Final Draft

Environmental Assessment

Erosion Protection System Maintenance at the San Antonio Road West Bridge

Vandenberg Air Force Base, California

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30th Space Wing, Installation Management Flight
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Acronyms and Abbreviations

°F	degrees Fahrenheit
30 CES/CEIEA	30th Space Wing, Installation Management Flight, Environmental Conservation
30 CES/CEI	30th Space Wing, Installation Management Flight
30 CES/CEIEC	30th Space Wing, Installation Management Flight, Environmental Compliance
30 SW	30th Space Wing
30 SWP	30th Space Wing Plan
AADT	Annual Average Daily Traffic
ac.	Acre(s)
ADT	Average Daily Traffic
AFI	Air Force Instruction
AFOSH	Air Force Occupational Safety and Health
AOC	Area of Concern
AOI	Area of Interest
APE	Area of Potential Effects
APZ	Accident Potential Zone
ARB	Air Resource Board
Base	Vandenberg Air Force Base
BCC	USFWS Bird Species of Conservation Concern
BMP	Best Management Practice
BO	Biological Opinion
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
Cal EPA	California Environmental Protection Agency
CalTrans	California Department of Transportation
CARB	California Air Resources Board
CCA	California Coastal Act
CCC	California Coastal Commission
CCR	California Code of Regulations
C&D	construction and demolition
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO2e	carbon dioxide equivalent
CSC	California Species of Special Concern
CRLF	California red-legged frog

CWA	Clean Water Act
CY	cubic yards
CZMA	Coastal Zone Management Act
dB	decibel
dBA	A-weighted decibel
DoD	Department of Defense
DOT	Department of Transportation
EA	Environmental Assessment
EISA	Energy Independence and Security Act
EMS	Environmental Management System
EO	Executive Order
EPA	Environmental Protection Agency
EPM	Environmental Protection Measure
ESA	Endangered Species Act
FE	federally endangered
FONPA	Finding of No Practicable Alternative
FR	Federal Register
Ft.	foot or feet
FT	federally threatened
GHG	greenhouse gas
GPS	global positioning system
GWP	global warming potential
ha	hectare(s)
HazMart	Hazardous Materials Pharmacy
HWMP	Hazardous Waste Management Plan
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
in.	inch(es)
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
km	kilometer
L	liter
LCZ	Lateral Clear Zone
L_{eq}	Average Daily Sound Level
L_{eq1H}	One hour average sound level
L_{max}	Maximum daily sound level
LOS	Level of Service
m	meter
mi.	mile(s)
$mi.^2$	square mile(s)
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NCA	Noise Control Act
NEPA	National Environmental Policy Act

NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSR	New Source Review
O_3	ozone
OHWM	ordinary high-water mark
OSHA	Occupational Safety and Health Administration
P2	Pollution Prevention
PJD	Preliminary Jurisdictional Determination
Pb	lead
$PM_{2.5}$	particulate matter less than 2.5 microns
PM_{10}	particulate matter less than 10 microns
POLs	petroleum, oil, and lubricants
ppmv	parts per million by volume
RCRA	Resource Conservation and Recovery Act
ROG	reactive organic gases
ROI	region of influence
RWQCB	Regional Water Quality Control Board
SBCAPCD	Santa Barbara County Air Pollution Control District
SBCPD	Santa Barbara County Planning and Development Department
SE	State Endangered Species
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SR	State Route
SCCAB	South Central Coast Air Basin
SSPP	Strategic Sustainability and Performance Plan
SWMP	Solid Waste Management Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solid
TI	traffic index
TWG	tidewater goby
U.S.	United States
U.S. 1	U.S. Highway 1
U.S. 101	U.S. Highway 101
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USGS	U.S. Geological Survey
USAF	United States Air Force
USFWS	United States Fish and Wildlife Service
UTS	Unarmored Threespine Stickleback

UXO	unexploded ordnance
VAFB	Vandenberg Air Force Base
V/C	volume-to-capacity

1 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The 30th Space Wing, Installation Management Flight (30 CES/CEI), has prepared this Environmental Assessment (EA) to evaluate the potential environmental effects of implementing the Proposed Action and identified alternatives per the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500–1508), and the United States (U.S.) Air Force's (USAF) Environmental Impact Analysis Process regulations (32 CFR 989). The Proposed Action consists of implementing repair and erosion protection system maintenance of the San Antonio Road West Bridge at Vandenberg Air Force Base (VAFB). The USAF would remove a buildup of sediment, repair gabions, manually trim vegetation from the San Antonio Creek channel and its hydrologic floodplain and perform mitigation downstream of the bridge. These maintenance activities would ensure that creek flow, under normal and flood conditions, does not undermine the stability of the bridge.

