General Plan serves as the principal means of setting goals and overall policy direction for physical development and use of lands within the unincorporated area of the county that includes Stanford. In 2000, the County adopted a Stanford Community Plan and approved a General Use Permit. The primary purpose of the Community Plan is to guide future use and development at Stanford in a manner that incorporates the County's General Plan principles of compact urban development, open space preservation, and resource conservation.

Prior to the adoption of the Community Plan, the principal means of guiding land use and development for Stanford lands was the "General Use Permit," or GUP. The GUP served as a form of master use permit under which Stanford received approvals for development, consistent with the provisions of the County's Zoning Ordinance. The General Use Permit remains the principal means for implementing the Community Plan. The GUP contains conditions for review of individual projects, as well as provisions requiring certain actions, such as regular monitoring and reporting. When development reaches the limits established by the GUP, Stanford will need to obtain new land use approvals from the County before any additional development can occur.

The Community Plan also established an Academic Growth Boundary (AGB) that contains sufficient land to accommodate the approved GUP development, and perhaps more, depending on Stanford's needs and the County's future land use policies. Inside of the AGB is land that is already developed or that may be developed under the 2000 GUP (Santa Clara County, 2000a). The allowable land uses differ on either side of the AGB. Management Zone 1, 2 and 3 lands occur both inside and outside of the AGB.

The AGB generally follows Junipero Serra Boulevard north from Page Mill Road to just north of Lagunita where the AGB juts into the foothills, skirts the golf course, and ends at Alpine Road. Almost all of the area within the AGB is within Management Zone 4 with the exception of areas adjacent to Lagunita and Campus Drive West which are in Management Zones 1 and 2. The allowable uses inside the AGB are summarized in Table 4-6.

The area containing Management Zones 1 and 2 near Lagunita is within the AGB and is developable under the 2000 GUP. No specific development is currently planned. The other areas of Management Zones 1, 2 and 3 within the AGB are along San Francisquito Creek adjacent to the golf course and are already developed. These areas are also designated as part of the Special Conservation Area in the Community Plan.

Outside of the AGB, the lands that are largely undeveloped are designated in the Community Plan as Special Conservation and Open Space/Field Research (see Table 4-7). Most of Management Zone 1 outside of the AGB is designated as Special Conservation Area, and development is not allowed except when it supports conservation efforts. This includes the portions of Zone 1 adjacent to San Francisquito/Los Trancos and Matadero/Deer creeks as well as most of the tiger salamander habitat south of Junipero Serra Boulevard.

A small portion of Zone 1, and all of Zones 2 and 3 south of Junipero Serra Boulevard are designated as Open Space/Field Research. These include field study, utility infrastructure, grazing/agricultural uses, recreational activities, specialized facilities (e.g., radio antennas), and environmental restoration (Table 4-7). The population density and building intensity are expected to be quite low due to the nature of the uses allowed in the Open Space/Field Research and Special Conservation Area designations. The maximum allowable development on the lands outside the AGB under the GUP is 15,000 gross square feet (gsf).

4.1.9.3.2 San Mateo County

The land use designations for Stanford lands in San Mateo County are open space, institutional, future study area. The zoning is RE/S11, residential estate. The allowable uses under this zoning are listed in Table 4-8. This zoning allows housing on a 1- to 5-acre minimum lot determined by slope, as well as public parks/playgrounds, farming, residential day care, and kennel/cattery uses. Additional uses that are allowable with a conditional use permit include schools, libraries, fire stations, churches, riding academies, golf courses, and non-commercial clubs.

4.1.9.3.3 City of Palo Alto

The general plan designations and zoning for Palo Alto are shown in Table 4-9. As explained above, the Stanford lands in Palo Alto occur on both the north and south sides of Stanford.

On the north side, Zones 1 and 2 occur along San Francisquito Creek within an otherwise heavily developed corridor. The Comprehensive Plan (Palo Alto's General Plan) designations and zoning reflect current development. Although the current zoning would permit the development of currently undeveloped areas, the remaining undeveloped space in this area will likely remain undeveloped. This is because the areas are small, in streamside open space, and contain Management Zones 1 and 2.

On the south side, Stanford's lands are zoned as Agricultural Conservation District next to Deer Creek, and as Planned Community on Arastradero Road. The Comprehensive Plan designation for these lands promotes primarily open space uses.

4.1.9.3.4 Town of Woodside

In Woodside, land containing Management Zones 2 and 3 are designated in the General Plan as Open Space/Environmentally Sensitive Area (OS/ESA) and Residential/Environmentally Sensitive Area (R/ESA). The OS/ESA designation requires a 10-acre or larger minimum lot size and no minimum lot size for open space. The R/ESA designation allows a 3- to 10-acre minimum lot size. The zoning is Open Space for Preservation of Natural Resources (OSN) and Special Conservation District (SCP5), as described in Table 4-10. There are no areas of Zone 1 in Woodside.

4.1.9.3.5 Town of Portola Valley

Stanford's land in Portola Valley is mostly designated in the Portola Valley General Plan as Conservation-Residential. This designation permits low-density residential development with one housing unit per 2 to 4 acres, depending upon slope and geologic stability. The lands adjacent to Los Trancos Creek are designated as Greenway in the general plan. Stanford's lands are zoned Residential Estate District/ 3.5 acre minimum/slope density 2/Design review (R-E/3.5A/SD-2/D-R). There are no areas of Zone 1 in Portola Valley.

4.1.9.3.6 City of Menlo Park

There are small areas of Zones 1, 2 and 3 lands in the jurisdiction of Menlo Park. Zone 1 and 2 lands are located along San Francisquito Creek at the Stanford Golf Course. A portion of the area is currently not developable under the City's General Plan because of restrictions on development in riparian zones. The remaining portion is already in the existing golf course development. These lands are designated in the Menlo Park General Plan as Landscaped Greenways, Buffers or Parkways. There is also a two-acre strip of Zone 3 lands to the west of Alpine Road that is designated as very low density residential in the general plan.

4.1.9.3.7 Summary of Existing and Future Uses by Jurisdiction

A summary of the area, existing land use, and allowable land use of the Management Zones in each jurisdiction is provided in Table 4-11. The current land use designations for future land use in Management Zones 1, 2 and 3 protect open space and limit the extent of development.

Much of the lands in Management Zone 1 are protected as open space by local general plans and zoning ordinances. In Santa Clara County, currently undeveloped Zone 1 lands are designated as Campus Open Space, Academic Campus, and Special Conservation Area. The areas designated as Academic Campus are limited to areas within the Academic Growth Boundary (AGB); the lands immediately surrounding Lagunita within the AGB are designated as Campus Open Space; and the riparian zones and the area outside of the AGB where the CTS Reserve is proposed are designated as Special Conservation Area. In San Mateo County, the lands in Management Zone 1 are zoned as very low-density residential. In Palo Alto, which includes Zone 1 lands adjacent to San Francisquito Creek and Matadero/Deer creeks, the land use designations are Agriculture Conservation District, Commercial with a Landscape Overlay, Planned Community, Public Facilities, and Medium Density Multi-family Residential with Design Review. The designations protect areas adjacent to San Francisquito and Matadero/Deer creeks through design review and specific limitations.

In Menlo Park, the very small areas of Zone 1 are designated in the general plan as Greenways, Buffers or Parkways, and are not available for development. In Portola Valley, Zone 1 lands are adjacent to Los Trancos Creek and are designated as Greenway. There are no Zone 1 lands in Woodside.

Lands in Management Zone 2 in Santa Clara County are designated as Academic Campus and Campus Residential inside the AGB; this includes the Stable site and lands north of Lagunita. Outside of the AGB, in the foothills south of Junipero Serra Boulevard, Zone 2 lands are designated as Open Space/Field Research. The allowed uses are similar to those that currently exist, including limited academic facilities, field research activities, limited recreational use, and

agriculture (grazing). In San Mateo County, Zone 2 is zoned as Residential Estates, which allows residential development at a very low density.

In Palo Alto, Zone 2 lands are located along San Francisquito Creek and Deer Creek. They are designated the same as Zone 1 lands: Agriculture Conservation District, Commercial with a Landscape Overlay, Planned Community, Public Facilities, and Medium Density Multi-family Residential with Design Review. The designations protect areas adjacent to San Francisquito and Deer creeks through design review and specific limitations. In Menlo Park, the very small areas of Zone 2 are designated as Greenways, Buffers or Parkways, and are not available for development. There are no Zone 2 lands in Portola Valley. In Woodside, these lands are designated as Open Space and Special Conservation Planning.

Lands in Management Zone 3 in Santa Clara County are designated as Academic Campus inside the Academic Growth Boundary; these areas are at the Stanford Golf Course. Outside of the AGB, the lands in Zone 3 are designated as Open Space/Field Research, and as with Zone 2, the allowed uses are similar to those that currently exist, including limited academic facilities, field research activities, limited recreational use, and agriculture (grazing). In San Mateo County, the lands in Zone 3 are designated for very low density residential uses. In Palo Alto, Zone 3 lands include a parcel south of Felt Reservoir on Arastradero Road and lands along Deer Creek near the Stanford Research Park. They are designated as Agriculture Conservation District and Planned Community. In Portola Valley, Zone 3 lands are designated for residential use. In Woodside, Zone 3 lands are designated as Open Space and Special Conservation Planning. There are no Zone 3 lands in Menlo Park.

4.2 BIOLOGICAL ENVIRONMENT

This section describes the plant communities and wildlife that occur on Stanford lands, including sensitive communities and special-status species. Information on vegetation communities and wildlife is drawn from the results of surveys conducted by the Stanford Center for Conservation Biology, a search of the California Natural Diversity Database, consultation of species lists from the Sacramento Office of the USFWS and other sources. Decades of research in field biology have been completed on Stanford lands including research on special-status species. Additional information about the vegetation communities, wildlife associations, special-status species, their life histories, and reasons for decline can be found in Chapter 2 of the HCP (see DEIS Appendix B).

4.2.1 Overview of Habitat: Plant Communities and Wildlife

4.2.1.1 Plant Communities

Stanford University lands contain several vegetation communities including annual grassland, serpentine grassland, oak woodland/savannah, riparian woodland, perennial and intermittent streams, chaparral, coastal scrub, seasonal wetlands and perennial wetlands associated with freshwater ponds, freshwater lakes/reservoirs and urban/suburban. Along boundaries of plant communities, species composition is mixed. The following is a brief description of the plant species and wildlife found within the different vegetation communities. For a more complete discussion, refer to the Stanford University HCP, Section 2.3.

Annual grasslands are the most dominant plant community on Stanford. The annual grasslands cover the major portions of the foothills as well as the floodplains of the creeks. This vegetation community is dominated by non-native annual grasses such as Italian ryegrass (*Lolium multiflorum*) and wild oat (*Avena spp*.). Several native grasses are also present, most notably purple needle grass (*Nassella pulchra*). Invasive herbaceous plants such as yellow star thistle (*Centaurea solstitialis*) are common also. Common native forbs include blue dicks (*Dichelostemma capitatum*), blue-eyed grass (*Sisyrinchium bellum*) and California buttercup (*Ranunculus californicus*), among others. Some occasional scrub and tree species occur within this vegetation community.

Stanford lands contain two main areas of serpentine grassland, both located in the Jasper Ridge Biological Preserve. Small areas of serpentine grassland also occur in other areas. Serpentine grassland supports several native plant species including California plantain (*Plantago erecta*) and goldfields (*Lasthenia chrysostoma).*

Oak woodland/savannah occurs in a number of locations at Stanford. This community is dominated by a mix of coast live oak (*Quercus agrifolia*), blue oak (*Quercus douglasii*), valley oak (*Quercus lobata*), and California buckeye (*Aesculus californica*). Common understory species include poison oak (*Toxicodendron diversilobum*), toyon (*Heteromeles arbutifolia*), and blue elderberry (*Sambucus mexicana*), among others. Common grass species and herbs present beneath the oak woodland canopy include ripgut brome (*Bromus diandrus*), and soft chess (*Bromus hordeaceous*).

Stanford lands also contain riparian woodlands and perennial and intermittent streams. Most of the creeks within the Stanford HCP area support a 25- to 75-meter-wide corridor of riparian woodland. Riparian woodland is well established along Matadero and Deer creeks, as well as the creeks within the San Francisquito watershed. Riparian woodland is composed of a moderately closed canopy of valley oak and coast live oak trees. Also common are big leaf maple (*Acer macrophyllum*), western sycamore (*Platanus racemosa*), California buckeye, redwood (*Sequoia sempervirens*), arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*.) and white alder (*Alnus rhombifolia*), among others. An understory shrub layer is present, especially where gaps in the overstory allow direct sunlight. Typical shrub species include blue elderberry, brown dogwood (*Cornus glabrata*), American dogwood (*C. californica*), seafoam (*Holodiscus discolor*), hairy honeysuckle (*Lonicera hispidula* var. *vacillans*), and common snowberry (*Symphoricarpos albus* var. *laevigatus*). Small clumps of native and non-native grasses and forbs are also present in the understory. Aquatic vegetation is found intermittently along the creek channels, including watercress (*Rorripa nasturtium-aquaticum*) and broad-leaved cattail (*Typha latifolia*). Riparian vegetation around the periphery of Searsville Reservoir consists of a substantial riparian forest dominated by willows (*Salix spp*.), big-leaf maple and dogwood.

Chaparral and coastal scrub is present in the Jasper Ridge Biological Preserve. Dominant vegetation within the chaparral community is chamise (*Adenostoma fasciculatum*) and yerba santa (*Eriodictyon californicum*). Coastal scrub is found on Coyote Hill and Jasper Ridge. This community is dominated by sagebrush (*Artemisia californica*) and coyotebrush (*Baccharis pilularis*).

Stanford lands contain seasonal and perennial wetlands. The primary seasonal wetlands at Stanford are Lagunita and Skippers Pond. Smaller isolated seasonal wetlands are found within intermittent drainages, including eight seasonal ponds that have been created for tiger salamander. Searsville Reservoir and Felt Reservoir are the primary water bodies at Stanford that support perennial standing water with associated wetlands on their periphery. The wetland vegetation includes cattails (*Typha spp.*), tule (*Scirpus spp.*), and sedges.

The urban/suburban landscape dominates about half of Stanford lands, and includes both native and non-native vegetation growing within the main campus and around residential areas of Stanford. Vegetation consists of remnant native species such as oaks, non-native trees, ruderal annual grasslands, and ornamental plants.

The Management Zones contain the following vegetation communities:

- Management Zone 1 is dominated by riparian vegetation and includes the aquatic habitats associated with San Francisquito, Los Trancos, Matadero and Deer creeks, and Lagunita. It also includes grassland and oak savannah associated with Lagunita and the foothills immediately south of Junipero Serra Boulevard at Lagunita;

- Management Zone 2 contains riparian, oak woodland and grassland vegetation and the aquatic habitat associated with Searsville Reservoir;

- Management Zone 3 contains primarily grassland vegetation with some oak savannah, and the aquatic habitat associated with Felt Reservoir and ephemeral drainages to Los Trancos and Matadero creeks.

4.2.1.2 Wildlife

Vegetation communities on-site provide suitable foraging, cover, and nesting habitat for a large number of common amphibians, reptiles, birds, and mammals within the Stanford HCP area. Many of these species are not specific to one vegetation community, especially for omnivorous and predacious species that utilize a variety of habitats.

Annual grasslands provide habitat for a diversity of wildlife, which use this habitat for foraging, cover, or nesting. Some common wildlife that use grassland habitat include western toad (*Bufo boreas*), western fence lizard (*Sceloporus occidentalis*), gopher snake (*Pituophis melanoleuca*), western meadowlark (*Sturnella neglecta*), red-winged blackbird (*Agelaius phoeniceus*), deer mouse (*Peromyscus maniculatus*), bobcat (*Lynx rufus*), and California ground squirrel (*Spermophilus beecheyi*). A wide range of reptiles, mammals, and birds can also be found in serpentine grasslands.

The oak woodland provides shelter, shade, breeding, and foraging habitat for common wildlife species such as western gray squirrel (*Sciurus griseus*), acorn woodpecker (*Melanerpes formicivorus*), raccoon (*Procyon lotor*), black-tailed or mule deer (*Odocoileus hemionis*) coyote (*Canis latrans*), and striped skunk (*Mephitis mephitis*).

Riparian woodlands provide abundant food, cover, and/or breeding habitat for large number of wildlife species including California quail (*Callipepla californica*), black phoebe (*Sayornis*

nigricans), red-shouldered hawk (*Buteo lineatus*), raccoon, tree squirrels (*Sciurus sp*.), Mexican free-tailed bat (*Tadarida brasiliensis*), California myotis bat (*Myotis californicus*), hoary bat (*Lasiurus cinereus*), Pacific treefrog, and salamanders (*Ensatina spp., Aneides spp.*) among others. Chaparral provides habitat for California quail and gray fox (*Urocyon cinereoargenteus*), among others.

In addition, the Matadero and San Francisquito creek systems provide habitat for fish species. Native fish recorded from these creek systems include three-spined stickleback (*Gasterosteus aculeatus*), roach (*Lavinia symmetricus*), Sacramento blackfish (*Orthodon microlepidotus*), Sacramento suckers (*Catostomus occidentalis*), and sculpin (*Cottus asper* and C. *gulosus*). Steelhead/rainbow trout (*Onchorhynchus mykiss*) are abundant in the San Francisquito system, but have not been recorded in the Matadero system in recent surveys conducted by Stanford (but have been reported as being historically present by numerous long-term local residents). Hitch (*Lavinia exilicauda*) are also present in the San Francisquito system. Steelhead spawn throughout the San Francisquito Creek system, including those portions that flow through Stanford. Searsville Dam is a barrier to fish migration in the system, and isolates about 3 to 5 miles of suitable spawning habitat from migrating adults. Resident rainbow trout are present in the creeks above Searsville Dam (notably Corte Madera Creek and Sausal Creek), and are scattered throughout the system.

Non-native aquatic animals that have been recorded from the creeks at Stanford include bullfrog (*Rana catesbeiana*), green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), red-ear sunfish (*Lepomis microlophus*), mosquito fish (*Gambusia affinis*), largemouth bass (*Micropterus salmoides*), Louisiana red swamp crayfish (*Procambarus clarki*), and signal crayfish (*Pascifasticus leniusculus*).

4.2.2 Covered Species

4.2.2.1 California Red-legged Frog

The red-legged frog (*Rana aurora draytonii*) is federally listed as Threatened and is defined by the state as a California Species of Special Concern (CSC). This species occurs from Shasta County south to the Mexican border. Red-legged frogs require permanent or nearly permanent bodies of water for persistence. They are known to occur within grassland, riparian woodland, oak woodland, and coniferous forests, but require quiet pools, slow-moving streams, and marshes with heavily vegetated shores for reproduction. They occasionally traverse over 1 mile (1.6 kilometers) or more though upland habitats during rainy periods when seeking out new breeding locations. During warmer periods, red-legged frog can be found in rodent burrows in upland habitats. For this reason, red-legged frog requires breeding habitats (ponds/ streams) along with adjacent upland dispersal corridors between breeding habitats for long-term persistence.

Red-legged frogs have been monitored annually on Stanford lands since 1997. These surveys have documented two distinct frog populations, one along Matadero and Deer creeks, and one along San Francisquito Creek (Fig. 4-14 California Red-legged Frog at Stanford). Prior to the construction of Highway 280 and the general suburban buildup of the area, it is likely that these two populations were part of a single, more widespread population.

Annual surveys conducted since 1997 have documented red-legged frog reproduction in Deer Creek and Matadero Creek and in a pool associated with the "Upper Quarry." Red-legged frog reproduction in Matadero Creek appears to be very limited, with only a few tadpoles surviving to metamorphosis each year. In some years, Deer Creek is more productive, with large numbers of mature tadpoles (hundreds) and metamorphs (tens) observed in comparatively wet years. However, it appears that no successful red-legged frog reproduction occurs in Deer Creek during conditions of moderate to severe drought. Reproduction in the quarry pool is fairly consistent, but the pool is somewhat unusual because red-legged frog tadpoles are present in the pool year-round. (Fellers et al. 2001).

Red-legged frogs also are found along the Stanford portions of San Francisquito Creek. Recent observation of red-legged frogs in San Francisquito Creek have been limited to the reaches located downstream from the confluence with Bear Creek (in the Jasper Ridge Biological Preserve) to within 1.5 kilometers (along the creek) upstream from the Interstate 280 bridge. Red-legged frog reproduction in this area has been variable, with few tadpoles (~20) seen most years since 1997, but with 50+ seen in some years (particularly when weather conditions have caused side-pools to form).

Red-legged frogs also are known to occur along Los Trancos Creek. Los Trancos Creek provides cool, clear water that is not typically red-legged frog habitat. However, the creek corridor may serve as a dispersal corridor. Most of the recently observed frogs were found well upstream of Stanford, and there is only a single recent record of a red-legged frog from Stanford's portion of Los Trancos Creek. In 1995, a single frog was repeatedly observed in the roots of a large bay tree located just downstream of the Los Trancos Diversion facility.

All red-legged frog breeding habitat on Stanford lands is found in Management Zone 1 (Figure 4-15). Due to the dispersal ability of this species, red-legged frog can also occur in Management Zone 2 and, on rare occasions, wander outside of these Zones.

4.2.2.2 California Tiger Salamander

The tiger salamander (*Ambystoma californiense*) was listed by the USFWS as federally Threatened in September 2004. Tiger salamander ranges from the Sierra Nevada crest (just west of it) to the outer coast range and from Sonoma and Yolo counties on the north to Santa Barbara County in the south. Tiger salamander requires a mosaic of habitats consisting of seasonally filled pools located in or near grasslands or oak woodlands. Semi-permanent ponds, reservoirs, and portions of slow-moving, seasonal creeks may also be used. For most of the year, tiger salamander lives in the burrows of ground squirrels, gophers, and other rodents in open wooded or grassy areas. However, they may also use man-made structures such as underground utility boxes and drainage pipes. They do not emerge to breed every year.

At Stanford, the tiger salamander population is concentrated around Lagunita, a man-made reservoir located in the north central portion of Stanford University (Figure 4-16, California Tiger Salamander at Stanford). The tiger salamander uses burrows in the grasslands south of Lagunita, and migrates across Junipero Serra Boulevard in the rainy season to breed in the reservoir. The density of tiger salamanders decreases significantly as the distance from Lagunita exceeds 1 kilometer (0.62 mile). Few if any tiger salamanders are present in the heavily developed areas close to Lagunita (mainly to the north). Because numerous barriers (curbs,

steps, buildings, walls, etc.) are present within the main campus, this part of Stanford acts as a population sink. Individual tiger salamanders that wander from Lagunita northward to this area are unable to migrate back, and are lost to the population.

Stanford University entered into the California Tiger Salamander Management Agreement (CTS MA) with the USFWS, the California Department of Fish and Game, and the County of Santa Clara on June 1, 1998, prior to the species' listing. The Agreement fulfilled a condition of Architectural and Site Approval of Santa Clara County for the Graduate Student Housing project at Governor's Corner. The purpose of the CTS MA was to set forth a mitigation plan for possible impacts to tiger salamander at Stanford. The CTS MA addressed current activities and facilitated the approval of future activities located within the tiger salamander habitat on Stanford lands. Implementation of the CTS MA included the installation of an experimental research migration tunnel under Junipero Serra Boulevard to reduce the number of animals killed on the road, and the construction of new experimental breeding ponds in the grassland south of Junipero Serra Boulevard (to provide an alternative to Lagunita). These ponds and first tunnel were considered experimental activities because they were the initial attempts at design and construction to be evaluated upon completion. In Fall 2003, following two years of consultation and permitting by the Service, California Department of Fish and Game, California Regional Water Quality Control Board, U.S. Army Corps of Engineers, and Santa Clara County, the two remaining ponds were reconstructed and enlarged, and six additional ponds were built. In 2006, Tiger salamanders reproduced in two of the ponds. Stanford has also installed experimental piles of woody debris near the breeding ponds to encourage ground squirrel activity and benefit tiger salamander. Also, the initial experimental tunnel was supplemented by three additional tunnels. Now that the tiger salamander is a listed species, the HCP will supersede the CTS Management Agreement.

Tiger salamander habitat on Stanford lands is in Management Zones 1, 2 and 3 (Figures 3-1, Management Zones and 4-16, California Tiger Salamander at Stanford).

4.2.2.3 Western Pond Turtle

The pond turtle (*Actinemys marmorata*) is a California Species of Special Concern. It is included as a Covered Species because of the reasonable possibility that it could become a federally listed species during the 50-year term of the HCP. Preferred habitat of pond turtle consists of calm waters, such as streams or pools with vegetated banks and basking sites such as logs or rocks. They may use upland areas to excavate nests as far as 0.5 km (0.3 mile) away from water. Nests are excavated in compact, dry soils, with high clay or silt content, in areas consisting of short grasses or forbs.

Pond turtles are the only native turtles found at Stanford. They are found scattered throughout San Francisquito Creek, from Searsville Dam to the downstream edge of Stanford's boundary (Figure 4-17 Western Pond Turtle at Stanford). In the Jasper Ridge Biological Preserve, they have been historically found along marshier areas of Searsville Reservoir. Pond turtles were found in Searsville Reservoir through the mid-1990s, but there have been no recent records from the reservoir. Likewise, surveys in creeks and ponds upstream from Searsville Reservoir have not documented the presence of pond turtles in the last 5 years.

The number of turtles, including both pond turtles and various non-native turtles, present at Felt Reservoir varies considerably from year to year. The Stanford Water Department and Public Safety personnel report that over the last 40 years or so turtles have been irregularly observed at Felt Reservoir. In some years, no turtles are observed; while in other years upwards of ten turtles have been observed. Biological surveys during the last decade have also found inconsistent numbers of turtles at Felt Reservoir. Some of this variation is undoubtedly due to differences in the observers and to the variable physical factors of the reservoir (mainly the large fluctuations in water level) that make it difficult to see turtles that may be present in the reservoir when it is relatively full. While these factors may account for some of the differences in the number of turtles that are actually observed each year, the number of turtles in Felt Reservoir actually does vary considerably from year to year.

Pond turtles present in Felt Reservoir are likely individuals released at the site. There are no areas recently occupied by the species within a distance a pond turtle could reasonably expect to disperse. San Francisquito Creek is approximately 1.1 miles from Felt (at its closest point), but a turtle would need to cross either Alpine Road and Los Trancos Creek, or Highway 280 to go overland directly to Felt Reservoir. The intervening agricultural lands would also make overland dispersal from San Francisquito Creek to Felt Reservoir very unlikely. It is also very unlikely that a turtle would disperse upstream in Los Trancos Creek from San Francisquito Creek and then either travel overland for 0.25 miles to the reservoir, or traverse the entire 2.25 miles of Los Trancos Creek on Stanford property then, go down the cement-lined water diversion flume 0.5 miles to Felt Reservoir. Despite annual surveys of the creek since the mid-1990s, there are no records of any turtles in the Stanford portion of Los Trancos Creek. Likewise, there has been no recent documentation of pond turtles from Boronda Lake, located 0.6 miles from Felt Reservoir in Palo Alto's Arastradero Preserve.

While no pond turtles have been observed by recent surveys in Matadero and Deer creeks, local residents report that turtles were present in the area, at least through the 1980s. Pond turtles have not been found at Los Trancos Creek, which provides cool, clear, flowing water that is not typically pond turtle habitat.

Pond turtles are occasionally found well away from waterways; along paths and roads at Jasper Ridge, near the Stanford golf course, along Palm Drive, and the Stanford Shopping Center. These specimens are probably either individuals leaving the creek-bed during the beginning of the rainy period (when many turtles apparently take cover in upland areas), or are females looking for places to lay eggs.

Habitat for pond turtle is primarily confined to Management Zones 1 and 2, however individual pond turtles may wander into the other zones (Figures 3-1, Management Zones and 4-17, Western Pond Turtle at Stanford).

4.2.2.4 Steelhead

The Central California Coast Distinct Population Segment of steelhead (*Oncorhynchus mykiss*) is a population of an anadromous fish that is federally listed as threatened. Steelhead is native to coastal streams from Baja California to Alaska and parts of Asia. Adult steelhead migrate from the ocean into streams in the late fall, winter, or early spring seeking out deep pools within fast

moving water to rest prior to spawning. Steelhead spawn in shallow-water gravel beds and the young typically spend the first one to two years of their lives as residents in their natal stream.

The San Francisquito Creek watershed winter-run steelhead population represents one of only a few known remaining runs in South San Francisco Bay. Within the Stanford HCP area (San Francisquito Creek, Los Trancos Creek, and Bear Creek), adult steelhead spawn, eggs incubate, juveniles rear, and smolts outmigrate (Figure 4-18 Steelhead at Stanford). Young steelhead generally rear in the creeks for one or two years. Although only a fraction of the San Francisquito watershed steelhead population reproduces in reaches adjacent to Stanford lands, the mainstem of San Francisquito Creek within the HCP study area is essential for the immigration of adults and the emigration of smolts. The most important spawning and rearing habitat for steelhead in the San Francisquito Creek system is in Los Trancos Creek, San Francisquito Creek (from Searsville Reservoir to Junipero Serra Boulevard), and Bear Creek and its tributaries; however, steelhead will rear in any part of the system that has water year-round (Alan Launer personal communication).

Factors that affect steelhead survival in this creek system include the amount and type of winter and summer rearing habitat, barriers to movement, pool temperature, competition and predation of steelhead eggs and juveniles by non-native fishes, and loss of diversity and abundance of invertebrate prey species.

Jones and Stokes (2006) conducted a habitat assessment and limiting factor analysis for the lower San Francisquito watershed within Santa Clara County. The tributaries of the upper San Francisquito Creek watershed and the Bear Creek watershed within San Mateo County were not part of the geographic scope of the Jones and Stokes assessment. The study found over-wintering habitat to be the primary limiting factor for steelhead productivity in the lower mainstem of San Francisquito Creek and the Los Trancos Creek sub-watershed, and likely for the entire watershed (Jones and Stokes 2006). This study also found:

- The lack of key habitat features such as boulder and cobble aggregations, large woody debris jams, root wads, and backwater habitat limit both winter and summer rearing habitat, with winter productivity more impaired than summer;

- The loss of complex pool habitat used by over-wintering and over-summering juvenile steelhead is primarily the result of low recruitment of boulder and woody debris, the building blocks of complex pool habitat, from the upper watershed;

- Deposition of fine sediment onto cobbles and gravels reduces the quality of over-wintering and over-summering habitat;

- Searsville Dam is a complete barrier to adult migration and cuts off approximately one-third of the upper watershed to steelhead access;

- Partial barriers to adult immigration exist throughout the watershed, and although these barriers do not completely block all fish from upstream migration, they may significantly limit the number of adults that reach upper watershed spawning grounds;

- Partial barriers to downstream migration also exist and are often exacerbated by low or non-existent flows;

- Spring and summer stream temperatures in San Francisquito Creek can reach levels high enough to cause egg and fry mortality; and

- Fine sediments associated with urban runoff have led to coarse substrate embeddedness and the loss of invertebrate diversity and abundance.

Non-native fish species such as mosquito fish (*Gambusia affinis*), green sunfish (*Leopomis cyanellus*), large mouth bass (*Micropterus salmoides*), and red-eared sunfish (*Lepomus microlophus*) have been found to inhabit areas just below Searsville Dam and are likely predators of and competitors with steelhead (Alan Launer, personal communication).

Stanford water diversion facilities act as partial barriers to steelhead migration and movement within Stanford-adjacent stream reaches. The fish passage barrier at the non-operating Lagunita Diversion was partially remedied with a temporary extension of the ladder in 2005. A recent agreement between CDFG and NMFS is the Steelhead Habitat Enhancement Project, (SHEP, Stanford University Utilities Division, 2005). Through the SHEP, Stanford is modifying fish barriers at the Los Trancos Diversion and the San Francisquito Pump Station.

Steelhead habitat on Stanford lands is entirely in Management Zone 1 (Figure 3-1, Management Zones).

4.2.2.5 San Francisco Garter Snake

The San Francisco garter snake (*T.s. tetrataenia*) and red-sided garter snake (*T.s. infernalis*) are two distinct subspecies of the common garter snake (*Thamnophis sirtalis*). The San Francisco garter snake is listed as endangered under the ESA and is state fully protected. The red-sided garter snake is not a federally listed species. Both of these subspecies have been found on the San Francisco Peninsula.

On the San Francisco Peninsula there is a fairly well-documented intergrade zone between the San Francisco garter snake and red-sided garter snake. This intergrade zone is located on the eastern flank of the Santa Cruz Mountains (Barry 1994, Fox 1951). Stanford is within this intergrade zone. The intergrade populations do not belong exclusively to either the red-sided garter snake subspecies or the San Francisco garter snake subspecies. In the HCP and DEIS, the San Francisco garter snake, red-sided garter snake, and intergrade populations are referred to collectively as "local subspecies" or "garter snakes."

Populations found in an intergrade zone generally include individuals exhibiting a range of color patterns and can include individuals with physical characteristics of one or both of the subspecies; they can also clearly include one subspecies or another. The legal status of the intergrade form currently is not clear. The San Francisco garter snake was listed as endangered under the ESA in 1967, but the listing does not specify the intergrade as a protected form of the San Francisco garter snake subspecies. At present the draft regulations state that if the individual has more than 50% of the listed characteristic it is considered to be the listed entity (which is the

San Francisco garter snake). The USFWS considers regulation of intergrades on a case-by-case basis.

Stanford is within the southern portion of the red-sided/San Francisco garter snake intergrade zone. The intergrade populations have been studied at Stanford and the vicinity sporadically for nearly 100 years. At the present time, garter snakes are infrequently encountered at Stanford. A few individuals are encountered at Lagunita every year, but specimens from other locations at Stanford are only very infrequently observed. Given the number of museum records and mentions in the scientific literature, it is likely that historically the intergrade populations were more common in the area.

The intergrade populations found at Stanford exhibit color patterns that are generally more characteristic of red-sided garter snakes. A 1994 study of 47 snakes found in the Palo Alto area, which included Lagunita and areas near San Francisquito Creek, found that approximately 20 percent of the 47 snakes exhibited a red-sided garter snake color pattern and the remaining, approximately 80 percent, exhibited an intergrade color pattern (Barry 1994). An additional 12 snakes that the study observed just south of Stanford, at Boronda Lake in Foothill Park in Palo Alto, all exhibited a red-sided garter snake color pattern (Barry 1994). The study indicates that the intergrade population (or populations) at Stanford have a color pattern that is more similar to the red-sided garter snake than to the San Francisco garter snake.

This conclusion is further supported by California Academy of Science specimens noted in a 1981 study of 35 individual snakes collected at and near Stanford (Seib and Papenfuss 1981). The museum records classified 18 as red-sided garter snakes, 16 as having an intergrade color pattern, and one as a San Francisco garter snake.

On Stanford lands in southern San Mateo County the taxonomic status of the local subspecies is the least clear. Stanford and other researchers have repeatedly surveyed areas near Sand Hill Road and Highway 280 for red-legged frogs and San Francisco garter snakes. These surveys were done at the SLAC National Accelerator Laboratory and the nearby former Christmas tree farm (Barry 1976, Balgooyen 1981, Seib and Papenfuss 1981, Westphal, Seymour, and Launer 1998, Launer 2005/2006). With the exception of one intergrade captured in 1981 in a drainage near the main SLAC National Accelerator Laboratory building, no snakes were observed during any of these surveys.

Populations of the local subspecies are typically associated with permanent or nearly permanent bodies of water, usually areas of shallow water and heavily vegetated shores. However, they are known to occur, at least temporarily, in grassland, riparian woodland, oak woodland, and coniferous forest. Sag ponds in the San Andreas Fault rift zone and freshwater coastal marshes are considered prime habitat for the San Francisco subspecies.

Although garter snakes have not been observed in the vicinity of San Francisquito Creek or Searsville Reservoir, those areas provide potential habitat. Garter snakes have not been found at Los Trancos Creek, which provides cool, clear, flowing water that is not typically garter snake habitat.

Garter snake habitat on Stanford lands is in Management Zones 1, 2 and 3.

4.2.3 Other Special-Status Species

Several plant and animal species that occur on Stanford lands have a special status with other agencies. These species are listed by the state or other recognized groups as species that may be declining in number and should be carefully considered in the course of land use planning. The majority of special-status species on Stanford lands are associated with the same habitats as the Covered Species. Serpentine-based species on the Jasper Ridge Biological Preserve are the exception.

4.2.3.1 Plants

The Stanford University Center for Conservation Biology has documented over 1,000 native plant species on Stanford lands from surveys and historical records. Of these, 10 special-status plant species are known to currently occur within the Stanford HCP area (Table 4-12 Special-status Plant Species). Table 4-12 also includes plants that were historically recorded either on or in the vicinity of Stanford lands, but which have not been found in several years, and are presumed to not occur there.

4.2.3.2 Invertebrates

Although several special-status invertebrates could occur at Stanford, two species of Lepidoptera have been the focus of research efforts by Stanford scientists (Table 4-13 Special-status Animal Species). These species include the federally listed Threatened Bay checkerspot butterfly (*Euphydryas editha bayensis*), and the Federal Species of Concern Opler's longhorn moth (*Adela oplerella*). Both species occur in habitats on shallow, serpentine-derived soils, which support dwarf plantain (*Plantego erecta*), the Bay checkerspot butterfly's primary larval host plant, and California cream cups (*Platystemon californicus*), the Opler's longhorn moth larval host plant (USFWS 1998). The serpentine grassland habitat at Stanford is within the designated Critical Habitat for the Bay checkerspot butterfly. Although the Bay checkerspot butterfly was historically present in the serpentine grassland at Jasper Ridge, it has not been found there since 1997. The Opler's longhorn moth has not been observed and is not expected, due to the local rarity of its obligatory host plant, California cream cups.

The callippe silverspot butterfly (*Speyeria callippe callippe*) a federally threatened species, is found on San Bruno Mountain approximately 30 miles north of Stanford. A similar, but unlisted species, Comstock's silverspot (*Speyeria callippe comstocki*) is found at Stanford. Its habitat requirements include grasslands with abundant colonies of its host plant *Viola pedunculata*, nectar plant sources such as thistles and other herbaceous flowers, and hilltops for mating. The habitat requirements for the callippe silverspot and Comstock's silverspot are the same, and these species are separated only by geographic range and taxonomic characteristics.

The current taxonomic status of the overall group of silverspot butterflies is unclear, and previously designated populations of *Speyeria callippe comstocki* are now considered to be *Speyeria callippe callippe* in the north and east San Francisco Bay area. At this time, the subspecies at Stanford is considered to be *Speyeria callippe comstocki*.

With the exception of the Lepidoptera, little is known about the distribution of several potentially special-status invertebrate species in the region surrounding and including Stanford. There are

two arachnid species: Edgewood blind harvestman, *(Calicina (=Sitalcina) minor),* and Edgewood Park micro-blind harvestman *(Microcina edgewoodensis).* Both of these species are present at Edgewood County Park and have the potential to be present within the serpentine grasslands at Jasper Ridge. These species have not been detected at this time.

One additional invertebrate species, the Berkeley ground cricket (*Neonemobius eurynotus*), has been recorded at Jasper Ridge, formerly grazed pasture on the lower Stanford foothills, a location near the Stanford Arboretum, and three other localities in the San Francisco Bay area. This species was petitioned for endangered status in 1993, but was rejected by USFWS (USFWS, 1993).

All special-status animal species identified as having some potential for presence on Stanford lands are listed in Table 4-13.

4.2.3.3 Birds

The plant communities on Stanford lands provide suitable habitat for both common and special-status birds. Habitat for special-status bird species on Stanford lands is described in Table 4-11.

Special-status raptors that nest at Stanford on a regular basis include golden eagle (*Aquila chrysaetos*, California Species of Special Concern: CSC, Bird of Conservation Concern: BCC, California fully-protected: CFP), Cooper's hawk (*Accipiter cooperi*, CSC), and white-tailed kite (*Elanus leucurus*, Federal Species of Concern: FSC, CFP). Those that have some potential to nest on-site include northern harrier (*Circus cyanus*, CSC), osprey (*Pandion haliaetus*, CSC), long-eared owl (*Asio otus*, CSC), short-eared owl (*Asio flammeus*, CSC), and burrowing owl (*Athene cunicularia*, CSC, FSC, BCC).

Since burrowing owls are highly sensitive to habitat changes and have lost significant habitat in the San Francisco Bay area due to development of lowland grasslands along the bay plain, this species warrants further discussion. Burrowing owls inhabit open, annual and perennial grasslands, deserts and scrublands characterized by low-growing vegetation. They may also occupy woodland habitats where the canopy covers less than 30 percent of the ground surface. Within these habitats, burrowing owls nest in and occupy burrows made by fossorial mammals, particularly those of California ground squirrels. They will also occupy man-made structures including cement culverts; and cement, asphalt, or wood debris piles (CBOC 1993). The grasslands and open areas of oak savannah that support ground squirrel colonies provide suitable habitat for burrowing owls. In addition, the recent creation of wood debris piles to attract fossorial rodents near the new tiger salamander breeding ponds could also provide suitable burrows for burrowing owls in the future.

Burrowing owls have not been recorded nesting at Stanford since the early 1900s (CNDDB, 2006). Over the last four winters (2005/06 to 2008/09) however, this species was observed near Felt Reservoir and between the Dish and 280, and burrowing owls could be using other portions of Stanford lands as wintering habitat. None have been observed in the spring or early summer breeding season, despite numerous surveys (Alan Launer, pers. comm.).

Special-status passerines that potentially nest on-site include loggerhead shrike (*Lanius ludovicianus*, CSC), California horned lark (*Ermophila alpestris*, CSC, FSC), little willow

flycatcher (*Empidonax traillii brewsteri*, California Endangered), Olive-sided flycatcher (*Contopus cooperi*, BCC), rufous hummingbird (*Selaphorus rufus*, BCC), Vaux's swift (*Chaetura vauxi*, CSC), and yellow warbler (*Dendroica petechia*, CSC). Saltmarsh common yellowthroat (*Geothypis trichas sinuosa*, CSC, BCC) is known to nest at Searsville Reservoir.

Additional special-status birds that could occur, but are unlikely to nest at Stanford include double-crested cormorant (*Phalacrocorax auritus*, CSC), Lawrence's goldfinch (*Carduelis lawrencei*, BCC), tricolored blackbird (*Agelaius tricolor*, CSC, BCC), yellow-breasted chat (*Icteria virens*, CSC), Caspian tern (*Sterna caspia*, BCC), purple martin (*Progne subis*, CSC), yellow-billed cuckoo (*Coccyzus americanus*, SE, BCC), sharp-shinned hawk (*Accipiter striatus*, a CSC), ferruginous hawk (*Buteo regalis*, CSC), merlin (*Falco columbarius*, CSC), northern goshawk (*Accipiter gentiles*, CSC), California condor (*Gymnogyps californianus*, SE, FE), Swainson's hawk (*Buteo swainsoni*, ST, BCC), ferruginous hawk (*Buteo regalis*, BCC, CSC), peregrine falcon (*Falco peregrinus anatun*, BCC, CFP), and prairie falcon (*Falco mexicanus*, BCC, CSC).

While only one state Endangered bird species (little willow flycatcher) is considered to have potential to occur on-site, most breeding birds are afforded protection under the California Fish and Game Code (3503 and 3503.5) and the Migratory Bird Treaty Act (MBTA). The MBTA is administered by the USFWS. It establishes seasons and bag limits for hunted species, and renders taking, possession, import, export, transport, sale, purchase, and barter of migratory birds, their occupied nests, and their eggs illegal except when authorized by a Federal permit. California Fish and Game Code prohibits take, possession, or needless destruction of bird nests or eggs. Non-native species including rock doves, European starlings, and European house sparrow are not protected.

4.2.3.4 Mammals

Special-status bats are widely distributed throughout California and roost in a variety of habitats including man-made structures such as mines, bridges, and buildings, and natural habitats such as caves, rock outcrops, and trees. Roost sites provide protection when sleeping, resting between foraging bouts, breeding, nursing, and hibernating. At Stanford, the oak woodland and riparian habitats provide potentially suitable roosting habitat for many species of bats. Roosting sites associated with these habitats include tree snags or live trees supporting cavities, crevices, or exfoliating bark. Some species will also roost directly within the tree foliage. Campus buildings and structures may also provide roosts. Roosting sites in buildings are often found in confined spaces around the outside of the building such as behind hanging tiles, weather boarding, eaves boarding; between roof tiles; or in wall cavities.