1.1 Project Location

VAFB is headquarters for the 30th Space Wing (30 SW). The 30 SW at VAFB is the Air Force Space Command organization responsible for Department of Defense (DoD) space and missile launch activities on the West Coast of the United States. Satellites destined for polar or near-polar orbit are launched from VAFB, and ballistic missiles are tested. The 30 SW supports West Coast launch activities for the USAF, DoD, Missile Defense Agency, National Aeronautics and Space Administration, foreign nations, and various private industry contractors. To accommodate space and missile launches, roadways are required to access all portions of base.

VAFB is located on the south-central coast of California, approximately halfway between San Diego and San Francisco (Figure 1-1). The Base covers 99,099 acres (ac.) (40,104 hectares [ha]) in western Santa Barbara County and occurs in a transitional ecological region that includes the northern and southern distributional limits for many plant and animal species.

The Proposed Action Area is located within the San Antonio Creek watershed (San Antonio Road West Bridge). The San Antonio Road West Bridge is approximately 0.6 miles (mi.) (0.97 kilometers [km]) east of Lompoc-Casmalia Road and 2.6 mi. (4.2 km) west of the U.S. Highway 1 crossing at the Barka Slough (Figure 1-2). The proposed riparian mitigation area is approximately 1 mi. (1.6 km) west, downstream of the San Antonio Creek bridge (Figure 1-2). San Antonio Creek is a 28 mi. (45 km) long, east-west trending creek, entering north VAFB at Barka Slough, on its eastern boundary, and emptying into the Pacific Ocean north of Purisima Point. The San Antonio Creek drainage basin is approximately 154 square miles ($mi.^2$) (388 square kilometers [km^2]) that includes Los Alamos Valley in the upstream portion and San Antonio Valley in the downstream portion.

Figure 1-1. Regional Location of Vandenberg Air Force Base.