Tree and building-roosting bats that may occur at Stanford include long-eared myotis (*Myotis evotis*, FSC), fringed myotis bat (*Myotis thysanodes*, FSC), long-legged myotis bat (*Myotis volans*, FSC), Yuma myotis bat (*Myotis yumanensis*, FSC), Townsend's big-eared bat (*Corynorhinus townsendii townsendii*, CSC and FSC), greater western mastiff bat (*Eumops perotis californicus*, CSC and FSC), and pallid bat (*Antrozous pallidus*, CSC). Additional bat species including California bat (*Myotis californicus*), big brown bat (*Eptesicus fuscus*), western pipistrelle (*Pipistrellus hesperus*), and western red bat (*Lasiurus borealis*) also may occur in the HCP area. A number of bat species have been recorded at Stanford including Townsend's big-

eared bat and Yuma myotis. More information is provided in Chapter 2 of the HCP (see DEIS Appendix B).

The San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*) is a California Species of Special Concern. Woodrats typically occur in forest habitats of moderate canopy and moderate dense understory. They build elaborate nests within these habitats consisting of sticks, bark, plant cuttings, and miscellaneous objects built in a conical pile. This species is known to occur within riparian woodland and chaparral habitat and in residential areas.

Special-status carnivore species that could occur at Stanford include Mountain lion (*Felis concolor*, CFP), ringtail (*Bassariscus astutus*, CFP), and American badger (*Taxidea taxus*, CSC*).* Mountain lions have been recently recorded throughout Stanford; however ringtail and American badger have not been recorded at Stanford lands for several decades.

4.2.3.5 Special-Status Species Known or Expected in each Management Zone

The Management Zones contain suitable habitat for special-status species, as follows:

- Management Zone 1 provides the riparian habitat used by several bird species of concern for nesting, including Cooper's hawk, sharp-shinned hawk, long-eared owl, and yellow warbler. Mammal species of concern that could be found nesting in Management Zone 1 include San Francisco dusky-footed woodrat, ringtail, and bats (long-eared myotis, Yuma myotis, and Townsend's big-eared bat). Plant species of concern include western leatherwood, Gairdner's yampah, and San Francisco collinsia. Management Zone 1 at Lagunita and in the adjoining foothills provides habitat for golden eagle, short-eared owl, burrowing owl, Lawrence's goldfinch, white-tailed kite, California horned-lark, osprey, double-crested cormorant, Franciscan onion, and fragrant fritillary;

- Management Zone 2 provides the riparian woodland and grassland habitat that could provide suitable nesting habitat for the species listed in Management Zone 1. The plants include those listed for Management Zone 1 plus Franciscan onion and fragrant fritillary;

- Management Zone 3 provides the grassland and oak savannah habitat that could provide suitable nest sites for golden eagle, short-eared owl, burrowing owl, Lawrence's goldfinch, white-tailed kite, California horned-lark, loggerhead shrike, osprey, and double-crested cormorant. Plant species include Franciscan onion and fragrant fritillary.

4.3 SOCIOECONOMIC ENVIRONMENT

Under NEPA, the social and economic effects that are related to effects on the natural or physical environment must be considered in the DEIS.

4.3.1 Socioeconomic Setting

4.3.1.1 Employment at Stanford

Stanford University is a large employer on the peninsula. In 2005, Stanford employed 9,159 staff members including 4,118 managerial and professional staff, 2,762 clerical and technical

staff, and 737 service and maintenance staff. SLAC National Accelerator Laboratory employs an additional 1,467 employees (Stanford Facts, 2006). In addition, the major leased uses (Stanford Shopping Center, Stanford Research Park) employ a few thousand people who live in the surrounding community.

4.3.1.2 Housing in the Stanford Area

According to the Stanford Community Plan Housing Element, Stanford students, faculty, and staff who seek housing in the Stanford area encounter high housing costs and relatively few housing units available for sale or for rent. The Stanford area is one of the most desirable and in-demand locations in the Bay Area.

The incomes and wealth creation associated with the high technology industries in the area have resulted in unprecedented ability and willingness to pay what the market will bear for housing prices in these highly desirable communities. Scarcity of housing, prosperity, and desirability has been and will continue to be potent factors in the housing situation for the Stanford area.

There are currently two main types of housing on the Stanford campus: student housing and faculty/staff housing. Housing for both undergraduate and graduate students is located near the center of campus, since several Stanford programs extend into the residential setting. Currently, Stanford provides approximately 5,900 units of undergraduate housing and 3,860 units of graduate student housing.

The student housing is comprised of dormitories and apartments. Undergraduates primarily live in dormitories, and typically remain on campus only during the academic year. Graduate student housing is mostly concentrated on the east side of campus in the 3,200-person Escondido Village. Graduate students live primarily in apartments, and often occupy their apartments year-round for multiple years while obtaining a degree.

On-campus housing opportunities are also available to active faculty, retired faculty, surviving faculty spouses, and senior staff. Currently, 989 on-campus units are available to faculty and staff. Most of these homes are on long-term ground leases, whereby the occupants lease the land from Stanford but own the home itself. Twenty-five percent of these homes are multiple-family dwellings, 3 percent are attached townhomes, and the remainder is single-family homes.

Under an existing General Use Permit issued by Santa Clara County, Stanford can add up to 3,018 housing units. The County's Community Plan identifies locations for residential development that would allow between 2,655 and 3,022 additional housing units to be constructed on Stanford land over the 10-year period of the current General Use Permit. Most of these housing units would be located in Management Zone 4.

According to Santa Clara County's Community Plan for Stanford lands, housing is a countywide issue of concern that has taken on particular importance in the northern portion of Santa Clara County, where Stanford University is located:

"• The University has a large population of graduate students with very limited incomes who are at a severe disadvantage in the local rental market. Hospital residents and postdoctoral fellows also have incomes substantially lower than the area's median income.

• Faculty and staff must compete for rental and ownership housing with other area residents. Unlike other Santa Clara County industries, where an individual employer is likely to compete with other local employers for workers, Stanford is competing for its faculty and staff with other universities which are generally located in areas with more affordable housing markets. Stanford considers the housing market as a primary obstacle in its recruiting and retention efforts for graduate students, faculty and staff.

• Students, faculty, and administrative staff must often commute very long distances to their classes and jobs at Stanford if they cannot find affordable housing close to the campus.

In the century since its inception, Stanford University has taken steps to address the housing needs of its students and faculty many times, due to the limitations of the housing market and Stanford's nature as a residential university. However, as housing supply and affordability trends within Santa Clara County and the Stanford area worsen, it is in the interest of both Stanford University and the public to ensure balance between housing demand and supply as it pertains to Stanford University's development.

Stanford lands represent one of the most important opportunities in the County to improve the balance between jobs and housing, due to the potential to provide housing on Stanford lands for designated populations. While this housing is directly accessible only to Stanford students, faculty and staff, it also benefits the wider community by augmenting the local housing supply. To that end, development of additional housing on the campus is a fundamental policy direction of this Community Plan."

4.3.1.3 Income Producing Revenues at Stanford

The financial performance of Stanford enables it to advance the mission of teaching and research. The following FY 2006 financial growth results were reported to the Stanford University Board of Trustees on December 11, 2006. Stanford University reported growth of 9 percent in both revenues and expenses in fiscal year 2006 (FY 2006), which ended Aug. 31. Revenues come from various sources; one source is the commercial, industrial, and equestrian/agricultural leaseholds on Stanford lands. The revenues generated by these sources also contribute to the County's tax base, and to the economy of the two counties and nearby cities.

Despite Stanford's strong financial performance, it has identified continued financial challenges. Currently these include the tightening of federally sponsored research funding, the ability to attract and retain top faculty and senior staff by providing affordable housing, and the need to renovate and invest in new facilities.

While most of the commercial and industrial leaseholds are contained within Zone 4, almost all of the equestrian/agricultural leaseholds are located within Zones 1, 2 and 3.

4.4 ENVIRONMENTAL JUSTICE

According to the Federal Council on Environmental Quality's guidance, agencies should consider the composition of the affected area to determine whether minority populations or low-income populations are present, and if so whether there may be disproportionately high and

adverse effects on those populations compared with the general population. Minority and low-income populations as they apply to environmental justice are defined as:

- Black - a person having origins in any of the black racial groups of Africa.
- Hispanic - a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
- Asian American - a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands.
- American Indian and Alaskan Native - a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or recognition.
- Low-Income - a person whose household income (or, in the case of a community or group, whose median household income) is at or below the U.S. Department of Health and Human Services poverty guidelines.

To determine whether a proposed action is likely to have disproportionately high and adverse effects, agencies must identify a geographic scale for which they will obtain demographic information. This is identified as the "Region of Influence" (ROI). For this DEIS the ROI includes Santa Clara and San Mateo counties because Stanford is located within both of these counties.

According to the 2000 Census, the racial makeup of Santa Clara County was approximately 53 percent White, 25 percent Asian American, 2.80 percent Black, less than one percent American Indian, and 24 percent of the population identified themselves as Hispanic of any race.

The racial makeup of San Mateo County according to the 2000 census was approximately 59 percent White, 20 percent Asian American, 3.5 percent Black, less than one percent American Indian, and 21.88 percent of the population were Hispanic of any race.

Both of the counties have a higher population of Asian Americans than the statewide average, which in 2004 was estimated to be 12.1 percent. Both of the counties had fewer Hispanic and Black populations than the 2004 estimated statewide averages of 34.7 percent (Hispanic) and 6.8 percent (Black).

Income levels within the ROI are significantly higher than the California or U.S. average, and poverty levels are significantly lower. The median household income within the ROI exceeded $85,000 in 2004 (California Franchise Tax Board), and according to the 2000 U.S. Census, 7.5 percent of the population in Santa Clara County and 5.8 percent of the population in San Mateo County lives below the poverty line. This figure contrasts with figures for the U.S. population which had a median household income of $41,648 with 12.7 percent of the population living below the poverty line as of 2004, and the statewide population which had a median household income level of $48,440 with 13.8 percent of the state's population living below the poverty line as of 2003.

4.5 INDIAN TRUST ASSETS

Indian Trust Assets (ITAs) are property interests held in trust by the United States for the benefit of Indian tribes or individuals. Indian reservations, rancherias, and public domain allotments are common ITAs. The land associated with these ITAs, as well as the resources within the boundaries, such as trees, minerals, oil, and gas, are also considered trust assets. Other ITAs include traditional-use areas and fishery resources. Hunting and fishing rights may be ITAs, although in California, fishing and hunting are regulated by the California Department of Fish and Game, both on and off reservations. Types of actions which could affect ITAs include an interference with the exercise of a reserved water right, degradation of water quality where there is a water right, impacts to fish and wildlife where there are hunting or fishing rights, or noise near a land asset that adversely impacts uses of the reserved land.

There are no ITAs within Stanford University, immediately adjacent to Stanford or downstream from Stanford between Stanford lands and the San Francisco Bay. The closest Rancherias were in the east bay (Niles and Sunol). Native American individuals owned some large tracts in the Moffett Field, Milpitas and Coyote Point areas at the turn of the century, and there are a few trust lands in Hollister.

Table 4-1. Creek Protection Policies

Municipality	Policy	Description
Santa Clara Valley Water District	Section 6 of Ordinance 83-2	A permit is required for all construction or grading within 50 feet of the top of bank for all creeks, channels and floodways within the District's boundaries.
Santa Clara County General Plan	C-GD 6	Riparian corridors are considered unsuitable for urban development.
	R-RC 31	Natural streams, riparian areas, and freshwater marshes shall be left in their natural state providing for percolation and water quality, fisheries, wildlife habitat, aesthetic relief, and educational or recreational uses that are environmentally compatible. Streams which may still provide spawning areas for anadromous fish species should be protected from pollution and development impacts which would degrade the quality of the stream environment.
	R-RC 32	Riparian and freshwater habitat shall be protected by setback of development, regulation of tree and vegetation removal, reducing/eliminating use of pesticides and herbicides and fertilizers.
	R-RC 37	Lands near creeks streams and freshwater marshes shall be considered to be in a protected buffer area, consisting of the following: 1) 150 feet from top of bank in natural areas 2) 100 feet from top of bank in altered/developed areas 3) If (1) and (2) are not applicable, an area sufficient enough to protect the stream from adverse impacts of adjacent development
Stanford University Community Plan	SCP-LU 30	The Special Conservation Areas designation applies to lands south of Junipero Serra Boulevard…deemed unsuitable for development due to natural resource constraints… it may include…Riparian areas extending 150 feet from the top of creek banks.
	SCP –LU 31	The use of Special Conservation Areas is limited to conservation activities and habitat management, field environmental studies, and appropriate agricultural uses. Recreational use may be allowed if it is consistent with the particular environmental constraints of an area.
	SCP-LU 32	No new permanent development in the form of buildings or structures is allowed [in Special Conservation Areas], other than construction, modification, and maintenance of improvements to support conservation efforts…
	SCP-OS 3	Identify and delineate Special Conservation areas where no development would be permitted (see SCP-LU 30).
	SCP-OS (i) 2	Require easements as appropriate in Special Conservation areas. Locate easements in areas which serve critical habitat needs.
	SCP-RC 7	Maintain and restore riparian buffer zones along creeks as described in Santa Clara County General Plan policy R-RC 37.
	SCP-RC 17	Avoid development in riparian areas and wetlands.

Table 4-1. Creek Protection Policies

Municipality	Policy	Description
San Mateo County Zoning Ordinance	6912.2	(k) With the exception of trails and paths, and related appurtenances, no structural development shall be permitted where such development will adversely affect a perennial stream and associated riparian habitat.
	6912.4	(f) Development, with the exception of agricultural uses and public works and public safety projects, which might cause significant adverse impacts upon the natural course or riparian habitat of any stream, shall not be permitted. All developments shall be required to perform all feasible measures to mitigate possible impacts upon such areas.
City of Menlo Park (no specific ordinances for creek setbacks)	7.42.130 Watercourse protection	Every person owning property through which a watercourse passes, or such person's lessee or tenant, shall keep and maintain that part of the watercourse within the property reasonably free of trash, debris, excessive vegetation, and other obstacles which would pollute, contaminate, or significantly retard the flow of water through the watercourse; shall maintain existing privately owned structures within a watercourse so that such structures will not become a hazard to the use, function, or physical integrity of the watercourse; and shall not remove healthy bank vegetation beyond that is actually necessary for said maintenance, nor remove said vegetation in such a manner as to increase the vulnerability of the watercourse to erosion. (Ord. 859 (part), 1994).
	15.16.130 Watercourses	Watercourses shall be shown as easements, and storm drains shall be placed in easements when public right-of-way is not available or adequate. The planning commission or city engineer may require watercourses to be placed entirely in underground conduits or adequately fenced or otherwise improved. If any watercourse alteration is to be made in the designated flood hazard area, the city engineer will notify the California State Department of Water Resources, and the Federal Insurance Administrator. (Ord. 658 § 2(b), 1980; Ord. 615 § 1 (part), 1977: Prior code § 24.7 (1)).
City of Palo Alto	16.28.060 of the Municipal Code	A permit is required to grade, fill, excavate, store, or dispose of soil and earth materials or perform any other land-disturbing or land-filling activity when the activity takes place within 100 feet by horizontal measurement from the top of the bank of a watercourse, the mean high watermark (line of vegetation) of a body of water or the boundary of the wetlands associated with a watercourse or water body, whichever distance is greater. (Ord. 4564 § 1 (part), 1999)
	Streamside Open Space Land Use designation (Comprehensive Plan)	The corridor of riparian vegetation along a natural stream. Development limited to hiking, biking, riding trails. The corridor generally varies in width up to 200 feet on either side of the center of the creek, except along San Francisquito Creek where the open space corridor varies between 80 to 310 feet from the center line of the creek.
	Program N-7 of Policy N-11: Preserve the integrity of riparian corridors	Adopt a setback along natural creeks that prohibits the siting of buildings and other structures, impervious surfaces, outdoor activity areas, and ornamental landscaped areas within 100 feet of the top of a creek bank. Allow passive or intermittent outdoor activities and pedestrian, equestrian, and bicycle pathways where there are adequate setbacks to

Table 4-1. Creek Protection Policies		
Municipality	**Policy**	**Description**
	(Palo Alto Comprehensive Plan)	protect the natural riparian habitat. Within the setback area, provide a border of native riparian vegetation at least 25 feet along the creek bank. Exceptions: 1) Single family properties are exempt except that undeveloped parcels southwest of Highway 280 are not exempt. A creek ordinance and guidelines will be prepared addressing appropriate setbacks and creek conservation measures. 2) Existing development within the 100-foot setback will be considered legal and nonconforming. With the 100-foot setback as a goal where feasible, redevelopment of such sites must be consistent with basic creek habitat objectives and make a significant net improvement in the condition of the creek.

Table 4-2. San Francisco Bay Area Air Basin Annual Average Emissions, in Tons per Day

Pollutant	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
TOG	1666.464	1559.712	1293.374	980.761	844.167	1024.765	930.295	899.899	887.677	888.852
ROG	1366.22	1277.975	1029.001	755.68	631.436	513.364	386.559	337.419	307.275	292.258
Nox	978.755	972.33	909.345	878.127	765.016	658.022	546.909	464.642	389.109	352.376
Sox	214.136	203.199	119.833	123.882	67.51	64.337	54.045	57.292	62.498	68.45
PM10	177.705	178.838	193.418	191.986	188.865	219.318	213.487	225.829	238.39	251.154
PM2.5	86.546	85.35	86.542	88.332	86.409	92.671	90.477	94.258	98.457	102.954
CO	8845.745	8199.568	6996.673	5189.488	3814.378	2798.77	2212.71	1791.737	1455.726	1256.805

Source: California Environmental Protection Agency. 2006. Air Resources Board: 2006 Almanac Data Forecasted Emissions by Summary Category. http://www.arb.ca.gov/app/emsinv/fcemssumcat2006.php last accessed 2/12/07.

Table 4-3. Stanford Environmental Health and Safety Departments, Programs and Policies (Stanford 2007)

Department/Plan	Responsibility/Contents
Department of Environmental Health and Safety	Everyday management of health and safety operations at Stanford
Chemical Hygiene Plan/Lab Safety Plans	Describes health and safety responsibilities at laboratory level, information and training requirements, standard operating procedures, and chemical inventories
Hazardous Materials Safety System	Regulates hazardous material transportation, acquisition, use (including training, hazard communication, emergency preparedness and response, and informational signage) and disposal. Tools include: Chemical Safety Database
Chemical Safety Database	Proper emergency response planning and other regulatory compliance
Training	In-house training for all students and employees for safe handling
Campus Emergency Plan	General emergency guidelines
Department Emergency Planning Guidelines	General emergency guidelines
Emergency and Hazardous Materials Release Response Policy	Guidelines for hazardous materials release response
Hazardous Materials Management Plan	Site-specific plans (spill, fire, other emergency and evacuation) for hazardous materials storage areas
Life Safety Box System	Assists emergency response personnel with chemical inventories, room maps, and emergency notification sheets
Stanford Safety Manual	Requirements of the hazard communication program including chemical labeling requirements and the Chemical Safety Database
Biosafety Manual	Safe storage, handling, and disposal of biohazard materials
Radiation Safety Manual	Safe storage, handling, and disposal of radioactive materials
Hazardous Chemical Waste Management Reference Guide for Laboratories	Safe storage, handling, and disposal of chemicals in laboratories
Hazardous Waste Program	Collection, recycling, and disposal of waste chemicals and low-level radioactive waste

Table 4-4. Public Service Providers

Service	Unincorp. Santa Clara CO	Unincorp. San Mateo CO	Portola Valley (Zone 3)	Woodside (Zone 2, 3, 4)	Palo Alto (Zone 1, 2, 3, 4)	Menlo Park (Zone 4)
Police	Santa Clara County Sheriff's Department	San Mateo County Sheriff's Department	San Mateo County Sheriff's Department	San Mateo County Sheriff's Department	City of Palo Alto	City of Menlo Park
Fire	Palo Alto Fire Department	Palo Alto Fire Department	Woodside Fire Protection District	Woodside Fire Protection District	Palo Alto Fire Department	Menlo Park Fire Department
Schools	Palo Alto Unified School District	Las Lomalitas Elementary School District/ Woodside School District	Portola Valley School District	Woodside School District	Palo Alto Unified School District	Menlo Park City School District [6] /Las Lomalitas School District
Solid waste	Peninsula Sanitary Services [3]	Allied Waste	Green Waste [2]	Green Waste [2]	Peninsula Sanitary Services [3]	BFI Peninsula [2]
Water	Stanford Utilities Division	Cal Water, Stanford Utilities Division	Cal Water [1]	Cal Water [1]	City of Palo Alto Utilities	Cal Water's Bear Gulch District [1] / Menlo Park Municipal Water District [7]
Waste-water	Palo Alto Regional Water Quality Control Plant	Palo Alto Regional Water Quality Control Plant	Palo Alto Regional Water Quality Control Plant	Palo Alto Regional Water Quality Control Plant	Palo Alto Regional Water Quality Control Plant	Palo Alto Regional Water Quality Control Plant [4]
Electricity and gas	Stanford Utilities Division, PG&E	PG&E	PG&E	PG&E [5]	City of Palo Alto Utilities	PG&E

Sources:
1. www.calwater.com/DistrictProfile.php?d=Bear Gulch
2. http://www.recycleworks.org/resident/map.html
3. Stanford GUP EIR.
4. Miks, 2000 from GUP EIR
5. http://www.woodsidetown.org/departments_services.html#utilities
6. http://www.menlopark.org/departments/pwk/mpmwd_map.pdf

Table 4-5. Distribution of Stanford Lands Across Jurisdictions

Jurisdiction	Acres	Percent of Total
Santa Clara County - unincorporated	4,017	49%
San Mateo County – unincorporated	2,701	33%
Palo Alto	1,161	14%
Woodside	114	1%
Menlo Park	111	1%
Portola Valley	76	1%
Total	8,180	100%

Source: Stanford University

Table 4-6. Santa Clara County: Stanford Community Plan Zoning Designation And Allowable Land Use Inside Academic Growth Boundary (AGB)

Land Use Designation	Allowable Land Use
Campus Residential- Low Density	a. Single-family housing, duplexes, and townhouses available as residences for Stanford faculty and staff. b. Residential support services such as child care or convenience commercial facilities at a neighborhood-serving level.
Campus Residential- Moderate Density	a. Single-family housing, duplexes, townhouses, condominiums, flats, and apartments available to Stanford faculty and staff. b. Residential support services such as child care, recreation services, or convenience commercial facilities.
Academic Campus	1. instruction and research (including teaching hospital facilities); 2. administrative facilities; 3. housing intended for students, postgraduate fellows, and other designated personnel; 4. high density housing for faculty and staff; 5. athletics, physical education, and recreation facilities; 6. support services (such as child care facilities, the bookstore, and the post office); 7. infrastructure, storage, and maintenance facilities; 8. cultural facilities associated with Stanford; and, 9. non-profit research institutions with close academic ties to Stanford.
Public School	The use of these lands is limited to public school facilities, including appropriate buildings, parking, playgrounds, and athletics fields.
Campus Open Space	Uses must retain land in open space, and must be consistent with the individual character of each area included in this designation. These areas shall be maintained as park-like areas, unimproved open space, landscape buffers, riparian corridors, and conservation areas. Temporary activities of a limited nature that are in keeping with the open space character are also permitted. Examples include limited duration special events or general recreational activities, such as those regularly occurring in the Oval area. This designation applies to the lands immediately adjacent to Lagunita and along JSB.
Special Conservation Area	See Table 4-5. Although this designation primarily exists outside of the AGB, it extends along San Francisquito Creek at the Stanford Golf Course inside the AGB.

Source: Stanford Community Plan 2000

Table 4-7. Santa Clara County: Stanford Community Plan Zoning Designation and Allowable Land Use Outside the AGB

Zoning Designation	Allowable land uses
Open Space/ Field Research	a. field study activities; b. utility infrastructure in keeping with the predominantly natural appearance of the foothill setting; c. grazing and other agricultural uses; d. recreational activities which are consistent with protection of environmental resources (*e.g.*, not construction or operation of a new golf course) and with appropriate policies regarding foothill access; e. specialized facilities and installations that by their nature require a remote or natural setting, such as astronomical or other antennae installations or structures accessory to field study activities; and, f. environmental restoration.
Special Conservation Areas	The use of these areas is limited to conservation activities and habitat management, field environmental studies, and appropriate agricultural uses. Recreational use may be allowed if it is consistent with the particular environmental constraints of an area. Access for recreational use may be restricted.

Source: Stanford Community Plan 2000

Table 4-8. Allowable Uses under San Mateo County Zoning

Zoning	Allowable Uses
R-E	(a) One-family dwellings. (b) Public parks and playgrounds. (c) Crop and tree farming and truck gardening. (d) Home occupations. (e) Accessory buildings and accessory uses, including servants' quarters and one non-commercial guest house, provided, however, that such accessory buildings shall not be constructed until the main building shall have been constructed. (f) Nurseries and greenhouses used only for the propagating and cultivating of plants, provided that no retail sale be allowed. (g) (1) Keeping of pets in association with a one-family dwelling. (2) Limited keeping of pets in association with a second unit. (h) (1) Animal Fanciers in association with a one-family dwelling, subject to an animal fanciers' permit issued in accordance with County Ordinance Code, Division III, Part Two, Chapter 6.3. (2) Catteries in association with a one-family dwelling, subject to a kennel/cattery permit issued in accordance with County Ordinance Code, Division III, Part Two, Chapter 12. (i) Large Residential Day Care Facilities for Children (Family Day Care Homes; 7-12 children), subject to a large family day care permit issued in accordance with the County Zoning Regulations, Chapter 22, Section 6401.2. (j) The following uses subject to securing a use permit in each case: 1. Schools, libraries, fire stations, churches, and riding academies. 2. Golf courses with standard length fairways, and other non-commercial clubs.

S-11	Minimum Building Site		Minimum Lot Area Per Dwelling unit (Sq. ft)	Minimum Yards Required			Maximum Height Permitted		Maximum Coverage Permitted
	Ave. Width (Ft)	Min. Area (Ft)		Front (Ft)	Side (Ft)	Rear (Ft)	Stories	Ft	
	100	1 to 5 ac.[1]	1-5 ac. [1]	50	20	20	3	36	15

Source: San Mateo County Zoning Regulations, July 1999.

[1] Gross area per dwelling unit and required minimum lot size varies by slope percent.

Table 4-9. Allowable Uses under San Mateo County Zoning

Comprehensive Plan Designation	Zoning	Allowable uses
Multiple Family Residential	RM-30 (D)	Medium density multiple family residential with a site and design review combining district.
Streamside Open Space	CC (L); PC-4426; PF	Streamside Open Space is the corridor of riparian vegetation along a natural stream. Hiking, biking, and riding trails may be developed in the streamside open space. The corridor will generally vary in width up to 200 feet on either side of the centerline of the creek. However, along San Francisquito Creek between El Camino Real and the Sand Hill Road bridge over the creek, the open space corridor varies in width between 80 to 310 feet from the center line of the creek. The zoning in this area varies from Community Commercial with a Landscape overlay (only landscaping allowed), to Planned Community and Public Facilities.
Open Space/ Controlled Development	AC (D); PC-1941	Land having all the characteristics of open space but upon which some development may be allowed. Open space amenities must be retained in these areas. Residential densities range from 0.1 to 1 dwelling unit per acre but may rise to a maximum of 2 units per acre where second units are allowed and population densities range from 1 to 4 persons per acre. The zoning includes Agricultural Conservation District with a site and design review combining district, and Planned Community.

Table 4-10. Zoning Definitions for Woodside

Designation	Allowable uses
RR- Rural Residential	Single family dwellings, agricultural uses, home occupations, open space and conservation, bee keeping. Minimum lot size requirement for newly created lots is 3 acres, and increases as the average ground slope increases to maintain rural single family character of the town.
OSN- Open Space for Preservation of Natural Resources	Bee keeping, conservation easements, ecologic study, fences, native plantings, scenic easements, trails, and uses of historic or cultural value.
SCP-5- Special Conservation Planning	Permitted uses include: single family dwellings, agricultural uses, home occupations, open space and conservation, bee keeping. Special rural residential classifications where the minimum lot size is 5 acres. The purpose of this SCP district is to provide for reduced human densities for lands containing characteristics such as, but not limited to, steep hillsides, geological hazards, difficult road access, or soil or water problems.

Source: Town of Woodside General Plan 1988

Table 4-11. Acreage, Existing Land Use, and Allowable Land Use of Management Zones									
Jurisdiction	**Approximate Acres**			**Current Land Uses**			**General Plan Designation or Zoning**		
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
Santa Clara County	662	467	1231	Academic Reserve, Institutional, Recreation, Open Space	Academic Reserve, Recreation, Academic	Academic Reserve, Recreation	Inside AGB: Campus Open Space, Academic Campus Outside AGB: Special Conservation Area	Inside AGB: Academic Campus, Campus Residential – Moderate Density Outside AGB: Open Space/Field Research	Inside AGB: Academic Campus Outside AGB: Open Space/Field Research
San Mateo County	105	34	616	Biological Preserve, Academic Reserve, Open Space	Biological Preserve, Academic Reserve	Biological Preserve, Academic Reserve	R/S-11 (Residential Estates)	R/S-11 (Residential Estates)	R/S-11 (Residential Estates)
Palo Alto	81	63	112	Residential, Institutional, Open Space, Academic Reserve	Residential, Institutional, Open Space, Academic Reserve	Academic Reserve	Agriculture Conservation District, Community Commercial with a landscape overlay, Planned Community, Public Facilities, and Medium density multi-family residential with design review	Agriculture Conservation District, Community Commercial with a landscape overlay, Planned Community, Medium density multi-family residential with design review	Agriculture Conservation District, Planned Community
Woodside	0	59	32	na	Biological	Academic	na	Planned Community,	OSN, SCP5

Table 4-11. Acreage, Existing Land Use, and Allowable Land Use of Management Zones

Jurisdiction	Approximate Acres			Current Land Uses			General Plan Designation or Zoning		
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
					Preserve	Reserve		Medium density multi-family residential with design review	
Menlo Park	8	2	2	Recreation	Recreation	Residential	Greenways, Buffers or Parkways	Greenways, Buffers or Parkways	Very Low Density Residential
Portola Valley	21	0	77	Academic Reserve	Academic Reserve	Academic Reserve	Greenway	na	Residential

Note: See Tables above for general plan and zoning definitions

Table 4-12. Special-Status Plant Species

Scientific Name	Common Name	Status	Habitat Requirements/ Habitat at Stanford	Flowering Period	Status at Stanford
Allium peninsulare var. *franciscanum*	Franciscan onion	CNPS 1B.2	Grasslands, oak savannah habitats, often serpentine Habitat in Zones 2 and/or 3.	May – June	Present at Jasper Ridge
Arabis blepharophylla	coast rock cress	CNPS 4.3	Rocky outcrops, steep banks in coastal scrub and prairie. Habitat in Zones 2 and/or 3.	February - May	Present at Jasper Ridge
Dirca occidentalis	western leatherwood	CNPS 1B.2	Foothill woodland and riparian forest. Habitat in Zones 1 and 2.	January – March	Present at Jasper Ridge and on Los Trancos Creek upstream of Stanford. Expected to occur in San Francisquito and Los Trancos creek corridors.
Lessingia hololeuca	woolly-headed lessingia	CNPS 3	Ultramafic, clay soils in coastal scrub, coniferous forests, and valley and foothill grasslands. Habitat in limited areas of Zones 1, 2, and 3.	June – October	Present at Jasper Ridge, foothills. Historically reported near Woodside, Portola Valley, and Los Trancos Road in Thomas, 1961.
Lessingia tenuis	spring lessingia	CNPS 4.3	Dry, open slopes. Serpentine habitat in limited areas of Zone 3.	May – July	Present at Jasper Ridge. Historically reported near Searsville and Jasper Ridge in Thomas, 1961.
Leptosiphon (*Linanthus) ambiguus*	serpentine linanthus	CNPS 4.3	Ultramafic grasslands, coastal scrub and foothill woodland. Habitat in limited areas of Zones 2 and 3.	March – June	Present at Jasper Ridge. Historically reported in Woodside in Thomas, 1961.
Malacothamnus arcuatus[1]	arcuate bush mallow	CNPS 1B.2	Ultramafic chaparral. Habitat in Zone 2 and limited areas of Zone 3.	April – September	Present at Jasper Ridge. Historically reported as near Stanford in Thomas, 1961.
Perideridia gairdneri ssp. *gairdneri*	Gairdner's yampah	CNPS 4.2	Moist soil of flats, meadows, stream sides, grasslands and pine forests. Habitat in Zones 1, 2, and/or 3.	June – October	Present at Jasper Ridge. Historically reported as near Palo Alto in Thomas, 1961.

[1] There are recent taxonomic questions about *M. arcuatus*; the Jepson Manual currently considers this species to be synonymous with the more common *M. fasciculatus*. (http://ucjeps.berkeley.edu/cgi-bin/get_JM_treatment.pl?5042,5073,5079; accessed 8/13/09)

Table 4-12. Special-Status Plant Species

Scientific Name	Common Name	Status	Habitat Requirements/ Habitat at Stanford	Flowering Period	Status at Stanford
Piperia michaelii	Michael's piperia	CNPS 4.2	Coastal scrub, prairie, foothill woodland, mixed-evergreen and closed-cone pine forest. Habitat in Zones 1, 2, and 3.	April - August	Present at Jasper Ridge. Historically reported at Coal Mine Ridge (Los Trancos)
Plagiobothrys chorisianus var. hickmanii	Hickman's popcorn flower	CNPS 4.2	Grassy, moist places in coastal scrub and chaparral. Habitat in Zones 2 and 3.	April – June	Present at Jasper Ridge. Historically reported as near Stanford in Thomas, 1961.
Androsace elongata acuta	California rockjasmine	CNPS List 4.2	Dry grassy slopes. Habitat in Zones 2 and 3.	March – June	Historically reported as occurring at Stanford in Thomas, 1961.
Collinsia multicolor	San Francisco collinsia	CNPS List 1B.2	Moist, shady woodland. Closed cone coniferous forest; coastal scrub, sometimes serpentine. Habitat in limited areas of Zones 1, 2 and 3.	March – May	Historically reported as occurring near Stanford in Thomas, 1961.
Cypripedium montanum	mountain lady's slipper	CNPS List 4.2	Moist areas in mixed-evergreen and coniferous forest. Habitat in Zones 1, 2 and/or 3.	March - August	Historically reported on Corte Madera Creek in Thomas, 1961.
Eryngium aristulatum var. hooveri	Hoover's button-celery	CNPS List 1B.1	Vernal pools. No habitat recorded at Stanford.	July	No records at Stanford. Believed to be extirpated in Santa Clara County.
Fritillaria liliacea	fragrant fritillary	CNPS List 1B.2	Moist areas, often ultramafic, open hills, in valley and foothill grasslands, woodland Habitat in Zones 2 and 3.	February - April	Historically reported as occurring at Stanford in Thomas, 1961.
Leptosiphon (Linanthus) acicularis	bristly linanthus	CNPS List 4.2	Chaparral and coastal prairie. Habitat in Zones 2 and 3.	April – July	Historically reported as occurring at Coal Mine Ridge (Los Trancos) in Thomas, 1961.
Malacothamnus davidsonii	Davidson's bush mallow	CNPS List 1B.2	Slopes and washes. Unlikely to be present. According to the Jepson Manual, this species does not occur in the San Francisco Bay Region.	June – January	One historic record from 1936 in CNDDB from Stanford area. CNPS shows historic records on the Palo Alto, Woodside, and San Mateo quads.
Potamogeton filiformis	slender-leaved pondweed	CNPS List 2.2	Shallow, clear freshwater of lakes and drainage channels, marshes and swamps.	May – July	One record from 1899 in CNDDB from Stanford area. Believed to be extirpated in Santa Clara County, no records in San Mateo County.

Table 4-12. Special-Status Plant Species

Scientific Name	Common Name	Status	Habitat Requirements/ Habitat at Stanford	Flowering Period	Status at Stanford
Micropus (Stylocline) amphibolus	Mt. Diablo cottonseed	CNPS List 3.2	Bare, grassy or rocky slopes. Habitat in zone 3.	March – May	Possibly present at Coyote Hill. Historically reported at Stanford in Thomas, 1961.
Tropidocarpum capparideum	caper-fruited tropidocarpum	CNPS List 1B.1	Alkaline soils, low hills, valley and foothill grassland. Habitat in zone 3.	March – April	Last seen in vicinity of Stanford area in 1957

Notes: CNPS 1B.1: Rare, threatened or endangered in California and elsewhere and seriously endangered in California (CNPS 2007); Note: "endangered is the CNPS term and does not refer to state or Federal listing status;" 1B.2: rare, threatened or endangered in California and elsewhere and fairly endangered in California. CNPS 2: Rare, threatened or endangered in California, more common elsewhere; CNPS 3: Plants about which we need more information (a review list); 3.2: Plants above which we need more information (a review list); fairly endangered in California. CNPS 4: Plants of limited distribution (a watch list); 4.2: Limited distribution (watch list); fairly endangered in California; 4.3: Limited distribution (watch list); not very endangered in California. J.Thomas, Flora of the Santa Cruz Mountains, 1961.

Table 4-13. Special-Status Animal Species

Scientific Name	Common Name	Status	Habitat Requirement	Habitat at Stanford
Invertebrates				
Calicina (=Sitalcina) minor	Edgewood blind harvestman	This species was petitioned for endangered status in 1993, but was rejected by USFWS (USFWS, 1993).	Serpentine grasslands	Not recorded; habitat is present at Jasper Ridge Biological Preserve
Euphydryas editha bayensis	Bay checkerspot butterfly	FT	Serpentine grasslands with primary host plant dwarf plantain (*Plantego erecta*).	Critical Habitat designated at Jasper Ridge Preserve. Species has not been recorded since 1997.
Microcina edgewoodensis	Edgewood Park micro-blind harvestman	This species was petitioned for endangered status in 1993, but was rejected by USFWS (USFWS, 1993).	Serpentine grasslands	Not recorded; habitat is present at Jasper Ridge Biological Preserve
Neonemobius eurynotus	Berkeley ground cricket	This species was petitioned for endangered status in 1993, but was rejected by USFWS (USFWS, 1993).	Grasslands	Has been identified on Stanford lands
Speyeria callippe callippe	Callippe silverspot butterfly	FE	Grasslands with host plant *Viola pedunculata* present.	Subspecies range does not include Stanford area. Taxonomically similar species, *Speyeria callippe comstocki*, is present at Stanford.
Herpetofauna				
Thamnophis sirtalis tetrataenia	San Francisco garter snake	FE, SE, CFP	Highly aquatic species found in or near densely vegetated freshwater ponds with adjacent open hillsides where they can bask, feed, and find cover in rodent burrows. Suitable prey limited to	Stanford provides suitable habitat for the San Francisco garter snake.

Table 4-13. Special-Status Animal Species				
Scientific Name	**Common Name**	**Status**	**Habitat Requirement**	**Habitat at Stanford**
			ranid frogs (red-legged frog and/or bullfrog.)	
Rana boylii	Foothill yellow-legged frog	CSC	Highly aquatic species in or near rocky streams.	Has not been identified on Stanford lands or vicinity since 1906.
Birds				
Accipiter cooperi	Cooper's hawk	DFG Watch List	Dense canopied evergreen and deciduous forests or in riparian zones. This habitat occurs in Zone 1.	This species has been recorded on Stanford lands, and is expected to be present.
Accipiter gentiles	Northern goshawk	CSC	Forages and nests in mature conifer and deciduous forest habitats, with meadows and riparian areas. This habitat occurs in Zone 1.	This species has been recorded on Stanford lands, and is expected to be present only rarely as a vagrant.
Accipiter striatus	Sharp-shinned hawk	DFG Watch List	(Nesting) Ponderosa pine, black oak, riparian deciduous mixed conifer and Jeffrey pine habitats. Prefers riparian areas. This habitat occurs in Zone 1.	This species has been recorded on Stanford lands, and is expected to be present.
Agelaius tricolor	Tricolored blackbird	CSC, BCC	Requires open water, protected nesting substrate such as cattails, and foraging area with insect prey base.	This species has been recorded on Stanford lands, but breeding colonies have not been reported.
Aquila chrysaetos	Golden eagle	DFG Watch List, BCC, CFP	(Nesting and wintering) Rolling foothill mountain areas. This habitat occurs in Zones 2 and 3.	This species has been recorded on Stanford lands, and is expected to be present.
Asio flammeus	Short-eared owl	CSC	Forages in open treeless areas such as marshes and grasslands, with elevated sites for perches and dense vegetation for roosting and nesting. This habitat occurs in Zone 3.	This species has been recorded on Stanford lands, and is expected to be present.

Table 4-13. Special-Status Animal Species

Scientific Name	Common Name	Status	Habitat Requirement	Habitat at Stanford
Asio otus	Long-eared owl	CSC	Prefers dense riparian, coniferous or live oak woodlands. This habitat occurs in Zone 1.	This species has been recorded on Stanford lands, and though uncommon, is expected to be present.
Athene cunicularia	Burrowing owl	CSC, BCC	Open, dry annual grasslands and scrublands characterized by low-growing vegetation. Dependent upon burrowing mammals, most notably the California ground squirrel. Known to occur in Zone 3.	This species has not been recorded breeding on Stanford lands since early 1900s. Recent records indicate burrowing owls may utilize areas near Felt Reservoir as wintering habitat.
Buteo regalis	Ferruginous hawk	DFG Watch List, BCC	Forages over open grasslands and agricultural fields. Nests on elevated structures, (trees and human made structures) near open terrain. This habitat occurs in Zone 3.	This species has been recorded in the region, but has not been recorded on Stanford lands.
Buteo swainsoni	Swainson's hawk	ST, BCC	Nests in juniper sage flats, riparian areas, and oak savannah. Forages in adjacent grasslands or agricultural fields. This habitat occurs in Zones 1, 2 and 3.	Species has been observed in Stanford region, but has not been recorded breeding on Stanford lands.
Carduelis lawrencei	Lawrence's goldfinch	BCC	Forages in herbaceous habitats and nests in open oak woodlands, chaparral, and other woodland and scrub habitats. This habitat occurs in Zones 1, 2 and 3.	This species has been recorded on Stanford lands, and is expected to be present.
Chaetura vauxi	Vaux's swift	CSC	Forages over rivers and a variety of habitats. Nests in large tree hollows in redwood and Douglas fir habitats and occasionally in buildings. Habitat occurs in limited portions of Zones 1 and 2.	This species has been recorded on Stanford lands, and is expected to be present.

Table 4-13. Special-Status Animal Species

Scientific Name	Common Name	Status	Habitat Requirement	Habitat at Stanford
Circus cyanus	Northern harrier	CSC	Nests on ground in shrubby vegetation, usually at marsh edge nest built of a large mound of sticks in wet areas. May forage in grasslands. Nesting habitat in limited areas of Zone 1; forage habitat in Zone 3.	This species has been recorded on Stanford lands, and is expected to be present.
Coccyzus americanus	Yellow-billed cuckoo	SE, BCC, Candidate for Federal listing	Nests and forages in dense, mature riparian forests and thickets along large low elevation streams.	This species has been recorded in the region, but has not been recorded on Stanford lands since the early 1900s.
Contopus cooperi	Olive-sided flycatcher	CSC, BCC	Occupies forest and woodland habitats including mixed conifer, Douglas fir and redwood. Habitat occurs in limited areas of Zones 1 and 2 near Jasper Ridge.	This species has been recorded on Stanford lands, and is expected to be present.
Dendroica petechia	Yellow warbler	CSC	Utilizes riparian plant associations. Prefers willows, cottonwoods, aspens, sycamores, and alders for nesting and foraging. Habitat present in Zone 1.	This species has been recorded on Stanford lands, and is expected to be present.
Elanus leucurus	White-tailed kite	CFP	Nests in rolling foothills/valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Forages in open grasslands, meadows or marshes with perching sites. Habitat occurs in Zones 1, 2 and 3.	This species has been recorded on Stanford lands, and is expected to be present.
Empidonax traillii brewsteri	Little willow flycatcher	SE	Forages and nests in dense willow thickets in wet meadows and riparian habitats. Habitat occurs in limited areas of Zone 1.	This species has been recorded in the region, but has not been recorded on Stanford lands.
Ermophila alpestris	California horned lark	DFG Watch List	Utilizes short-grass prairie, bald hills, mountain meadows,	This species has been recorded on Stanford lands, and is expected to be

Table 4-13. Special-Status Animal Species

Scientific Name	Common Name	Status	Habitat Requirement	Habitat at Stanford
			open coastal plains, fallow grain fields, alkali flats for foraging and nesting. Habitat occurs on Zone 3.	present.
Falco columbarius	Merlin	DFG Watch List	Forages over open grasslands, wetlands, and forest openings, often near water. Nests in trees and cliffs (does not nest in California). Forage habitat occurs in Zones 1, 2 and 3.	This species has been recorded on Stanford lands, and is expected to be present.
Falco mexicanus	Prairie falcon	DFG Watch List, BCC	Forages over grasslands and other open terrain. Nests on a sheltered ledge or in old raven or eagle stick nests on cliffs. Forage habitat occurs in Zones 2, 3. Few, if any, ledges and cliffs are present.	This species has been recorded on Stanford lands, and is expected to be present.
Falco peregrinus anatun	Peregrine falcon	SE, CFP, BCC	Uses steep cliffs and buildings for nesting, forages over a variety of habitats, especially wetlands. Forage habitat in Zones 1, 2, 3.	Species has been observed at Stanford, but has not been recorded breeding on Stanford lands.
Geothlypis trichas sinuosa	Saltmarsh common yellowthroat	CSC, BCC	Nests and forages in fresh and saltwater marshes, and seasonal wetlands. Habitat present in limited portions of Zone 1.	This species has been recorded on Stanford lands, and is expected to be present.
Gymnogyps californianus	California condor	FE, SE	Nests and roosts on rock ledges, forages over wide expanses of territory for carrion. Forage habitat most likely to be Zone 3.	This species has been recorded historically on Stanford lands, but has not been observed for several decades. The large home range size of this species, combined with successful recovery programs could remotely result in condors utilizing Stanford lands within the 50-yr term of the HCP.
Icteria virens	Yellow-breasted chat	CSC	Nests and forages within riparian thickets near water. Habitat	This species has been recorded in the region, but has not been recorded on Stanford lands.

Table 4-13. Special-Status Animal Species

Scientific Name	Common Name	Status	Habitat Requirement	Habitat at Stanford
			present in limited areas of Zone 1.	
Lanius ludovicianus	Loggerhead shrike	CSC, BCC	Open country with short vegetation such as pastures with fencerows, old orchards, mowed roadsides, agricultural fields, and open woodlands. Breeding habitat occurs in Zone 2 and 3.	This species has been recorded on Stanford lands, and is expected to be present.
Pandion haliaetus	Osprey	DFG Watch List	Forages over open water for fish primarily. Nests in tall trees or other structures near large water bodies. Suitable habitat occurs in Zone 3 near Felt Reservoir and Lagunita.	This species has been recorded on Stanford lands, and is expected to be present.
Phalacrocorax auritus	Double-crested cormorant	DFG Watch List	Forages for fish over large bodies of water, nests near large bodies of water such as San Francisco bay. Forage habitat in Zone 3. Nesting not expected.	This species has been recorded on Stanford lands, and is expected to be present.
Progne subis	Purple martin	CSC	Occurs in a variety of woodland habitats, typically near water. Suitable habitat in Zones 1, 2.	Historically recorded on Stanford lands. No recent records of this species.
Selaphorus rufus	Rufous hummingbird	BCC	Forages in lowland riparian, open woodlands, scrub, and chaparral. Nests in northern California, north of San Francisco Bay area. May forage in Zones 1 and 2.	This species has been recorded on Stanford lands, and is an uncommon migrant.
Sterna caspia	Caspian tern	BCC	Nests in dense colonies near large water bodies, and forages over open water for fish. Suitable habitat occurs in limited areas of Zones 1 and 3.	This species has been recorded on Stanford lands, and is expected to be present.

Table 4-13. Special-Status Animal Species				
Scientific Name	**Common Name**	**Status**	**Habitat Requirement**	**Habitat at Stanford**
Mammals				
Myotis evotis	Long-eared myotis bat	Western Bat Working Group – Medium Priority	Roosts in trees and/or buildings. Fairly common and widespread especially near forests. Suitable habitat occurs in Zones 1 and 2.	This species has been recorded on Stanford lands, and is expected to be present.
Myotis thysanodes	Fringed myotis bat	Western Bat Working Group – High Priority	Uncommon. Found in undisturbed areas; large redwoods, chaparral with rocks. Suitable habitat present in limited areas of Zones 1 and 2.	This species has been recorded on Stanford lands, and is expected to be present.
Myotis volans	Long-legged myotis bat	Western Bat Working Group – High Priority	Uncommon. Found in undisturbed areas; large redwoods, chaparral with rocks. Suitable habitat present in limited areas of Zones 1 and 2.	This species has been recorded on Stanford lands, and is expected to be present.
Myotis yumanensis	Yuma myotis bat	Western Bat Working Group – Low/Medium Priority	Common and widespread along permanent streams, lakes and other waterways. Suitable habitat present in Zones 1 and 2.	Has been recorded on Stanford lands. No known maternity roosting colonies on Stanford lands.
Corynorhinus townsendii townsendii	Townsend's big-eared bat	CSC, Western Bat Working Group – High Priority	Roosts in caves, mines, and large trees and forages within woodlands along stream edges. Suitable habitat in Zones 1 and 2.	Has been recorded on Stanford lands. No known maternity roosting colonies on Stanford lands.
Eumops perotis californicus	Greater western mastiff bat	CSC, Western Bat Working Group – High Priority	Rare in San Francisco Bay area. Roosts in caves and rocky high cliff areas. Suitable habitat in limited areas near Jasper Ridge Biological Preserve.	Has been recorded on Stanford lands. No known maternity roosting colonies on Stanford lands.
Antrozous pallidus	Pallid bat	CSC, Western Bat Working Group – High Priority	Uncommon, especially near urban areas. Roosts in caves and large trees and forages in grasslands and oak savannah. Suitable	Has been recorded on Stanford lands. No known maternity roosting colonies on Stanford lands.

Table 4-13. Special-Status Animal Species

Scientific Name	Common Name	Status	Habitat Requirement	Habitat at Stanford
			habitat in portion of Zones 2, 3.	
Neotoma fuscipes annectens	San Francisco dusky-footed woodrat	CSC	Forest and scrub habitats of moderate canopy and moderate dense understory. Suitable habitat present in Zones 1, 2, 3 and 4.	Present and common within scrub and forest communities on Stanford lands.
Bassariscus astutus	Ringtail	CFP	Forages in coniferous forests and riparian woodlands. Nests in tree hollows, rocky outcrops and cliffs. Suitable habitat occurs in Zones 1, 2.	This species is considered uncommon in the region, and has a low potential for being present on Stanford lands.
Taxidea taxus	American badger	CSC	Rare in western San Francisco Bay area. Grasslands and open stages of forest and scrub habitats with friable soils and good prey base of burrowing rodents. Suitable habitat occurs in Zones 1, 2 and 3.	Has been recorded once in the last decade on Stanford lands.

Notes: FE – Federal endangered; FT – Federal threatened; SE – State endangered; ST – State threatened; FSC – Federal Species of Concern; CSC – California Species of Special Concern; BCC – Bird of Conservation Concern (Federal).

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Figure 4-1 Geologic Hazards

Boundary of Stanford Lands

Liquefaction

Areas where historical occurence of liquefaction or local geological, geotechnical and ground water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required

Earthquake-Induced Landslides

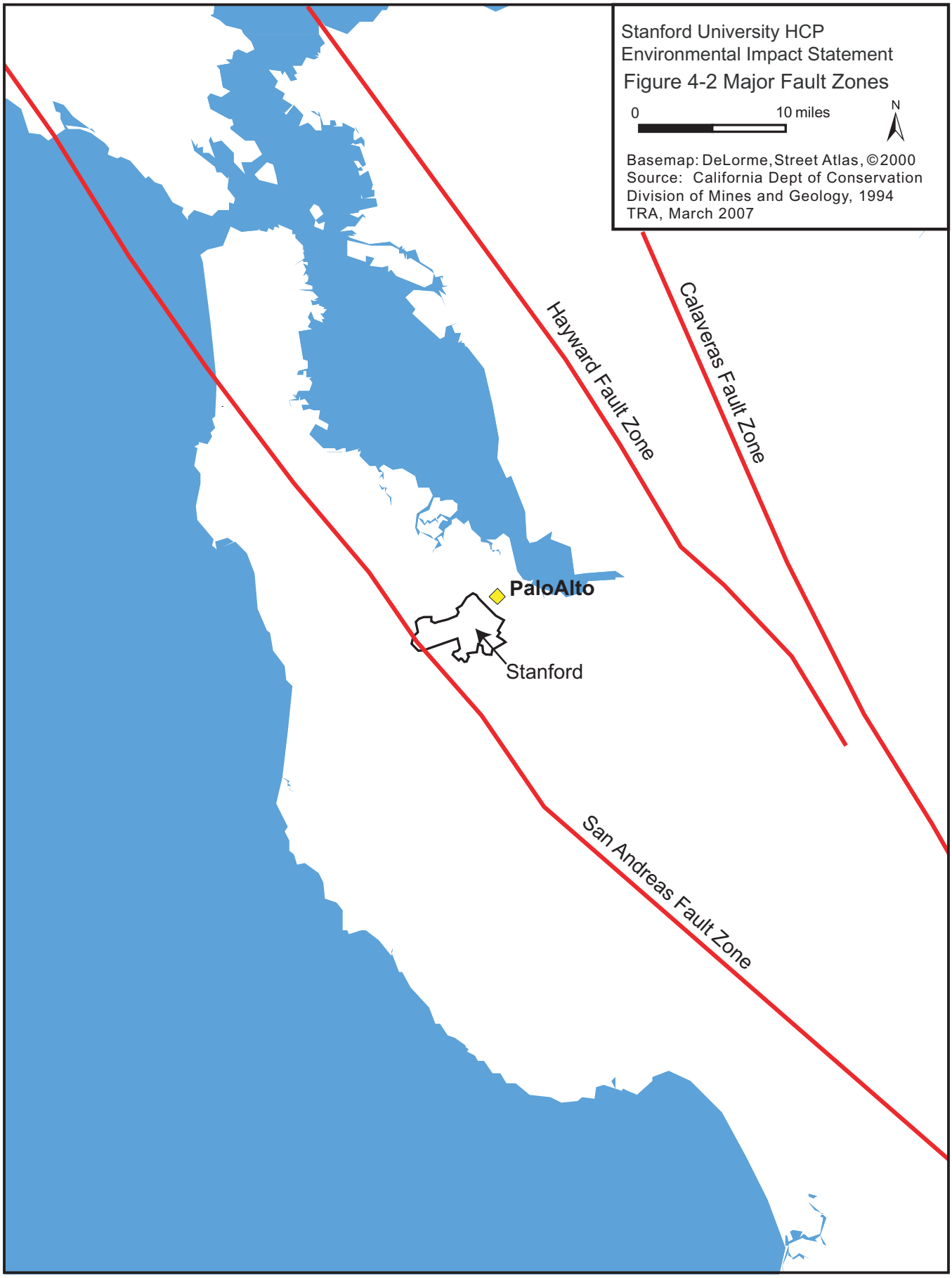
Areas where previous occurence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Note: Seismic Hazard Zones identified on this map may include developed land where delineated hazards have already been mitigated to city or county standards. Check with your local/building planning department for information regarding the location of such mitigated areas.

N

0 1 Mile

Source: www.conservation.ca.gov/cgs, Seismic Hazard Zones, Palo Alto Quadrangle, October 8, 2006
TRA, March 2007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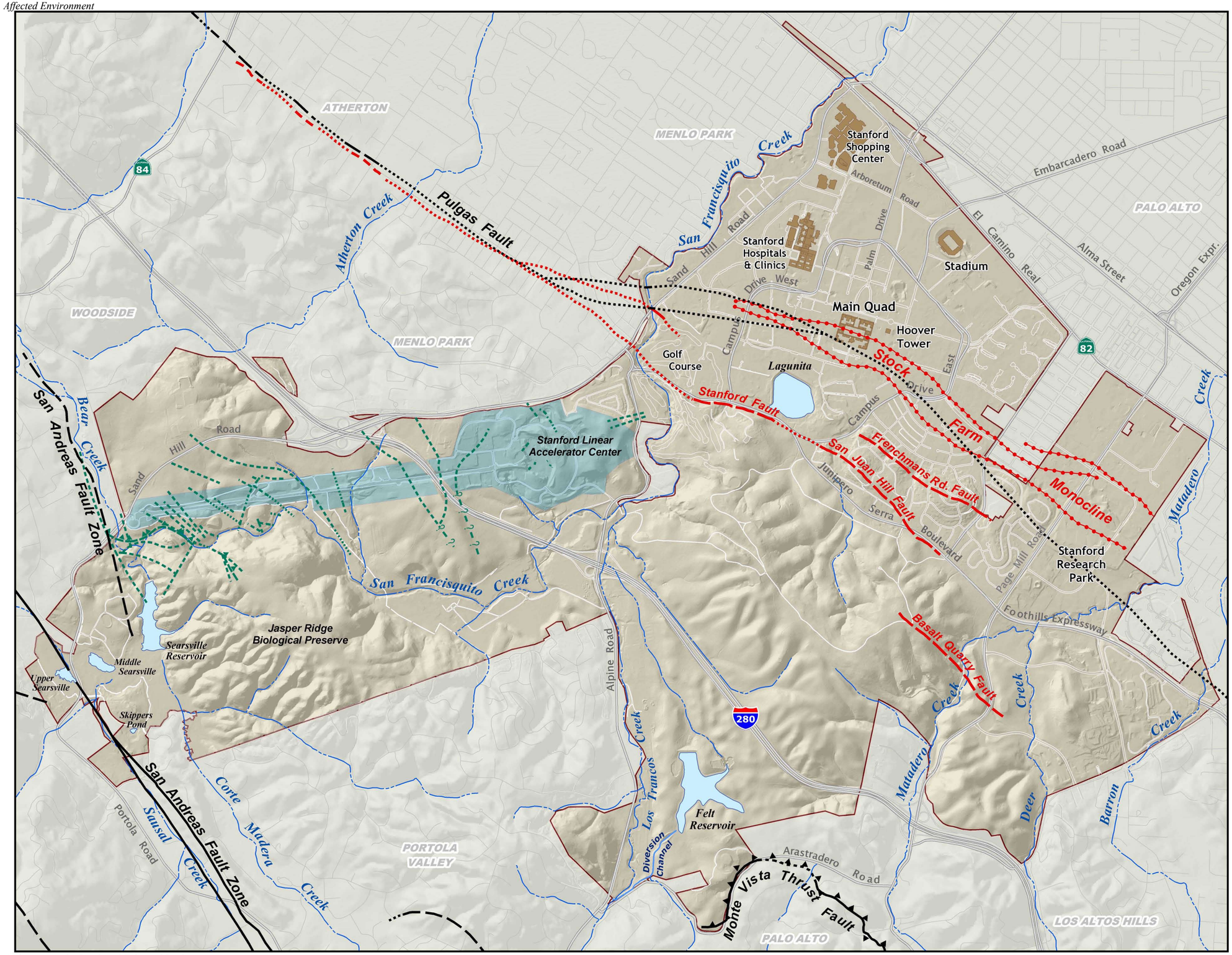
Environmental Impact Statement
Figure 4-2 Major Fault Zones
0
10 miles
N
Basemap: DeLorme, Street Atlas, ©2000
Source: California Dept of Conservation
Division of Mines and Geology, 1994
TRA, March 2007
Hayward Fault Zone
Calaveras Fault Zone
San Andreas Fault Zone
PaloAlto
Stanford



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Geologic Faults

USGS, named faults only

- Fault, certain
- Fault, approx. located
- Fault, concealed
- Thrust fault, approx.
- Thrust fault, concealed

Dames & Moore

- Faults
- Faults - Concealed
- Faults - Inferred
- Monocline

SLAC Hydrogeologic Review

- Concealed
- Indefinate or Inferred
- Uncertain
- Upper Plate of Low Angle Thrust Fault

Sources:

1. *U.S. Geological Survey, Palo Alto 30' x 60' Quadrangle Geologic Map Profiles, Source scale 1:100,000 Publication date: 2000, Issue ID: 2332*
2. *Dames & Moore, 1997, "The Stock Farm Monocline"*
3. *Hydrogeologic Review Stanford Linear Accelerator Center Prepared by: ESA Consultants (ESA# 117.9001) Date: February, 1994 (SLAC-1-750-2A15H-002)*

Disclaimer:
This map was produced by the SU Planning Office. While generally accurate, this map may not be completely free of error. The information is derived from a variety of sources deemed reliable, but subject to recurrent change and Stanford does not warrant the accuracy and completeness of these data.

Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1
Miles

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Date Printed: March 14, 2007

Figure 4-3

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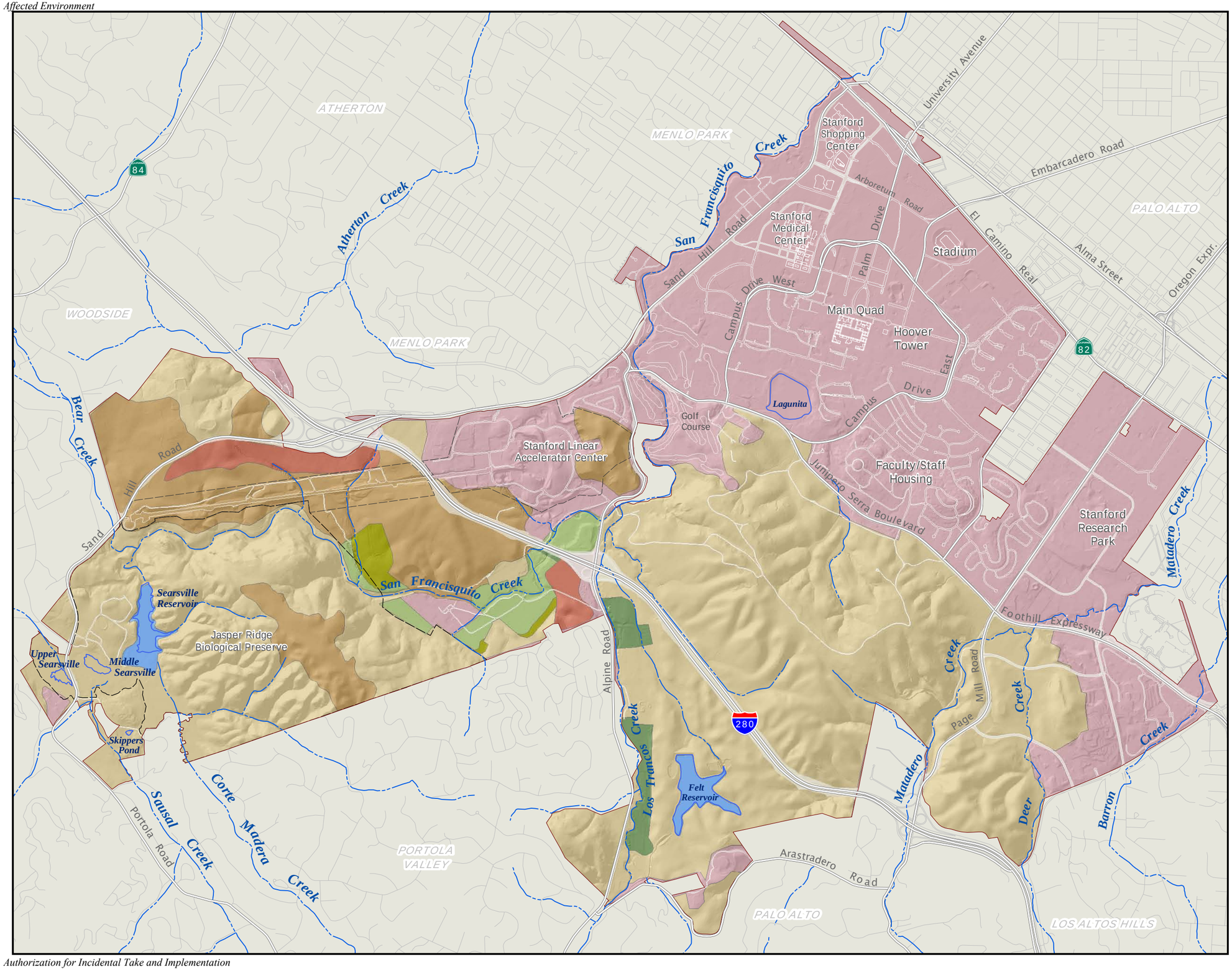

Farmland

- Prime
- Statewide Importance
- Unique
- Local Importance
- Grazing
- Urban
- Water
- Not Farmland

hectare

100
25
4
acres

Sources:
CA Department of Conservation, 2004
Creeks: US Geological Survey, 1991

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0 0.25 0.5 0.75 1
Miles

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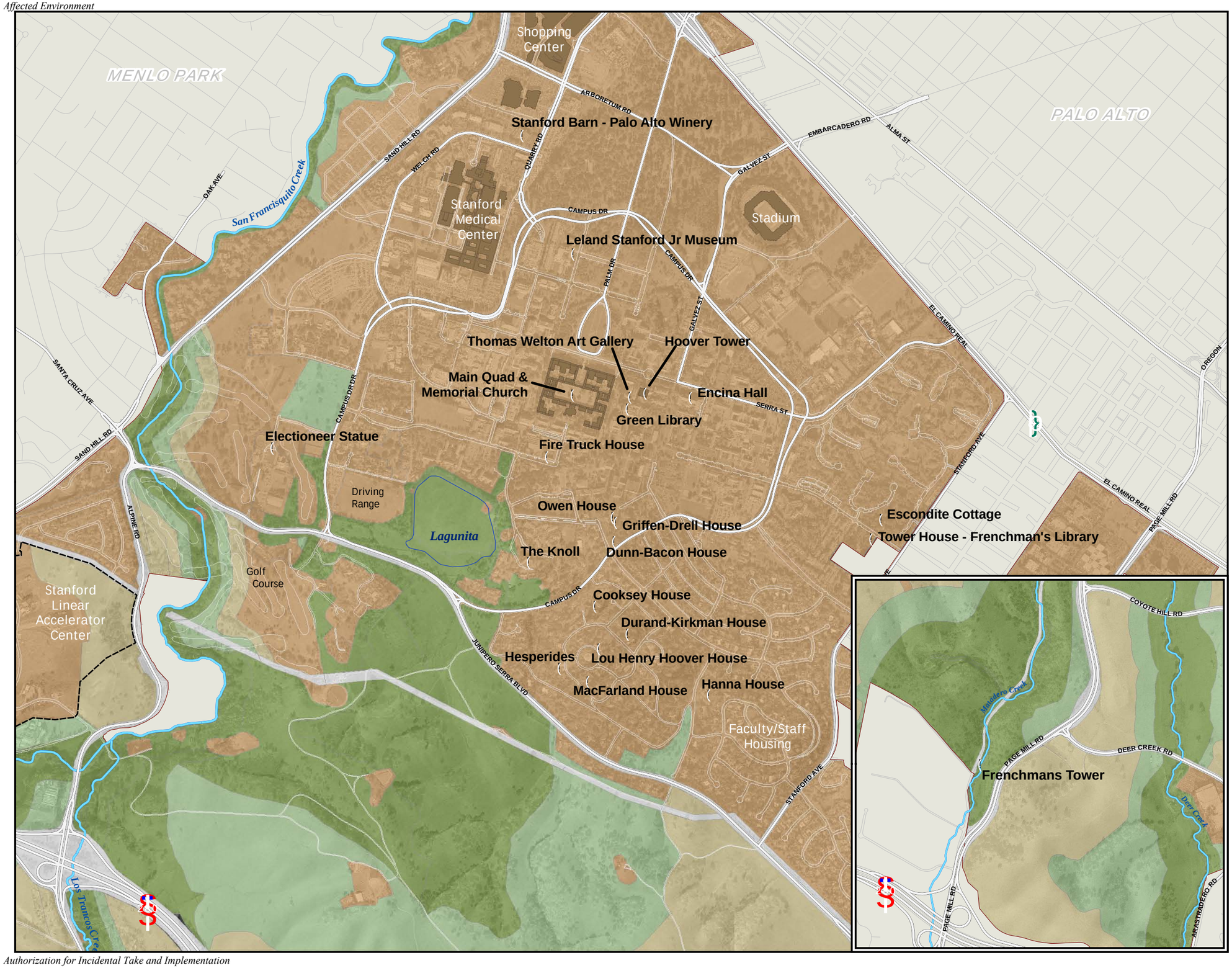
Figure 4-4



Stanford University HCP Environmental Impact Statement

Historic Resources Inventory with Management Zones

- Historic Resource
- Zone 1
- Zone 2
- Zone 3
- Zone 4

hectare

100
25
4

acres

Sources:
Historic Resources: Santa Clara County, 2006
HCP Zones: Stanford University Campus Biologist, 2006
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

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Graphic Scale
1 Inch = 0.25 Miles

0 0.25 0.5

Miles

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Date Printed: July 30, 2009

Figure 4-5

Figure 4-6. Average Annual Forecasted Emissions

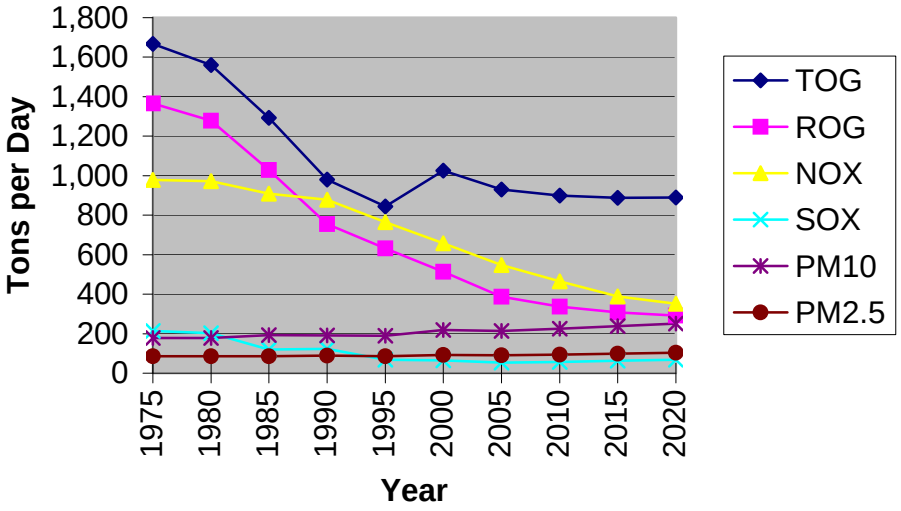
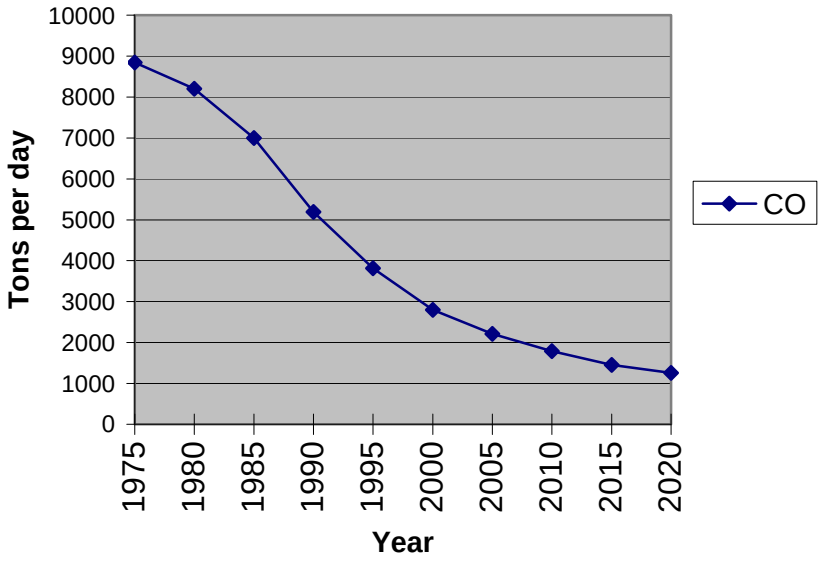


Figure 4-7. Annual Average CO Emissions

Past, Current, and Forecasted



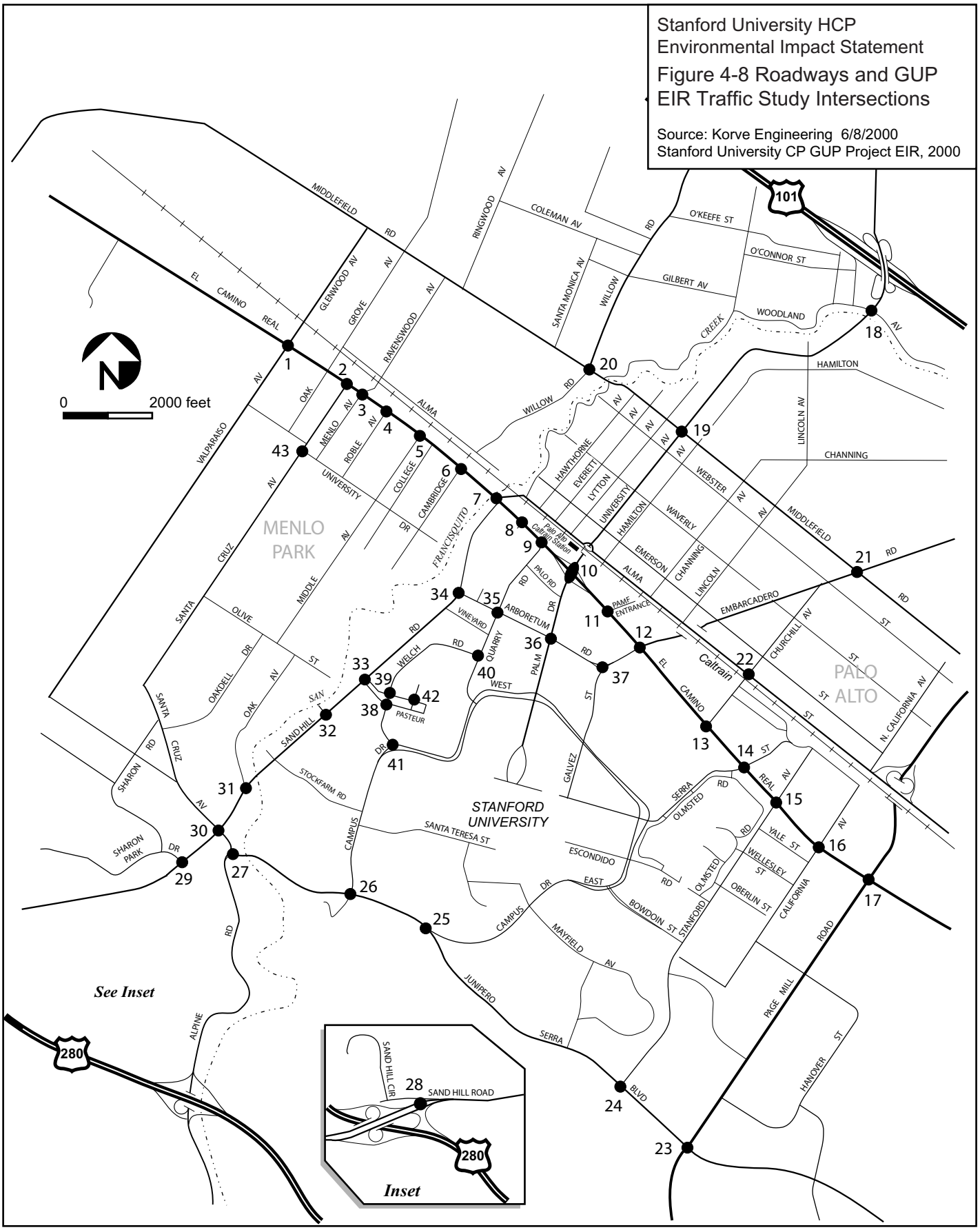

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Figure 4-8 Roadways and GUP
EIR Traffic Study Intersections
Source: Korve Engineering 6/8/2000
Stanford University CP GUP Project EIR, 2000
0
2000 feet
MENLO PARK
PALO ALTO
STANFORD UNIVERSITY
Caltrain
Palo Alto Caltrain Station
PAMF ENTRANCE
ARBORETUM
PASTEUR
See Inset
Inset
SAND HILL ROAD
MIDDLEFIELD RD
EL CAMINO REAL
GLENWOOD AV
GROVE AV
RAVENSWOOD AV
RINGWOOD AV
COLEMAN AV
SANTA MONICA AV
WILLOW RD
O'KEEFE ST
O'CONNOR ST
GILBERT AV
WOODLAND AV
CREEK
HAMILTON
LINCOLN AV
CHANNING
WEBSTER
MIDDLEFIELD
VALPARAISO AV
OAK GROVE AV
MENLO AV
ROBLE AV
ALMA
UNIVERSITY
COLLEGE
CAMBRIDGE
DR
FRANCISQUITO
HAWTHORNE
EVERETT
LYTTON
UNIVERSITY
HAMILTON
WAVERLY
EMERSON
CHANNING
LINCOLN
ALMA
PALO RD
EMBARCADERO RD
CHURCHILL AV
ST
N. CALIFORNIA AV
SANTA CRUZ AVE
MIDDLE AV
OLIVE
OAKDELL DR
OAK GROVE AV
SAN
SAND HILL RD
SANTA CRUZ AVE
SHARON RD
SHARON PARK DR
VINEYARD
WELCH RD
QUARRY
PALM DR
WEST
PASTEUR
STOCKFARM RD
CAMPUS
SANTA TERESA ST
GALVEZ ST
SERRA
OLMSTED RD
REAL AV
YALE ST
WELLESLEY ST
OBERLIN ST
CALIFORNIA
STANFORD
ESCONDIDO RD
EAST
BOWDOIN ST
CAMPUS DR
MAYFIELD AV
JUNIPERO SERRA BLVD
PAGE MILL ROAD
HANOVER ST
ALPINE RD
SAND HILL CIR
101
280

Stanford University HCP Environmental Impact Statement

"Lake" Water Systems

- Creek Monitoring Facility
- US Geological Survey Stream Gaging Station
- Diversion
- Waterbody
- Watershed Boundary
- Stanford Lands
- Additional San Francisquito Creek basin area connected via storm drainage system

hectare

100 / 25 / 4

acres

Sources:
Stream Monitoring Facilities: SU/PO, 2004
Detention Ponds: SU/PO, 2004
Diversions: SU/PO, 2004
Watershed: Nolte, 1999 and SU/PO, 2004
Additional S.F. Creek drainage: Nolte, 1999
Gaging Stations: US Geological Survey, 1991
Creeks: US Geological Survey, 1991

Disclaimer:
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Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1

Miles

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Date Printed: March 14, 2007

Figure 4-9

Stanford University HCP Environmental Impact Statement

Governmental Jurisdictions

- City of Menlo Park
- City of Palo Alto
- Town of Portola Valley
- Town of Woodside
- San Mateo County
- Santa Clara County

Government Jurisdiction

hectare

100
25
4
acres

Sources:
Jurisdictions: Stanford University Planning Office, 2004
Creeks: US Geological Survey, 1991

Disclaimer:
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0 0.25 0.5 0.75 1
Miles

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Figure 4-10

Stanford University HCP Environmental Impact Statement

Existing Land Use in Habitat Management Zones

- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Existing Land Use

AC: Academic
AR: Academic Reserve
BP: Biological Preserve
CM: Commercial
IN: Institutional
OS: Open Space
RC: Recreation
RS: Residential

hectare
100
25
4
acres

Sources:
HCP Zones: Stanford University Campus Biologist, 2006
Existing Land Use: Stanford Univ. Planning Office, 2004
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

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Graphic Scale
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0 0.25 0.5 0.75 1
Miles

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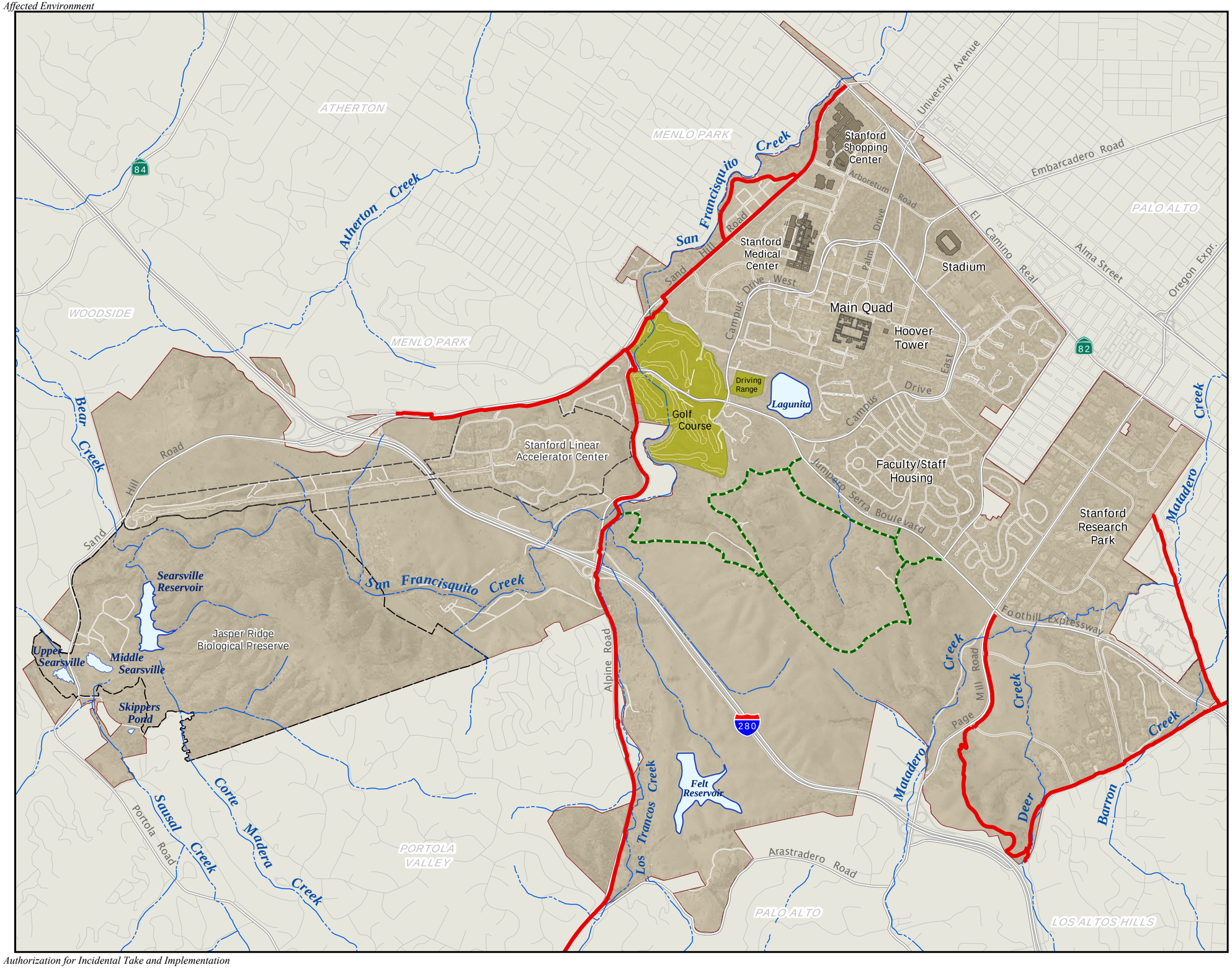
Figure 4-11



Stanford University HCP Environmental Impact Statement

Recreational Uses

- "Dish" Recreational Route
- Public Trail
- Golf Course

hectare

100
25
4
acres

Sources:
Public Trails:
Santa Clara Co. Trails Master Plan Update, Nov. 14, 1995
San Mateo Co. Trails Plan, Draft Program EIR, Oct. 1999
Creeks: US Geological Survey, 1991

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Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1
Miles

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Figure 4-12

Stanford University HCP Environmental Impact Statement

Leaseholds: Agricultural & Equestrian

- Agriculture
- Equestrian
- Equestrian Trail
- Grazing
- Vacant

hectare
100
25
4
acres

Sources:
Leases: Stanford Management Co. & SU/PO, 2006
Creeks: US Geological Survey, 1991

Disclaimer:
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Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1
Miles

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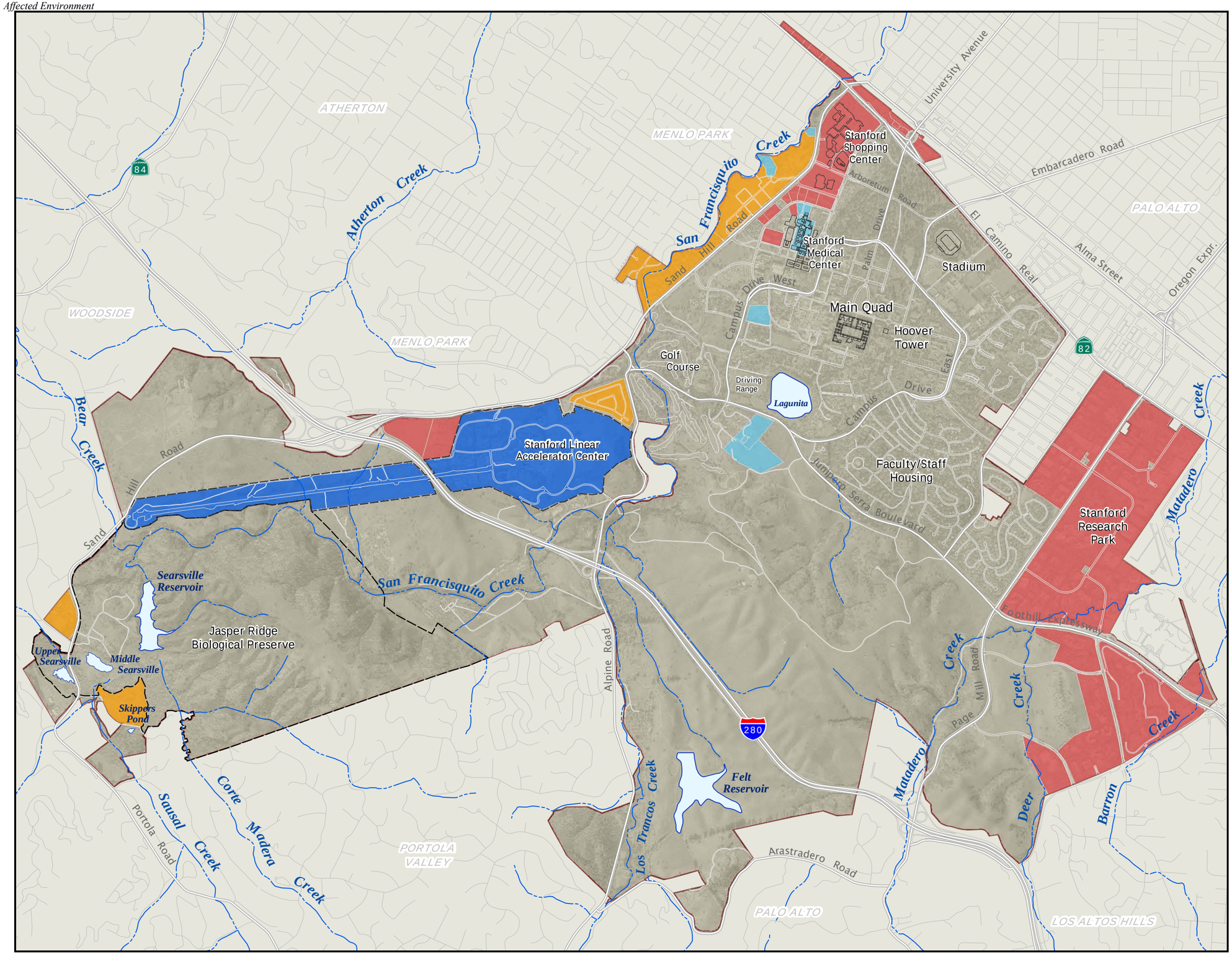
Figure 4-13



Stanford University HCP Environmental Impact Statement

Leaseholds: Commercial/ Institutional

- Commercial
- Institutional/ Professional
- Residential
- SLAC

hectare

100
25
4
acres

Sources:
Leases: Stanford Management Company & SU/PO, 2006
Creeks: US Geological Survey, 1991

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Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1
Miles

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Figure 4-14

Stanford University HCP Environmental Impact Statement

California Red-Legged Frog at Stanford

Occupied Creek
(Creek widths exaggerated)

Associated Uplands

Outliers / Historical Records

hectare
100
25
4
acres

Sources:
CRLF habitat: Stanford Unv. Campus Biologist, 2006
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

Disclaimer:
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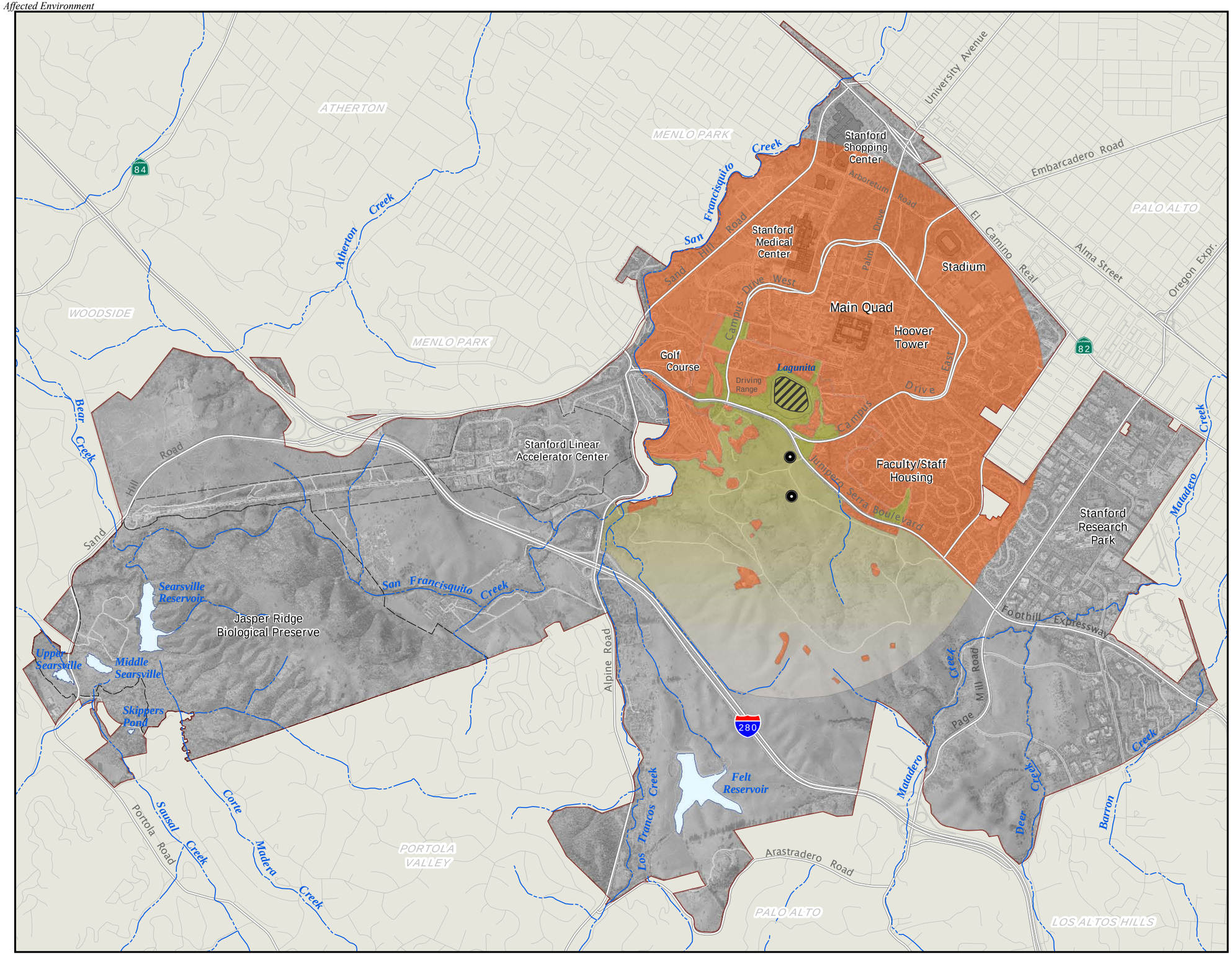
Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1
Miles

Stanford University Land Use & Env. Planning
Date Printed: March 14, 2007

Figure 4-15



Stanford University HCP Environmental Impact Statement

California Tiger Salamander at Stanford

- Recently constructed pond where breeding has occurred
- Historic breeding location
- Occupied Undeveloped Lands
- Population Sinks

hectare

100
25
4

acres

Sources:
CTS habitat: Stanford Unv. Campus Biologist, 2006
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

Disclaimer:
This map was produced by the SU Planning Office. While generally accurate, this map may not be completely free of error. The information is derived from a variety of sources deemed reliable, but subject to recurrent change and Stanford does not warrant the accuracy and completeness of these data.

Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1

Miles

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Date Printed: March 14, 2007

Figure 4-16

Stanford University HCP Environmental Impact Statement

Western Pond Turtle at Stanford

Recently Occupied Creek
(Creek width exaggerated)

Recently Occupied Reservoir

hectare
100
25
4
acres

Sources:
WPT habitat: Stanford Unv. Campus Biologist, 2006
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

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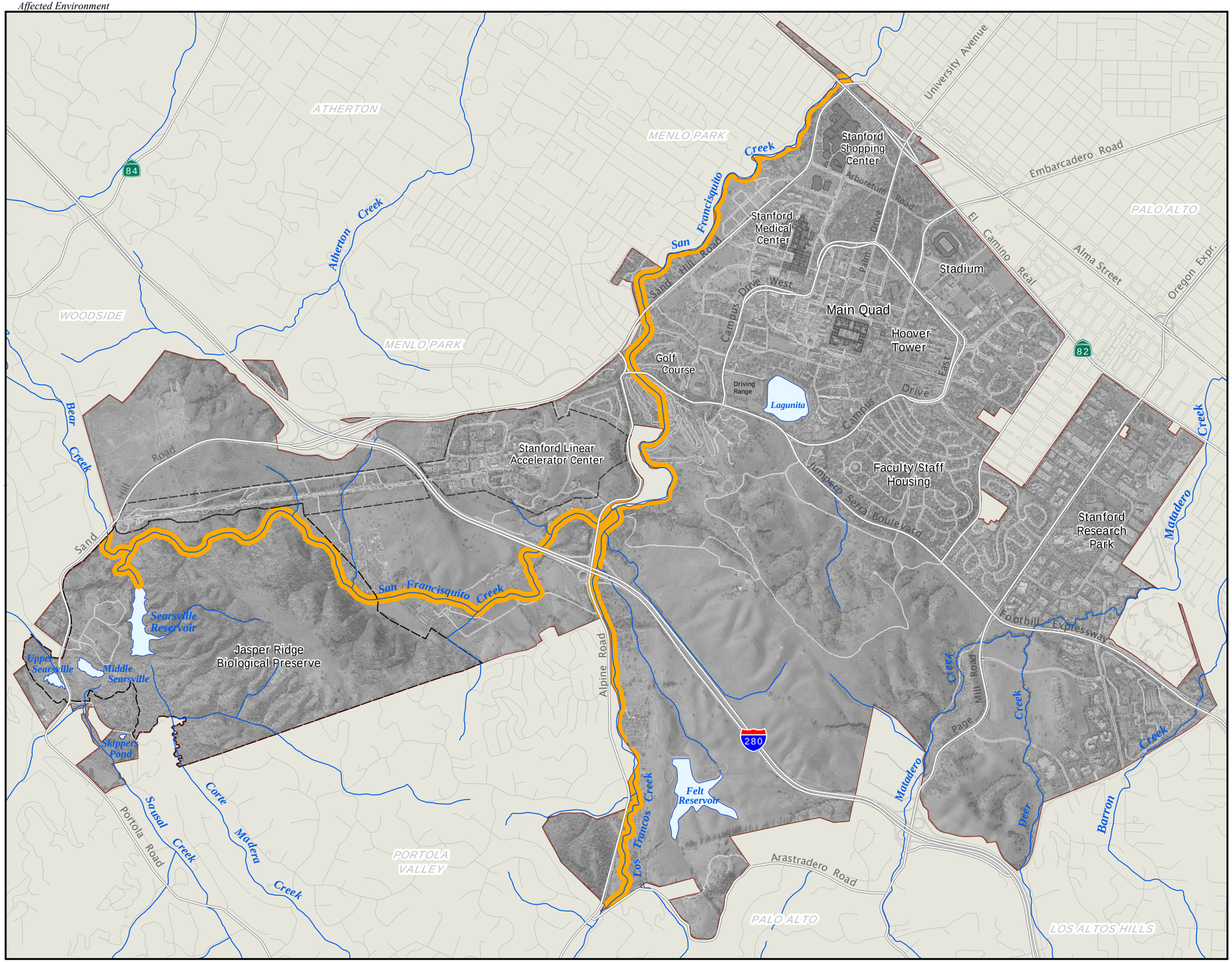
Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1
Miles

Stanford University Land Use & Env. Planning
Date Printed: March 14, 2007

Figure 4-17



Stanford University HCP Environmental Impact Statement

Steelhead at Stanford

Occupied Creek
(Creek width exaggerated)

hectare
100
25
4
acres

Sources:
SH habitat: Stanford Unv. Campus Biologist, 2006
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

Disclaimer:
This map was produced by the SU Planning Office. While generally accurate, this map may not be completely free of error. The information is derived from a variety of sources deemed reliable, but subject to recurrent change and Stanford does not warrant the accuracy and completeness of these data.

Graphic Scale
1 Inch = 0.5 Miles

0 0.25 0.5 0.75 1
Miles

Stanford University Land Use & Env. Planning
Date Printed: March 14, 2007

Figure 4-18

5.0 ENVIRONMENTAL CONSEQUENCES

This chapter analyzes the effects of issuing the ITPs and implementation of the HCP on the physical, biological, and socioeconomic environment. It describes the direct, indirect, and cumulative effects of the alternatives, including the Proposed Action, No Action, and HCP for CTS Only. Any of the alternatives could result in take authorization by the Services which in turn could result in physical, biological or socioeconomic impacts.

The list of activities covered by the Proposed Action is provided in Chapter 3 and in the HCP (Appendix B of the DEIS). The direct and indirect effects of the Proposed Action and two alternatives on the physical environment are addressed in Section 5.1; on the biological environment in Section 5.2; on the socioeconomic environment in Section 5.3; and on environmental justice in Section 5.4. A summary comparison of the alternatives is provided in Table 5-6 at the end of the chapter.

Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. They may include the physical effects of population growth or changes in land use.

The possible cumulative effects on each resource are evaluated in Section 5.5. Cumulative effects are the incremental effects of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. Global climate change, for example, is addressed in this section.

Other NEPA required topics such as short-term uses versus long-term productivity and the irreversible or irretrievable commitment of resources are addressed in Sections 5.6 and 5.7.

5.1 PHYSICAL ENVIRONMENT

5.1.1 Geologic Hazards and Soils

This section describes the effects on geologic hazards and soil resources caused by the Proposed Action or the alternatives. The effects related to geologic hazards and soils were analyzed qualitatively, and are based on a review of soils and geological information for the affected environment and on professional judgment. The impact assessment evaluates whether the Proposed Action or alternatives would cause slope instability, erosion, or other soil failure that could result in property damage, personal injury, or death. The effects on soil resources, which include the conversion of important farmland soils (see Chapter 4), are also analyzed qualitatively. The analysis assumes that Stanford would comply with State laws, current building codes, and local seismic safety standards and ordinances. This would normally include a geotechnical review of new construction in hazard-prone areas, the use of erosion controls when soil is disturbed, and possible conditions imposed as a result of permits required by other agencies for in-stream activities.

5.1.1.1 Effects of the Proposed Action

Conservation Program. The proposed Conservation Program would not significantly affect geologic features or soils. None of the Minimization Measures or monitoring would require earth-moving of the scale that could trigger a geologic hazard or adversely affect soil resources. Management and enhancement activities could involve some earth-moving in hazard prone

areas, but would not involve moving large quantities of dirt that could trigger a geologic hazard. The implementation of certain management and enhancement activities within the San Francisquito/Los Trancos and Deer/Matadero easements such as removing riprap and other in-stream structures in San Francisquito Creek that create barriers to wildlife movement, have the potential to affect or be affected by geologic hazards. For example, the removal of riprap or gabions within creeks could result in unstable bank slopes and if the slopes are not adequately stabilized, they could fail. Likewise, management and enhancement activities in Zone 1 and Zone 2 riparian areas could disturb soils that are prone to erosion. Geotechnical protocols that are already in place for operations and maintenance work, including Stanford Design Facility Guidelines and Santa Clara Valley Water District Best Management Practices for work in and around creeks, would apply to all Conservation Program activities. In addition, the Conservation Program includes erosion control and bank stabilization measures that would stabilize areas that are currently prone to erosion. The removal of in-stream structures would be designed by a qualified engineer, and particularly unstable areas generally would be avoided or specific construction measures would be included to assure that geologic hazards are addressed properly. Therefore, the management and enhancement activities would be done in a manner that addresses the geologic site conditions, including slope stability, erodible soils, and local fault zones.

The implementation of existing geotechnical protocols, including consultation with a qualified engineer and review by local, State, and Federal agencies, would eliminate or minimize the possibility of slope failure caused by Conservation Program activities in unstable geologic areas.

Under the Proposed Action, conservation easements are proposed over lands in Zone 1 that contain geologic hazards, including unstable slopes, and areas with moderate to high potential for earthquake-induced landslides. Preserving these areas with a conservation easement would not adversely affect these geologic hazards. Should there be a geologic failure within a conservation easement, such as a landslide, the hazard could be remediated in accordance with the requirements set forth in Section 4.2 of the HCP.

Conservation Program activities would not induce a geologic event or cause slope instability, erosion, or soil failure, and therefore would not have an adverse effect on resources that are vulnerable to geologic or seismic events.

The San Francisquito/Los Trancos Easement would preclude agricultural land uses on about 10 acres of soil designated as Prime Farmland located along San Francisquito Creek upstream of Alpine Road and about 10 acres of soil designated as Unique Farmland on Los Trancos Creek upstream of I-280. This is a small area of Prime or Unique Farmland, and its preservation in a conservation easement (as opposed to being developed) would not result in an adverse effect on Prime or Unique Farmland.

Ongoing Stanford Operations. Some of the ongoing Covered Activities require ground disturbance, including 1) the maintenance of, repair, replacement and construction of new utilities, pipelines, roadways and bridges; 2) creek bank stabilization; 3) academic activities that involve digging test pits; 4) maintenance of fire breaks; 5) the use of existing and construction of new recreational trails; and 6) agricultural activities. In general, the ongoing Covered Activities would not trigger a geologic hazard. Further, geotechnical protocols already in place, including Stanford Design Facility Guidelines and Santa Clara Valley Water District Best Management Practices, assure that operations and maintenance work conducted throughout Stanford is done in a manner that reflects the geologic site conditions, including faults, unstable slopes, and erosive

soils. Where these activities occur in Management Zones 1 and 2, the HCP imposes additional erosion control measures. The agricultural lessees operate under a program of Best Management Practices that includes erosion and sediment control measures, such as vegetated filter strips between the agricultural use and the creeks, appropriate revegetation of eroded areas, and use of erosion control blankets. The erosion control, best management practices, and geotechnical protocols minimize the likelihood that the ongoing Covered Activities would result in erosion or that a geologic hazard would affect people or property. Therefore, although the ongoing operations and maintenance involve ground disturbance, they would not cause slope instability, erosion, or soil failure, and thus would not adversely affect geologic hazards.

Future Development. Construction-related activities, such as grading and new building improvements, would not have a significant geologic effect or pose a safety hazard in the event of an earthquake with the implementation of existing State and local building and construction regulations. The Uniform Building Code and California Building Code establish specific design requirements to prevent collapse and minimize structural damage during an earthquake, and each of the local jurisdictions requires geotechnical review or reports for projects in hazard-prone areas. The "National Pollutant Discharge Elimination System General Permit for Stormwater Discharges Associated with Construction Activity" specifies actions to be taken at all construction sites 1 acre or larger to prevent and minimize erosion during construction. Local grading ordinances also require measures to reduce erosion. This conclusion is consistent with prior review under the California Environmental Quality Act (CEQA) for development approved by the Santa Clara County under the 2000 GUP, which concluded the potential geologic and seismic impacts were less than significant with the application of existing regulations.

The exact location of future development that is not already allowed under the GUP is currently unknown; however, it would not occur within any of the conservation easements or in the CTS Reserve. This future development would undergo review under CEQA and may undergo site-specific geotechnical review under the local agencies' building ordinances.[1] If any site-specific geologic concerns are identified that cannot be addressed through existing regulations, the local permitting agency could impose site-specific mitigation measures. Thus, with the implementation of existing State and local review and regulations, the effects of future development would not cause slope instability, erosion, or soil failure, and would not cause significant adverse geologic effects.

Future development is not likely to significantly affect Farmland soils. Nearly all of the soils designated as Prime or Unique Farmland are located in Zones 1 and 2. The HCP anticipates the future development of 5 to 15 acres in Zone 1 and 10 to 30 acres of development within Zone 2. Although no new development is currently proposed in areas that contain Prime or Unique Farmland soils, up to 45 acres of the approximately 200 acres of Prime or Unique Farmland on Stanford lands could be affected by future development. Any development that affects these soils would be subject to policies that protect farmland, such as the Farmland Protection Policy Act. The amount of Prime or Unique Farmland that could be converted is small relative to the amount of Prime or Unique Farmland in San Mateo and Santa Clara counties, and therefore the Proposed Action would not have an adverse effect on these resources.

[1] Small permanent conversions of habitat resulting from the ongoing Covered Activities may be exempt from CEQA review, but such small activities should not have adverse geologic related effects.

5.1.1.2 Effects of the No Action Alternative

As described in Chapter 3, under the No Action alternative take authorization would be required for any activity resulting in the take of a federally listed species (e.g., red-legged frog, steelhead, tiger salamander or garter snake). Under this alternative, the individual take authorizations would likely incorporate take minimization measures similar to those defined in the HCP, with the same effect as the Proposed Action, but on a smaller scale in keeping with the level of impact.

Conservation. The No Action alternative would not implement a conservation program. Under this alternative, it is assumed that the activities in Zones 1 and 2 that require a permit would also require minimization measures similar to those defined in the HCP for Zones 1 and 2. Several components of the HCP's Conservation Program would not occur under this alternative unless required as mitigation for a take authorization. Mitigation measures that could affect geologic hazards or soils would be subject to the same protection measures as described for the Proposed Action (e.g., Stanford Facility Design Guidelines, and Best Management Practices). The project-specific take minimization measures and Best Management Practices related to future permits under the No Action alternative would likely be similar to the minimization and mitigation measures proposed as part of the HCP, and like the Proposed Action, would not result in adverse effects to geologic hazards or soils. The amount of ground disturbance from conservation activities under the No Action alternative may be less than for the Proposed Action's Conservation Program because it would involve mitigation for project-specific impacts, whereas the Proposed Action's Conservation Program includes activities throughout Management Zones 1 and 2 as part of a comprehensive effort to improve Covered Species habitat.

Under the No Action alternative the conservation easements along San Francisquito/Los Trancos and Matadero/Deer creeks would not be immediately recorded, and the Monitoring and Management Plans would not be implemented. Whether future conservation easements would be recorded over Prime or Unique Farmland soils pursuant to a project-specific incidental take authorization is unknown.

Ongoing Stanford Operations. Under the No Action alternative, Stanford would continue to operate. The ongoing operations and maintenance would be the same as described for the Proposed Action, above, and would have the same effects on geologic hazards and soils as the Proposed Action. Although the ongoing operations and maintenance involve ground disturbance, they would not cause slope instability, erosion, or soil failure, and therefore would not adversely affect geologic hazards or soils.

Future Development. The future development under the No Action alternative would be the same as that under the Proposed Action; therefore, the effects of future development on geologic hazards and soils would be the same under the No Action alternative as described for the Proposed Action.

5.1.1.3 Effects of the HCP for CTS Only Alternative

Under this alternative, the HCP area would be geographically limited to the CTS Basin, which includes the area around Lagunita (90 acres) and the CTS Reserve in the foothills south of Junipero Serra Boulevard (315 acres). Stanford activities that would result in the take of listed species other than tiger salamander would require project-specific incidental take permits.

Conservation Program. The Conservation Program would be limited to activities outlined in the Central Campus CTS Management Plan and the CTS Reserve Monitoring and Management Plan. The activities in the CTS Reserve Monitoring and Management Plan, such as vegetation mowing and species monitoring, would result in little, if any, ground disturbance, and would not affect geologic hazards or soils. The Conservation Program prohibits development in the CTS Reserve. Similarly, the activities in the Central Campus CTS Management Plan address methods of vegetation and ground animal management, worker education, restriction of off-road vehicles, and monitoring. These activities would not require large-scale earth moving that might trigger a geologic hazard or adversely affect geologic hazards or soils. The Conservation Program under this alternative affects a smaller area and results in less ground disturbance than the Proposed Action alternative's Conservation Program, thus it has less effect on geologic hazards and soils than the Proposed Action. It would likely also have less effect on geologic hazards and soils than the No Action alternative because the No Action alternative may still result in mitigation measures that require more ground disturbance or ground disturbance in more geologically sensitive areas, such as stream banks.

Ongoing Stanford Operations. Specific ongoing activities that could not avoid take of steelhead, red-legged frog, or garter snake would require take authorization from the Service or NMFS. It is assumed that such authorization would require the same minimization measures as proposed in the HCP, and may also require mitigation such as habitat restoration or a conservation easement.

The ongoing operations and maintenance covered by this alternative are a subset of the activities that would be covered by the Proposed Action alternative. Because they are smaller in scope, they would have less effect on geologic hazards and soils than the Proposed Action or the No Action alternatives, however, Stanford operations outside of the Central Campus CTS Monitoring Plan area and the CTS Reserve area would still occur under this alternative, so it would not result in an overall lower effect on geologic hazards and soils. Ongoing operations and maintenance covered under the HCP for CTS Only alternative would not adversely affect geologic hazards or soils.

Future Development. Future development that could not avoid take of steelhead, red-legged frog, or garter snake would require take authorization from the Service or NMFS. Such authorization would likely require the same minimization measures as proposed in the HCP, and may also require a conservation easement as mitigation.

The future development under the HCP for CTS Only alternative would be the same as that under the Proposed Action and No Action alternatives; therefore, the effects on geologic hazards and soils of future development under this alternative would be the same as the effects described for the No Action and Proposed Action alternatives.

5.1.1.4 Comparison of Alternatives

The Proposed Action or the alternatives would not result in significant adverse effects to geologic hazards and soils (see Table 5-6 at the end of the chapter). The Conservation Program under the Proposed Action provides bank stabilization that may not otherwise be required, and this would reduce erosion and benefit water quality. The easements proposed in the Conservation Program would also protect Prime Farmland from development. In comparing the alternatives, none pose a significant adverse effect, but the Proposed Action provides a benefit related to geologic hazards and soils.

5.1.2 Cultural and Historic Resources

This section describes the effects of the Proposed Action and alternatives on cultural (archaeological and paleontological) and historic resources. The effects on cultural and historic resources were analyzed qualitatively, and are based on a review of the cultural and historic information for the affected environment and consultation with the University Archaeologist. The potential effects on cultural and historic resources is assessed based on the type of resource that could be affected, and whether the Proposed Action or alternatives would result in irretrievable damage to or the destruction of a resource that is considered a culturally or historically significant resource under Federal, State, or local laws. The analysis assumes compliance with State and Federal laws and Stanford's archaeological protocols. In addition, the Services must comply with the National Historic Preservation Act, and as part of that process a letter was sent to interested Native American organizations and the State Historic Preservation Officer. A telephone call was received by USFWS in response to the letter, and a recommendation was made that a Native American monitor be present during construction actions (J. Robles, USFWS, pers. comm.).

5.1.2.1 Effects of the Proposed Action

Conservation Program. The HCP's Conservation Program monitoring, management, preservation, and enhancement activities would occur in Zones 1 and 2 where most of Stanford's 65 archaeological sites have been documented to occur. The implementation of certain management and enhancement activities has the potential to impact cultural resources through activities such as removal of the non-operating Lagunita Diversion which is more than 50 years old, moving a barn or a farmhouse away from the creek banks, bank stabilization within the San Francisquito/Los Trancos Easement and Deer/Matadero Creek Easement, and removing riprap and other in-stream structures that create barriers to wildlife movement. These activities could also unearth cultural or historic resources. In the event that previously unknown buried cultural resources are discovered, all work would stop within 50 feet of the discovery and the University Archaeologist would be notified to evaluate the find. If the resource is determined eligible for the National Register of Historic Places, a plan to mitigate impacts to the resource would be prepared prior to recommencement of work in the area.

Protocols already in place by the University Archaeologist would minimize the risk of damaging or destroying known cultural or historic resources. The protocols include having an archaeological monitor present during any activities that could disturb cultural resources, and if there is a possibility of uncovering human remains, having a Native American monitor present. Conservation activities would be subject to the protocols noted in DEIS Section 4.1.2, namely: the project or activity would be designed to avoid known resources; archaeological testing would be done for unknown resources; the project or activity would comply with the Secretary of Interior's standards for the treatment of historic properties; and site-specific mitigation measures would be developed. With these precautions, the Conservation Program would not significantly affect cultural or historic resources.

Ongoing Stanford Operations. Since the ongoing Covered Activities could involve ground disturbance anywhere on Stanford lands, there is potential for the activities to affect cultural and historic resources. Stanford operations have been ongoing since construction began in 1889. Stanford adopted policies to protect archaeological resources in 1986, and maintains a professional staff position (University Archaeologist), collections, and archives of its archaeological resources. As noted in Chapter 4, procedures have already been put in place to

assure that all ground-disturbing activities are conducted in a manner that avoids impacts to known cultural or historic resources. Although ongoing operations could inadvertently damage or destroy a cultural or historic resource, there would be no significant adverse effect because of the extent of documentation of existing resources, and the protocols used to protect known and anticipated resources.

Future Development. Development under the 2000 GUP was subject to environmental review by Santa Clara County. An EIR was prepared which addressed the specific impacts of the GUP development on cultural and historic resources.

The GUP EIR found that the development anticipated under the GUP would not have a significant unavoidable impact on prehistoric and archaeological resources, but that the impact on historic resources could not be mitigated to a less than significant level due to the lack of specific information as to where the development would take place. According to the GUP EIR, because the GUP permits development in areas that contain historic, or potentially historic, buildings it is possible that specific building projects would be proposed that would either remodel or demolish existing buildings that the County considers, or could consider, an historic resource. However, Stanford does not anticipate demolishing or remodeling the exterior of any historic buildings as part of the GUP development in Zones1, 2, or 3. Therefore, the GUP development covered by the HCP would not result in adverse effects on historic resources.

The additional 150 acres of development contemplated beyond the GUP could occur in areas that contain cultural or historic resources, including historic buildings. Unless specifically exempt from review under the CEQA, the local land agencies would review any proposed future development. As part of CEQA review there would be an analysis of a future project's potential to impact cultural and historic resources and specific mitigation measures could be imposed. This review would be done when the specific nature and location of a project were known. Also, new development, including ongoing Covered Activities that result in the permanent conversion of habitat, would be subject to Stanford's protocols that protect cultural prehistoric, archeological, and historic resources. Therefore, known and anticipated resources would not be affected, although some buried resources could be inadvertently damaged or destroyed by future development. At this time, the HCP does not include activities that would involve remodeling or demolishing any historic buildings; however, there are feasible mitigation measures, including written and pictorial analysis of historic buildings, and exhibiting or reusing significant archeological features that would reduce the adverse effect of altering or demolishing historic buildings.

5.1.2.2 Effects of the No Action Alternative

Under the No Action alternative, the ITPs would not be issued and the HCP including a comprehensive Conservation Program would not be implemented. Future development and ongoing Stanford operations in Management Zones 1 and 2 that could impact federally listed species would require take authorization on a project-by-project basis, which is what happens now.

Conservation. Under this alternative, the activities in Zones 1 and 2 that require a permit are assumed to require minimization measures similar to those defined in the HCP for Zones 1 and 2. Several components of the HCP's Conservation Program would not occur under this alternative unless required as mitigation for a take authorization. The effects of any measures required by the Services through take authorization would be the same as the effects of the

Conservation Program described in the HCP, although at a smaller scale in keeping with the level of impact that has to be mitigated. The effects on cultural and historic resources would be the same under the No Action alternative as described for the Proposed Action; the resources would be protected by protocols used by the University Archaeologist and the alternative would have no adverse effect on historic or cultural resources.

Ongoing Stanford Operations. Under the No Action alternative, Stanford would continue to operate. Ongoing operations and maintenance work conducted throughout Stanford would continue to be done under Stanford's protocols for avoiding impacts to cultural and historic resources. As a result, the effects of the ongoing operation would be the same under the No Action alternative as those described for the Proposed Action. Thus, under the No Action alternative ongoing university operations would have no adverse effects on cultural or historic resources, the same as the Proposed Action.

Future Development. Under the No Action alternative, new development would occur. Future development would be subject to the GUP, and any new development that has not already been permitted by the GUP would require project-specific CEQA review that could include measures to reduce potential impacts to cultural and historic resources. As a result, the effects of future development would be the same under the No Action alternative as those described for the Proposed Action. Under the No Action alternative, future development would have no adverse effects on cultural or historic resources if Stanford continues its current practices to protect cultural or historic resources.

5.1.2.3 Effects of the HCP for CTS Only Alternative

Under this alternative, the HCP area would be geographically limited to the CTS Basin, which includes the area around Lagunita (90 acres) and the CTS Reserve in the foothills south of Junipero Serra Boulevard (315 acres). Stanford activities that would result in the take of listed species other than tiger salamander would require project-specific incidental take permits.

Conservation Program. The activities in the CTS Reserve Monitoring and Management Plan, such as vegetation mowing and species monitoring, would result in little, if any, ground disturbance, and would not affect cultural or historic resources. The Conservation Program prohibits development in the CTS Reserve. Similarly, the activities in the Central Campus CTS Management Plan address methods of vegetation and ground animal management, worker education, restriction of off-road vehicles, and monitoring. These activities would not require large-scale earth moving that might adversely affect a cultural or historic resource. In addition, resources would be protected by protocols used by the University Archaeologist and the alternative would have no adverse effect on historic or cultural resources.

Ongoing Stanford Operations. Under this scenario, ongoing activities that could not avoid take of red-legged frog, garter snake and/or steelhead would require take authorization from the USFWS or NMFS on a project-by-project basis. The authorization would likely require the same minimization measures as proposed in the HCP.

Under the HCP for CTS Only alternative, Stanford would continue to operate. The effects of the ongoing operation of the Stanford would be the same as described for the Proposed Action.

Future Development. Under this alternative, future development that could not avoid take of red-legged frog, garter snake or steelhead would require take authorization from the USFWS or NMFS on a project-by-project basis. The authorization would likely require the same

minimization measures as proposed in the HCP, and possibly a conservation easement managed to benefit the species. The size of the easement would depend on the effects of the project.

Under the HCP for CTS Only alternative, future development would occur. Future development would be subject to the existing GUP, and any new development that has not already been permitted by the GUP would require project-specific CEQA review that could include measures to reduce potential impacts to cultural and historic resources. The effects from future development would be the same as described for the Proposed Action and the No Action alternative.

5.1.2.4 Comparison of Alternatives

The Proposed Action or the alternatives would not result in significant adverse effects to cultural resources. Protocols already in place by the University Archaeologist would minimize the risk of damaging or destroying known cultural or historic resources under the Proposed Action or alternatives. The Proposed Action or alternatives do not significantly differ in effects on cultural resources.

5.1.3 Hydrology and Water Quality

This section addresses potential effects of the Proposed Action and alternatives on surface drainage, water diversions, groundwater hydrology, and water quality. The effects related to hydrology and water quality are based on a review of the hydrology and water quality information for the affected environment and an assessment of the activities associated with the Proposed Action and alternatives, including an estimation of the future amount of impervious surfaces. Effects associated with the Proposed Action or alternatives are analyzed in light of whether they would lead to an increase in run-off that could adversely affect surface or ground water quality, modify groundwater recharge, increase the risk of damage caused by flooding, or lead to the violation of applicable Federal, State or local laws.

5.1.3.1 Effects of the Proposed Action

Conservation Program. Under the Proposed Action, permanent conservation easements would be recorded over the most biologically sensitive portions of San Francisquito, Los Trancos, Matadero, and Deer creeks on Stanford lands. These easements would restrict activities within and adjacent to the creeks, and the easements would be monitored and managed in accordance with a San Francisquito/Los Trancos Easement Monitoring and Management Plan and Matadero/Deer Easement Monitoring and Management Plan. The easements and associated monitoring and management plans would contribute to the protection of surface water quality by minimizing soil disturbance where it could potentially introduce sediment or pollutants into the creek.

In addition, as part of the monitoring and management plans for the riparian easements, Stanford would maintain water quality monitoring stations in the creeks (Los Trancos, Bear, San Francisquito) for 5 years to determine if the data are valuable for conservation purposes. If useful, the monitoring stations could be used beyond 5 years. Stanford would also investigate the feasibility of installing water quality monitoring stations on Matadero and Deer creeks. Installation of additional water quality monitoring stations would not adversely affect the creeks' flow or water quality.

The monitoring and management plans for the riparian easements also call for control of existing erosion in riparian areas. This includes using bioengineering methods to stabilize stream banks

and adjacent upland areas, and revegetating areas where erosion is an existing problem. In addition, when it is feasible, Stanford would remove man-made structures in San Francisquito Creek (e.g., rip-rap, gabions) to improve fish passage. The removal methods would be subject to review by the Conservation Program Manager to reduce impacts to water quality and Covered Species. These actions would improve water quality by reducing erosion.

Any actions undertaken pursuant to the conservation easements' monitoring and management plans would be done in accordance with the Clean Water Act and applicable State water resource laws, including the State Fish and Game Code. The easements and monitoring and management plans do not anticipate filling any wetlands or other aquatic resources; however, permits could be required from Federal, State or local agencies before stream stabilization activities were undertaken or any structures were removed from the creeks.

The Conservation Program in the HCP also includes several Minimization Measures to protect water quality as a way to also protect the Covered Species. These measures are included in Chapter 4 of the HCP, apply to work in Management Zones 1 and 2, and include:

- performing maintenance or other construction in the creeks without heavy equipment and coffer dams;
- limiting maintenance activities in reservoirs to the dry season (Lagunita) or periods where there is no overflow (Searsville);
- conducting all activities associated with the operation, maintenance, and installation of infrastructure improvements in an environmentally responsible manner in accordance with practices outlined in current industry published manuals;
- monitoring of service roads periodically for structural integrity and erosion;
- placing riparian areas "out-of-play" at the Stanford Golf Course;
- minimizing the use of biocides and fertilizers at the Golf Course;
- prohibiting public access to creek channels;
- keeping new recreational routes out of Management Zones 1 and 2 and at least 150 feet away from the creek bank;
- removing structures, crop fields, stables and paddocks associated with the equestrian and agricultural leases in Zone 1;
- requiring fuels stored in Zone 1 and 2 to be double contained; and
- oversight of all work in Zone 1 and 2 by the Conservation Program Manager.

Overall, the proposed HCP's Conservation Program would improve surface water quality, and would not lead to the violation of any Federal or State water quality standards. No structures or enhancements are proposed by the HCP that would place impermeable surfaces over the unconfined zone and affect groundwater recharge. Likewise, the HCP's proposed Conservation Program would not increase the amount of impermeable surfaces, which could increase run-off and the risk of flooding. To the extent that the underlying activities that are subject to the Minimization Measures or the proposed conservation activities require Federal, State, or local

permits, the HCP would not affect the need to obtain such permits.[2] Thus, the HCP would not lead to the violation of any Federal, State, or local water laws. Because it prohibits development in the creek corridor in perpetuity, the Proposed Action provides greater protection of water quality than the No Action or HCP for CTS Only alternatives (described later below).

With regard to the "Lake" water system, the water diversions at Los Trancos and San Francisquito creeks are already subject to steelhead by-pass flow operations required by the CDFG and NMFS, and the HCP would incorporate these operational protocols. Specific operational measures for the Searsville, Los Trancos and San Francisquito creek water diversions are described in the HCP (Chapter 3, and Appendix A), and there are Minimization Measures associated with maintenance of the diversion facilities, which are described in Section 4.2.1 of the HCP.

Regional flood reduction is not a Covered Activity in the HCP. As noted in Chapter 2.0 *Purpose and Need*, this issue will be addressed at a later date, and by all of the stakeholders in the region, not just Stanford. Therefore, possible regional flood reduction activities, such as modifications to Searsville Dam, the construction of off-stream detention sites, or regional-flood-reduction-related widening of San Francisquito Creek, are not Covered Activities.

While the HCP does not expressly cover any future regional flood reduction activities, it does not inhibit regional flood reduction planning. The HCP does not propose any major modifications of Searsville Reservoir that would prevent its possible use as a flood reduction facility (e.g., removal or modification). Likewise, the HCP does not prevent future removal or modification of the Searsville Dam to enhance steelhead passage. The HCP requires Stanford to study the technical feasibility of fish passage alternatives at Searsville Dam; conducting a study would not affect flood reduction.

The HCP protects 270 acres of the most biologically valuable portions of San Francisquito and Los Trancos creeks by placing conservation easements over them. This is a small fraction of the 45-square-mile watershed, and would not preclude the Corps and JPA from identifying viable, and possibly less environmentally sensitive, places to build flood reduction improvements.

The Proposed Action would not have a significant adverse effect on regional flood reduction as a result of either implementation of the Conservation Program or placement of a conservation easement in the San Francisquito Creek watershed. The Proposed Action would not require changes to operations and maintenance that would result in an increase in withdrawal of groundwater, or pose a threat to groundwater quality.

Ongoing Stanford Operations. Ongoing operations are described in Chapter 3 of the HCP (see Appendix B of the DEIS), and include water management, academic activities, infrastructure installation and maintenance (utilities, roads and bridges, fences, detention basins), residential land use, recreation and athletics, grounds and vegetation management, agricultural and equestrian leaseholds, and commercial and institutional leaseholds.

Ongoing Stanford operations do not adversely affect surface or ground water quality, modify groundwater quality or recharge, increase the risk of damage caused by flooding, or lead to the violation of applicable Federal, State or local laws. The operations are currently regulated in a

[2] For example, the HCP does not authorize the fill of any wetlands or alteration of a creek or creek bed. These activities would still require permits under the CWA, Porter-Cologne Water Quality Control Act, or Fish and Game Code.

manner that protects water quality. Several measures are in place to prevent storm water (i.e., surface water) pollution. Stanford is required to comply with Palo Alto's Sewer Use Ordinance, which includes storm water requirements. Though not required by law, Stanford operates under its own campus Storm Water Pollution Prevention Plan (SWPPP) for ongoing operations. All new contracts for development at Stanford are required to include the Best Management Practices and requirements set forth in Stanford University's Special Conditions for Storm Water Pollution Prevention (Stanford University, 2005). The City of Palo Alto also conducts inspections each year to identify storm water issues.

Ongoing operations include maintenance activities to reduce obstructions in the creeks that could contribute to flooding. These maintenance activities are intended to reduce the risk of flooding.

The ongoing Covered Activities have not had an adverse effect on surface, drinking, or ground water quality, and have not significantly increased the risk of damage caused by flooding. The continuation of these activities would not adversely affect hydrology or water quality.

Future Development. Future development anticipated to occur during the 50-year term of the HCP/ITPs includes development permitted by the existing GUP, and development estimated to occur beyond the GUP. Development allowed under the existing GUP in Management Zones 1, 2 and 3 consists of 30 acres, and the impacts were addressed in the GUP EIR. Development anticipated in the HCP to possibly occur beyond what is currently allowed under the GUP is estimated to be between 50 and 150 acres. The HCP includes the following future development as a Covered Activity that could occur in Management Zones 1, 2 and 3: 1 to 3 million gross square feet of academic development, or 200 to 750 single family homes, or a combination of the two (e.g., 1 million gsf academic and 400 to 500 single family homes).[3]

The total amount of development addressed in the GUP EIR, including that in Management Zone 4, was 2,035,000 gsf of academic development and up to 3,018 housing units. Some of the development was proposed for vacant land and some was redevelopment. The GUP EIR found that the entire proposed development under the GUP would add an estimated 39 acres of impervious surfaces. Mitigation was required to prevent significant impacts related to flooding, groundwater supply and groundwater quality. Future development beyond the GUP would be reviewed by the county or city in which the development is proposed, and it likely would be subject to similar mitigation measures. The effects of future development beyond the GUP likely would have similar effects, but at a much smaller scale because of the level of development, and would be subject to similar mitigation measures.

Flooding. The GUP EIR determined that the entire proposed GUP development would result in a 39-acre increase in impervious surfaces, which could result in increased downstream flooding. During the EIR process, the Santa Clara Valley Water District indicated that any additional impervious area could increase downstream flooding. Mitigation included construction and operation of storm water detention facilities to ensure that peak 100-year storm runoff would not increase as a result of the development on campus.

It is estimated that 75 percent of future developed acreage beyond the GUP would be impervious surface (building, parking lots, and other paving). The remaining 25 percent would be permeable surfaces, such as landscaping. Therefore, the future development (50 to 150 acres)

[3]This example of future development beyond the GUP assumes 150 acres of urban type development, and does not attribute any of this development to small conversions of habitat associated with the ongoing Covered Activities.

anticipated as part of the proposed action could result in an additional 37 to 113 acres of impervious surfaces over the 50-year term of the ITPs. This analysis assumes that all of the development would occur on vacant land and not include redevelopment of areas that already contain impervious surfaces. Since any increase in impervious surface could increase the risk of flooding, the future development anticipated in the HCP could increase the risk of flooding. Specific impacts would depend on the scope and nature of the future development, and would be addressed under CEQA review at the time that the development was proposed. Development that could result in an increased risk of downstream or local flooding would require improvements, such as detention basins or other storm water runoff controls to mitigate the effect. Based on the results of the current GUP, there are feasible measures that Stanford could implement so that the future development anticipated under the Proposed Action would not increase the risk of flooding.

Groundwater Supply. Impacts to groundwater supply from the development analyzed in the GUP EIR were found to be significant because 20 acres of new impervious area could occur in the unconfined zone (where groundwater recharge can occur) and could reduce groundwater volumes. Mitigation for this impact was the implementation of a groundwater recharge plan.

A small area of future GUP development included in the HCP as a Covered Activity is in the unconfined zone; this area is primarily around Lagunita. The effects of development allowed under the GUP in this area would be mitigated through the 2005 "Proposed Campus-wide Plan for Ground Water Recharge". The effects on groundwater of a specific development project that has not already been permitted by the GUP would be addressed in future environmental review under CEQA. Based on the results of the current GUP, there are feasible water measures that Stanford could implement so that future development anticipated under the HCP would not adversely affect groundwater recharge.

Groundwater Quality. The GUP EIR found that construction in the vicinity of improperly abandoned wells could result in adverse impacts to groundwater quality. This is because the wells could serve as a conduit for pollutants, such as oil and gasoline from construction equipment, into groundwater. The EIR and the Final Conditions of Approval require wells to be properly abandoned prior to construction. Because the location of development that has not already been permitted by the GUP is not known, future development could also adversely impact groundwater quality in this way. Groundwater quality protection and abandonment of wells would be addressed in future environmental review of specific development proposals on Stanford lands under CEQA. If necessary, wells would be abandoned properly, and as demonstrated by the GUP conditions of approval, there are feasible water quality measures that Stanford could implement so that development anticipated under the HCP would not pollute groundwater.

Storm Water/Surface Water Quality. Storm water pollution in San Mateo and Santa Clara counties is controlled through the National Pollutant Discharge Elimination System (NPDES) permits issued by the San Francisco Bay RWQCB and implemented through the Santa Clara Valley Urban Runoff Pollution Prevention Plan and San Mateo Countywide Water Pollution Prevention Program. To comply with the NPDES permit, local agencies address the protection of storm water quality during the development review process. All projects in Santa Clara and San Mateo counties must consider the incorporation of appropriate site design and source control measures as well as use best management practices (BMPs) to reduce the impacts of storm water discharges. Future development under the GUP, and that anticipated in the HCP, would be

required to include BMPs in project design. This would prevent adverse impacts to storm and surface water quality.

All construction sites that are open October through April are included in Stanford's Notice of Intent to qualify for the State's General Storm Water Construction Permit, with a SWPPP prepared for each project. All sites are monitored regularly by Stanford staff and site project managers. Stanford project managers receive annual training regarding storm water pollution prevention at construction sites.

The analysis done for the GUP development demonstrates that there are feasible mitigation measures that could be imposed on site-specific future development that would minimize or avoid adverse effects on hydrological resources and prevent an increased risk of flooding.

Regulated Waters. Because the exact location of future development is still unknown, Stanford does not know if its future development might result in the fill of wetlands or other aquatic resources regulated under the CWA, Porter-Cologne Water Quality Control Act, or Fish and Game Code. Any fill would require a permit from the Corps, RWQCB, and possibly CDFG, and may also be subject to review under CEQA. Compensatory mitigation for the fill could be required as a condition of those permits. Thus, future development would not violate any Federal, State, or local laws.

5.1.3.2 Effects of the No Action Alternative

Conservation. There would be no comprehensive Conservation Program under the No Action Alternative, and the easements and associated monitoring and management plans of the Proposed Action would not be recorded or implemented. Under this alternative, it is assumed that the activities in Zones 1 and 2 that require a permit would also require minimization measures similar to those defined in the HCP for Zones 1 and 2. Several components of the HCP's Conservation Program would not occur under this alternative unless required as mitigation for a take authorization. Activities that result in ground disturbance would be subject to Best Management Practices as required under the applicable stormwater pollution prevention plan, and activities that affect waters or wetlands would be subject to protections required under the Clean Water Act and California Fish and Game Code. As with the Proposed Action, there would be no adverse effects on surface water quality, hydrology, surface or groundwater supply and quality, or regional flood reduction.