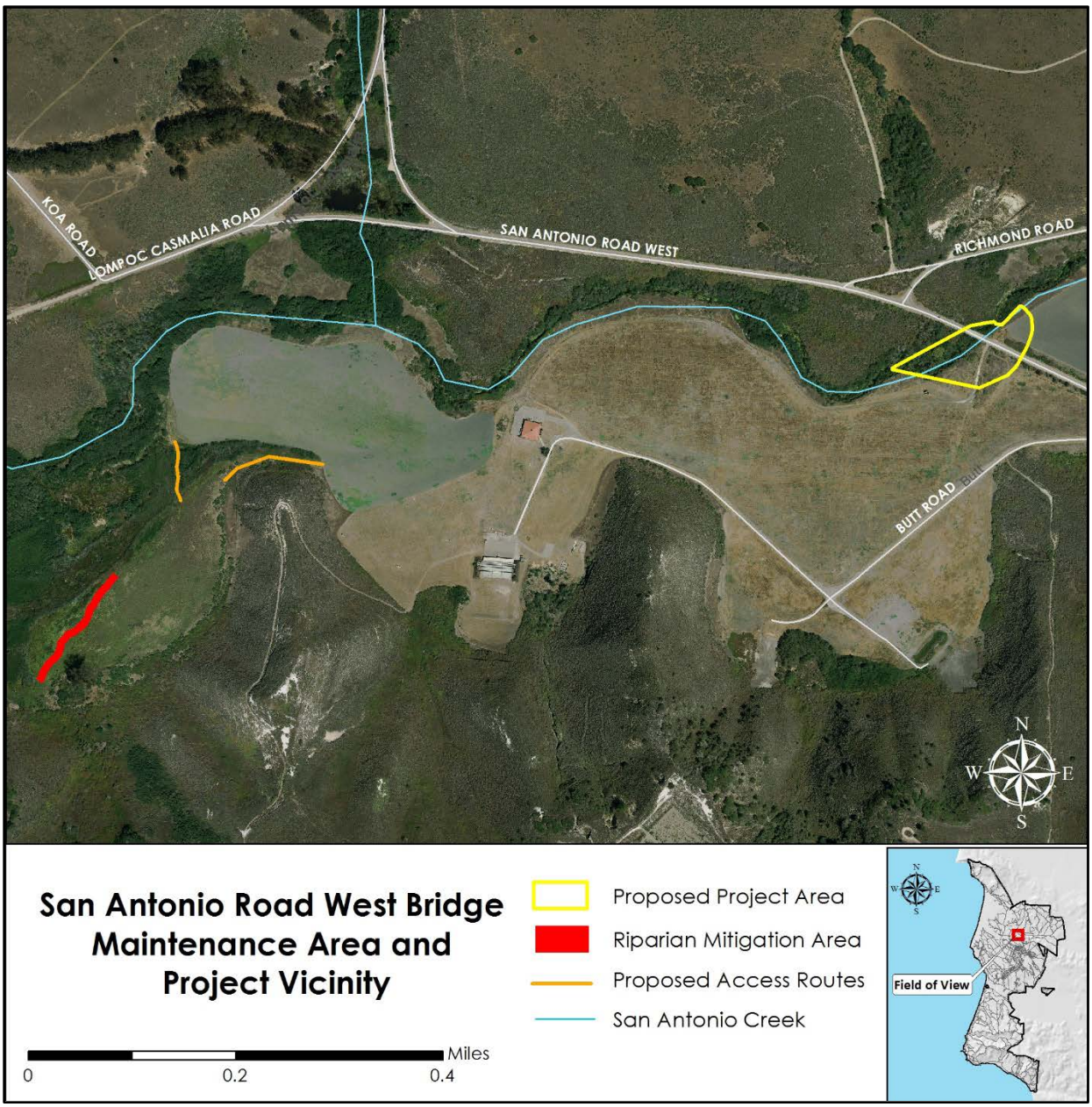

Figure 1-2. Proposed Action Area and Vicinity.

1.2 Purpose and Need

Reliable transportation corridors are critical to the missions of the 30 SW. San Antonio Road West crosses San Antonio Creek near its intersection with Richmond Avenue and serves as a vital access route into North VAFB. The San Antonio West Bridge was constructed in 1969 and repaired in 1983 to include the installation of riprap and gabions under the bridge (Penfield & Smith 2012).

The USAF proposes to improve water flow that is currently being choked at the bridge location. During a recent inspection it was noted that the water pooling upstream of the bridge is eroding and undermining the gabions (metal nets containing rock) that attach to the bridge piling (Bengal 2011). Sediment needs to be removed to further inspect the gabions, determine the extent of damage, and to conduct repair and or replacement. Manual vegetation removal would stop the roots from damaging the gabions and reduce sediment deposition caused by decreased water velocity (Penfield & Smith 2012).

The purpose of the Proposed Action is to stop the undermining of the bridges substructure and maintain secure reliable transportation to mission critical access points on North VAFB, along with any associated utilities that are carried across San Antonio Creek at the bridge location. The need for the Proposed Action is to sustain vital infrastructure for mission support by repairing and conducting maintenance of the erosion protection system at the San Antonio Road West Bridge. If the bridge is not repaired, space launch missions would continue to operate under the risk of potential bridge failure, which would result in significant reduction of physical access to North VAFB, severance of utility infrastructure, impacts to space launch missions, and constraints on VAFB to provide safety and security support to North VAFB due to lack of access or utilities.

1.3 Scope of the Environmental Assessment

This EA identifies, describes, and evaluates the potential environmental impacts that could result from the Proposed Action and the No-Action Alternative, as well as possible cumulative impacts from other past, present, and planned actions on VAFB. In, addition, the EA identifies environmental permits relevant to the Proposed Action. As appropriate, the EA describes, in terms of a regional overview or a site-specific description, the affected environment and environmental consequences of the action. Finally, the EA identifies management measures to avoid, prevent, or minimize environmental impacts.