Ongoing Stanford Operations. Under the No Action alternative, ongoing Stanford operations would continue. These activities are subject to water quality protection requirements independent of any take authorization, and would have the same effects on water quality as the Proposed Action.

Future Development. Future development under the No Action alternative is the same as that described for the Proposed Action. Future development would be subject to Federal, State and local water quality regulations, and any new development that is not already allowed under the 2000 GUP would require project-specific building permits, CEQA review and possibly take authorization. Depending on its size and location, future development may affect storm water runoff, surface or ground water quality, ground water supply, flooding, or regulated waters, as described above for the Proposed Action. However, because of the project-specific review that is required for new development, these effects could be avoided or reduced through standard mitigation measures that are generally applicable to new urban development. This is the same effect as under the Proposed Action. The difference between the No Action alternative and the

Proposed Action is that the Proposed Action would establish permanent conservation easements within one year of ITP approval along the San Francisquito/Los Trancos and Matadero/Deer creek zones which would restrict development adjacent to sensitive water resources, and the Proposed Action includes a comprehensive Conservation Program that will reduce erosion and improve surface water quality in the creeks.

5.1.3.3 Effects of the HCP for CTS Only Alternative

Under this alternative, the HCP area would be geographically limited to the CTS Basin, which includes the area around Lagunita (90 acres) and the CTS Reserve in the foothills south of Junipero Serra Boulevard (315 acres). Stanford activities that would result in the take of listed species other than tiger salamander would require project-specific incidental take permits.

Conservation Program. The Conservation Program in the HCP for CTS Only alternative would not apply to the creek corridors, where water quality and hydrology issues are of greater concern. Conservation easements would not be immediately placed on the riparian corridors along San Francisquito/Los Trancos creeks and Matadero/Deer creeks although conservation easements could be placed as a result of future project-specific mitigation. The Conservation Program under the Proposed Action provides more comprehensive protection of water quality, including development restrictions in riparian corridors through conservation easements, and Minimization Measures that apply to activities occurring in and adjacent to the creeks.

The Conservation Program in the HCP for CTS Only alternative does not require activities near sensitive water resources and does not require ground disturbance that would adversely affect water quality or hydrology. In addition, measures to minimize ground disturbance, runoff, and erosion would be implemented in order to protect storm water quality. As with the Proposed Action and No Action alternative, there would be no adverse effects on surface water quality, hydrology, surface or groundwater supply and quality, or regional flood reduction.

Because it does not involve sensitive water resources, the Conservation Program in the HCP for CTS Only alternative has less potential for impact on water resources than the Proposed Action's Conservation Program, but it also does not have the beneficial effects of reducing erosion in the creek zones provided for in the Proposed Action's Conservation Program.

Ongoing Stanford Operations. Under the HCP for CTS Only alternative, Stanford would continue to operate. The same operations and maintenance activities would occur under the HCP for CTS Only alternative as for the Proposed Action. Thus, this alternative would have the same effects on hydrology and water quality as the Proposed Action.

Future Development. Future development under the HCP for CTS Only alternative is the same as that described for the Proposed Action. Future development would be subject to Federal, State and local water quality regulations, and any new development that is not already allowed under the 2000 GUP would require project-specific building permits, CEQA review and possibly take authorization. Depending on its size and location, future development may affect storm water runoff, surface or ground water quality, ground water supply, flooding, or regulated waters, as described above for the Proposed Action. However, because of the project-specific review that is required for new development, these effects could be avoided or reduced through standard mitigation measures that are generally applicable to new urban development. This is the same effect as under the Proposed Action and the No Action alternative. The difference between the HCP for CTS Only alternative and the Proposed Action is that the Proposed Action would establish permanent conservation easements within one year of ITP approval along the

San Francisquito/Los Trancos and Matadero/Deer creek zones which would restrict development adjacent to sensitive water resources, and the Proposed Action includes a comprehensive Conservation Program that will reduce erosion and improve surface water quality in the creeks. With regard to the impacts of future development, the HCP for CTS Only alternative has the same effects as the No Action alternative.

5.1.3.4 Comparison of Alternatives

The Proposed Action or the alternatives would not result in significant adverse effects to hydrology and water quality (see Table 5-6 at the end of the chapter). The Conservation Program under the Proposed Action provides bank stabilization that may not otherwise be required, and this would reduce erosion and benefit water quality. The easements proposed in the Conservation Program would also restrict development within the creek zones, in turn protecting surface water quality in the creeks. In comparing the alternatives, none pose a significant adverse effect, but the Proposed Action provides a benefit related to hydrology and water quality.

5.1.4 Air Quality

This section describes the impacts to air quality resulting from the implementation of the Proposed Action or the alternatives. The effects related to air quality are based on a review of air quality information for the affected environment and an assessment of the activities under the Proposed Action and alternatives that could affect air quality. Actions that result in violations of air quality standards or emissions that contribute substantially (as determined by the BAAQMD) to an existing or projected air quality violation would constitute a significant adverse effect on air quality.

5.1.4.1 Effects of the Proposed Action

Conservation Program. Some of the proposed HCP's habitat management and enhancement activities would involve ground disturbance or the use of construction equipment or vehicles causing air emissions. These activities may include the use of a backhoe or a bobcat tractor, and the ground disturbance would be minimized in order to protect biological resources. The equipment and type of work is similar to everyday activities that could occur in the air basin, and would not result in violations of air quality standards or emissions that would contribute substantially to an existing or projected air quality violation. Therefore, the implementation of the Conservation Program would not result in significant adverse effects on air quality.

Ongoing Stanford Operations. Stanford's ongoing activities would not markedly change due to the HCP. Therefore, the Proposed Action would not result in changes to air quality from ongoing university operations.

Future Development. The Stanford GUP EIR described the regional climate and physiographic, regional air quality, and State and Federal air quality standards. It was determined that the proposed development would result in significant impacts from diesel exhaust, a toxic air contaminant. These impacts were reduced to less than significant by implementing a mitigation measure requiring contractors to properly maintain their equipment and use "clean fuel" equipment and control technologies where feasible. All other impacts were considered less than significant.

Except for small projects that are exempt from CEQA, future development anticipated beyond that addressed in the GUP EIR would undergo independent environmental review and would be

governed by the constraints set forth by State and Federal law, and local ordinances and air quality plan. The Bay Area Air Quality Management District CEQA Guidelines outline feasible measures to reduce construction emissions of dust and diesel exhaust and establishes thresholds of significance for emissions from project operations including indirect sources of emissions from land use development (mobile emissions from cars at office parks, shopping centers, residential areas), and for plan (general, regional or air quality plan) impacts. Future development would have similar effects as the GUP development on air quality and based on the GUP CEQA analysis, there are feasible mitigation measures to reduce emissions and avoid the violation of air quality standards. Future development anticipated in the Proposed Action would therefore not have any significant adverse effects on air quality.

5.1.4.2 Effects of the No Action Alternative

Conservation. Under the No Action alternative, the proposed ITPs would not be issued and the HCP, including a comprehensive Conservation Plan, would not be implemented. Future development and ongoing Stanford operations in Management Zones 1 and 2 that could result in take of federally listed species would require take authorization on a project-by-project basis, which is what happens now. Under this alternative, activities in Zones 1 and 2 that require a permit are assumed to also require minimization measures similar to those defined in the HCP for Zones 1 and 2. Several components of the HCP's Conservation Program would not occur under this alternative unless required as mitigation for a take authorization. Air quality effects would result from the use of construction equipment or vehicles, as described for the Proposed Action, but the amount of restoration work involving the equipment may be less under the No Action alternative. There could be fewer emissions generated under the No Action alternative than described for the Proposed Action, but neither would result in an adverse effect on air quality.

Ongoing Stanford Operations. Under the No Action alternative, Stanford would continue to operate and the No Action alternative would not result in additional emissions beyond current emissions from ongoing university operations. This is the same as under the Proposed Action.

Future Development. Under the No Action alternative, new development would occur. Future development would be subject to the GUP, and any new development that has not already been permitted by the GUP would require project-specific CEQA review that could include measures to reduce potential effects on air quality. As demonstrated by the GUP conditions of approval, there are feasible air quality mitigation measures that would reduce potential effects on air quality. The effect of future development would be the same as described for the Proposed Action.

5.1.4.3 Effects of the HCP for CTS Only Alternative

Under this alternative, the HCP area would be geographically limited to the CTS Basin, which includes the area around Lagunita (90 acres) and the CTS Reserve in the foothills south of Junipero Serra Boulevard (315 acres). Stanford activities that would result in the take of listed species other than tiger salamander would require project-specific incidental take permits.

Conservation Program. The HCP for CTS Only alternative would have no effects on air quality. The conservation program would be limited to activities outlined in the Central Campus CTS Management Plan and the CTS Reserve Monitoring and Management Plan. The activities in the CTS Reserve Monitoring and Management Plan are restricted to vegetation mowing and species monitoring, and except for the creation of new tiger salamander breeding ponds within

the CTS Reserve, do not differ significantly from existing vegetation management activities. The conservation program prohibits development in the CTS Reserve, and the creation of new breeding ponds would not have significant long-term effects on air quality by resulting in violations in AAQS. Similarly, the activities in the Central Campus CTS Management Plan address methods of vegetation and ground animal management, worker education, restriction of off-road vehicles, and monitoring and also would not affect air quality. These activities would not require soil disturbance or a significant change in equipment use that would affect air quality. Activities outside of the CTS Basin would be subject to measures that protect air quality as described for the Proposed Action and No Action alternatives.

Ongoing Stanford Operations. Under the HCP for CTS only alternative, Stanford would continue to operate, and the alternative would not result in changes to air quality from ongoing university operations. This is the same as described for the Proposed Action.

Future Development. Under the HCP for CTS Only alternative, new development would occur. Future development would be subject to existing State and local regulations pertaining to air quality, and any new development that has not already been permitted by the GUP could require project-specific CEQA review. The effects of future development would be the same as described for the Proposed Action.

5.1.4.4 Comparison of Alternatives

The Proposed Action or the alternatives would not result in significant adverse effects to air quality. Although the Proposed Action's Conservation Program may require more hours of equipment use than the other alternatives in order to implement restoration activities, the Proposed Action or alternatives do not significantly differ in effects on air quality.

5.1.5 Noise

This section describes the effects of the Proposed Action and alternatives on the existing noise environment. The assessment of the noise effects is based on local noise regulations, and whether local noise ordinances would be violated.

5.1.5.1 Effects of the Proposed Action

Conservation Program. The Conservation Program's monitoring, management, and enhancement activities would occur in Management Zones 1 and 2, which are located away from residential neighborhoods that contain sensitive noise receptors. Conservation activities would mostly take place in the foothills and along creek corridors. Such measures include creek restoration to remove impediments, bank stabilization, exotic vegetation removal, vegetation management through mowing, and pond management. These activities are discrete and short-term, and do not represent a new source of significant noise.

Existing noise ordinances regulate unwanted sound and prevent or minimize adverse noise effects. Conservation program activities would not exceed the noise ordinance limitations and would not result in adverse noise effects.

Ongoing Stanford Operations. A few of the activities conducted for ongoing Stanford operations such as those related to the creeks, utilities, roads, bridges, and storm water detention and other general improvements could require the use of machinery or heavy equipment such as a backhoe, bobcat tractor and dump truck.

Noise from ongoing Stanford operations is subject to the restrictions in applicable city or county noise ordinances. The HCP would not result in a change in ongoing operations and maintenance and would not result in the violation of a noise ordinance.

Future Development. Development under the 2000 GUP was subject to environmental review by Santa Clara County. The Stanford GUP EIR addressed the impacts of GUP development on sensitive noise receptors for both construction-related noise and operational noise (ongoing use after construction). The Stanford GUP EIR found that the impacts of construction noise on residential locations outside of the campus (e.g., residences on Stanford Avenue) were significant because construction-related noise would exceed Santa Clara County noise standards. Although the EIR included several mitigation measures to reduce construction-related noise impacts, the EIR concluded that the impacts were significant even with the mitigation measures. Mitigation measures included requiring the use of a noise-attenuating jacket around jackhammers; using state-of-the-art technology to mitigate construction equipment noise (i.e., engine enclosures, intake and exhaust silencers, etc.); constructing 8- to 10-foot-high temporary walls along the property lines of the project site adjacent to residential areas; and scheduling the construction such that the absolute minimum number of machines would be operating at the same time.

The GUP EIR found that operational noise impacts due to the GUP development were not significant with specific mitigation measures incorporated. The mitigation measures included requiring that mechanical equipment and new facilities incorporate state-of-the-art noise reduction components (mufflers, enclosures, parapets), that all operational noise sources comply with the County noise ordinance, that the project incorporate design measures to locate noise sources such as loading zones, trash bins, and mechanical equipment as far away from the noise sensitive receptor locations as possible, and that residential uses be separated from parking structures by at least 150 feet.

In addition to the development proposed in the Stanford University GUP, the development of up to 150 acres of Zone 1, 2 and 3 lands over the next 50 years is a Covered Activity in the HCP. Although the exact location of any future development, including small conversions of habitat from ongoing activities, is currently unknown, future development would have noise impacts similar to the GUP development. The specific impacts would depend on the exact location of the development and its proximity to land uses outside of Stanford with a high sensitivity to noise (e.g., residential). The areas that the GUP EIR concluded would experience unavoidable significant noise impacts are located in Management Zone 4, or in off-site locations adjacent to Zone 4. The EIR found that only sensitive noise receptors outside of Stanford could be significantly impacted by development activities that exceeded local noise ordinances. The same would be true for future development beyond the GUP. Any development that is located adjacent to sensitive off-site noise receptors could, even with mitigation, exceed a local noise ordinance. In addition, noise sensitive areas that are not directly affected by construction activities could experience elevated noise levels due to increased vehicular traffic and construction equipment transport, although these activities are not likely to exceed local noise ordinances or regulations.

Regardless of the location or source of the noise, any proposed new development could be subject to future CEQA review which would address both construction-related and operational noise. Future development could result in adverse effects related to noise even with mitigation measures, as evidenced by the GUP EIR findings, because noise ordinance violations during

construction could still occur. Operational noise due to future development could be mitigated to prevent violation of a noise ordinance, and should not result in a significant adverse effect.

5.1.5.2 Effects of the No Action Alternative

Conservation. Under the No Action alternative, the proposed ITPs would not be issued and the HCP would not be implemented. Under this alternative, activities in Zones 1 and 2 that require a permit are assumed to also require minimization measures similar to those defined in the HCP for Zones 1 and 2. Several components of the HCP's Conservation Program would not occur under this alternative unless required as mitigation for a take authorization. Conservation activities would mostly take place along creek corridors, and in the foothills where tiger salamander are found. Such measures could include creek restoration to remove man-made impediments, bank stabilization, exotic vegetation removal, vegetation management through mowing, and pond management. These activities are discrete and short-term, and do not represent a new source of significant noise. The noise effects of possible conservation activities under the No Action alternative would be similar to the noise that would be generated by the conservation activities under the Proposed Action.

Ongoing Stanford Operations. Under the No Action alternative, Stanford operations would continue and would be subject to existing and future noise ordinances. This alternative would not result in changes to noise from ongoing university operations. This is the same as described for the Proposed Action.

Future Development. Under the No Action alternative, new development would occur. Future development would be subject to existing State and local noise regulations, and any new development that has not already been permitted by the GUP could require project-specific building permits and CEQA review. Thus, the effects from future development would be the same under the No Action alternative as those described for the Proposed Action. Depending on the location of future development relative to sensitive receptors, construction noise could be significant even with mitigation measures. The operational noise should not be significant after mitigation is implemented.

5.1.5.3 Effects of the HCP for CTS Only Alternative

Under this alternative, the HCP area would be geographically limited to the CTS Basin, which includes the area around Lagunita (90 acres) and the CTS Reserve in the foothills south of Junipero Serra Boulevard (315 acres). Stanford activities that would result in the take of listed species other than the tiger salamander would require project-specific incidental take permits.

Conservation Program. The specific activities that would be included in the conservation program for this alternative are described in Chapter 4 of the HCP (see Appendix B). In general, they include surveys, mowing/grazing, monitoring, and education programs. None of these activities are significant sources of noise. The noise effects of the implementation of a conservation program under the HCP for CTS Only would be similar to the noise associated with the Proposed Action.

Conservation activities similar to those identified in the Proposed Action could also occur as a result of individual take authorizations for projects affecting listed species outside of the CTS Basin (red-legged frog, garter snake and/or steelhead). Such measures include creek restoration to remove impediments, bank stabilization, exotic vegetation removal, vegetation management through mowing, and pond management. These activities are discrete and short-term, would not result in violations of applicable noise ordinances because they would be done by hand or with

commonly-used construction machinery (such as a mower or bobcat, as opposed to a loud pile-driver), and do not represent a new source of significant noise.

Ongoing Stanford Operations. Under the HCP for CTS Only alternative, Stanford operations would continue as at present under existing noise ordinance restrictions. This alternative would not result in changes to noise from ongoing university operations. This is the same as described for the Proposed Action.

Future Development. The future development anticipated in the Proposed Action and the No Action alternatives could still occur under this alternative, although it may require individual take authorizations. Hence, this alternative would result in the same noise effects as the Proposed Action.

5.1.5.4 Comparison of Alternatives

The Proposed Action or the alternatives would not result in significant adverse effects to noise, with the exception of construction noise associated with future development. Depending on the location of future development relative to sensitive receptors, construction noise could be significant even with mitigation measures. The operational noise should not be significant after mitigation is implemented. The Proposed Action or alternatives do not significantly differ in effects on noise.

5.1.6 Traffic

This section describes the impacts to traffic resulting from implementation of the Proposed Action or the alternatives. Traffic effects were assessed by using the GUP EIR, reviewing the information in the affected environment, and by calculating the trips that could be generated by future development using standard trip rates published by the Institute of Transportation Engineers (ITE), which is described in more detail under the Proposed Action, below. Effects on traffic were assessed to see if the Proposed Action or alternatives would cause any intersection to fall below an accepted Level of Service (LOS). This depends on the intersection, and is usually LOS D or better.

5.1.6.1 Effects of the Proposed Action

Conservation Program. No activities are proposed in the Conservation Program that would permanently alter existing traffic patterns or result in an increase in vehicle trips. Conservation activities would mostly take place in the foothills and along creek corridors. Such measures include creek restoration to remove impediments, bank stabilization, exotic vegetation removal, vegetation management though mowing, pond management, and monitoring for the Covered Species. These activities could result in temporary traffic delays as personnel and equipment are moved to and from the sites, but would not affect long-term traffic levels or patterns by worsening intersection LOS.

Ongoing Stanford Operations. Existing traffic from the ongoing Covered Activities is part of the existing traffic affected environment (see Chapter 4.1.6). Continuation of the ongoing activities would not significantly affect existing traffic patterns by worsening intersection LOS.

Future Development. The traffic impact attributable to development beyond that covered by the GUP is uncertain because the exact locations, timing, and sizes of future developments are not known at this time. The trip generation potential was estimated for a range of future development (beyond the GUP) as specified in Chapter 3 of the DEIS. The estimate includes

AM and PM peak hour vehicle trips. Standard trip rates published by the ITE were used to estimate trips associated with new housing development. This is a conservative estimate because potential housing development for Stanford employees on its lands would likely have an alternative transportation component included to reduce vehicular trips. The previously prepared trip generation estimates from the GUP traffic study were used to develop similar projections for traffic attributable to future academic development anticipated in the HCP.

As described in Chapter 3, Stanford provided estimates of the future development potential, beyond that already approved by the GUP, over the 50-year term of the ITPs and HCP. Their estimates are general projections based on current campus planning principles of density and building efficiency. Assuming a typical suburban campus development density of 0.25 Ground Area Coverage and two-story buildings, 1 to 3 acres could support 20,000 to 60,000 square feet of academic development. Assuming a housing density of 4 to 5 single-family units per acre, 1 to 3 acres could support 4 to 15 housing units each year. Therefore, during the term of the ITPs up to approximately 1,000,000 to 3,000,000 square feet of academic development, or 200 to 750 single-family housing units, or some combination of the two (e.g., 1,000,000 square feet of academic development and 400-500 housing units) could occur.[4]

Under the maximum possible housing development scenario, there could be as many as 141 new inbound trips and 422 new outbound trips during the AM peak hour, and 477 new inbound trips and 280 new outbound trips during the PM peak hour. Under the maximum possible academic development, there could be as many as 190 new inbound trips and 268 new outbound trips during the AM peak hour, and 512 new inbound trips and 663 new outbound trips in the PM peak hour. Under the mid-range combination, there could be a total of 184 new inbound trips and 401 new outbound trips in the AM peak hour, and 558 new inbound trips and 510 new outbound trips in the PM peak hour. The low range combination could result in 133 new inbound trips and 247 new outbound trips in the AM peak hour and 383 new inbound trips and 407 new outbound trips in the PM peak hour (Tables 5-1 and 5-2).

The GUP traffic study concluded the projected traffic impacts from the GUP development were significant and unavoidable, because some local intersections would fall below acceptable levels of service (LOS D). This traffic analysis has determined that future development under the HCP would result in additional traffic that would presumably further impact these already congested intersections. Thus, traffic attributable to future development anticipated in the HCP could result in traffic that would adversely affect traffic levels of service. However, it is important to note that a definitive determination of effects on traffic is not possible considering the uncertainty of changes that could affect traffic over the next 50 years. Improvements to the road system or transit in and around Stanford unrelated to Stanford development could change the affected environment compared to what is being evaluated here. Each new development that is proposed would undergo separate environmental review which would address traffic impacts and mitigation on a case-by-case basis.

[4] This example of future development beyond the GUP assumes 150 acres of urban type development, and does not attribute any of this development to small conversions of habitat associated with the ongoing Covered Activities.

Table 5-1. Traffic Projections for Stanford HCP Development Scenarios

Traffic Projections for Stanford HCP Development Scenarios

Land Use	Size	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Housing Development							
Maximum Possible Development	750 sfdu's	141	422	563	477	280	758
Academic Development							
Maximum Possible Development	3,000,000 s.f.	190	268	458	512	663	1175
Low-Range Combination							
Housing Development	200 sfdu's	38	113	150	127	75	202
Academic Development	1,000,000 s.f.	95	134	229	256	332	588
Low-Range Totals		133	247	379	383	407	790
Mid-Range Combination							
Housing Development	475 sfdu's	89	267	356	302	178	480
Academic Development	1,500,000 s.f.	95	134	229	256	332	588
Mid-Range Totals		184	401	585	558	510	1,068

Notes:
/a/ Trip generation rates for single-family homes (ITE Land Use #210) used for housing development; taken from *ITE Trip Generation, Seventh Edition*.
/b/ Trip generation for academic development is based on the ratio of HCP development divided by GUP development.

Table 5-2. Traffic Rates Comparison between Stanford GUP and Habitat Conservation Plan

Comparision Between Stanford General Use Permit and Habitat Conservation Plan

Land Use	Size	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Housing Development							
Maximum Possible Development	750 sfdu's	141	422	563	477	280	758
GUP Trips		129	182	311	347	450	797
Total Estimated Trips (GUP+HCP)		270	604	874	824	730	1555
Percent Increase		**52.16%**	**69.86%**	**64.40%**	**57.90%**	**38.38%**	**48.73%**
Academic Development							
Maximum Possible Development	3,000,000 s.f.	190	268	458	512	663	1175
GUP Trips		129	182	311	347	450	797
Total Estimated Trips (GUP+HCP)		319	450	769	859	1113	1972
Percent Increase		**59.58%**	**59.58%**	**59.58%**	**59.58%**	**59.58%**	**59.58%**
Low-Range Combination							
Housing Development	200 sfdu's	38	113	150	127	75	202
Academic Development	1,000,000 s.f.	95	134	229	256	332	587
Low-Range Totals		133	247	379	383	407	789
GUP Trips		129	182	311	347	450	797
Total Estimated Trips (GUP+HCP)		262	429	690	730	857	1,586
Percent Increase		**50.69%**	**57.54%**	**54.94%**	**52.47%**	**47.49%**	**49.76%**
Mid-Range Combination							
Housing Development	475 sfdu's	89	267	356	302	178	480
Academic Development	1,500,000 s.f.	95	134	229	256	332	587
Mid-Range Totals		184	401	585	558	510	1,067
GUP Trips		129	182	311	347	450	797
Total Estimated Trips (GUP+HCP)		313	583	896	905	960	1,864
Percent Increase		**58.81%**	**68.80%**	**65.31%**	**61.66%**	**53.11%**	**57.25%**

Notes:
/a/ Trip generation rates for single-family homes (ITE Land Use #210) used for housing development; taken from *ITE Trip Generation, Seventh Edition*.
/b/ Trip generation for academic development is based on the ratio of HCP development divided by GUP development.

5.1.6.2 Effects of the No Action Alternative

Conservation. Under the No Action Alternative, the HCP would not be implemented. Under this alternative, activities in Zones 1 and 2 that require a permit are assumed to also require minimization measures similar to those defined in the HCP for Zones 1 and 2. Several components of the HCP's Conservation Program would not occur under this alternative unless required as mitigation for a take authorization. As with the Proposed Action, these activities could result in temporary traffic delays as personnel and equipment are moved to and from the sites during conservation activities. No long-term effects to traffic levels or patterns would occur.

Ongoing Stanford Operations. Under the No Action alternative, Stanford operations would continue. This alternative would not result in changes to traffic from ongoing university operations, which is the same as described for the Proposed Action. Existing traffic from the ongoing Covered Activities is part of the existing traffic affected environment (see Chapter 4.1.6). Continuation of the ongoing activities would not significantly affect existing traffic patterns by worsening intersection Levels of Service.

Future Development. Under the No Action alternative the projected future development described for the Proposed Action would still occur, but incidental take authorization would be granted on a project-specific basis. Thus, the effects on traffic from the ongoing activities and future development would be the same under the No Action alternative as described for the Proposed Action. Mitigation for future development currently anticipated in the GUP is in place, and future development anticipated in the HCP would be subject to project-specific environmental review; however, future mitigation may not be enough to prevent adverse traffic effects from new development.

5.1.6.3 Effects of the HCP for CTS Only Alternative

Under this alternative, the HCP area would be geographically limited to the CTS Basin, which includes the area around Lagunita (90 acres) and the CTS Reserve in the foothills south of Junipero Serra Boulevard (315 acres). Stanford activities that would result in take of listed species other than tiger salamander would require project-specific incidental take permits.

Conservation. The conservation program of the HCP for CTS Only alternative would be limited to activities in the CTS Basin that entail short-term construction or maintenance and do not result in long-term traffic impacts. The individual take authorizations issued on a project-specific basis for red-legged frog, garter snake or steelhead would likely require minimization measures and mitigation such as conservation easements and creek restoration. These would be similar to those proposed in the HCP, but probably more limited in scope in accordance with the impacts of the individual project. The traffic effects of the HCP for CTS Only alternative would be the same as the Proposed Action, because the conservation activities are similarly short-term, cover a small area, and like everyday construction activities in the area.

Ongoing Stanford Operations. The HCP for CTS Only alternative would not result in changes to ongoing Stanford operations, or to traffic associated with ongoing operations, which is the same as described for the Proposed Action. Existing traffic from the ongoing Stanford operations is part of the existing traffic affected environment (see Chapter 4.1.6). Continuation of these activities would not significantly affect existing traffic patterns by worsening intersection Levels of Service.

Future Development. The projected future development described for the Proposed Action would also still occur under the HCP for CTS Only alternative. Thus, the effects on traffic from future development would be the same under the HCP for CTS Only alternative as for the Proposed Action. Mitigation for future development currently anticipated in the GUP is in place, and future development anticipated in the HCP would be subject to project-specific environmental review; however, future mitigation may not be enough to prevent adverse traffic effects caused by new development.

5.1.6.4 Comparison of Alternatives

The Proposed Action or the alternatives would not result in significant adverse effects to traffic, with the exception of traffic associated with future development. Because development under the GUP EIR was found to have an unavoidable traffic impact by adversely affecting the LOS at some intersections, the analysis in this DEIS assumes that any future development under the Proposed Action or alternatives would also have an unavoidable adverse effect on traffic. However, a definitive determination of effects on traffic is not possible considering the uncertainty of changes that could affect traffic over the next 50 years. Improvements to the road system around Stanford or project-specific mitigation may prevent adverse traffic effects. The Proposed Action or alternatives do not significantly differ in effects on traffic.

5.1.7 Hazardous Materials/Waste

This section describes the hazardous materials and hazardous waste impacts resulting from the implementation of the Proposed Action or the alternatives. Effects related to hazardous materials and wastes are analyzed qualitatively, and are based on Stanford's current hazardous materials and waste protocols and policies, and the nature of the activities that would occur. The analysis focuses on the potential for public and environmental exposure to hazardous materials as a result of the implementation of the Proposed Action or alternatives or from the continuation of the ongoing Covered Activities and new development anticipated in the HCP.

The Stanford GUP EIR determined that requiring the preparation of a Risk Management Plan for projects under the GUP that trigger the California Accidental Release Prevention Law would reduce significant impacts to less than significant for future projects. The California Accidental Release Prevention Law is triggered when chemicals are held in certain quantities, generally such quantities that would affect areas beyond the room or building where an accidental release occurred.

5.1.7.1 Effects of the Proposed Action

Conservation Program. There are no hazardous waste sites within Management Zones 1, 2, and 3. Conservation Program activities such as bank stabilization and instream structure removal which could require the use of heavy equipment would involve the use of small amounts of hazardous materials (fuels, motor oils, lubricants, antifreeze etc.) in order to run the equipment. In these instances, Stanford would employ standard operating procedures such as using equipment that is regularly maintained and refueling in safe areas. Compliance with applicable laws and regulations pertaining to handling of heavy equipment and associated hazardous materials substantially reduce the risk of accidental release of hazardous materials or exposure to hazardous materials, and the implementation of the Conservation Program would not have an adverse effect related to hazardous materials or waste. Potential effects on water quality from activities that require the use of hazardous materials in the creek zones are also not significant, and are addressed in Section 5.1.3.

Ongoing Stanford Operations. Hazardous materials and hazardous waste use, handling, storage, and disposal occur only in Management Zone 4, and are done according to State, Federal, county and local laws as implemented through various Stanford environmental health and safety department programs and policies. Hazardous materials that could be used in Management Zones 1, 2, and 3 include materials associated with mechanical equipment, such as fuels, motor oils, antifreeze, etc. There are no effects from ongoing operations complying with all applicable laws and regulations, and the risk of an accidental release or hazardous materials exposure is very small. Therefore, the ongoing operation of Stanford under the HCP would not have a significant adverse effect related to hazardous materials and waste.

Future Development. There are no known hazardous waste sites at Stanford within Management Zones 1, 2, or 3. Thus, future development in these areas would have no effect on known hazardous waste sites. Future development in any Management Zone would be subject to State, Federal, county and local laws regarding the storage, handling, and use of hazardous materials and waste. Hence, the risk of accidentally releasing hazardous materials or hazardous waste is very small and would not result in significant adverse effects.

If future development at Stanford involved the construction of a building that would store, use or dispose of hazardous materials in quantities great enough to trigger the California Accidental Release Prevention law, the law would require the preparation of a Risk Management Plan. The Risk Management Plan would include a hazard assessment, and specify preventative measures and emergency response procedures. Therefore, the risk for accidental release of hazardous materials would be minimized, and the potential adverse effect would not be significant.

5.1.7.2 Effects of the No Action Alternative

Conservation. There would be no comprehensive Conservation Program under the No Action Alternative. Under this alternative, activities in Zones 1 and 2 that require a permit are assumed to also require minimization measures similar to those defined in the HCP for Zones 1 and 2. Several components of the HCP's Conservation Program would not occur under this alternative unless required as mitigation for a take authorization. Such measures do not generally require handling of hazardous materials although some hazardous materials (e.g., fuel) could be associated with heavy equipment used to implement some of the activities. As long as the equipment and materials are handled according to applicable laws, adverse effects would not occur. There are no known hazardous waste sites that could be disturbed. Because the activities under any alternative must comply with applicable laws, the effects of the No Action alternative are the same as the Proposed Action

Ongoing Stanford Operations. Under the No Action alternative, Stanford would continue to operate in compliance with State, Federal, county and local laws as implemented through various Stanford environmental health and safety department programs and policies. Hazardous materials that could be used include materials associated with mechanical equipment, such as fuels, motor oils, antifreeze, etc. There are no effects from ongoing operations complying with all applicable laws and regulations, and the risk of an accidental release or hazardous materials exposure is very small. Therefore, the ongoing operation of Stanford under the No Action would not have a significant adverse effect related to hazardous materials and waste. Since the ongoing operations are the same under each alternative, the effects on hazardous materials and waste under the No Action alternative are the same as the Proposed Action.

Future Development. Future development would be subject to existing State and local regulations, and any new development that has not already been permitted by the 2000 GUP would require project-specific CEQA review. The anticipated future development would be the same under the Proposed Action and the alternatives. Thus, the effects of the ongoing operation of Stanford and future development would be the same under the No Action alternative as described for the Proposed Action.

5.1.7.3 Effects of the HCP for CTS Only Alternative

Under this alternative, the HCP area would be geographically limited to the CTS Basin, which includes the area around Lagunita (90 acres) and the CTS Reserve in the foothills south of Junipero Serra Boulevard (315 acres). Stanford activities that would result in take of listed species other than tiger salamander would require project-specific incidental take permits.

Conservation Program. The conservation program under this alternative would be limited to activities outlined in the Central Campus CTS Management Plan and the CTS Reserve Monitoring and Management Plan. That includes vegetation mowing, pond building and species monitoring, and the plan prohibits development in the CTS Reserve. Similarly, the activities in the Central Campus CTS Management Plan address methods of vegetation and ground animal management, worker education, restriction of off-road vehicles, and monitoring. Conservation Program activities such as mowing and pond building could involve the use of mechanical equipment that requires fuel, oil, etc. As with the Proposed Action, the risk of an accidental release or hazardous materials exposure is very small through the use of standard operating procedures when handling these materials. The risk to waterways is less than the Proposed Action because the conservation activities would be limited to grassland areas away from riparian zones.

Take authorization for other federally listed species would have the same effects related to hazardous materials as the Proposed Action. As long as the equipment and materials are handled according to applicable laws, adverse effects would not occur.

Ongoing Stanford Operations. Under the HCP for CTS Only alternative, Stanford would continue to operate. Stanford operates according to all State, Federal, and local laws related to hazardous materials and hazardous waste as implemented through various Stanford environmental health and safety department programs and policies. There are no adverse effects from ongoing operations complying with all applicable laws and regulations, and the risk of an accidental release or hazardous materials exposure is very small. The effects of ongoing operations of Stanford under the HCP for CTS Only Alternative would be the same as those described for the Proposed Action.

Future Development. Development in the CTS Basin would be covered by the HCP for CTS Only alternative, whereas other development that adversely affects red-legged frog, garter snake or steelhead would need separate take authorization. Regardless, future development would be subject to existing State and local regulations pertaining to handling of hazardous materials, and any new development that has not already been permitted by the GUP could require project-specific CEQA review. The amount of future development would be the same under each of the alternatives and the effects of future development on hazardous materials and hazardous waste under this alternative would be the same as the Proposed Action.

5.1.7.4 Comparison of Alternatives

The Proposed Action or the alternatives would not result in significant adverse effects to hazardous materials/waste. Protocols already in place by Stanford would minimize the risk of exposure to hazardous materials/waste under the Proposed Action or alternatives. The Proposed Action or alternatives do not significantly differ in effects on hazardous materials/waste.

5.1.8 Public Services

This section describes the potential effects of the Proposed Action and the alternatives on public services such as police, fire, schools, solid waste, water, wastewater services, and electricity/gas. The effects related to public services are based on a review of information about the affected environment and the activities associated with the Proposed Action or alternatives that could require public services. This assessment analyzes whether the Proposed Action or alternatives would result in a need for public services that could not be met by existing providers or entitlements, or require an expansion of services that would adversely affect the environment (such as a new wastewater plant).

5.1.8.1 Effects of the Proposed Action

Conservation Program. The activities relate to protection and management of habitat for the Covered Species and do not require additional police, fire, schools, solid waste, water, wastewater services, or electricity/gas services.

Ongoing Stanford Operations. The ongoing Covered Activities are already covered by existing public services and would not require additional public services.

Future Development. Development under the GUP was subject to environmental review by Santa Clara County. The EIR required Stanford to provide the funding or negotiate services to provide adequate levels of fire and police services. Stanford was also required to upgrade waste water collection system infrastructure if additional development required additional capacity. Solid waste disposal capacity was determined adequate for the proposed GUP development given an existing comprehensive and successful recycling program. By law, the only mitigation that can be required to maintain school capacities is to impose statutory school fees for additional development.

In addition to the development proposed in the Stanford University GUP, the ITPs cover the development of up to an additional 150 acres of Stanford lands over the next 50 years. Future development could undergo independent environmental review under CEQA and would be governed by State and Federal law, city and county General Plans, and local ordinances. It is unknown if levels of police, fire, school, and similar public services would be adversely affected by future development. The need and type of mitigation would depend on the conditions existing at the time of future development and on the type of project that was proposed. It is anticipated that the precise impacts of future development would be assessed when it is proposed. Future development could be constrained by inadequate capacity or level of service if additional funding, physical improvements, or negotiations of service are not made. Small conversions of habitat associated with the ongoing Covered Activities may be exempt from CEQA, but these would not affect public services.

As noted in DEIS Chapter 4, Stanford uses water from several sources, and currently operates under a water conservation plan. The maximum future development anticipated in the HCP could require as much as 0.33 mgd of water[5]. This number does not take into account possible conservation measures. However, current conservation efforts under the Water Reuse and Conservation Plan have reduced average campus domestic water use by 0.5 mgd from 2.7 mgd in 2000-2001 (Stanford 2003) to 2.31 mgd in 2007-2008 (Santa Clara County, June 2009) leaving future usage for the GUP development at 0.723 mgd, which is within the SFPUC's current water allocation.

Development beyond the GUP could raise Stanford's demand for water from the SFPUC up to 3.14[6] mgd, which would exceed the SFPUC's current allocation of 3.033 mgd. Currently, the SFPUC could not meet Stanford's expected water demand for development beyond the GUP. If the SFPUC's water allocation does not increase, future development beyond the GUP would need to include water conservation measures in order to remain within the SFPUC's allocation, or Stanford would need to either augment its water allocation or acquire other sources of water. Whether Stanford could sufficiently reduce its water use through additional water conservation measures or augment its water supply is not known at this time. However, Stanford could not require the SFPUC to exceed its allocation or build new facilities to provide additional water supplies. Rather, Stanford's ability to develop would be constrained, and Stanford would be required to stay within the SFPUC's water allocation. Thus, future development could be limited by the availability of public services, but future development would not adversely affect any public services.

5.1.8.2 Effects of the No Action Alternative

Under the No Action alternative, the proposed ITPs would not be issued and the HCP, including a comprehensive Conservation Program would not be implemented. Separate take authorization would be required for each activity resulting in take of a federally listed species.

Conservation. Under this alternative, activities in Zones 1 and 2 that require a permit are assumed to also require minimization measures similar to those defined in the HCP for Zones 1 and 2. Several components of the HCP's Conservation Program would not occur under this alternative unless required as mitigation for a take authorization. These would not require new public services which is the same as the Proposed Action.

Ongoing Stanford Operations. Under the No Action alternative, Stanford would continue to operate. Ongoing operations do not alter the need for public services; therefore the effect would be the same as the Proposed Action.

Future Development. Future development would be subject to existing State and local regulations, and any new development that has not already been permitted by the GUP could require project-specific building permits and CEQA review. Regardless of the issuance or non-issuance of the ITPs, maintaining adequate public services would be required of all future activities and development on Stanford lands. The effects of the ongoing operation of Stanford

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[5] This is calculated by multiplying 3,000,000 sf of academic space (the maximum anticipated in the HCP) by 0.11 gpd/sf (the amount of water consumed per square foot for existing campus academic and other space per the 2000 GUP EIR).

[6] This is calculated by adding the current 2007-2008 water usage (2.31 mgd), plus water use anticipated under GUP development (0.609 mgd) (Parsons 2000), plus water use anticipated under future development defined in the HCP.

and of future development would be the same under the No Action alternative as those described for the Proposed Action.

5.1.8.3 Effects of the HCP for CTS Only Alternative

Under this alternative, the HCP area would be geographically limited to the CTS Basin, which includes the area around Lagunita (90 acres) and the CTS Reserve in the foothills south of Junipero Serra Boulevard (315 acres). Stanford activities that would result in the take of listed species other than the tiger salamander would require project-specific incidental take permits.

Conservation Program. Impacts to public services under the HCP for CTS Only alternative are the same as the Proposed Action because the conservation activities proposed would not require new public services. The implementation of any conservation program would have no effect on public services.

Ongoing Stanford Operations. Under the HCP for CTS Only alternative, Stanford would continue to operate. Ongoing operations do not alter the need for public services; therefore the effect would be the same as the Proposed Action.

Future Development. As noted above, future development could not occur without adequate levels of public services, and any new development that has not already been permitted by the GUP would require project-specific CEQA review that would address public service impacts. The effects of future development on public services would be the same as described for the Proposed Action.

5.1.8.4 Comparison of Alternatives

The Proposed Action or the alternatives would not result in significant adverse effects to public services. Future development could be limited by the availability of public services, such as water supply, but future development would not adversely affect any public services. The Proposed Action or alternatives do not differ in effects on public services.

5.1.9 Land Use

This section addresses the effects of the Proposed Action and alternatives on land use, and analyzes whether the HCP would conflict with existing land uses or land use designations. The effects of the Proposed Action and alternatives were assessed by analyzing whether the Proposed Action or alternatives are consistent with existing general plan designations and zoning ordinances. If implementation of the Proposed Action or an alternative would be inconsistent with the land uses anticipated by the applicable general plans and zoning ordinances, it could have a significant adverse effect on land use.

5.1.9.1 Effects of the Proposed Action

Conservation Program. The Conservation Program includes the establishment of permanent conservation easements along creek corridors and restrictions on the development of upland tiger salamander habitat.

The HCP would prohibit the development of tiger salamander habitat and would place permanent conservation easements over a portion of the most biologically sensitive Zone 1 lands in the San Francisquito/Los Trancos Creek Basin (see Figure 3-2) and the Matadero/Deer Creek Basin (see Figure 3-3). These easements would generally preclude any new development. Because these lands are adjacent to the creeks their development potential is already limited by

local zoning that protects riparian corridors. For example, the Special Conservation Area in Santa Clara County covers portions of Zone 1 lands along Los Trancos, San Francisquito, Matadero and Deer creeks and portions of the CTS Reserve. This designation generally prohibits development. The conservation easements would not change existing land use, and would be consistent with the Special Conservation Area designation.

The area designated in the HCP as the CTS Reserve is designated by the County of Santa Clara in the Stanford Community Plan as a Special Conservation Area, and the surrounding area is Open Space/Field Research. The HCP's restriction of development in this area during the life of the HCP and recording permanent easements in the CTS Reserve would not conflict with existing general plan designations.

Areas in Santa Clara County adjacent to the proposed conservation easements for Zone 1 are designated as Open Space and Field Research. Expansion of the easement areas, which could occur under the HCP, would not conflict with this land use designation. Conservation Program activities which primarily promote habitat restoration are also compatible with the land use designation.

In addition to the conservation easements, Section 4.2 of the HCP includes a number of measures that would minimize potentially adverse effects of the Covered Activities in Zones 1 and 2 and sometimes in Zone 3. These measures restrict or condition activities allowed in the Management Zones, but do not modify the land use designations. These Minimization Measures guide activities pertaining to the land use, but do not change the underlying use.

The Minimization Measures would regulate the Covered Activities when they occur in certain Management Zones. None of the measures change existing land uses or affect the applicable general plan designations or zoning. Restrictions set by the HCP reflect the protection of sensitive species, and similar restrictions would apply to the land regardless of the HCP/ITPs. Thus, the implementation of the HCP would not adversely affect land use.

Ongoing Stanford Operations. Ongoing operation of Stanford, including maintenance, academic activities, recreation, athletics, residential, agricultural, equestrian, commercial and institutional land uses are already established land uses that would not be changed by the Proposed Action, and would therefore not adversely affect land use.

Future Development. The HCP anticipates future development that is included in the existing GUP and other development that could also reasonably occur within the 50-year term of the HCP/ITPs. Future development is anticipated to include academic and residential uses. There are lands available with the appropriate land use designation for these uses.

If in the future Stanford proposes a development that is not consistent with the local land use designations or zoning, the proposed development would require a general plan amendment and a change in zoning. If a general plan amendment or zoning amendment were denied, the future development would not be permitted. Thus, any future development would have to be consistent with the applicable general plan designation and zoning before it is approved. Hence, any future development would be consistent with the applicable land use designation and zoning, and would not have an adverse effect on land use.

5.1.9.2 Effects of the No Action Alternative

Under the No Action alternative, the proposed ITPs would not be issued and the HCP would not be implemented along with a comprehensive Conservation Program. Activities at Stanford that

result in take of federally listed species (red-legged frog, tiger salamander, garter snake, steelhead), would require take authorization issued on a project-by-project basis.

Conservation. Under this alternative, activities in Zones 1 and 2 that require a permit would are assumed to also require minimization measures similar to those defined in the HCP for Zones 1 and 2. Several components of the HCP's Conservation Program would not occur under this alternative unless required as mitigation for a take authorization. Future development in Zones 1 and 2 would also be subject to mitigation, such as dedication of conservation easements, to offset permanent losses of habitat in Zones 1 and 2. The extent of conservation activities would likely be less than that in the proposed HCP, in keeping with the level of project-specific impact. With regard to land use, this means that less area would likely be placed under permanent conservation easements, so there would be less area subject to the additional land use restriction of a conservation easement than under the Proposed Action. Otherwise, the No Action alternative would have the same effects as the Proposed Action, and there would not be an adverse effect on land use.

Ongoing Stanford Operations. Under the No Action alternative, Stanford would continue to operate. The effect on land use under the No Action alternative resulting from ongoing activities would be the same as the Proposed Action, and there would not be an adverse effect on land use.

Future Development. Future development is anticipated to include academic and residential uses. Land with the appropriate land use designation for these uses is available for development. If in the future Stanford proposes a development that is not consistent with the local land use designations or zoning, the proposed development would require a general plan amendment and a change in zoning. If a general plan amendment or zoning amendment were denied, the future development would not be permitted. Thus, any future development would have to be consistent with the applicable general plan designation and zoning before it is approved. Hence, any future development would be consistent with the applicable land use designation and zoning, and would not have an adverse effect on land use. This is the same under each of the alternatives, so the effects of the No Action alternative on future development are the same as the Proposed Action, and would not cause an adverse effect on land use.

5.1.9.3 Effects of the HCP for CTS Only Alternative

Under this alternative, the HCP area would be geographically limited to the CTS Basin, which includes the area around Lagunita (90 acres) and the CTS Reserve in the foothills south of Junipero Serra Boulevard (315 acres). Stanford activities that would result in the take of listed species other than tiger salamander would require project-specific incidental take permits.

Conservation Program. The conservation program under this alternative would be limited to activities outlined in the Central Campus CTS Management Plan and the CTS Reserve Monitoring and Management Plan, which are summarized in DEIS Chapter 3 and detailed in HCP Chapter 4 (see Appendix B). These activities would not conflict with the future land uses that are reflected in Santa Clara County's current general plan designations and zoning. Areas of tiger salamander habitat are designated by Santa Clara County as Campus Open Space and Special Conservation Areas. The HCP for CTS Only conservation program would prohibit residential, commercial, and land altering academic land uses in the CTS Reserve. These restrictions on future development would not conflict with the applicable land use designations or zoning, and would not cause adverse land use effects.

Under this alternative, projects that affect red-legged frog, garter snake, or steelhead must obtain separate take authorization. Such authorization could require conservation actions similar to those proposed in the HCP, but would likely be more limited in scope than the Proposed Action, in keeping with the scale of the specific project. It is likely that less area would be placed under permanent conservation easements, so there would be less area subject to the additional land use restriction of a conservation easement than under the Proposed Action Otherwise, the HCP for CTS Only alternative would have the same effects as the Proposed Action on land use.

Ongoing Stanford Operations. Under this alternative, Stanford would continue to operate. This is the same for each of the alternatives. Continued operations do not require changes in land use, therefore the HCP for CTS Only alternative would have the same effects as the Proposed Action, and there would not be an adverse effect on land use.

Future Development. Future development would be subject to the general plans and zoning regulations of the six jurisdictions that regulate Stanford's land uses. Any new development that has not already been permitted by the GUP would require project review for compliance with the applicable general plans and zoning regulations. The effects of the ongoing operation of Stanford and from future development would be the same as described for the Proposed Action.

5.1.9.4 Comparison of Alternatives

The Proposed Action or the alternatives would not result in significant adverse effects to land use. Land use is governed by local general plans and zoning ordinances, and any future changes in land use would comply with those or would require approval for a change in land use designation. The Proposed Action or alternatives do not significantly differ in effects on land use.

5.2 BIOLOGICAL ENVIRONMENT

This section of the DEIS analyzes the potential effects of the Proposed Action and alternatives on biological resources. The analysis addresses the effects of implementing the Conservation Program, of ongoing operations and maintenance, and of future development on biological resources in Zones 1, 2 and 3. The analysis identifies the potential effects on plant communities, the Covered Species, non-listed plant and animal special-status species that are likely to be present, and on biological resources in general. The effects on biological resources were evaluated both qualitatively and quantitatively, including potential effects on species' populations, long-term survival, and the quality and quantity of habitat. The analysis is based on a review of biological resources information for the affected environment, analysis provided in the HCP, including the HCP's quantitative analysis of take, and professional judgment.

5.2.1 Effects of the Proposed Action Alternative

The Proposed Action is described in Chapter 3. It is the issuance of ITPs and the implementation of a Conservation Program that is intended to meet the following biological goals stated in chapter 1 of the HCP (see Appendix B):

- Maintain and enhance natural communities so that they benefit the Covered Species;
- Stabilize the local tiger salamander population and increase its chance of long-term persistence at Stanford;
- Maintain ponds to promote tiger salamander reproduction in the Foothills;

- Increase the local red-legged frog population and its chance of long-term persistence at Stanford;
- Maintain or improve hydrologic and terrestrial conditions that presently support steelhead and increase the chance of long-term persistence for the local steelhead population;
- Maintain and improve habitat for pond turtle to increase its chance of long-term persistence at Stanford;
- Maintain or improve habitat that could support the San Francisco garter snake and continue to contribute to the body of information about garter snakes at Stanford.

Conservation Program

*Plant Communities***.** Conservation Program activities under the San Francisquito/Los Trancos Easement Monitoring and Management Plan, Matadero/Deer Easement Monitoring and Management Plan, CTS Reserve Monitoring and Management Plan and Central Campus CTS Management Plan would occur in Zones 1 and 2, where they could affect riparian, oak woodland, and grassland plant communities, however, none of the effects would be adverse, and most would be beneficial effects. In addition, the proposed conservation easements would permanently protect and provide management for the riparian zones and could provide permanent protection and management of grassland habitat south of Junipero Serra Boulevard in the CTS Reserve.

Some native vegetation could be removed during non-native plant species removal, enhancement projects, or creek bank stabilization activities, however, the amount of native vegetation removed is expected to be minor as the Conservation Program is intended to protect and retain native vegetation. This non-native plant removal could permanently reduce the amount of non-native plant species and provide the opportunity to restore native plant species so that there could be a net increase in native plant cover. For example non-native Scotch broom shrubs removed along the creeks could be replaced with native shrub vegetation, such as willows. Enhancement and bank stabilization completed under the Conservation Program could result in a small amount of native plant removal. However, no significant changes in vegetation type would occur as a result of the Monitoring and Management Plans. No jurisdictional wetlands would be affected by the Conservation Program because the activities would not remove or fill existing wetlands. Temporary effects on waters of the U.S. (e.g., increased turbidity) may occur during bank stabilization work.

The creation of new tiger salamander breeding ponds as part of the CTS Reserve Monitoring and Management Plan would not affect native grasslands because the CTS Reserve does not contain native grasslands; however, it may convert a small amount of non-native grassland to wetland habitat. This would not result in a significant adverse effect on the vegetation community.

Covered Species. The implementation of the Management and Monitoring Plans in the HCP's Conservation Program could result in the take, or impacts to, some of the Covered Species and could temporarily disturb some of their habitat, but the long-term effects would be minor (See Table 5-3). The Conservation Program is a comprehensive program that would have an overall benefit to the Covered Species. The following activities under the Conservation Program could result in take of the Covered Species. For example:

- Monitoring activities, including the use of electrofishing, block netting, hand nets, funnel/fyke traps or rotary screw traps, minnow traps, turtle traps, snorkeling, hand

capture, walking in the habitat, dipnets, metering equipment, trapping and visual methods. These activities could kill a small number of individual steelhead, red-legged frogs, tiger salamanders, or pond turtles. Likewise, monitoring could harm or harass the Covered Species and temporarily disturb their habitat.

- Mowing to improve habitat. Mowing may harass grassland species that are present during the mowing, but timing and mower height are controlled to minimize the likelihood that a species is present during mowing (see below).
- Constructing new breeding ponds. Construction activities could kill, harm or harass a small number of tiger salamanders or red-legged frogs that are not detected in underground burrows and relocated prior to construction.
- Relocating salvaged individuals from urbanized areas to suitable habitat. Relocating salvaged tiger salamanders, red-legged frogs, or pond turtles could result in the death of a species, or harm, and would require capture of the species.
- Surveys for non-native species. These activities disrupt breeding or foraging behavior of a small number of Covered Species.
- Removal of in-stream barriers. This activity could kill a small number of individual steelhead when equipment is in the stream or when the stream is dewatered. Likewise relocating steelhead prior to dewatering could harm or harass individual steelhead, and dewatering would temporarily disturb steelhead habitat.
- Revegetation and stabilization of stream banks for erosion control or to improve shade. This activity could kill or disrupt breeding or foraging behavior of a small number of steelhead or red-legged frogs when equipment is in the creek and riparian zone.

The effects of these activities, which are described above, are generally temporary, and would not adversely affect the species' long-term persistence (Table 5-3). Moreover the effects would be minimized by:

- Combining surveys for Covered Species to reduce the amount of time spent in the habitat
- Mowing during the dry season and during the time of day when tiger salamander and garter snake are least likely to be present
- Oversight by the Conservation Program Manager
- Conducting night surveys for red-legged frog every two years rather than annually
- Electrofishing would only be used in reaches not historically occupied by red-legged frog, and would be done in accordance with NMFS guidelines
- Conducting pre-activity surveys and relocating individuals in harm's way

Monitoring activities would provide important data on the success of the Conservation Program, whether adaptive management is needed to improve the Conservation Program, and contribute to the general body of scientific knowledge about the species. In the long run, this knowledge would benefit the Covered Species, and aid in the recovery of the species.

For example, removal of the existing barriers to steelhead passage at the non-operating Lagunita Diversion could temporarily disturb steelhead and their designated Critical Habitat during construction activities, but improved passage would provide a long-term benefit to steelhead

migration, which could increase spawning opportunities and reproductive success. Similarly, constructing new breeding ponds in the foothills could temporarily disturb upland tiger salamander habitat, but providing additional breeding opportunities in the foothills could reduce the importance of Lagunita (which is hazardous for tiger salamander to reach because of Junipero Serra Boulevard), and increase the likelihood of the persistence of the tiger salamander population at Stanford.

The estimated loss of habitat and the estimated take of individuals from the Covered Activities including the conservation program, ongoing Stanford operations and future development are provided in Tables 5-4 and 5-5.

Table 5-3. Effects of Implementation of the Monitoring and Management Plans on Covered Species

Activity	Net Effect
1.0 San Francisquito/Los Trancos Easement Monitoring and Management Plan[7]	
1.1 Surveys for steelhead, red-legged frog, garter snake and pond turtle, and of their habitat, will be conducted in accordance with the monitoring program set forth in Section 4.6 for the term of the HCP.	1.1 Beneficial effect on steelhead, red-legged frog, garter snake and pond turtle. Surveys may harass steelhead, red-legged frog, pond turtle, and garter snakes but would result in data that could improve species and habitat management. No effect on tiger salamander.
1.2 If the monitoring program shows the presence of non-native animal species that could adversely affect Covered Species within the Easement area, the non-natives will be removed to the extent feasible. Before trapping is used to remove the non-natives in areas where any Covered Species may occur, Stanford will submit a plan to the USFWS and NMFS for approval. If monitoring shows that wildlife species have been placed within the Easement area, Stanford will post signs prohibiting the release of any wildlife in the ponds and/or fence as necessary.	1.2 Beneficial effect. Removal of non-native species that are adversely affecting the Covered Species would benefit both the Covered Species and other more common plants and animals. Dip-netting, trapping, or other invasive methods could harm or harass a small number of steelhead, red-legged frog, pond turtle, or garter snakes, but would help to monitor and control competing, predator and habitat-damaging species.
1.3 If the monitoring program results show that non-native plant species could adversely affect Covered Species or their habitat within the Easement area, the non-natives will be removed, to the extent that Stanford can feasibly remove or control them.	1.3 Beneficial effect. Could benefit the Covered Species by fostering habitat diversity.
1.4 If the steelhead habitat or gravel surveys identify sediment entering the creek form a point source, Stanford will try to identify the source of the sediment. If the sediment source is located on Stanford lands, Stanford will remediate the situation. If the sediment source is located off Stanford lands, Stanford will notify NMFS and the USFWS.	1.4 Beneficial effect on steelhead, red-legged frog, pond turtle and garter snake by improving water quality and on steelhead by reducing sediment impacts on spawning beds. No effect on tiger salamander.

[7] The implementation of the San Francisquito/Los Trancos Monitoring and Management Plan will not affect tiger salamanders.

Table 5-3. Effects of Implementation of the Monitoring and Management Plans on Covered Species	
Activity	**Net Effect**
1.5 If the steelhead surveys or other information find that the steelhead would benefit from a habitat enhancement such as the addition of woody debris and it can be done without increasing the potential for flooding, Stanford will place large woody debris into the creeks, anchored in place.	1.5 Beneficial effect. This enhancement would be specifically designed to benefit steelhead by enhancing its habitat.
1.6 If the creek surveys find that the turtles would benefit from the addition of natural basking platforms, Stanford will place anchored platforms, if it can be done without increasing the potential for flooding.	1.6 Beneficial effect on pond turtle by enhancing its habitat. May also provide basking sites for garter snake and red-legged frog. No effect on steelhead or tiger salamander.
1.7 If the creek surveys find that the turtles would benefit from the addition of natural basking platforms, Stanford will place three anchored platforms each in Searsville Reservoir, Felt Reservoir, and Skippers Pond.	1.7 Beneficial effect. This enhancement is specifically designed to benefit pond turtle.
1.8 In addition to providing annual results of the monitoring program to the USFWS and NMFS, Stanford will share the monitoring results with other interested local, State and Federal conservation agencies.	1.8 Beneficial effect. Sharing data could result in regional benefits by informing other management programs.
1.9 Maintain the three existing water quality monitoring stations located in Los Trancos, Bear, and San Francisquito creeks for the first five years of the HCP and review the resulting data for its value in conservation efforts. If the stations produce data that are useful to conservation planning, operation of the monitoring stations will continue beyond five years. Stanford will ensure that one stream flow gaging station on San Francisquito Creek and one on Los Trancos Creek are operational year-round and that the daily flow data are made available to NMFS.	1.9 Beneficial effect. Water quality data could provide useful scientific information for management of steelhead, red-legged frog, pond turtle, and garter snakes. Maintenance of the stations requires little incursion into the creek, but could harass a small number of steelhead, red-legged frog, pond turtle, and garter snakes. Sharing of data would assist regional conservation efforts.
1.10 If water quality monitoring data are found to be valuable in conservation efforts, Stanford will perform a study on the feasibility of expanding the network of water monitoring stations in San Francisquito Creek and Los Trancos Creek. If it is feasible, the network of water monitoring stations will be expanded.	1.10 Beneficial effect. Would provide more data to inform management decisions pertinent to steelhead, red-legged frog, pond turtle, and garter snakes. Expansion and maintenance of network may require short-term incursion into creek that could harass a small number of steelhead, red-legged frog, pond turtle, and garter snakes.
1.11 Stanford will identify at least two areas where two new, off-channel red-legged frog breeding ponds may be constructed. Stanford will provide a specific design proposal to USFWS.	1.11 Beneficial effect. This enhancement is specifically designed to benefit red-legged frog, and could provide habitat for pond turtle and tiger salamander.
1.12 Stanford will remove undesirable items, such as trash, from the creeks.	1.12 Beneficial effect, although trash removal may have temporary water quality impacts over the long term it could reduce the impacts of water pollution on the covered species.
1.13 Stanford will initiate stabilization efforts along stream banks and adjacent upland areas that are subject to erosion (use of biological stabilization methods will be strongly encouraged), and create a pilot program on stream bank protection that could be used as a community resource.	1.13 Beneficial effect. Would reduce sediment load into creeks that adversely affects habitat for steelhead, red-legged frog, pond turtle, and garter snakes by causing turbidity. Work along the creek banks could harm or harass a small number of steelhead, red-legged frog, pond turtle, or garter

Table 5-3. Effects of Implementation of the Monitoring and Management Plans on Covered Species	
Activity	**Net Effect**
	snakes.
1.14 Revegetate stream banks and adjacent upland areas that are subject to erosion.	1.14 Beneficial effect. Revegetation would improve streamside habitat for red-legged frog, pond turtle, and garter snakes and maintain shade needed by steelhead. Revegetation activities could have short-term impacts on a small number of red-legged frog, pond turtle, garter snakes and steelhead due to encroachment into habitat and possible take of red-legged frog, pond turtle, and garter snakes.
1.15 Remove structures such as rip-rap and gabions, and in-stream structures that are partials barriers when feasible.	1.15 Beneficial effect. Would improve in-stream migration for steelhead, red-legged frog, pond turtle, and garter snakes. Could harm or harass a small number of steelhead, red-legged frog, pond turtle, and garter snakes, however the work would be monitored and take minimization measures used.
1.16 After the SHEP improvements are operational, Stanford will implement the operational protocols contained in the SHEP for the life of the HCP.	1.16 Beneficial effect. Would provide adequate flows in Los Trancos and San Francisquito creeks for steelhead migration and modifications of fish ladders to reduce barriers to migration. Water diversions could harm or harass steelhead, red-legged frog, pond turtle, and garter snakes.
1.17 Erect fences in the areas that the Conservation Program Manager determines they are needed to keep livestock and unauthorized persons out of the Easement.	1.17 Beneficial effect. Would protect riparian areas from the long-term effects of intruding cattle and humans that could harm or harass steelhead, red-legged frog, pond turtle, or garter snakes. Fence installation could harm or harass a small number of red-legged frog, pond turtle or garter snakes, but this would be short-term.
1.18 Feral cat feeding stations will not be permitted in Zones 1 and 2 within the San Francisquito/Los Trancos Basin or in Zones 3 and 4 that are within 150 feet of those areas.	1.18 Beneficial effect. Would reduce predation by domestic/feral cats.
1.19 No new permanent structures may be erected on lands covered by the San Francisquito/Los Trancos Easement unless the structures are for the benefit of the Covered Species, are necessary for safety reasons, or are part of Stanford's existing water diversion system. This prohibition does not preclude maintenance and improvement of existing structures, including utilities, roads, and buildings. Structures used to study the geomorphologic, hydrologic, and biologic characteristics of the creeks and surrounding uplands are allowed because they provide information that contributes to the management of the Covered Species. New bridges also are not precluded by the San Francisquito/Los Trancos Easement, but may require mitigation in accordance with Section 4.4 of the HCP. The Conservation Program Manager will be consulted before any permanent structures are erected, and such structures will be designed to minimize or avoid impacts to the Covered Species.	1.19 Beneficial effect. Limiting development and minimizing the permanent loss of riparian habitat would benefit steelhead, red-legged frog, pond turtle, and garter snakes.

Table 5-3. Effects of Implementation of the Monitoring and Management Plans on Covered Species	
Activity	**Net Effect**
1.20 Any new conservation easements within the San Francisquito/Los Trancos Creek Basin will be subject to the San Francisquito/Los Trancos Easement Monitoring and Management Plan. Stanford will consult with the USFWS and NMFS before recording any new conservation easements within the basin.	1.20 Beneficial effect. This measure assures that all conservation easements that could affect the riparian Covered Species are managed in a consistent way to benefit the Covered Species.
1.21 Five years before the expiration of the HCP and associated ITPs, Stanford will prepare a long-term monitoring and management plan that incorporates management and monitoring techniques that have been demonstrated to be the most successful. This plan will survive the expiration of the ITPs and HCP and will be subject to review and approval by the USFWS and NMFS.	1.21 Beneficial effect. Insures that valid conservation practices would be carried out in perpetuity.
2.0 Matadero/Deer Easement Monitoring and Management Plan[8]	
2.1 Surveys for the red-legged frog and garter snake and of their habitat will be conducted in accordance with the monitoring plan set forth in Section 4.6 for the term of this HCP.	2.1 Beneficial effect. Surveys may harass red-legged frog and garter snakes but would result in data that could improve species and habitat management.
2.2 If the monitoring program shows the presence of non-native animal species that could adversely affect Covered Species within the Easement area, the non-natives will be removed to the extent feasible. Before trapping is used to remove the non-natives in areas where any Covered Species may occur, Stanford will submit a plan to the USFWS and NMFS for approval. If monitoring shows that wildlife species have been placed within the Easement area, Stanford will post signs prohibiting the release of any wildlife in the ponds and/or fence as necessary.	2.2 Beneficial effect. Removal of non-native species that are adversely affecting the Covered Species would benefit both the Covered Species and other more common plants and animals. Dip-netting, trapping, or other invasive methods could harm or harass a small number of red-legged frog or garter snake, but would help to monitor and control competing, predator and habitat-damaging species.
2.3 If the monitoring program results show that non-native plant species could adversely affect Covered Species or their habitat within the Easement area, the non-natives will be removed, to the extent that Stanford can feasibly remove or control them.	2.3 Beneficial effect. Could benefit red-legged frog and garter snake by fostering habitat diversity. No effect on tiger salamander, pond turtle or steelhead.
2.4 In addition to providing annual results of the monitoring program to the USFWS and NMFS, Stanford will share the monitoring results with other interested local, State and Federal conservation agencies.	2.4 Beneficial effect. Sharing data could result in regional benefits by informing other management programs.
2.5 Stanford will identify at least one area where two new, off-channel red-legged frog breeding ponds may be constructed. Stanford will provide a specific design proposal to USFWS.	2.5 Beneficial effect. This enhancement is specifically designed to benefit red-legged frog, and could provide habitat for pond turtle and tiger salamander.
2.6 Study the feasibility of installing water monitoring stations in Matadero and Deer creeks, and if it is feasible, Stanford will install water monitoring stations in the	2.6 Beneficial effect. Would provide more data that could improve red-legged frog, pond turtle, and garter snake habitat management decisions.

[8] The implementation of the Matadero/Deer Easement Monitoring and Management Plan will not affect tiger salamanders.

Table 5-3. Effects of Implementation of the Monitoring and Management Plans on Covered Species	
Activity	**Net Effect**
creek(s).	Construction and maintenance of stations could require short-term incursion into creek that could harass a small number of red-legged frog, pond turtle, and garter snakes. No effect on steelhead.
2.7 Stanford will initiate revegetation efforts along stream banks and adjacent upland areas that are subject to erosion.	2.7 Beneficial effect. Revegetation would improve streamside habitat for red-legged frog, pond turtle, and garter snakes. Revegetation activities could result in short-term impacts on a small number of red-legged frog, pond turtle, garter snakes due to encroachment into habitat and possible take of red-legged frog, pond turtle, and garter snakes by impacting nesting or harboring sites. No effect on tiger salamander or steelhead.
2.8 Erect fences in the areas where the Conservation Program Manager determines they are needed to keep livestock and unauthorized persons out of the Easement.	2.8 Beneficial effect. Would protect riparian areas from the long-term effects of intruding cattle and humans that could harm or harass steelhead, red-legged frog, pond turtle, or garter snakes. Fence installation could harm or harass a small number of red-legged frog, pond turtle, or garter snakes, but this would be short-term.
2.9 Stabilize stream banks and adjacent upland areas that are subject to erosion (use of biological stabilization methods will be strongly encouraged), and create a pilot program on streambank protection that could be used as a community resource.	2.9 Beneficial effect. Would reduce sediment load into creeks that adversely affects habitat for red-legged frog, steelhead, pond turtle, and garter snakes by causing turbidity. Work along the creek banks could harm or harass a small number of steelhead, red-legged frog, pond turtle, or garter snakes.
2.10 Feral cat feeding stations will not be allowed in the Easement area, or within 150 feet of the Easement.	2.10 Beneficial effect. Would reduce predation on red-legged frog and garter snake by domestic/feral cats.
2.11 No new permanent structures may be erected on lands covered by the Matadero/Deer Easement unless the structures are for the benefit of the Covered Species or they are necessary for safety reasons. This prohibition does not preclude maintenance and improvement of existing structures, including utilities, roads, and buildings. Structures used to study the geomorphologic, hydrologic, and biologic characteristics of the creeks and surrounding uplands are allowed because they provide information that contributes to the management of the Covered Species. New bridges also are not precluded from the Matadero/Deer Easement, but would likely require additional mitigation in accordance with Section 4.4 of the HCP. The Conservation Program Manager will be consulted before any permanent structures are erected, and such structures will be designed to minimize or avoid impacts to the Covered Species.	2.11 Beneficial effect. Limiting development and minimizing the permanent loss of riparian habitat would benefit red-legged frog, pond turtle, and garter snakes.
2.12 Any new conservation easements within the Matadero/Deer Creek Basin will be subject to the Matadero/Deer Easement Monitoring and Management Plan. Stanford will consult with the USFWS and NMFS before recording any new conservation easements within the basin.	2.12 Beneficial effect. This measure assures that all conservation easements that could affect the riparian Covered Species are managed in a consistent way to benefit the Covered Species.

Table 5-3. Effects of Implementation of the Monitoring and Management Plans on Covered Species	
Activity	**Net Effect**
2.13 Five years before the expiration of the HCP and associated ITPs, Stanford will prepare a long-term monitoring and management plan that incorporates management and monitoring techniques that have been demonstrated to be the most successful. This plan will survive the expiration of the ITPs and HCP and will be subject to review and approval by the USFWS and NMFS.	2.13 Beneficial effect. Insures that valid conservation practices would be carried out in perpetuity.
3.0 CTS Reserve Monitoring and Management Plan [9]	
3.1 Annual tiger salamander and garter snake surveys in accordance with the monitoring program set forth in section 4.6 of the HCP.	3.1 Beneficial effect. Minnow traps could harass or harm tiger salamander, and trapping (if implemented) could harass or harm the garter snake but would provide scientific data and inform management decisions.
3.2 If monitoring shows that non-native wildlife species are adversely affecting the Covered Species, such as through direct kill or alteration of the habitat to the extent that it reduces its suitability, the non-natives will be removed, as allowed by law and to the extent it is feasible. Before trapping is used where it could affect Covered Species, Stanford will submit a plan to the USFWS for approval. If monitoring shows that wildlife species have been placed in ponds within the Reserve area, Stanford will post signs prohibiting the release of any wildlife in the ponds and/or fence the ponds as necessary.	3.2 Beneficial effect. Removal of non-native species that are adversely affecting the Covered Species would benefit both the Covered Species and other more common plants and animals.
3.3 If monitoring shows that non-native plant species could adversely affect Covered Species or their habitat within the Reserve area, the non-natives will be removed, to the extent that Stanford can feasibly remove or control them.	3.3 Beneficial effect. Could benefit the Covered Species by fostering habitat diversity.
3.4 If the seasonal ponds are found to not facilitate tiger salamander breeding, the pond(s) will be modified or eliminated. Stanford will consult with the USFWS regarding any proposed pond modifications.	3.4 Beneficial effect. Would insure that the breeding ponds are facilitating breeding and are not creating population sinks.
3.5 If there are three consecutive years of inadequate rainfall to sustain larval development of tiger salamander in the breeding ponds, Stanford will consult with the USFWS regarding ways to provide supplemental water to the constructed breeding ponds.	3.5 Beneficial effect. If supplemental water is provided as needed during a drought, breeding success is more likely, and the population may be sustained through a prolonged drought.
3.6 If surveys indicated that tiger salamanders would benefit from the addition of cover or egg-laying substrate in the created ponds, Stanford will place suitable material in the ponds.	3.6 Beneficial effect. Could increase population size by improving breeding success and providing cover that could protect tiger salamanders from predators.
3.7 Stanford will enhance tiger salamander and garter snake dispersal by mowing or grazing up to 2 acres of grassland adjacent to each of the newly created tiger salamander breeding ponds annually during the summer. Mowing will be done when salamanders are least likely to be present, either	3.7 Beneficial effect. Reducing the vegetation height would facilitate tiger salamander and garter snake migration. Would be completed when tiger salamander and garter snake are underground or in the shade or water and would not be directly

[9] The implementation of the CTS Reserve Monitoring and Management Plan will not affect red-legged frogs, steelhead, or pond turtles.

Table 5-3. Effects of Implementation of the Monitoring and Management Plans on Covered Species	
Activity	**Net Effect**
in the morning when it is still cool or during the hottest part of the day.	harmed.
3.8 If the tiger salamander surveys find that the tiger salamander would benefit form additional burrows, Stanford will enhance upland habitat adjacent to the newly created breeding ponds by creating cover piles to attract ground squirrels. Cover piles will typically be made of natural materials and will be up to 60 square feet in size and 4 feet deep. They will be located within 150 feet of the newly created breeding ponds and will be created during the dry season, between June and September.	3.8 Beneficial effect of enhancing tiger salamander and garter snake habitat. Physical manipulation of tiger salamander habitat, if required to study methods, has the remote possibility of harming tiger salamander, but would be done seasonally, when tiger salamander are underground. Could also disturb garter snakes. No effect on red-legged frog, pond turtle or steelhead.
3.9 Stanford will maintain oak woodland and savannah grasslands within 150 feet of the newly created breeding pond, and will remove chaparral (shrub) species in this area.	3.9 Beneficial to tiger salamander. Maintains tiger salamander upland habitat. May facilitate tiger salamander and garter snake migration.
3.10 Stanford will maintain at least three amphibian tunnels across Junipero Serra Boulevard. If annual monitoring shows that additional tunnels would benefit tiger salamander migration, Stanford may install additional tunnels with USFWS concurrence.	3.10 Beneficial to tiger salamander. Provides a safe route between upland habitat and the Lagunita breeding site. Unknown benefit to garter snake, red-legged frog, and pond turtle. No effect on steelhead.
3.11 Limit recreational access to existing service roads and restricted to daylight hours.	3.11 Beneficial effect. Would minimize human intrusion into tiger salamander habitat.
3.12 No dogs will be permitted in the CTS Reserve.	3.12 Beneficial effect. Would prevent impacts to tiger salamander from dogs entering ponds.
3.13 The Conservation Program Manager will review any proposed academic uses within the CTS Reserve, and if necessary, the CPM may impose conditions on use and restoration measures.	3.13 Beneficial effect. Would prevent adverse effects on tiger salamander caused by academic uses.
3.14 Development, such as academic buildings, residential dwelling units, or commercial buildings, will be prohibited. Utilities and other general infrastructure improvements that would not adversely affect the tiger salamander habitat may be placed within the CTS Reserve. However, these improvements will be reviewed by the Conservation Program Manager, and if necessary, the Conservation Program Manager may impose use conditions and restoration measures.	3.14 Beneficial effect. Would prevent adverse effects caused by loss of habitat to development or infrastructure.
3.15 A tiger salamander and garter snake education program will be developed by the Conservation Program Manager and presented to Stanford maintenance personnel and contractor personnel working in, or immediately adjacent to, the CTS Reserve. The education program will include protocols for identification, avoidance, immediate protection, and notification of the Conservation Program Manager.	3.15 Beneficial effect. Would increase worker awareness of tiger salamander and garter snake ecology and procedures if tiger salamander or garter snake is encountered.
3.16 Feral cat feeding stations will not be permitted in those portions of Zones 1 and 2 in the CTS Basin, or in Zones 3 and 4 that are within 150 feet of those areas.	3.16 Beneficial effect. Would reduce predation on tiger salamander, garter snake, and possibly red-legged frog by domestic/feral cats. No effect on pond turtle or steelhead.

Table 5-3. Effects of Implementation of the Monitoring and Management Plans on Covered Species	
Activity	**Net Effect**
3.17 All ground animal control programs will be discontinued in the CTS Reserve.	3.17 Beneficial effect. Lack of control of ground animals in Zone 1 would result in additional burrow habitat for tiger salamander, garter snake, and red-legged frog. No effect on pond turtle or steelhead.
3.18 Vegetation management activities in the CTS Reserve will be conducted to achieve the goal of improving tiger salamander habitat.	3.18 Beneficial effect on tiger salamander. Likely to also benefit garter snake by facilitating migration. May benefit red-legged frog. No effect on pond turtle or steelhead.
3.19 Five years before the expiration of the HCP and associated ITPs, Stanford will prepare a long-term monitoring and management plan for all habitat within the CTS Reserve that has been permanently preserved. The plan will incorporate management and monitoring techniques that have been demonstrated to be the most successful. It will include protocols for monitoring the abundance of tiger salamanders and garter snakes in permanently preserved areas and the quality of preserved habitat, invasive species monitoring and management, an adaptive management provision, and any other monitoring or management techniques that Stanford deems necessary to fulfill the conservation purpose of the conservation easement(s) recorded during the term of the HCP. This plan will survive the expiration of the ITPs and HCP and will be subject to review and approval by the USFWS and NMFS.	3.19 Beneficial effect on tiger salamander and garter snake. Insures that valid conservation practices would be carried out in perpetuity. Could also benefit red-legged frog and pond turtle, if these species eventually occur in the CTS Reserve. No effect on steelhead.
4.0 Central Campus CTS Management Plan[10]	
4.1 Surveys for the California tiger salamander and garter snake and their habitat will be conducted in accordance with the monitoring program set forth in Section 4.6 of the HCP.	4.1 Beneficial effect. Minnow traps could harass or harm tiger salamander, and trapping (if implemented) could harass or harm the garter snake but would provide scientific data and inform management decisions.
4.2 If the monitoring program results show that non-native species are adversely affecting Covered Species within the Central Campus CTS area, such as through direct kill or alteration of the habitat to the extent that it reduces its suitability to support the species, the non-natives will be removed, as feasible. Before trapping is used where it could affect Covered Species, Stanford will submit a plan to the USFWS for approval. If monitoring shows that wildlife species have been placed in Lagunita, Stanford will post signs prohibiting the release of any wildlife species in Lagunita.	4.2 Beneficial effect on tiger salamander and garter snake, and on red-legged frog if it occurs in the Central Campus CTS area. Removal of non-native species that are adversely affecting the Covered Species would benefit both the Covered Species and other more common plants and animals. No effect on pond turtle or steelhead.
4.3 If monitoring shows that non-native plant species could adversely affect Covered Species or their habitat within the Reserve area, the non-natives will be removed, to the extent that Stanford can feasibly remove or control them.	4.3 Beneficial effect. Could benefit the Covered Species by fostering habitat diversity.

[10] Except as specifically noted, the implementation of the Central Campus CTS Management Plan will not affect red-legged frogs, steelhead, or pond turtles.

Table 5-3. Effects of Implementation of the Monitoring and Management Plans on Covered Species	
Activity	**Net Effect**
4.4 Lagunita will continue to be operated consistent with the Lagunita operations plan (section 3.1.3 of the HCP), which includes diverting water from San Francisquito Creek during years of substantial rains to essentially provide breeding habitat of suitable depth and duration for tiger salamander to successfully breed that season. The diversion will be implemented only if the diversion facilities are safe and operational, there is sufficient water available and the diversion is not in significant conflict with other environmental considerations, there are not overriding public health and safety concerns associated with water in Lagunita, and the diversion is critical to the local persistence of tiger salamander.	4.4 Beneficial effect. Would provide management of water levels in important breeding habitat to the benefit of tiger salamander. Balanced diversions would not adversely affect red-legged frog, pond turtle, garter snakes and steelhead habitat in San Francisquito Creek.
4.5 No biocides will be applied to Lagunita for schistosome cercarial dermatitis ("swimmer's itch") without prior approval of the Conservation Program Manager.	4.5 Beneficial effect. Would prevent biocides from affecting tiger salamander reproduction. No effect on red-legged frog, pond turtle, garter snakes or steelhead.
4.6 The bed of Lagunita will be mowed to not less than 4 inches, instead of being disced, for fire protection in the summer after consultation with the Conservation Program Manager. Mowing will be done by the lightest vehicle capable of mowing the area and will be done either in the morning when it is still cool or during the hottest part of the day.	4.6 Beneficial effect. Mowing would occur when tiger salamander are underground, safe from possible direct harm, and when garter snakes are least likely to be present. Reducing the vegetation height would facilitate tiger salamander and garter snake migration. The restriction on discing would reduce the chance of physical harm to tiger salamander and garter snake. Beneficial to red-legged frog if it occurs at Lagunita. No effect on pond turtle or steelhead.
4.7 Ill-fitting utility box covers within 1500 feet of Lagunita will be retrofitted to exclude tiger salamanders.	4.7 Beneficial effect. Would prevent entrapment of tiger salamander in utility boxes.
4.8 Prohibit off-road vehicles in Lagunita and the Conservation Program Manager will inspect Lagunita monthly to ensure compliance with the prohibition.	4.8 Beneficial effect. Would prevent take of tiger salamander due to off-road vehicle use.
4.9 Feral cat feeding stations will not be permitted in the Central Campus CTS Management Area, or within 150 feet of the Central Campus CTS Management Area.	4.9 Beneficial effect. Would reduce predation on tiger salamander and garter snake by domestic/feral cats. Would benefit red-legged frog if present at Lagunita. No effect on pond turtle or steelhead.
4.10 A tiger salamander and garter snake education program will be developed by the Conservation Program Manager and presented annually to maintenance workers that regularly work in the Central Campus CTS Management Area and to contractor personnel before they begin work in the Central Campus CTS Management Area.	4.10 Beneficial effect. Would increase worker awareness of tiger salamander and garter snake ecology and procedures if tiger salamander or garter snake is encountered. No effect on red-legged frog, pond turtle or steelhead.

Table 5-4. Summary Estimated Loss of Zone 1 and 2 Habitat (HCP Table 5-2)

	Annual estimated short-term habitat disruption	Total estimated short-term habitat disruption	Annual estimated permanent loss of habitat	Total estimated permanent loss of habitat
Steelhead[11]	600 feet (maximum in one year)	15,000 feet	40 feet	2,000 feet
red-legged frog	2.0 acres	100 acres	0.6 acres	30 acres
tiger salamander	2.0 acres	100 acres	1.3 acres	68 acres
Garter snake	4.0 acres[12]	200 acres	1.9 acres	98 acres
Western pond turtle	1.6 acres	80 acres	0.3 acres	15 acres
Permanent loss of habitat totals are not identical to the values shown in HCP Table 4-1 because some of the habitat is shared by multiple species and some permanent loss of habitat is associated with ongoing Covered Activities.				

Table 5-5. Summary of Estimated Take of Individuals for both Direct and Indirect Effects (HCP Table 5-1)

	Estimated annual incidental mortality	Minimum population level	Maximum incidental mortality (percent)	Maximum population level	Minimum incident mortality (percent)
Juvenile steelhead	120	1,500	8 percent	9,000	1 percent
red-legged frog	3	25	12 percent	250	1 percent
tiger salamander	20	400	5 percent	4,000	1 percent
Garter snake	0	20	0 percent	100	0 percent
Western pond turtle	0	10	0 percent	40	0 percent
Population estimates are based on studies conducted at Stanford: 1992 to present (most variation in population estimates are based on annual fluctuations)					

[11] The steelhead numbers represent temporary and permanent habitat loss only within the creek channels.

[12] In addition, there would be approximately 75 acres of grassland that would be mowed each year for fire break and CTS conservation purposes.

Other Special-Status Species. The riparian Monitoring and Management Plans and the CTS Reserve Monitoring and Management Plan[13] include measures that could affect the Cooper's hawk, long-eared owl, yellow warbler, golden eagle, San Francisco dusky-footed woodrat, bats (long-eared myotis, Yuma myotis, and Townsend's big-eared bat), and the western leatherwood plant. Bank stabilization, restoration planting, and invasive species removal could temporarily reduce the amount of bird and bat habitat, and result in the removal of western leatherwood. It is estimated that 2 to 4 acres would be affected annually, and that the area would be substantially restored within a year.

Vegetation temporarily lost by bank stabilization measures could be replaced with native vegetation when the species are not nesting, so that nesting habitat is not lost. Similarly, invasive species removal and activities associated with revegetation, primarily in the riparian area, could result in the removal of woodrat houses, which would temporarily displace woodrats, but would not prevent them from building a new house or otherwise using the habitat. Likewise, there is sufficient potential bird and bat habitat available at Stanford that any loss of habitat resulting from the HCP's Conservation Program monitoring, management and enhancement activities would have a negligible effect on these species, primarily because it would be a temporary loss of a year or less.

Western leatherwood grows in foothill woodland and riparian forest, and exists at Jasper Ridge and on Los Trancos Creek upstream of Stanford-owned lands. Western leatherwood is expected to occur in suitable habitat in Zones 1 and 2 along the San Francisquito and Los Trancos creek corridors. Bank stabilization could result in the loss of individual stands of western leatherwood if it is located in or immediately adjacent to areas that require bank stabilization. Mitigation to avoid or replace the western leatherwood could be imposed, if needed, on a project-specific basis.

The implementation of the Conservation Program would not result in a significant decline in the populations of these wildlife species or the western leatherwood plant, particularly because in the course of implementation, Stanford would preserve and improve the native habitat that supports these species. Thus it is anticipated that the HCP's conservation activities would provide a long-term net benefit to other special-status species.

Other Biological Resources. The variety of plant communities within the Stanford HCP area provide suitable foraging, cover, and nesting habitat for a large number of common amphibians, reptiles, birds, and mammals. Many of these species are not specific to one vegetation community, especially for omnivorous and predacious species that utilize a variety of habitats.

The Conservation Program would establish conservation easements along San Francisquito/Los Trancos and Matadero/Deer creeks and the preserved habitat would be monitored and managed in perpetuity. The Conservation Program also encourages habitat enhancement actions that would benefit the local ecology. For example, mitigation credit can be earned for expanding riparian areas around the creeks by removing existing structures and planting riparian vegetation. Although there would be temporary construction impacts when the structures are removed, including re-grading the site and potentially removing native vegetation prior to re-planting, in the long term such riparian restoration would benefit more species than just the Covered Species. Other enhancements, such as creating new off-channel red-legged frog breeding ponds, could

[13] The Central Campus CTS Management Plan would have no adverse effect on other special-status species.

result in the conversion of existing habitat into a new habitat type, depending on the selected location. For example, a patch of grassland might be excavated in order to build the pond, but the addition of the pond may enhance the habitat for other species by providing a new source of water and prey. The CTS Reserve Monitoring and Management Plan includes measures to maintain and enhance the tiger salamander breeding ponds, for example, which also benefits common wildlife that also uses the ponds. Areas within 150 feet of the ponds would be maintained in oak woodland and savannah grasslands, and chaparral plants would be removed. While this could reduce the overall amount of chaparral that could develop in the foothills, it also preserves oak woodland habitat that is important to common species.

Ongoing Stanford Operations

Plant Communities. Ongoing Stanford operations, including repairs, maintenance, and the construction of new infrastructure occur throughout Stanford in all habitat types. However, these activities would not remove or substantially affect a significant portion of native grassland, oak woodland, or riparian habitat because most of the infrastructure in undeveloped areas is located underground and its repair or maintenance only requires temporary disturbance of the ground. Moreover, under the HCP, areas that are temporarily disturbed by ongoing activities would be restored in accordance with recommendations made by the Conservation Program Manager resulting in the permanent loss of very little habitat.

Covered Species. Landscaping, vegetation management, utility repairs, agricultural activities, bank stabilization, golf course maintenance,[14] academic field studies and other ongoing activities in Zones 1 and 2 could all affect the Covered Species, either by harming, harassing, or killing the species or temporarily removing their habitat.[15] The impacts of the ongoing activities would be reduced by the HCP's Minimization Measures, which include preconstruction surveys, scheduling work outside of the breeding season, worker education, and habitat restoration for activities that temporarily disturb habitat areas (see Chapter 4 of the HCP). As a result of these measures, the overall effect of Stanford operations on the Covered Species is considered insignificant.

California Tiger Salamander. Ongoing activities such as mowing, pipe repair, road maintenance, and other routine maintenance, would temporarily disturb an average of 2 acres of tiger salamander habitat each year, and could inadvertently harm, harass, or kill tiger salamanders (see Table 5-4). Over the course of the 50-year permit term, up to 100 acres of tiger salamander habitat (about 10 percent) could be temporarily disturbed, but it would happen incrementally and would be restored following the disturbance. The Minimization Measures that require pre-activity surveys and prohibit non-emergency work during the breeding and migration season would substantially decrease the chance of incidental mortality of any tiger salamanders in the course of ongoing Covered Activities. Salamanders may be crushed or injured by earth-moving activities such as pipe repair and maintenance. The ongoing activities could result in the incidental mortality of up to 20 tiger salamanders per year, which is approximately 1 to 5 percent of the current tiger salamander population (See Table 5-5). The 20 individuals that might be lost annually are expected to be replaced as the local population remains stable or increases due to management actions under the HCP.

[14] This includes golf course maintenance that could temporarily disturb steelhead Critical Habitat.

[15] Permanent losses of habitat are included as future development.

California Red-legged Frog. Agricultural activities, cattle grazing, academic field work, vegetation management, water diversion maintenance, and other ongoing Covered Activities in the riparian areas could disturb approximately 2 acres of red-legged frog habitat per year (See Table 5-4). This disturbance could cause individual red-legged frogs to alter their behavior, which could temporarily increase the level of red-legged frog mortality. Ongoing activities also could inadvertently harm, harass, or kill red-legged frogs, although with the Minimization Measures that require pre-activity surveys and prohibit non-emergency work in the creeks or riparian areas during the breeding and migration season, fewer red-legged frogs would be directly impacted by these activities. The ongoing Covered Activities could result in the incidental mortality of 3 frogs per year, which would be up to 12 percent of the current red-legged frog population (See Table 5-5).

Steelhead. Maintenance and operation of Stanford's diversion facilities, bridge repairs, creek bank stabilization, and other instream Covered Activities, particularly those that require dewatering portions of the creeks, could temporarily disturb approximately 600 feet of the creek channels and adjacent riparian areas each year (See Table 5-4). In addition, dewatering and other activities associated with these activities could harm, harass, or kill steelhead, even with the Minimization Measures. With the full implementation of the SHEP (which should occur during the 2009-2010 rainy season), these activities could therefore result in the incidental mortality of up to 30 juvenile steelhead per year, which would represent 0.33 to 2 percent of the steelhead population (See Table 5-5). Monitoring performed for the HCP may result in the incidental mortality of up to an additional 90 juvenile steelhead per year. No adult steelhead are expected to be disturbed, captured, or killed by Covered Activities or the monitoring program. For purposes of this analysis, the DEIS assumes the maximum impact (120 juvenile steelhead per year) could occur.

Western Pond Turtle. Maintenance of the diversion facilities, bridge repairs, creek bank stabilization, and other instream activities could disturb approximately 1.6 acres of pond turtle habitat each year (See Table 5-4). Only two pond turtles have been found at Stanford, and given the scarcity of the turtles, the ongoing Covered Activities should not come into direct contact with a turtle. Moreover, because of the turtle's scarcity at Stanford, the ITPs would not permit any incidental mortality because such take would be significant. Minimization Measures that require pre-activity surveys and prohibit non-emergency work in the creeks or riparian areas during the breeding and migration season significantly reduce the chance of incidental mortality of pond turtle.

San Francisco Garter Snake. Ongoing ground maintenance activities, such as mowing and vegetation management, pipe repair, road maintenance, and other routine maintenance, would temporarily disturb an average of approximately 4 acres of potential garter snake habitat annually. In addition, about 75 acres of grassland are mowed each year for fire control and tiger salamander conservation purposes. Dry season mowing may harass any garter snake that happens to be present and the removal of grass cover may increase the likelihood of predation. Implementation of minimization measures such as time of day and height of mowing precludes the likelihood or incident of mortality of garter snakes.

Net Effects on the Covered Species. The HCP includes a Conservation Program to offset the take caused by the Covered Activities. The net effect is that tiger salamander habitat would be permanently protected and managed in a way that would increase the size of the tiger salamander population. It is expected that at a minimum the individuals lost each year would be replaced

and that over time the population would also increase due to habitat improvements. No more than 5 percent of the tiger salamander population would be harmed, harassed or killed per year.

The HCP's Conservation Program, including riparian easements, control of non-native animal species, and bank stabilization is expected to improve the quality of red-legged frog habitat and decrease red-legged frog mortality, with a net effect of increasing the population over the term of the HCP. The Covered Activities could result in take of up to 3 frogs per year, and a total of 30 acres of red-legged frog habitat, but would permanently protect and manage 360 acres of habitat, including at least three new off-channel breeding sites for red-legged frog.

The HCP would also provide a net benefit to steelhead. While the Covered Activities are anticipated to result in the incidental mortality of 120 juvenile steelhead annually (Table 5-5), and permanently remove a total of 2,000 feet of habitat, the Conservation Program would reduce the amount of fine sediment introduced into the channels, reduce erosion, remove barriers to migration, and improve cover for steelhead. There are many external factors that could affect steelhead, since part of its life cycle occurs outside of the HCP area, but habitat improvements under the HCP could feasibly increase the local steelhead population.

Implementation of the HCP should have the net effect of improving garter snake survivability in general by protecting stream corridors, increasing the prey base by increasing red-legged frog breeding habitat and the red-legged frog population, and placing restrictions on mowing.

Implementation of the HCP would also improve habitat for pond turtle, and would protect it from incidental mortality, but may not increase its population in the HCP area. There are so few pond turtles in the HCP area that improved habitat may not be sufficient to increase the population.

Other Special-status Species. Habitat for the Cooper's hawk, long-eared owl, yellow warbler, golden eagle, San Francisco dusky-footed woodrat, bats (long-eared myotis, Yuma myotis, and Townsend's big-eared bat), and western leatherwood could be affected by academic research, infrastructure installation and maintenance, and vegetation management, even with the implementation of the Minimization Measures. For example, infrastructure installation and vegetation management could result in the removal of a woodrat house, or could result in the removal of western leatherwood. The ongoing activities generally would not affect birds or bats that are protected during their nesting and roosting seasons by the MBTA and California wildlife laws. Continuation of the ongoing Covered Activities is not expected to reduce the population of a wildlife special-status species or western leatherwood to a point that makes them eligible for listing under the Federal ESA or CESA because the Minimization Measures that are intended to reduce the amount of take of the Covered Species would also prevent adverse effects on other special-status species.

Other Biological Resources. Landscaping, vegetation management, utility repairs and installation, road maintenance, agricultural activities, bank stabilization, golf course maintenance, academic field studies and other ongoing activities as well as maintenance of the water diversion facilities, bridge repairs, and other instream activities could affect other common wildlife species by removing vegetation or other habitat that is used for forage or nesting and potentially disrupting feeding or breeding behaviors that in turn cause a reduction in the population. For example, those activities that require dewatering portions of the creeks could temporarily disturb approximately 1.2 acres a year of the creek channels and adjacent riparian areas. This may disrupt local fish and amphibian movement and breeding success, or may reduce the amount of food available in the water habitat. Grounds-related work could destroy

ground squirrel and other rodent burrows possibly killing any animals in the burrows, displace or kill lizards and snakes, and remove plants used by various insects. On occasion, grounds-related work could remove mature trees and shrubs used for nesting by various bird species.

In general, the Minimization Measures that are intended to reduce the amount of take of Covered Species, or that are standard requirements of wildlife agencies, such as active bird nest protections, would eliminate or minimize the effects of ongoing Covered Activities on common, plants and animals. In addition, the requirement to restore disturbed habitat with native species would replace habitat lost to temporary activities.

Future Development

Plant Communities. The Covered Activities in the HCP include up to 30 acres of development allowed under the current GUP generally located in the vicinity of Lagunita, and 50 to 150 acres of development in Management Zones 1, 2, and 3 beyond the GUP. Together, the GUP and additional future development would affect up to 180 acres of non-native grassland, oak woodland and riparian habitat. The specific location of the additional 50 to 150 acres of development is currently unknown because Stanford does not have any specific development plans beyond the GUP. However, existing land use restrictions would affect where the development occurs. For example, most of the riparian areas would be protected by easements, and local ordinances generally prohibit development in the riparian areas. Hence, the development likely would affect primarily non-native grassland or oak woodland habitat. While up to 15 acres of riparian habitat[16] could be affected if local ordinances change and all of the anticipated Zone 1 development occurs in riparian areas, the HCP estimates that 7 acres of Zone 1 and 2 riparian habitat outside of the creek channels would be developed. The remaining acres of development would be in grassland or oak woodland. Although the exact location of future development beyond the GUP is not known, the HCP estimates the approximate amount of grassland, oak woodland, and riparian habitat that could be developed during the life of the HCP. These estimates are based on historical building patterns, infrastructure needs, and projected future Stanford needs. Future development could permanently remove 1 to 3 percent of the habitat in Zone 1, and 2 to 4 percent of the habitat in Zone 2, and 1 to 4 percent of the habitat in Zone 3.

The 180 acres of potential development that would be subject to the ITPs and HCP represent a small fraction (0.04 percent) of the five thousand acres of grassland, oak woodland, and riparian habitat in Zones 1, 2, and 3. As such, the anticipated future development that would be subject to the HCP and associated ITPs would not remove or substantially modify a significant portion of habitat, including grassland, oak woodland, and riparian habitat; and therefore would not result in an adverse effect on the plant communities. Moreover, the permanent loss of Zone 1 and 2 habitat and land in Zone 3 would be mitigated through the HCP by permanently preserving higher quality riparian, oak woodland and grassland habitats. The set-aside ratios are 3-to-1 (3 acres preserved for each acre lost) for the permanent conversion of Management Zone 1 habitat, 2-to-1 for Zone 2, and 0.5-to-1 for Zone 3.

[16] The ITPs will cover up to 30 acres of Zone 1 development, including GUP and beyond the GUP. The GUP development would affect 15 acres of non-riparian Zone 1 habitat, leaving 15 acres of Zone 1 that could be developed beyond the GUP and that could include riparian habitat.

Covered Species. Permanent loss of habitat in Zones 1 and 2 is the primary effect that future development would have on the Covered Species. Before any construction activities begin, the HCP and ITPs require preconstruction surveys, the relocation of any Covered Species, placement of barriers to prevent Covered Species from re-entering a construction site, and worker education. It is therefore unlikely that future development would harm, harass, or kill any of the Covered Species. However, on rare occasions, a Covered Species could be inadvertently crushed by equipment or work crews during the course of construction.[17]

Less than 1 percent of the habitat next to the creeks where steelhead occur would be developed. Approximately 1.6 percent (30 acres) of the total red-legged frog and garter snake habitat at Stanford would be developed. This includes the approximately 7 acres that overlap with steelhead riparian habitat, and grasslands that also provide habitat for tiger salamanders and garter snakes. Approximately 68 acres oak woodland and grassland habitat that could support tiger salamander in Zones 1 and 2 could be developed. This represents 0.2 percent and 9.9 percent respectively of tiger salamander habitat. Less than 1 percent (15 acres) of suitable pond turtle habitat would be developed. Approximately 50 acres of suitable garter snake habitat is anticipated to be developed during the life of the HCP. This is less than 5 percent of the total suitable habitat at Stanford. Suitable habitat areas could support a larger garter snake population. These estimates are based on existing habitat for the Covered Species, and do not take into account new habitat that may be created during the life of the HCP. Thus, they represent the maximum acreage of habitat lost.

The HCP encourages development in Zones 3 and 4, which would minimize the effects of development on the Covered Species. The Covered Species do not normally occur in Zone 3 and Zone 2 provides a buffer between development in Zone 3, and the high quality Zone 1 habitat. Moreover, current State and local water quality regulations strictly regulate post- development water quality impacts, and new development would not be permitted if it does not comply with these regulations. With the enforcement of these regulations, new development would not result in adverse post-development water quality impacts on the creeks, or riparian areas, that support steelhead, red-legged frogs, pond turtles, or garter snakes.

There is sufficient habitat in Zones 1 and 2 to support the existing population of the Covered Species, and sufficient additional habitat exists to accommodate a population increase. Moreover, the value of the residual habitat could be higher than it is today because at least 360 acres of riparian habitat would be within a permanent conservation easement and managed in perpetuity for the benefit of the Covered Species that occur in the riparian zone, and development would be prohibited on over 300 acres of tiger salamander habitat for at least 50 years. The successful creation of new tiger salamander breeding ponds, and other habitat management measures, should increase the amount and quality of tiger salamander habitat, which would offset the overall loss of habitat.

Implementation of the HCP is expected to benefit the Covered Species even with the permanent loss of habitat. Despite the permanent loss of up to 180 acres of habitat for the Covered Species, HCP implementation would provide a net benefit to these species through permanent conservation easements and monitoring and management of the easements.

[17] This potential lethal loss of a Covered Species was included in the take estimates described for the ongoing Covered Activities shown in Table 5-4.

Other Special-status Species. Future development anticipated in the HCP in Zones 1, 2 and 3 could affect other special-status species, primarily through the permanent loss of habitat. An individual could be inadvertently killed or harmed, and habitat could be temporarily disturbed during the course of construction. The MBTA and California Fish and Game Code protect birds and mammals. The HCP does not specifically address the potential impacts that future development could have on other special-status species. However, the HCP includes a Conservation Program that would protect the habitat of the Covered Species, which in turn, would protect the habitat of other special-status species, and benefit these species.

In addition, future development would be subject to environmental review under CEQA. While impacts to the Covered Species would be mitigated through the HCP, additional measures that address other special-status species could be incorporated into project conditions based on a project-specific environmental review. Measures that were included in the GUP Conditions of Approval are examples of measures that could be carried forward to development anticipated in the HCP beyond that identified in the GUP. As one example, special-status plants are protected by measures requiring focused surveys for all proposed building projects located in riparian and oak woodland areas, providing a fenced buffer of at least 30 feet from identified special-status plants during construction, and site-specific mitigation plans. Thus, if necessary, there are feasible mitigation measures to further reduce the effects of development on other special-status species.

Other Biological Resources. The primary effect that future development would have on common wildlife species is permanent habitat loss in Zones 1, 2, and 3. Management Zone 1 contains the riparian habitat used by several bird, mammal, amphibian, and reptile species found in the region. Management Zone 2 contains the riparian woodland and grassland habitat that could provide suitable nesting and foraging habitat for a variety of common species. Management Zone 3 contains the grassland and oak savannah habitat that could provide suitable nesting and foraging sites for birds, mammals, and reptiles. Permanent loss of habitat could lead to habitat fragmentation, encroachment by exotic weeds and plants, and area-wide changes in surface water flows due to an increase in impervious surfaces. The protection and management of riparian and grassland habitats under the HCP's Conservation Program would benefit other biological resources. As mentioned above, future development is subject to CEQA review and the mitigation provisions of CEQA would assure that the removal of mature trees and other valuable native vegetation such as woodlands, would mitigate impacts of future development on biological resources.

5.2.2 Effects of the No Action Alternative

Conservation. Under the No Action alternative the ITPs would not be issued and the HCP would not be implemented, so there would not be a Conservation Program. Activities that could cause the take of a federally listed species (i.e., red-legged frog, steelhead, garter snake or tiger salamander), would require take authorization on a project-specific basis. Under this alternative it is assumed that the activities in Zones 1 and 2 that require a permit would also require minimization measures like those identified in the HCP for Zones 1 and 2. As part of project-specific take authorization, conservation easements could be placed over portions of the riparian corridors and tiger salamander habitat to mitigate for specific projects and project-specific monitoring and mitigation plans could be required. These measures, including easements and monitoring, would happen when development occurs (not in advance of it) and would only be required to offset the biological effects of a specific project. Since federally listed species are

not expected to be impacted by activities in Zone 3, these areas would probably not require take authorization.

Under the No Action alternative, the Covered Species, other special-status species, and plant communities in Zones 1, 2 and 3 would not benefit from the comprehensive approach and management provided in the HCP's Conservation Program. The riparian, oak woodland, and grassland communities would not be managed in a coordinated way to address issues of erosion and invasive non-native plant and animal species control. Consistent restoration planting would not occur. Any required conservation easements could be placed over these habitats in a piecemeal way. While it is feasible that the No Action alternative may not have more adverse effects on the Covered Species, other special-status species, or plant communities, than the Proposed Action, the No Action alternative is inferior to the Proposed Action with regard to protection of biological resources because it is less comprehensive.

Ongoing Stanford Operations. Under the No Action alternative, Stanford would continue to operate. While most ongoing operations are located in Zones 3 and 4 and would not require a permit for take of the Covered Species, activities in Zones 1 and 2 that could result in take of a federally listed species would require project-specific take authorization. It is assumed that such take authorization would require measures to protect the federally listed species that are similar to those listed in the HCP. These measures could benefit plant communities and other special-status species, but not to the same extent as the Proposed Action because they would not be as comprehensive. For the diversion on Los Trancos Creek Diversion and pump station on San Francisquito Creek, water diversions would occur in compliance with the fish bypass flows established by the SHEP. However, monitoring and evaluation of the effects of these water diversions on steelhead would not occur.

Future Development. Under the No Action alternative, future development would occur. Future development that would result in take of federally listed species would require take authorization issued on a project-by-project basis. As discussed above, project-specific take authorization would require measures to protect federally listed species, similar to the HCP. These measures could benefit plant communities and other special-status species, but not to the same extent as the Proposed Action because they would be project-based and would not provide comprehensive protection.

5.2.3 Effects of the HCP for CTS Only Alternative

Under this alternative, the HCP area would be geographically limited to the CTS Basin, which includes the area around Lagunita (90 acres) and the CTS Reserve in the foothills south of Junipero Serra Boulevard (315 acres). Stanford activities that would result in take of listed species other than tiger salamander would require project-specific incidental take permits.

Conservation Program. Under this alternative, the geographic scope of the HCP would be limited to the CTS Basin that includes the Lagunita area, golf course and driving range, and CTS Reserve in the foothills south of Junipero Serra Boulevard. The conservation program would be limited to the monitoring and management activities outlined in the Central Campus CTS Management Plan and the CTS Reserve Monitoring and Management Plan, and the tiger salamander-related Minimization Measures and enhancements. Ongoing activities and new development in Zones 1 and 2 that could result in the take of steelhead and red-legged frog would need to obtain take authorization on a project-by-project basis. The conservation activities would include vegetation and ground animal management, worker education,

restriction on off-road vehicles, and monitoring. These activities would have very little, if any, effect on plant communities, the Covered Species, or special-status species because they involve very little ground disturbance.

The HCP for CTS Only alternative would not include conservation easements over the riparian habitat along San Francisquito, Los Trancos, Matadero, and Deer creeks because tiger salamander does not occur in these areas. These riparian communities would be protected on a piecemeal basis through mitigation required under project-specific take authorization or environmental review. The mitigation would likely include minimization measures like those in the Conservation Program and mitigation for loss of habitat. The mitigation would occur later in time than proposed in the HCP and would only address the impacts of specific projects.

In general the effects of this alternative on biological resources would be the same as the Proposed Action except that it is not likely to result in conservation easements as big as proposed in the HCP and would not have the same monitoring and management plans overseen by a conservation program manager. This alternative is inferior to the Proposed Action with regard to protection of the red-legged frog, steelhead, pond turtle, and garter snake because it is less comprehensive.

Ongoing Stanford Operations. Under the HCP for CTS Only alternative Stanford would continue to operate. While conservation activities in the CTS Basin would be the same as the Proposed Action, as noted above, the riparian habitat would not be protected as comprehensively as under the Proposed Action. Most of the ongoing Stanford operations occur in Zones 3 and 4 and are unlikely to require project-specific take authorization or be subject to minimization measures or other mitigation. This in turn would provide less protection than the Proposed Action for biological resources, including plant communities and other special-status species.

For the diversion on Los Trancos Creek Diversion and pump station on San Francisquito Creek, water diversions would occur in compliance with the fish bypass flows established by the SHEP. However, monitoring and evaluation of the effects of these water diversions on steelhead would not occur.

Future Development. Under the HCP for CTS Only alternative, future development would occur as described for the Proposed Action, but any development in Zones 1 or 2 outside of the CTS Basin would likely require project-specific take authorization and mitigation. Future development would also be subject to CEQA review. This alternative would result in the same protection of tiger salamander as the Proposed Action, but piecemeal protection in Zones 1 and 2 of steelhead, red-legged frog and garter snake, other special-status species (such as pond turtle), and biological resources in general. Smaller fragments of habitat would be protected and may not be contiguous, offering less benefit to biological resources than the Proposed Action. The Proposed Action provides more comprehensive and coordinated protection of the biological resources affected by future development.

5.2.4 Comparison of Alternatives

The Proposed Action or alternatives would not result in a significant adverse effect on biological resources. The Proposed Action provides greater benefit to biological resources than the alternatives because it provides a comprehensive Conservation Program and Monitoring and Management Plans that would be implemented in perpetuity over at least 360 acres of the highest quality habitat. The No Action and HCP for CTS Only alternatives do not provide either a

comprehensive Conservation Program or perpetual management of biological resources over as large an area of Stanford lands.

5.3 SOCIOECONOMIC ENVIRONMENT

This section addresses the effects of the Proposed Action and alternatives on the socioeconomic environment, including jobs, housing, and commercial activities that generate revenue. Effects on the socioeconomic environment are analyzed qualitatively, taking into consideration the affected environment and the activities described in the HCP. The Proposed Action and the alternatives would have a significant adverse socioeconomic effect that could result in physical changes to the environment if it were to result in a substantial loss of employment opportunities, housing opportunities, or income-producing activities.

5.3.1 Effects of the Proposed Action

The Proposed Action (implementation of the proposed HCP and issuance of take permits) would not adversely affect employment, housing, or income producing activities. With or without the HCP in place, Stanford would continue to employ the staff (both teaching and non-teaching) needed to operate Stanford. The proposed HCP would not affect the regional economy, displace workers, jobs, farms or other agricultural uses, or permanently change the conditions that affect individual businesses or the local economic climate (land use, transportation systems, customer base, etc.).

Conservation Program. The Proposed Action includes a Conservation Program that would establish conservation easements that would permanently remove lands from potential development that could provide housing or generate revenue. These easements include the riparian zones along Los Trancos, San Francisquito, Matadero, and Deer creeks (360 acres total), and could include lands in the CTS Reserve south of Junipero Serra Boulevard. The initial easement areas and CTS Reserve represent about 8 percent of Stanford's total land and development in much of this area is already limited by current general plan designations and zoning.

The Conservation Program also regulates leasehold uses in Management Zones 1 and 2 by requiring buffers, set backs from riparian areas, and the implementation of best management practices to protect water quality and habitat. Establishment of the easements would not eliminate any existing equestrian/agricultural leased uses.

Activities carried out under the HCP and the position of Conservation Program Manager would be funded by Stanford. Stanford is financially solid and has sufficient revenue to cover the cost of implementing the measures proposed in the HCP, without affecting housing or employment opportunities at Stanford or adversely affecting income-generating assets.

Implementation of the Conservation Program would not result in a loss of employment, housing or income-producing activities, and would not have an adverse socioeconomic effect.

Ongoing Stanford Operations. Ongoing Stanford operations would continue under the Proposed Action. The HCP would not affect the current revenue-producing activities at Stanford. Most of the revenues are generated by uses that are in Zone 4, such as the Medical Center, Shopping Center, and Stanford Business Park, and are not affected by the HCP.

Future Development. The Proposed Action would not change future development anticipated to be needed by Stanford and would have no adverse socioeconomic effect relative to housing.

The HCP would replace the need to obtain project-specific take authorization for each project that could result in take of the Covered Species. It would streamline the permit process under the Endangered Species Act by clearly defining the Conservation Program activities required to mitigate project-specific impacts to the Covered Species.

The proposed HCP would not rezone any parcels, introduce any new or substantially different uses, or alter or expand any support infrastructure to these areas (e.g., expand water service, improve transportation network) such that the value of surrounding lands would be affected.

5.3.2 Effects of the No Action Alternative

Conservation. Under the No Action alternative, take authorization would be required for each activity that results in take of a federally listed species (i.e., red-legged frog, steelhead, garter snake and tiger salamander), on a project-specific basis. Under this alternative, it is assumed that the activities in Zones 1 and 2 that require a permit would also require minimization measures similar to those defined in the HCP for Zones 1 and 2. Several components of the HCP's Conservation Program would not occur under this alternative unless required as mitigation for a take authorization. While conservation easements could be placed over portions of the riparian corridors to mitigate for specific projects, the 360 acres of conservation easements proposed in the HCP would not be established. The permanent conservation easements that would be placed over at least 360 acres of land along the creek corridors, and possibly more in high quality tiger salamander habitat, would prohibit permanent structures unless they benefit the Covered Species. Under the No Action alternative, these restrictions would not be present, but other restrictions imposed by general plan and zoning designations already inhibit development in areas adjacent to the creek zone and in high quality tiger salamander habitat. Due to these restrictions, the No Action alternative would not have significant socioeconomic effects associated with conservation.

Ongoing Stanford Operations. Under the No Action alternative, Stanford would continue to operate, and separate take authorization would be needed for any maintenance or repair project that could result in take of the Covered Species. The efficiency and predictability in being able to carry out normal Stanford operations that is offered by the Proposed Action would not exist under the No Action alternative. However, this alternative would not result in a loss of housing, employment, or revenue and would not result in significant socioeconomic effects associated with ongoing Stanford operations.

Future Development. Future development under the No Action alternative is the same as that described for the Proposed Action. Any new development that is not already allowed under the 2000 GUP would require project-specific building permits, CEQA review and possibly take authorization.

Under the No Action alternative, conservation easements could be placed over portions of the riparian corridors to mitigate for specific projects, but the conservation easements proposed in the HCP would not be established. The initial easement areas and CTS Reserve that would be set aside under the Proposed Action represent about 8 percent of Stanford's total land and development in much of this area is already limited by current general plan designations and zoning, thus the socioeconomic effects would be minor. The No Action alternative would not result in adverse socioeconomic effects, and does not significantly differ from the Proposed Action.

5.3.3 Effects of the HCP for CTS Only Alternative

Under this alternative, the HCP area would be geographically limited to the CTS Basin, which includes the area around Lagunita (90 acres) and the CTS Reserve in the foothills south of Junipero Serra Boulevard (315 acres). Stanford activities that would result in the take of listed species other than tiger salamander would require project-specific incidental take permits.

Conservation Program. Under the HCP for CTS Only alternative, Stanford would implement a Conservation Program in the CTS Basin that includes the Lagunita area, golf course and driving range, and the CTS Reserve in the foothills south of Junipero Serra Boulevard. Conservation may entail establishing permanent easements over tiger salamander habitat in the future that would prohibit permanent structures unless they benefit tiger salamander. Development on the lands south of Junipero Serra Boulevard is already restricted by general plan and zoning designations, so the conservation measures under this alternative would not result in significant socioeconomic effects.

Conservation activities for red-legged frog, garter snake and steelhead would be addressed separately, on a project-specific basis. While conservation easements could be placed over portions of the riparian corridors to mitigate for specific projects, the 360 acres or more of conservation easements proposed in the HCP would not be established. The extent of conservation activities would likely be less than the Proposed Action and more land could remain available for development. However, development of most of this land is currently constrained by general plan and zoning designations, so the socioeconomic effects do not significantly differ from the Proposed Action. This alternative would not have significant socioeconomic effects associated with conservation.

Ongoing Stanford Operations. Under the HCP for CTS Only alternative, Stanford would continue to operate, but any operations outside of the CTS Basin that could result in take of a federally listed species would require project-specific take authorization. This could delay some operations, but would not result in a substantial loss of employment opportunities, housing opportunities, or income-producing activities, and would not have a significant socioeconomic effect associated with ongoing Stanford operations.

Future Development. Under the HCP for CTS Only alternative, the future development anticipated in the HCP would still occur. If a future project could result in take of a federally - listed species other than tiger salamander, a project-specific take authorization would be needed. This reduces the efficiency and predictability of completing future development outside of the CTS Basin, but does not preclude development. It would not result in a substantial loss of employment opportunities, housing opportunities, or income-producing activities and would not have a significant socioeconomic effect associated with future development.

5.3.4 Comparison of Alternatives

The Proposed Action or the alternatives would not result in significant adverse effects to socioeconomics. Future conservation easements under the Proposed Action or alternatives will restrict the ability to develop the land for economic benefit, however development on most of these lands is currently restricted by local land use regulations. The Proposed Action or alternatives do not significantly differ in effects on socioeconomics.

5.4 ENVIRONMENTAL JUSTICE

This section assesses the effects of the Proposed Action and alternatives on environmental justice. The analysis is qualitative, and is based on consideration of the affected environment and the activities proposed in the HCP. An adverse effect would be disproportionately high and adverse for a minority or low income population if it would predominantly result in an adverse effect on a minority or low income area; or result in an adverse effect on a minority or low income area that is appreciably more severe or of greater magnitude than the adverse effect experienced by non-minority and non-low-income areas.

There are no minority or low income areas on the lands where the HCP would be implemented. Issuance of the ITPs and implementation of the HCP would not affect any minority or low income areas, and thus would not have a disproportionately high adverse effect on minority or low-income populations. It would not significantly affect household, or per capita, incomes within the study area and would not have any human health effects.

Likewise, the alternative actions would not have a disproportionately high adverse effect on minority or low-income populations. The alternatives, like the Proposed Action, would not significantly affect incomes within the study are and would not have any human health effects. Therefore, the Proposed Action, the No Action alternative and the HCP for CTS Only alternative would not have a disproportionately high or adverse effect on these populations.

5.4.1 Comparison of Alternatives

The Proposed Action and alternatives would not have adverse effects related to environmental justice. The Propose Action and alternatives do not differ in their effects on environmental justice.

5.5 CUMULATIVE EFFECTS

Cumulative impacts are defined as the "impact on the environment that results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions." (40 CFR 1508.7). In this section, the incremental impact of the Proposed Action and the alternatives are assessed in light of other past, present and reasonably foreseeable future Federal, State, local government, and private actions. The study area for cumulative effects generally includes San Mateo and Santa Clara counties. However, the geographic scope does vary for some of the resources addressed in this analysis. As such, the relevant geographic scope is identified for each resource in the resource specific discussions below. For example, the geographic scope was expanded for air quality to include the San Francisco Air Basin, and is narrower for traffic impacts since such impacts tend to be localized. As such, the relevant geographic scope is identified for each resource in the resource specific discussions below.

5.5.1 Past, Present, and Reasonably Foreseeable Future Actions

The San Francisco Peninsula has been highly altered by human generated actions, including substantial residential, commercial, institutional, industrial, and recreational development, along with a vast transportation network and other infrastructure to support these land uses. These alterations to the natural landscape have all contributed to the current environmental conditions, which are described in DEIS Chapter 4, Affected Environment.

Population growth in the study area will continue over the 50-year timeframe of the ITPs. As such, urban development is likely to continue. In addition to future development, there are a number of environmental programs underway that also may be implemented. These present and reasonably foreseeable future actions that could affect the resources in the study areas are described below.

Urban Development

The City of Palo Alto, Town of Portola Valley, City of Menlo Park, and Town of Woodside (collectively, "cities") and San Mateo and Santa Clara counties will continue to urbanize. Based on the cities' and counties' general plans, new shopping centers, commercial and institutional buildings, and housing will be built during the next 50 years. This development would be accompanied by public and private infrastructure improvements, such as new roads, utilities, and recreational facilities, and maintenance of new and existing facilities, such as street and sidewalk repairs.

Urban development includes regional transportation, and a number of regional transportation improvements will occur during the next 50 years. *See, e.g.*, Comprehensive County Expressway Planning Study Draft 2008 Update, October 2008. http://www.sccgov.org/rda/expressways2/draft2008update.pdf. Although the scope of regional transportation improvement projects is not known, and is subject to a number of considerations, including funding availability, changes in population and employment centers, and future environmental reviews, currently anticipated transportation projects include the U.S. 101/University Avenue Interchange Reconstruction, U.S. 101 northbound and southbound auxiliary lanes from Marsh Road to Santa Clara County line, Hwy 280/Page Mill Intersection modification, and Oregon Expressway operational and pedestrian improvements, which are underway.

Regional Flood Control

San Francisquito Flood Protection and Ecosystem Restoration Project. In 2006, the U. S. Army Corps of Engineers (Corps) and San Francisquito Creek JPA initiated a feasibility study for the San Francisquito Flood Protection and Ecosystem Restoration Project that is intended to identify and evaluate ways to alleviate flooding, address environmental degradation, and identify recreational opportunities in the San Francisquito Creek watershed. The Corps anticipates that the feasibility study will take several more years to complete and any project selected for implementation would require Congressional approval and further NEPA review. The Notice of Intent (NOI) for the feasibility study identified several potential alternatives, including the construction of new detention basins and other structural and non-structural improvements within the San Francisquito Creek watershed. Although flooding occurs primarily downstream of El Camino Real, actions upstream may be implemented to reduce flows downstream. At this time, the feasibility study has not identified a preferred alternative or determined whether any of the alternatives identified in the NOI are feasible.

Environmental/Conservation Projects

A number of regional and local environmental improvement projects are currently underway or anticipated during the next 50 years. These include the following projects.

Local Environmental Improvement Projects. Local cities and the Town of Woodside anticipate implementing a number of small scale environmental improvement projects including stabilization of degraded banks along San Francisquito creek and tree reforestation.

The San Francisquito Creek Watershed Council – Steelhead Task Force evaluated the entire San Francisquito Creek watershed, including numerous tributaries for steelhead passage, and identified modification of the Bonde Weir in order to improve steelhead passage as a high priority. The weir presents a passage barrier for both in-migrating adult and out-migrating smolt steelhead trout. The barrier is the farthest one downstream in the watershed and is located just downstream of the Caltrain tracks adjacent to Bonde Park, El Palo Alto Park, and the Alma Street Bicycle Bridge. The design and permitting for this project are complete, and the City of Menlo Park is currently seeking funding for construction. The project is anticipated to be completed by the end of 2010.

Proposed Three Creeks Habitat Conservation Plan. The Santa Clara Valley Water District is preparing an HCP to support an application for a 50-year Incidental Take Permit for 10 federally listed threatened or endangered species and 20 unlisted species from NMFS and FWS. The permit would include red-legged frog, CCC Steelhead and fall-run Chinook salmon.

The permit would cover the District on-going operations and maintenance activities, as well as future major construction activities for dam safety upgrades and other non-routine maintenance projects at District facilities within Stevens Creek, Guadalupe River, and Coyote Creek watersheds (Three Creeks). The working draft conservation program includes measures to improve streamflow and stream temperatures below District reservoirs on steelhead and salmon streams, fish habitat restoration and enhancement projects, removal of existing barriers to fish passage, and biological monitoring.

The SCVWD is developing the Three Creeks HCP to protect and enhance habitats for a suite of aquatic species and to provide for the conservation of species impacted by its on-going water-supply operations in northern Santa Clara Valley. The Three Creeks HCP addresses water-supply operations and facilities in the Coyote Creek, Guadalupe River, and Stevens Creek watersheds and incorporates a stream habitat-restoration program called the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE). The SCVWD anticipates submitting the HCP to NMFS for permitting in mid-2010.

Proposed Santa Clara Valley Habitat Conservation Plan/Natural Communities Conservation Plan (SCV Habitat Plan). The SCV Habitat Plan is a regional partnership between the County of Santa Clara, Santa Clara Valley Transportation Authority, Santa Clara Valley Water District, Santa Clara County Open Space Authority, and the cities of San Jose, Gilroy and Morgan Hill and the California Department of Fish and Game, USFWS, and NMFS. The SCV Habitat Plan is in preparation, with a draft scheduled to be released in early 2010; it is currently in its second administrative draft, which is available online (www.scv-habitatplan.org). The SCV Habitat Plan covers approximately 520,000 acres in southern Santa Clara County, and will be submitted as part of an incidental take permit application for 30 covered species, including the tiger salamander, red-legged frog, steelhead, pond turtle, western burrowing owl, Bay checkerspot butterfly, and other plant and animal species. It does not include the San Francisco garter snake. The covered activities include urban development, major capital improvements, and in-stream operations, maintenance, and flood protection projects.

The proposed SCV Habitat Plan includes a conservation strategy that provides for the protection and enhancement of natural resources at landscape, natural community, and species specific levels. The conservation strategy consists of the following major components:

- the acquisition of land and the creation of a Reserve System, including regional connections between protected areas;
- the long-term management, enhancement, and in some cases restoration of the Reserve System;
- the development of a comprehensive aquatic conservation strategy to address the needs of covered fish, amphibians, and aquatic reptiles;
- the implementation of a comprehensive, long-term adaptive management and monitoring program; and
- the implementation of avoidance and minimization measures on covered activities (called conditions on covered activities). (Jones and Stokes, June 2009)

Land acquisition would preserve an estimated 48,000 acres of upland, creek, and riparian habitat and create a network of reserves for the benefit of covered species, natural communities, biological diversity, and ecosystem function. This includes over 250 miles of riverine habitat and an estimated 664 acres of floodplain riparian habitat would be protected within the Reserve System, including at least 11.75 miles of high-quality spawning habitat for steelhead. Water releases from SCVWD reservoirs would be modified to increase stream flows when it would benefit the covered fish species. The aquatic conservation strategy would also improve fish passage through the removal of complete and partial barriers along the main courses and tributaries to Uvas Creek, the Guadalupe River, and Coyote Creek.

All terrestrial and aquatic land-cover types in the Reserve System would be enhanced to benefit covered and other native species. The SCV Habitat Plan contains detailed guidelines and recommendations for monitoring landscapes as well as the management, enhancement, or restoration of grassland, chaparral and northern coastal scrub, oak and conifer woodland, riverine and riparian forest, and wetlands and ponds. If all predicted impacts occur, the SCV Habitat Plan would restore up to 573 acres of riparian woodland and scrub, wetlands, and ponds, and up to 17.1 miles of streams.

The proposed SCV Habitat Plan overlaps a portion of the Three Creeks HCP. The covered activities and conservation actions in the Three Creeks HCP for Coyote Creek and the Guadalupe River watersheds are also included in the SCV Habitat Plan, so the plans are consistent with one another for the overlapping covered activities and conservation actions.

The proposed SCV Habitat Plan would provide for the protection of steelhead, pond turtle, tiger salamander and red-legged frog habitat in Uvas Creek, Llagas Creek, Coyote Creek, and a portion of the Guadalupe River watersheds, but does not cover the San Francisquito Creek or the Stevens Creek watersheds. It includes a portion of the San Francisco Bay Diversity Stratum in the CCC steelhead DPS, and a portion of the Interior Coast Range Stratum in the South-Central California Coast steelhead DPS. The Three Creeks HCP would provide for the protection of steelhead, pond turtle, tiger salamander, garter snake and red-legged frog in a portion of the San Francisquito and Matadero creek watersheds, and is entirely within the CCC steelhead DPS.

RWQCB Basin Plan Amendment regarding the Guadalupe River Watershed Mercury Contamination. The RWQCB has adopted a Basin Plan amendment that specifies the total maximum daily load (TMDL) for mercury in the Guadalupe River watershed. The amendment

addresses seven mercury-impaired waters: Guadalupe Reservoir, Calero Reservoir, Guadalupe Creek, Alamitos Creek, the Guadalupe River upstream of tidal influence, Almaden Reservoir and Lake Almaden. As of 2004, Guadalupe Reservoir had the highest recorded fish mercury concentrations in California-about 20 times higher than the U.S. EPA methylmercury criterion. Beneficial uses of waters in the watershed that are impaired by mercury are water contact recreation (due to human consumption of fish), wildlife habitat, and preservation of rare and endangered species.

This plan recommends specific freshwater water quality objectives. Implementation started in January 2009 and targets are to be attained before 2029. The goals of the first phase of implementation include implementing effective source control measures for mining waste at mine sites; completing studies to reduce discharge of mining waste accumulated in Alamitos Creek; and completing studies of methylmercury and bioaccumulation controls in reservoirs and lakes, by December 31, 2018. The goals for the second 10-year phase of implementation are to attain the watershed fish tissue targets and the San Francisco Bay mercury TMDL allocations to urban stormwater runoff and legacy mercury sources in the Guadalupe River watershed, by December 31, 2028. Mercury reduction in the watershed would benefit both aquatic and terrestrial wildlife, including steelhead, red-legged frog, and pond turtle. Tiger salamander and the San Francisco garter snake are not known to occur in the Guadalupe River watershed.

Grady Ranch Development and Restoration Project. Miller Creek in Marin County is an important resource in the CCC steelhead DPS because it has no large impassable dams, and is considered "a small but important part of regional production" by Leidy et al. (2003). The only planned project in the Miller Creek watershed is the Grady Ranch Development, which includes an office space with 640,800 SF of total floor area space, a new bridge over Miller Creek, road widening, and road realignment. Project mitigation includes preserving 3,283 acres of the Miller Creek watershed as open space, and substantially restoring and enhancing Miller Creek and its primary tributaries with fish-friendly rock and log structures to improve upstream fish passage (Liz Lewis, Marin County Public Works Department, personal communication). Depending on the placement of the bridge over Miller Creek and the quality of the in-stream restoration work, this project has the potential to improve upstream migration for steelhead. This is particularly important given that the culvert at Grady Ranch Fire Road is currently an upstream barrier to adult steelhead migration (Liz Lewis, personal communication). Long-term impacts from the project will likely be the increased pollutant loads and modified peak flood flows associated with increases in impervious surfaces. The EIR for this project was certified in 1996 but development has yet to begin.

San Anselmo Creek Saunders Avenue Crossing Fish Ladder Retrofit. San Anselmo Creek is a major tributary to Corte Madera Creek, which drains into San Francisco Bay in Marin County, and supports steelhead. The existing crossing consists of a concrete bridge on concreteabutments and concrete pilings. A large concrete apron spans the abutments and was likely constructed to protect the bridge as the downstream channel incised. It maintains a drop of over 4 feet. There are also two weirs that encase sewer lines.

In the 1980's an Alaskan Steeppass fish ladder was installed and a low-flow channel was built to provide for steelhead passage. However, the Steeppass is poorly suited for providing adult passage at typical migration flows. At migration flows the hydraulic capacity of the Steeppass is overwhelmed, and there is inadequate attraction flow for fish to find the outlet. At lower flows there is inadequate depth in the low-flow channel for adult steelhead to swim through.

Additionally, an Alaskan Steeppass does not provide passage for juvenile salmonids and is highly susceptible to plugging by debris.

A recent fish passage assessment of road-stream crossings in Marin County identified the Saunders Avenue site as a high priority for treatment due to more than eight miles of potential habitat affected, and presence of an ineffective fish ladder (Ross Taylor and Associates, 2003). The Friends of Corte Madera Creek Watershed received grant funding to develop design alternatives for improving fish passage at the site. The selected alternative is intended to improve passage conditions for both adult and juvenile salmonids, and to meet the design criteria of both NMFS and the California Department of Fish and Game. A pool and weir fish ladder is proposed.

5.5.2 Summary of Cumulative Effects

The cumulative effects for each environmental resource are described below. Both adverse and beneficial cumulative effects are considered in the context of other local, State, and Federal actions. In most cases there is no cumulative effect, either existing or caused by the Proposed Action or alternatives. However, continued urban development would likely increase traffic and cause a further decline in air quality. The air basin continues to exceed emission standards for fine particulate matter, and several intersections are currently below acceptable levels of service. These resources are therefore already impacted and current and reasonably foreseeable future development would impact them further because any future development would contribute additional particulate matter into the air basin, and potentially increase levels of traffic, which would exacerbate these conditions. The Proposed Action and alternatives would all have a relatively minimal incremental contribution to these already impacted traffic and air quality conditions. These are indirect effects of the Proposed Action and alternatives that would occur as a result of anticipated future development.

5.5.3 Geology and Seismicity

The study area used for the analysis of cumulative effects on geology and seismicity is Santa Clara and San Mateo counties. Most future urban development in the study area would be subject to similar geologic or seismic hazards and these hazards are generally mitigated through a combination of engineering design and site-specific geotechnical measures that address each project's needs as required by applicable local and State codes. The geologic hazards within the study area are considered typical and are normally addressed through appropriate engineering. Therefore, no regional cumulative effect exists. As described in the Environmental Consequences section of this DEIS, the Proposed Action and alternatives would not have any independent adverse effect on geologic resources or pose a seismic hazard, and since current and reasonably foreseeable future actions are not likely to have an adverse effect, neither the Proposed Action nor the alternatives would have an additive effect on geology or seismicity.

5.5.4 Cultural and Historic Resources

Historically, development in Santa Clara and San Mateo counties (the study area), has resulted in a cumulative loss of cultural (including archaeological and paleontological) and historic information because these resources have not been consistently identified, documented, assessed and protected. Currently, cultural and historic resources in the study area are protected by State and Federal laws to avoid significant adverse impacts to these resources, so that the cumulative

effect is mitigated. In addition, as described in the Affected Environment, Stanford has adopted policies to protect archaeological resources on Stanford lands, and maintains a professional staff position (University Archaeologist), collections, and archives on its archaeological resources. Procedures are in place to assure that all ground-disturbing activities are done in a manner that avoids impacts to known cultural resources. When previously unknown cultural resources are discovered, they are documented and assessed for the need to preserve them, sometimes in consultation with the California State Historic Preservation Officer. Because cultural and historical resources are protected in the region and at Stanford through State and Federal laws, and also at Stanford with site-specific Stanford policies, no cumulative impact is anticipated and the Proposed Action and alternatives would therefore not contribute to a study area cumulative effect.

5.5.5 Hydrology and Water Quality

The study area used for the analysis of cumulative effects on hydrology and water quality is the San Francisquito Creek and Matadero/Deer Creek watersheds, as past development in these watersheds has contributed to current hydrologic and water quality conditions (See Figure 1-2, Primary Watershed Basins).

As explained in Chapter 4, water quality was historically impaired in the watersheds primarily as a result of stormwater runoff laden with sediment and commonly used landscape pesticides. As a result, the NPDES permit requirements of the SCVURPPP and SMCWPPP control pollution in storm water runoff. Each plan includes a hydromodification[18] plan to reduce pollution of watercourses from human activity. These plans are expected to prevent study area cumulative effects on water quality. Likewise, conservation activities or development under the Proposed Action or alternatives are subject to requirements that minimize water pollution. No cumulative impact to water quality is anticipated and the Proposed Action and alternatives would therefore not contribute to a study area cumulative effect.

The gradual increase in impervious surfaces due to development in the watersheds has resulted in flooding problems in portions of the San Francisquito Creek watershed, although current and future urban development projects, including Stanford projects, are required to control storm water runoff (see DEIS Chapters 3 and 4). The Corps and JPA initiated the San Francisquito Flood Protection and Ecosystem Restoration Project feasibility study in an effort to reduce existing flood risk in the San Francisquito Creek watershed. The study is still underway and has not identified any preferred flood reduction options. The JPA, however, has been working to identify some flood reduction options along San Francisquito Creek that may be implemented before the San Francisquito Flood Protection and Ecosystem Restoration Project feasibility study is completed. Early implementation options include the possibility of increasing the capacity of the creek near San Francisco Bay and increasing detention along upstream portions of San Francisquito Creek, including possible detention facilities on Stanford lands. In June 2009 the JPA decided to proceed with more in-depth study of the flood reduction options near San Francisco Bay.

[18] Hydromodification is the alteration of the natural flow of water through a landscape, often caused by increased runoff from impervious surfaces. A hydromodification management plan delineates areas where increases in runoff are most likely to impact channel health and water quality and provides management options for maintaining pre-project runoff patterns. See http://www.scvurppp-w2k.com/pdfs/0506/hmp_factsheet.pdf

The conservation easements could complicate, but not prevent, the acquisition of Stanford's land by the Corps or JPA if proven necessary as part of a flood reduction project. Such acquisition is already difficult because, Stanford's Founding Grant prohibits Stanford from selling its lands donated by the Stanford family. Thus, if the Corps and JPA pursue a preferred flood reduction project on Stanford owned lands, the land would have to be condemned through the power of eminent domain. Property subject to a conservation easement is generally more difficult to acquire by eminent domain, but could be condemned if sufficient need for the property is shown. Once condemned, Stanford would no longer control the land and it would no longer be subject to the HCP and associated incidental take permits. However, any public flood reduction project would still be subject to the ESA and could require authorization by the USFWS and NMFS.

As described in the Environmental Consequences section of this DEIS, the Proposed Action or alternatives would not have any independent adverse effect on flooding, and would not preclude regional flood reduction improvements. No cumulative flooding impact is anticipated in the watersheds, and therefore, neither the Proposed Action nor the alternatives would have an additive effect on flooding.

5.5.6 Air Quality

The study area for the air quality analysis is the San Francisco Bay Area Air Basin. The San Francisco Bay Area Air Basin is managed by the Bay Area Air Quality Management District. It is made up of nine counties including, Alameda, Contra Costa, Marin, San Mateo, San Francisco, Santa Clara, Napa, southern Sonoma and western Solano counties.

As explained in Chapter 4, although overall emissions have improved over time, the air basin remains out of compliance for certain fine particulate matter and ozone emissions. This is primarily due to construction and an increase in vehicle miles traveled. Although there are plans in place to reduce these emissions (e.g., the 2001 Regional Transportation Plan for the San Francisco Bay Area and the Transportation Air Quality Conformity Analysis [MTC 2002]), the region is currently out of compliance.

Continued urban development in the study area would affect air quality. Specific projects in the study area would be subject to environmental review under CEQA or NEPA and would generally be required to implement feasible mitigation measures to mitigate the impacts to air quality. However, the impacts, and type of mitigation available to mitigate such impacts is currently not known. The Proposed Action and alternatives would result in localized air emissions caused by Conservation Program activities that require heavy equipment use for habitat restoration, as well as from future development anticipated in the 50-year term of the ITPs and the traffic associated with that development. These sources are similar to everyday activities that already occur in the air basin, and would not be a significant new source of air pollution, either stationary or mobile.

Because the San Francisco Bay Area Air Basin is currently in non-attainment for California's ambient air quality standards for fine particulate matter, there is an existing regional cumulative effect. The Air Basin will likely remain in non-attainment as particulate matter (PM10 and PM2.5) emissions are expected to increase slightly in the future. All reasonably foreseeable future urban development would likely contribute fine particulate matter. The Proposed Action or alternatives would not be a significant source of particulate matter emissions; therefore, their incremental contribution is minimal.

The San Francisco Bay Area Air Basin is also currently in non-attainment for the National 8-hour ozone standard and California 1-hour ozone standard, so there is an existing regional cumulative effect. The BAAQMD's 2005 Ozone Strategy contains policies and regulations that outline how the San Francisco Air Basin will achieve compliance with the State 1-hour ozone standard. The Bay Area Air Basin has already shown a dramatic improvement in ozone conditions over the years (quantified in number of days over the threshold), and ozone precursor emissions are expected to continue to decline over the next 15 years due to the implementation of 1) stationary source control measures through BAAQMD's regulations, 2) mobile source control measures through incentive programs and 3) other activities and transportation control measures in regionally coordinated transportation programs. Because of the expected continued decline in ozone due to these measures, this cumulative impact is likely to be reduced or eliminated during the next 50 years, even with reasonably foreseeable future urban development. As such, the Proposed Action or alternatives are not likely to contribute to a cumulative effect relative to ozone.

The San Francisco Bay Area Air Basin is currently in attainment for California and national ambient air quality standards for CO, NOx, SOx, and lead. Future emissions of ROG and NOx (ozone precursors), TOG, SOx, and CO from activities in the Air Basin have been forecast to continue decreasing or level off in the future, and this takes into account future population growth. Thus, no other future cumulative air quality impacts are anticipated.

The effects related to global climate change are discussed in section 5.4.13, below.

5.5.7 Noise

Noise in the study area (Santa Clara and San Mateo counties) is regulated through the noise element of a city or county general plan and local noise ordinances. Appropriate land use planning locates compatible land uses next to each other and requires mitigation to protect receiving sites from new noise sources or protects new development from existing noise sources. Therefore, there is no existing regional cumulative effect on noise. The Proposed Action and alternatives include conservation activities, ongoing activities, and future development that are normal activities that are anticipated in the region. Implementation of the Proposed Action or alternatives, in conjunction with other reasonably foreseeable actions would not result in a significant amount of new sources of noise. Therefore, no cumulative effects are anticipated, and neither the Proposed Action nor alternatives would have an adverse cumulative effect on noise levels, either alone or in combination with other noise sources in the study area.

5.5.8 Traffic

The cumulative analysis for traffic includes an overview of trends in the San Francisco Bay Area region, as well as conditions at Stanford and in the adjoining communities of Portola Valley, Menlo Park, Palo Alto and Woodside. While regional trends provide a historic context and sense of the future, the cumulative effect of development on traffic level of service is typically more severe at the local level. The study area is therefore limited to Stanford, Woodside, Portola Valley, Menlo Park, and Palo Alto.

Traffic in the San Francisco Bay Area has progressively increased over time as population and vehicle ownership has increased. Vehicles per capita in the Bay Area increased from 0.29 in 1930 to 0.64 in 2000, and population increased by over 5 million people. This trend is anticipated to continue. Past and future population growth combined with an increased number of cars and miles traveled contributes to worsening levels of service at intersections and roads in

the region. While measures to improve roadways and reduce traffic are continually implemented, there is an existing adverse study area cumulative effect from past and current development on traffic levels, both regionally and locally within Stanford, Woodside, Portola Valley, Menlo Park, and Palo Alto.

Continued urban development in the study area may lead to more traffic. Future local growth and land use change that could affect traffic is predicted in the general plans for Palo Alto and Menlo Park. Both plans foresee future growth through infill and redevelopment. While these communities are built out in terms of vacant lots, there is potential for population growth through increased density.

The City of Palo Alto Comprehensive Plan (1998-2010) directs future growth in the City "in appropriate locations within the urban area, particularly along transit corridors and near employment centers." It identifies future growth through infill and redevelopment as there is less than 1 percent of vacant developable land in the City.

Menlo Park is mostly built-out, and future development is expected to consist of infill and redevelopment. The development projects recently approved or pending include residential units as well as retail and commercial uses on El Camino Real.

Future growth in Woodside, Portola Valley and unincorporated Santa Clara/San Mateo counties is limited by available parcels and density restrictions, and would include primarily residential development. No large subdivisions are contemplated in the general plans.

The cumulative impact analysis in the GUP EIR included a series of projects that could take place by Year 2010 in the vicinity of Stanford. The analysis concluded that the impacts would be less than significant on public transit, bicycle/pedestrian traffic, parking, and freeways. However, the analysis concluded that by 2010 intersection impacts would be significant along five intersections in the City of Palo Alto, eight in the City of Menlo Park, two in Stanford, and two in Santa Clara County. A series of mitigation measures were included in the GUP EIR; however, despite the program of intersection improvements and trip reduction measures proposed, the EIR stated that "it is not possible to conclude definitively that intersection levels of service would be reduced to less than significant levels. Therefore, although it is likely that intersection impacts would be adequately mitigated for GUP related traffic, this impact is considered to be significant and unavoidable." The traffic impact analysis provided in Chapter 5.1.6 of this DEIS also concluded that the future development anticipated in the HCP could adversely affect traffic levels of service.

Generally, conservation related actions, either those related to the Proposed Action, alternatives or other reasonably foreseeable environmental/conservation projects would not permanently alter existing traffic patterns or result in a permanent increase in vehicle trips. Conservation activities include creek restoration to remove impediments, bank stabilization, non-native species removal, vegetation management/tree planting, and similar activities. These activities could result in minor temporary traffic delays when personnel and equipment are maneuvered to and from project sites. Thus, conservation related actions associated with the Proposed Action or alternatives would contribute minor and temporary traffic to the existing adverse condition.

Reasonably foreseeable urban development, along with the Proposed Action or alternatives could result in increased localized traffic. Future development that would be subject to the ITPs would result in additional traffic during the next 50 years. Cumulative growth in the surrounding

communities, including population density and the per capita vehicle ownership, would also result in increased traffic levels.

The reasonably anticipated future development could adversely affect traffic levels of service at local intersections, both individually and cumulatively with other projects. The specific intersections are not known because the specific location of the development is not yet known. A definitive determination of effects on traffic is not possible considering the uncertainty of changes that could occur over the next 50 years. Improvements to the road system or transit in and around Stanford unrelated to Stanford development could change the projected future traffic environment compared to what is being evaluated here. Even so, it is assumed that the cumulative traffic effect in the study area would be adverse, and that the Proposed Action or alternatives would have an additive effect.

5.5.9 Hazardous Materials

The study area for hazardous materials (and hazardous waste) is San Mateo and Santa Clara counties. Hazardous materials are regulated by State and Federal law to protect health and safety. As a result, there is no existing regional cumulative effect related to hazards and toxic materials or waste in the study area. The Proposed Action and alternatives, and other reasonably foreseeable actions would not require the use of hazardous materials other than those normally used in construction (e.g., machinery fuels, antifreeze, etc.), and these would be managed in order to prevent adverse effects. No hazardous waste sites would be affected by these actions, and no cumulative adverse effect is anticipated. The Proposed Action and alternatives would not result in an adverse cumulative effect related to hazardous materials/waste in the absence of a regional cumulative effect.

5.5.10 Public Services

The study area for public services (schools, police, fire, wastewater, and solid waste) includes San Mateo and Santa Clara counties. It is anticipated that minimum adequate levels of service would be maintained for future urban development within the study area as mitigation for projects, if necessary, would be required at the time of project approval. Such mitigation could include fees for the expansion of public services including fire and police protection, and schools. Available capacity at regional landfill facilities is anticipated to extend beyond the 50-year time frame of the Proposed Action, given current waste reduction programs mandated by State law. Therefore, there is no study area cumulative effect for schools, police, fire, wastewater, and solid waste services, and the Proposed Action or alternatives would not have an additive effect.

The study area for water supply in the analysis of cumulative effects is the service area for the San Francisco Public Utilities Commission (SFPUC). The SFPUC is the third largest municipal utility in California and the SFPUC Regional Water System currently supplies 2.4 million residential, commercial, and industrial customers. Approximately one-third of delivered water is supplied to retail customers in San Francisco, while the remaining two-thirds are wholesale deliveries to 238 suburban agencies in Alameda, Santa Clara, and San Mateo counties, including Stanford.

SFPUC water demand fell sharply following the drought-induced conservation efforts between 1987 and 1992 and despite increasing population, current water demand remains below pre-drought use. Greater efficiency realized through changes in the plumbing code, conservation

efforts, alternative water sources such as recycled water and desalination, all contribute to the amount of water available for future use. The 1983 California Urban Water Management Act requires all major water suppliers to prepare an Urban Water Management Plan every 5 years to ensure the long term management and efficient use of water supplies. The SFPUC's 2005 Urban Water Management Plan includes reliability planning; past, current, and projected water use; supply and demand comparisons; water demand management; shortage contingency plans; and water recycling. The SFPUC expects to meet projected water demand (in normal water years) through 2030 (SFPUC 2005). Because these types of plans are developed to manage existing and future supply and demand of water, there would be no existing study area cumulative effect. The analysis in Section 5.1.3 found that any future development would be subject to available water allocations. The Proposed Action or alternatives, along with other reasonably foreseeable actions would not result in an adverse cumulative effect on water supply.

5.5.11 Land Use

The study area for land use is San Mateo and Santa Clara counties. Land use is regulated by city and county general plans and zoning ordinances so that there is a balance between residential, commercial and industrial uses and these uses are appropriately located. There is no existing regional cumulative land use effect in the study area because the land use has been locally controlled and approved.

Implementation of the Proposed Action or alternatives along with other reasonably foreseeable urban development would not result in significant changes in land use, and no cumulative impacts to land use are therefore anticipated. As such, the Proposed Action or the alternatives would not result in cumulatively adverse changes in land use in the absence of a regional cumulative effect.

5.5.12 Biological Environment

The study area for the cumulative effects analysis for the tiger salamander, pond turtle, garter snake, and other biological resources, including special-status species, (Cooper's hawk, long-eared owl, yellow warbler, California thrasher, golden eagle, San Francisco dusky-footed woodrat, long-eared myotis, Yuma myotis, and Townsend's big-eared bat, and western leatherwood),[19] includes San Mateo and Santa Clara counties.

The assessment of cumulative effects on steelhead presented in this DEIS has broadened the study area to encompass the Coastal San Francisco Bay Diversity Stratum. Diversity strata are generally defined by Bjorkstedt et al. (2005) as groups of populations that inhabit regions of relative environmental similarity and therefore presumed to experience similar selective regimes. Diversity strata represent an important level of structure (although not necessarily biological structure) between the population and Distinct Population Segment, and offer a useful

[19] The other special-status species that are included in this analysis are the Cooper's hawk, long-eared owl, yellow warbler, golden eagle, San Francisco dusky-footed woodrat, long-eared myotis, Yuma myotis, and Townsend's big-eared bat, and western leatherwood. These species variously occur in riparian, scrub, and grassland habitat. They are known to occur at Stanford and elsewhere in San Mateo and Santa Clara counties. The San Francisco dusky-footed woodrat and the western leatherwood occur in more restricted ranges than the other species. The woodrat occurs from the southern end of the Golden Gate Bridge to Santa Cruz. Western leatherwood occurs only in the San Francisco Bay area in six counties. The remaining special-status species also occur in other areas of California.

framework for accounting for diversity and spatial structure in the evaluation of population viability under current conditions and future scenarios (Bjorkstedt 2005). The Coastal San Francisco Bay Diversity Stratum of the Central California Coast Steelhead DPS includes populations that spawn in eastern Marin County (Novato Creek, Miller Creek, Corte Madera Creek, and Arroyo Corte Madera del Presidio), in portions of Santa Clara County (Guadalupe River, Stevens Creek and a portion of San Francisquito Creek), and in portions of San Mateo County (San Francisquito Creek and San Mateo Creek) (Figure 5-1). Activities on these creeks could affect the Coastal San Francisco Bay Diversity Stratum populations.

Similarly, the study area for red-legged frog includes Recovery Unit #4 identified in the USFWS Recovery Plan for the California Red-legged Frog (USFWS, 2002). The recovery unit covers most of San Mateo, Santa Clara, Alameda, and Contra Costa counties. It is defined by watersheds and contains an area with similar conservation needs and population statuses. Stanford is in this recovery unit (Figure 5-2).

Population growth in San Mateo and Santa Clara counties has contributed to the decline in numbers or extent of several plant and wildlife species, primarily due to disturbance or loss of vegetation types that provide the plant and animal habitat. (See Chapter 4, Affected Environment for more information on the status of these species). Moreover, small losses of habitat for non-listed plants may be overlooked at the single-project level, but contribute to the cumulative decline of these species throughout their range. While non-listed these species generally occur in a broader range and have higher population numbers than special status species, over time their habitat in San Mateo and Santa Clara counties have been adversely affected by development.

Reasonably foreseeable actions that would affect the biological environment include future incidental take authorizations, future urban development, and future regional flood reduction activities that could result in further habitat modifications and loss of habitat for special-status and other species, and conservation activities that could improve habitat conditions and populations.

Future Incidental Take Authorizations. As discussed above, two other HCPs are currently being prepared within the study area; the proposed SCV Habitat Plan and the proposed Three Creeks HCP. If the USFWS and NMFS issue ITPs to these HCP applicants, those permits would authorize the take of wildlife species, including steelhead, red-legged frog, pond turtle, and tiger salamander. For example, the SCV Habitat Plan estimates the permanent loss of 4 to 5% of habitat for red-legged frog, pond turtle and tiger salamander in the plan area, and the permanent loss of less than 1% of riverine habitat that supports steelhead in the plan area. If issued, these ITPs could result in the cumulative loss of these species or their habitats within the study area. However, these permits would be accompanied by HCPs that would likely include avoidance, minimization, and conservation actions that could reduce the effects of the authorized taking and potentially improve the habitat and populations of these species.

Future Development. Most reasonably foreseeable future urban development in the study area will be on the flat lands closer to the bay. Most cities within the study area are built-out under their general plans, and future development consists of infill and redevelopment that would not substantially alter natural habitat. However, according to the Bay Area Greenbelt Report (Greenbelt Alliance, 2006), approximately 75,000 acres of greenbelt in Santa Clara County and 10,000 acres of greenbelt in San Mateo County are likely to be developed in the next 40 years. The report indicates that about 26,000 greenbelt acres are similarly at risk of development in

Alameda County, 82,000 greenbelt acres are at risk in Contra Costa County, and 3,800 acres of greenbelt are at risk of development in Marin County. The greenbelt includes lands that have not been developed, are usually on the outskirts of the urban areas, and provide habitat for plants and wildlife, including possibly the Covered Species. In addition to the loss of habitat to urban uses, urban development could result in an increased human presence in riparian areas, particularly if recreational routes are located along creeks, which could in turn affect water quality through increased trash and run-off. While future urban development would continue to result in the loss and modification of habitat for special status and other species, the specific affects on species and their habitats is not currently known and would be subject to future environmental review under CEQA. Future development covered by the Proposed Action or alternatives would contribute to the loss of habitat within the study area. Given the limited amount of development covered by the Proposed Action and alternatives, their contribution to the potential loss of habitat from urban development is relatively small.

Future Flood Protection Projects. Future flood protection projects could affect steelhead, red-legged frog, garter snake, pond turtle and other wildlife and plant species. Flood control projects generally do not improve steelhead habitat and can reduce the quality of steelhead habitat by reducing complexity. They can also reduce habitat value for red-legged frog by providing habitat for bullfrogs and non-native fish which prey on eggs, tadpoles and juvenile frogs. However, the permit process for these projects requires that they be reviewed by the Corps and wildlife agencies such as NMFS, USFWS and the California Department of Fish and Game. Most modern-day flood control methods use techniques that allow for some in-stream vegetation and employ materials that can provide complex habitat, but the ultimate goal to efficiently convey floodwaters frequently results in the degradation of instream habitat for native species. Flood control projects can also result in the loss of habitat for red-legged frogs, pond turtles and other riparian species by modifying the banks and side pools used by these species. Some modern flood control projects have improved flood conveyance by creating or expanding streamside flood benches which can also create opportunities to enhance habitat for native species including steelhead. For example, the Upper Guadalupe River Flood Project has removed buildings from several streamside properties to widen the channel and enhance adjacent riparian habitat. Channel widening for flood control allows for creek meanders and bends, large woody debris, and other natural channel functions to occur. The specific effects on steelhead, other species and their habitat from regional flood control projects are currently not known and would be subject to future environmental review under CEQA or NEPA.[20]

Future Conservation Activities. Reasonably foreseeable environmental/conservation projects would likely benefit special status and other species within the study area. Local tree reforestation would likely provide some additional habitat for bird species, and environmentally sensitive bank stabilization of degraded stream banks would reduce erosion. Bank stabilization projects, during construction and the subsequent vegetation growth period, often act as local sediment sources and can impact downstream steelhead habitat. However, long-term benefits

[20] For example, Arroyo Corte Madera Creek in Marin County is listed as critical habitat for CCC steelhead DPS but is "limited by water" (Leidy et al. 2005). If the Lower Arroyo Corte Madera del Presidio flood control project is implemented it could impact steelhead, although the CEQA or NEPA process may identify off-site mitigation measures that reduce or off-set such impacts. As such, this project may have adverse cumulative effects, however the extent of the effects on steelhead is currently not known.

from bank stabilization projects often include reduced erosion and sedimentation and improved bank structure, cover, and shade.

Conservation actions within the study area may provide a cumulative benefit to biological resources. For example, the preservation of 3,283 acres of the Miller Creek watershed as open space, and substantially restoring and enhancing Miller Creek and its primary tributaries with fish-friendly rock and log structures to improve upstream fish passage should improve steelhead habitat on Miller Creek in Marin County, which provides a small, but regionally important contribution to steelhead production (Leidy et al. (2003). These actions also cumulatively benefit other stream-dependent biological resources. Likewise, Arroyo Corte Madera Creek in Marin County is considered ecologically important to Marin County and to the San Francisco Estuary in general for its ability to contribute regionally to steelhead numbers (Leidy et al. 2003). The fish ladder retrofit at the San Anselmo Creek Saunder's Avenue Crossing has the potential to significantly improve steelhead productivity in the Corte Madera Creek system as San Anselmo Creek is considered to have the most productive steelhead habitat within the system (Jones 1969 as cited in Leidy et al. 2003). In addition, the San Anselmo Creek Saunder's Crossing Fish Ladder Retrofit has the potential to greatly improve upstream fish passage on San Anselmo Creek, a major tributary of Corte Madera Creek. The existing fish ladder impedes adult fish passage during typical migration flows and likely significantly reduces the number of fish that are able to reach the high-quality spawning grounds of the upper watershed (Sandra Guldman, Friends of Corte Madera Creek Watershed, personal communication).

Reasonably foreseeable future actions are not anticipated to have an adverse cumulative effect on biological resources, and some future actions could benefit biological resources. For example, the Proposed Action and HCP for CTS Only alternative would have an additive effect on region-wide conservation planning currently ongoing in Santa Clara County. The proposed SCV Habitat Plan and the proposed Three Creeks HCP combined with the Proposed Action or HCP for CTS Only alternative would greatly increase the geographic area of Santa Clara County that is covered by a conservation plan such as an HCP or HCP/NCCP, which could provide better regional protections for biological resources, including steelhead, red-legged frog, pond turtle and tiger salamander. However ITPs issued in conjunction with these HCPs, would also result in a greater amount of authorized take, so until permit decisions are made, and these HCPs are completed, the cumulative conservation effect is not known.

5.5.13 Socioeconomics

The study area for socioeconomics is San Mateo and Santa Clara counties. The existing cumulative effect of employment, housing and income-producing activities have created a study area that is generally economically stable. Implementation of the Proposed Action or alternatives, in conjunction with other reasonably foreseeable actions, would not have a cumulative effect on socioeconomics, although new urban development may provide some additional employment opportunities. Therefore, no cumulative socioeconomic effects are anticipated.

5.5.14 Global Climate Change

Climate change is defined as any significant change in climate metrics, including temperature, precipitation, and wind patterns, over a period of time. The effects of climate change most people refer to today stems from "global warming," a relatively recent phenomenon of rising

average temperatures across the globe. The temperature increase is thought to be due in large part to the human-induced increase in greenhouse gas emissions released into the atmosphere as a result of combustion. Common greenhouse gases (GHG) such as carbon dioxide, methane, and nitrous oxide trap radiant heat from the earth causing the average temperature to rise.

Climate change research in reports from the United Nations Intergovernmental Panel on Climate Change (IPCC) (www.ipcc.ch), U.S. Climate Change Science Program's Science Synthesis and Assessment Products, and the U.S. Global Change Research Program, conclude that earth's climate is already changing. This change is expected to accelerate. Human GHG emissions, primarily carbon dioxide emissions (CO_2), are the main source of accelerated climate change. This rise in temperature changes the climate worldwide and is expected to continue to cause or increase the severity of droughts, flooding, wildfires, and food and water shortages (USDA Forest Service guidance).

Currently, there are no laws on the national level that specifically require the evaluation of climate change in NEPA documents nor have any thresholds been set. However, NEPA generally directs Federal agencies to consider the environmental effects of their actions, and as such the effects of global climate change are addressed here.

In an effort to provide Federal agencies with guidance regarding the consideration of global climatic change in documents prepared pursuant to NEPA, the Council on Environmental Quality issued draft guidance. (October 8, 1997); see also, Climate Change Considerations in Project Level NEPA analysis (U.S. Forest Service (USFS), January 13, 2009)). The draft guidance identifies two aspects of global climate change which should be considered in NEPA documents:

1) The potential for Federal actions to influence global climatic change (e.g., increased emissions or sinks of greenhouse gases); and
2) the potential for global climatic change to affect Federal actions (e.g., feasibility of coastal projects in light of projected sea level rise).

Effects of Climate Change in the Bay Area

General predictions can be made about the regional effects of global climate change, and some qualitative assumptions about the effects of the alternatives, and on the alternatives, can be made based on available scientific information. See, Climate Change Considerations in Project Level NEPA analysis (USFS, January 13, 2009).

Sea Level Rise. In March 2006, the California Environmental Protection Agency published the *Climate Action Team Report to the Governor and the Legislature*, which evaluated three scenarios for reducing the amounts of greenhouse gases released into the atmosphere over the next century. Depending on whether and how much these emissions can be reduced, the report projects that by 2100 average temperatures in California will rise between 3 and 10.5 degrees Fahrenheit.

One of the most publicized consequences of global climate change is a predicted acceleration of sea level rise. This acceleration would increase the historic rate of sea level rise, which has been measured in San Francisco Bay for over 140 years. Between 1900 and 2000, the level of the Bay increased by 7 inches. Depending on which end of the range of projected temperature increases occurred, the California Climate Action Team found that water levels in San Francisco Bay could rise an additional 5 inches to 3 feet, or nearly 1 meter by the end of this century. More

recent analyses indicate that sea level rise from warming oceans may exceed 4 feet over the next 100 years, or even higher depending upon the rate at which glaciers and other ice sheets on land melt (BCDC 2008).

Rainfall pattern change. Warmer weather temperatures would change where and how rain falls in areas. If more precipitation is falling as rain in the Sierra Nevada, where a slowly melting snowpack is the norm, the water will run off faster and less water can be stored.

Increased incidence and severity of droughts and flooding. Increased temperatures would likely mean that droughts would be longer and the average annual rainfall could decrease over time. When rain does fall it can create flash flood conditions causing flooding and increased erosion and scouring of waterways.

Increased energy use. Warmer temperatures could result in increased energy use due to longer hours of air conditioning.

Increased fire hazard. Reduced total rainfall or changes in rainfall patterns could result in increased fuel loads and drier fuels, which in turn could increase the risk and severity of wildfires.

The Potential for the Alternatives to Influence Global Climatic Change

The DEIS assesses the effects of the Proposed Action and the No Action and HCP for CTS Only alternatives. Both the Proposed Action and the HCP for CTS Only alternative include conservation programs that would require the occasional use of construction vehicles. The contribution of GHG emissions from these actions is expected to be minimal.

The ongoing operation and maintenance of Stanford and future development are activities that would occur under the Proposed Action and both of the alternatives. These activities may result in an incremental contribution of construction-related vehicle equipment emissions and increases in traffic related to future development. An assessment of GHG emissions associated with the Covered Activities cannot be undertaken because project-level details are unknown at this time, and any attempt to quantify GHG emissions from future development would be speculative. Future development subject to the ITPs would undergo project specific CEQA or NEPA evaluation at the local level, and would include a more detailed evaluation of GHG emissions that may more precisely quantify the extent of GHG emissions, and if appropriate, impose specific mitigation.

The Potential for Global Climatic Change to Affect the Proposed Action and the Alternatives

Global climate change is expected to adversely affect habitat conditions for the Covered Species for all of the alternatives. For example, North American climate models predict warmer temperatures, particularly in the summer, and less precipitation in the form of snow for the southwestern United States (IPCC 2007). VanRheenen et al. (2004) found reduced late spring snow pack resulted in decreased winter, spring, and summer streamflows in the Sacramento-San Joaquin River Basin. Warmer temperatures and reduced streamflows could adversely affect steelhead throughout its range. For example, lower streamflows affect steelhead at all life stages. Reduced winter flows, which attract adults into their natal stream for reproduction, may result in lowered spawning recruitment rates. Lower spring and summer flows would reduce the number of smolts able to leave a watershed, particularly in arid systems that dry back in most water years.

The San Francisquito watershed would likely experience the increased temperatures, particularly in summer, and generally reduced streamflows predicted for California over the next century (IPCC 2007). Reduced winter streamflows would likely have the greatest impact on San Francisquito Creek as the limiting factor for steelhead productivity is overwintering habitat (Jones and Stokes 2006). Reduced winter flow means less recruitment of the boulders and large woody debris that create complex overwintering habitat. In addition, lower flows means less scouring action and lower rates of fine sediment removal from creek pools. Lower recruitment of materials and less scouring action results in less overwintering habitat.

Shorter rainfall seasons and more frequent or prolonged droughts may also affect other Covered Species. Tiger salamander, for example, depends on seasonal ponds that retain enough water in the Spring to facilitate metamorphosis into land-dwelling juveniles. Metamorphosis generally occurs in May or June. A prolonged drought, which is a potential consequence of global climatic change, could therefore seriously impair the continued existence or recovery of the tiger salamander (and other listed species) by impairing this important life-stage.

The effect of global climate change on the Proposed Action and alternatives is currently unknown. However, as described above, global climatic change may worsen habitat conditions for the Covered Species. But, the implementation of the HCP could respond to, and thereby reduce, some of the anticipated effects of global climatic change on the Covered Species and their habitats.

Stanford supports the last known tiger salamander population on the San Francisco peninsula, and as described above, worsening or prolonged drought conditions could adversely the tiger salamander. The HCP, however, addresses certain drought conditions, and commits to remedial measures that would lessen the effect of drought conditions. For example, under the HCP, Stanford may supply artificial water sources to sustain tiger salamander ponds that would otherwise no longer support tiger salamander reproduction. The HCP also includes management actions, such as stream bank revegetation, that would lessen the effects of erosion caused by increased storm severity. Steelhead management includes the addition of woody debris to San Francisquito Creek, which would improve overwintering conditions. In this way, the effects of global climate change on the Proposed Action would be reduced. The HCP for CTS Only alternative could likewise reduce the effects of climate change on tiger salamander but would not have any effect on the other Covered Species. The No Action alternative would not reduce the effect of global climate change on the Covered Species because it does not include a comprehensive conservation program.

5.5.15 Comparison of Alternatives

The Proposed Action or alternatives would not contribute to cumulative effects in the study area associated with geology and seismicity, cultural and historical resources, water quality, flooding, air quality, noise, hazardous materials/waste, public services, land use, and socioeconomics.

Future development associated with the Proposed Action or alternatives would contribute to cumulatively adverse traffic effects.

Future development covered by the Proposed Action or alternatives would contribute to the loss of a relatively small amount of habitat within the study area. The Proposed Action and HCP for CTS Only alternative could have an additive beneficial effect in combination with proposed conservation plans in preparation in Santa Clara County, however ITPs issued in conjunction

with these HCPs would also result in a greater amount of authorized take, so until permit decisions are made, and these HCPs are completed, the cumulative conservation effect is not known.

The Proposed Action and the HCP for CTS Only alternative include conservation programs, but the contribution of GHG emissions from these actions is not cumulatively significant. Because project-level details are unknown at this time, any attempt to quantify GHG emissions from future development under the Proposed Action or alternatives would be speculative. The Proposed Action's Conservation Program includes actions that could reduce the effects of global climate change on the Covered Species. Similarly, the HCP for CTS Only alternative includes actions that could reduce the effects of climate change on tiger salamander.

In comparison, the Proposed Action and alternatives are the same except with regard to cumulative effects on biological resources related to development and to greenhouse gas emissions. The Proposed Action is superior to the alternatives because it provides a cumulatively beneficial effect on biological resources and provides for adaptive management throughout Covered Species habitat on Stanford lands to respond to the effects of global climate change on the Covered Species.

5.6 THE RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

In accordance with NEPA, Section 102 (42 USC 4332), an DEIS must include a discussion of the relationship between the short-term uses of the environment and the maintenance and enhancement of long-term productivity. The Proposed Action is fundamentally designed to enhance long-term productivity, and ensures that the long-term preservation and enhancement provided through the Conservation Program (including conservation easements, management plans, habitat enhancement and take minimization measures) would be in place in advance of future habitat conversion.

Long-term productivity is considered in terms of both the natural environment and the human environment. In the case of this HCP, the natural environment would be protected and restored in order to foster increases in the populations of the Covered Species, and this in turn would help overall ecological productivity in the creek zones and the CTS Reserve. The HCP also would provide assurances that operation and maintenance of Stanford could continue and provide a measure of predictability for future development needed by Stanford in order to operate.

5.7 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSAL SHOULD IT BE IMPLEMENTED

In accordance with NEPA, Section 102 (42 USC 4332), an DEIS must explain which environmental effects of the proposed project are irreversible or would result in an irretrievable commitment of resources, such as consumption of fossil fuels.

The Proposed Action would result in a minor irretrievable commitment of fossil fuel to implement the Monitoring and Management Plans and for future habitat enhancement. The Proposed Action would not result in a substantial change in ongoing operations and maintenance or its use of irretrievable resources.

The conversion of land from vacant to urban use would be considered an irreversible commitment due to the remote possibility that the land could revert to open space in the future. Conversion of land to urban use is a Covered Activity, but no specific development is authorized by the Proposed Action.

Table 5-6. Comparison of Alternatives			
	Proposed Action/Preferred Alternative	**No Action Alternative**	**HCP for CTS Only Alternative**
Geologic Hazards and Soils	No significant adverse effects, either individually or cumulatively. Bank stabilization would reduce erosion and benefit water quality and easements would protect prime farmland. Greatest benefit for Geologic Hazards and Soils compared to No Action and HCP for CTS Only alternatives.	No significant adverse effects, either individually or cumulatively. Because there would be no comprehensive Conservation Program, including Minimization Measures that reduce erosion in Zones 1 and 2 and easement related conservation activities, the amount of erosion control is likely less than under the Proposed Action. The location of future easements is unknown, so the effect on farmland is unknown.	No significant adverse effects, either individually or cumulatively. Because there would be no comprehensive Conservation Program for the riparian areas, including Minimization Measures or easement related conservation activities that reduce erosion in Zone 1 and 2 riparian areas, the amount of future erosion control is unknown, but is likely to be less than under the Proposed Action. The location of future riparian easements is unknown, so the effect on farmland is unknown.
Cultural Resources	No significant adverse effects, either individually or cumulatively.	No significant adverse effects, either individually or cumulatively.	No significant adverse effects either individually or cumulatively.
Hydrology and Water Quality	No significant adverse effects and beneficial effects. Overall, the Conservation Program under the Proposed Action would improve surface water quality by limiting activities in the riparian easements and requiring minimization measures that protect water quality to benefit the Covered Species.	No significant adverse effects. Provides less water quality protection than the Proposed Action.	No significant adverse effects. Provides less protection of water quality than the Proposed Action.
Air Quality	No significant adverse effects individually. Significant adverse cumulative effects due to particulate emissions.	No significant adverse effects individually. Significant adverse cumulative effects due to particulate emissions.	No significant adverse effects individually. Significant adverse cumulative effects due to particulate emissions.
Noise	No significant adverse effects, either individually or cumulatively.	No significant adverse effects, either individually or cumulatively.	No significant adverse effects, either individually or cumulatively.

Table 5-6. Comparison of Alternatives			
	Proposed Action/Preferred Alternative	**No Action Alternative**	**HCP for CTS Only Alternative**
Traffic	Unavoidable significant adverse effects, both individually and cumulatively. Projected traffic impacts associated with the GUP development were significant and unavoidable. Future development covered by the ITPs could result in additional traffic to levels of service that are already unacceptable. However, a definitive determination of effects on traffic is not possible because of uncertainty about future land uses and traffic patterns or traffic improvements.	Unavoidable significant adverse effects, both individually and cumulatively. The effects for this alternative would be the same as for the Proposed Action.	Unavoidable significant adverse effects, both individually and cumulatively. The effects for this alternative would be the same as for the Proposed Action.
Hazardous Materials/Waste	No significant adverse effects, either individually or cumulatively.	No significant adverse effects, either individually or cumulatively.	No significant adverse effects, either individually or cumulatively.
Public Services	No significant adverse effects, either individually or cumulatively.	No significant adverse effects, either individually or cumulatively.	No significant adverse effects, either individually or cumulatively.
Land Use	No significant adverse effects, either individually or cumulatively.	No significant adverse effects, either individually or cumulatively. Likely less area subject to the land use restriction of a conservation easement than under the Proposed Action.	No significant adverse effects, either individually or cumulatively. Likely less area subject to the restriction of a conservation easement than under the Proposed Action.
Biological Resources	Beneficial effect due to a comprehensive Conservation Program that would preserve and restore habitat.	No significant adverse effects. This alternative would provide fewer benefits to the Covered Species and other species than the Proposed Action. Conservation activities would be piecemeal and implemented later in time to avoid or mitigate for specific impacts.	No significant adverse effects. This alternative would have the same benefit to tiger salamander as the Proposed Action, but less benefit to the red-legged frog, garter snake, steelhead, and pond turtle due to the lack of a comprehensive Conservation Program.

Table 5-6. Comparison of Alternatives			
	Proposed Action/Preferred Alternative	**No Action Alternative**	**HCP for CTS Only Alternative**
Socioeconomics	No significant adverse effects, either individually or cumulatively.	No significant adverse effects, either individually or cumulatively.	No significant adverse effects, either individually or cumulatively.

Figure 5-1 Steelhead Central Coast DPS

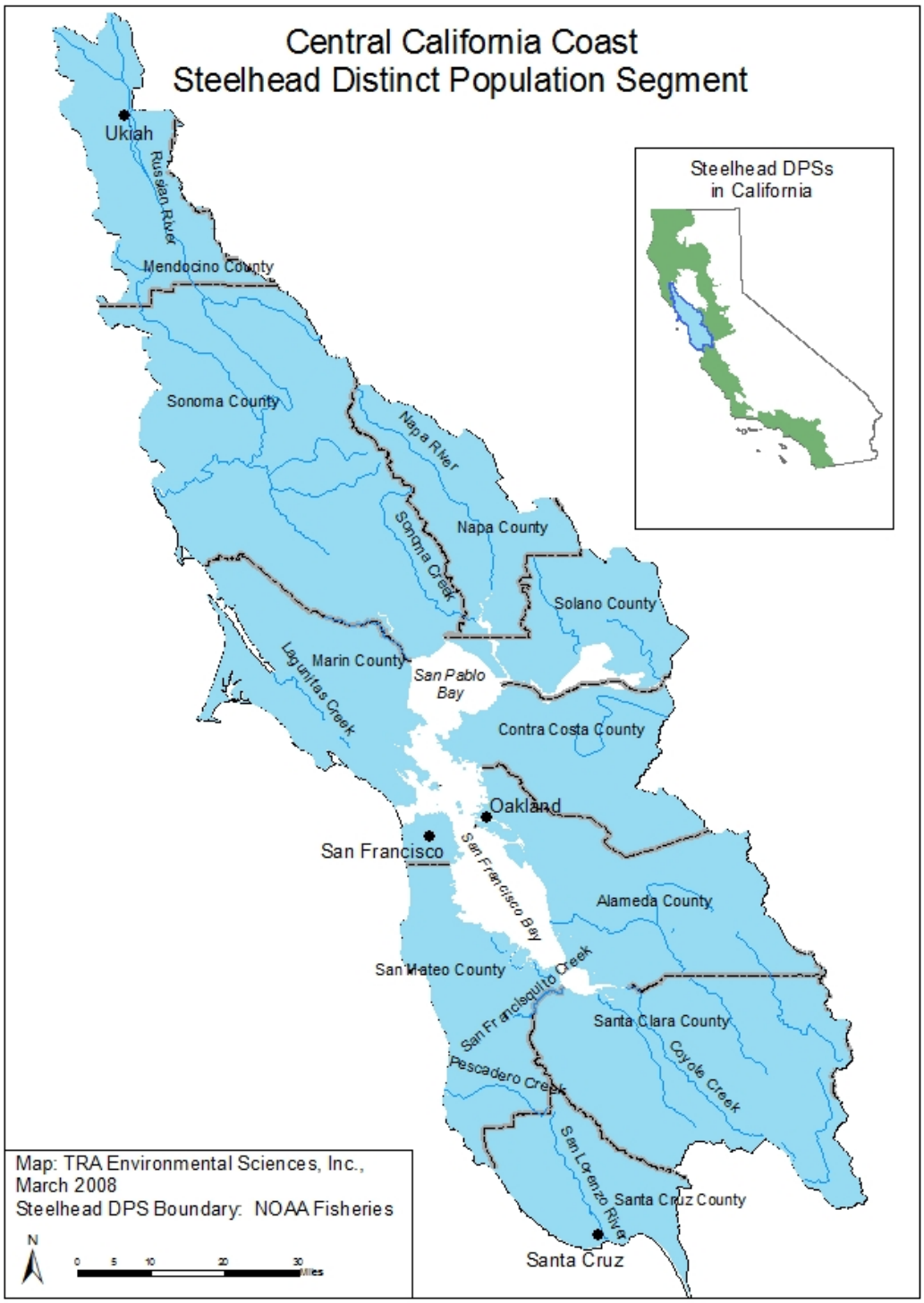

Figure 5-2 CRLF Recovery Units

California red-legged frog recovery units

Source: USFWS CRLF Recovery Plan 2002

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Deanna Chow, City Planner, City of Menlo Park, July 2008

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TRA Environmental Sciences, Inc.,

Taylor Peterson, Project Manager. Ms. Peterson has over 29 years of experience at TRA in environmental analysis and project management. Her area of expertise is ecology.

Victoria Harris, Cultural Resources, Biology, Socioeconomics. With over 28 years of experience at TRA, Ms. Harris has particular expertise in preparing Habitat Conservation Plans (HCPs) and Natural Community Conservation Plans (NCCPs) for state and federally listed threatened and endangered species.

Christina Lau, Air Quality, Noise, Public Services, Hazardous and Toxic Materials/Waste, Hydrology and Water Quality. Ms. Lau has 11 years of experience preparing CEQA & NEPA documents on a variety of project types.

Janet Cochrane, Land Use, Geology. Ms. Cochrane has over 12 years of professional experience in CEQA analysis and planning projects.

Sara Krier, Biology. Ms. Krier has six years of professional experience with a background is in environmental policy, ecology, and watershed science. Ms. Krier's area of expertise is in watershed analysis.

Rebecca Sloan, Biology. Ms. Sloan has four years of professional experience and a background in marine and aquatic sciences, coastal ecology and resource management. One of Ms. Sloan’s areas of expertise is the monitoring and habitat assessment of aquatic ecosystems in Coastal California, specifically in San Mateo and Santa Cruz counties.

Hexagon Transportation Consultants, Inc.

Mike Waller, Traffic, Principal Associate. Mr. Waller is one of the company's founding partners. He has over 30 years experience in transportation planning and traffic modeling.

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