1.4 Interagency and Intergovernmental Coordination and Consultation

Air Force Instruction (AFI) 32-7060 requires the USAF to implement a process known as Interagency and Intergovernmental Coordination for Environmental Planning (IICEP), which is used for the purpose of agency coordination and implements scoping requirements. Through the IICEP process, VAFB notified relevant federal, state, and local agencies, and the surrounding communities of the Proposed Action, and provided them sufficient time to make known their environmental concerns specific to the action (Appendix A).

The Proposed Action is a federal undertaking subject to compliance with Section 106 of the National Historic Preservation Act (NHPA). VAFB initiated consultation with the State Historic

Preservation Officer (SHPO) under 36 CFR Part 800. VAFB determined that the Proposed Action would have no adverse effect to any properties listed in or potentially listed in the National Register of Historic Places. The SHPO has concurred with VAFB's determination of no adverse effect to historic properties and (see Appendix B).

Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments*, directs federal agencies to coordinate and consult with Native American tribal governments whose interests might be directly and substantially affected by activities on federally administered lands. The Santa Ynez Band of the Chumash Indians was consulted on the Proposed Action and determined that no impacts to cultural sites would occur and a Native American monitor would be unnecessary (Appendix C).

VAFB determined that the Proposed Action may affect threatened or endangered species and consultation with the U.S. Fish and Wildlife Service (USFWS) was completed under Section 7 of the Endangered Species Act (ESA) (see Appendix D).

Under Section 401 of the Clean Water Act of 1977 (CWA), a federal agency must obtain a Section 401 water quality certification to perform any activity that may result in a discharge to waters of the state. The State Water Resources Control Board (SWRCB) and, locally, the Central Coast Regional Water Quality Control Board (RWQCB) administer the CWA and state water regulations. VAFB is currently consulting with the RWQCB for a 401 certification.

Under Section 404 of the CWA, the U.S. Army Corps of Engineers (USACE), any proposed activities including the discharge of dredged or fill materials into waters of the U.S. must be reviewed by the USACE and issued a Section 404 permit before the activity may occur. VAFB is currently consulting with the USACE to obtain a Section 404 permit.

Under the Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. §§ 2452–24645), a federal action that may affect the coastal zone must be carried out in a manner that is consistent with state coastal zone management programs. On 12 September 2018, the California Coastal Commission (CCC) concurred with a negative determination (ND-0026-18; Appendix G) for the Proposed Action at VAFB, wherein the Executive Director determined that the proposed project would not adversely affect coastal resources.

2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter provides detailed descriptions of the Proposed Action, including equipment needs, construction requirements, and operational parameters.

2.1 Alternative A: Proposed Action

2.1.1 Bridge Maintenance

The Proposed Action involves maintenance activities at the San Antonio Road West Bridge (Figure 2-1). This area includes some previously disturbed areas, depicted in Figure 2-2 . The Proposed Action Area includes: (1) the Main Project Area (gabions under the bridge and the extent of vegetation removal); (2) staging areas; (3) the bank erosion control area; (4) a downstream portion of San Antonio Creek, approximately 400 feet (ft.) (122 meters [m]) from the bridge (Figure 2-3); and the riparian mitigation area (Figure 1-2).

Figure 2-1. Main Construction Area.

Figure 2-2. Disturbed Areas at Northeast Staging Area.

The USAF applied a 400 ft. (122 m) downstream distance from the Main Project Area to delineate the limit of potential effects from sedimentation or increased turbidity as a result of the Proposed Action. This distance was the farthest downstream sampling point required by the Central Coast Regional Water Quality Control Board (RWQCB) in a past project on San Antonio Creek (ManTech SRS Technologies, Inc. 2008a). The Proposed Action Area at the bridge covers approximately 3.42 ac. (1.38 ha), but the majority of this area would not be disturbed under the Proposed Action. The Proposed Action Area includes an additional 0.48 ac. (0.19 ha) at the riparian mitigation area. The Proposed Action is anticipated to impact approximately 1.6 ac. (0.65 ha), with annual maintenance affecting some or all of the same areas (Table 2-1). Ground disturbing activities would only occur in the Main Project Area, staging areas, and the riparian mitigation area.

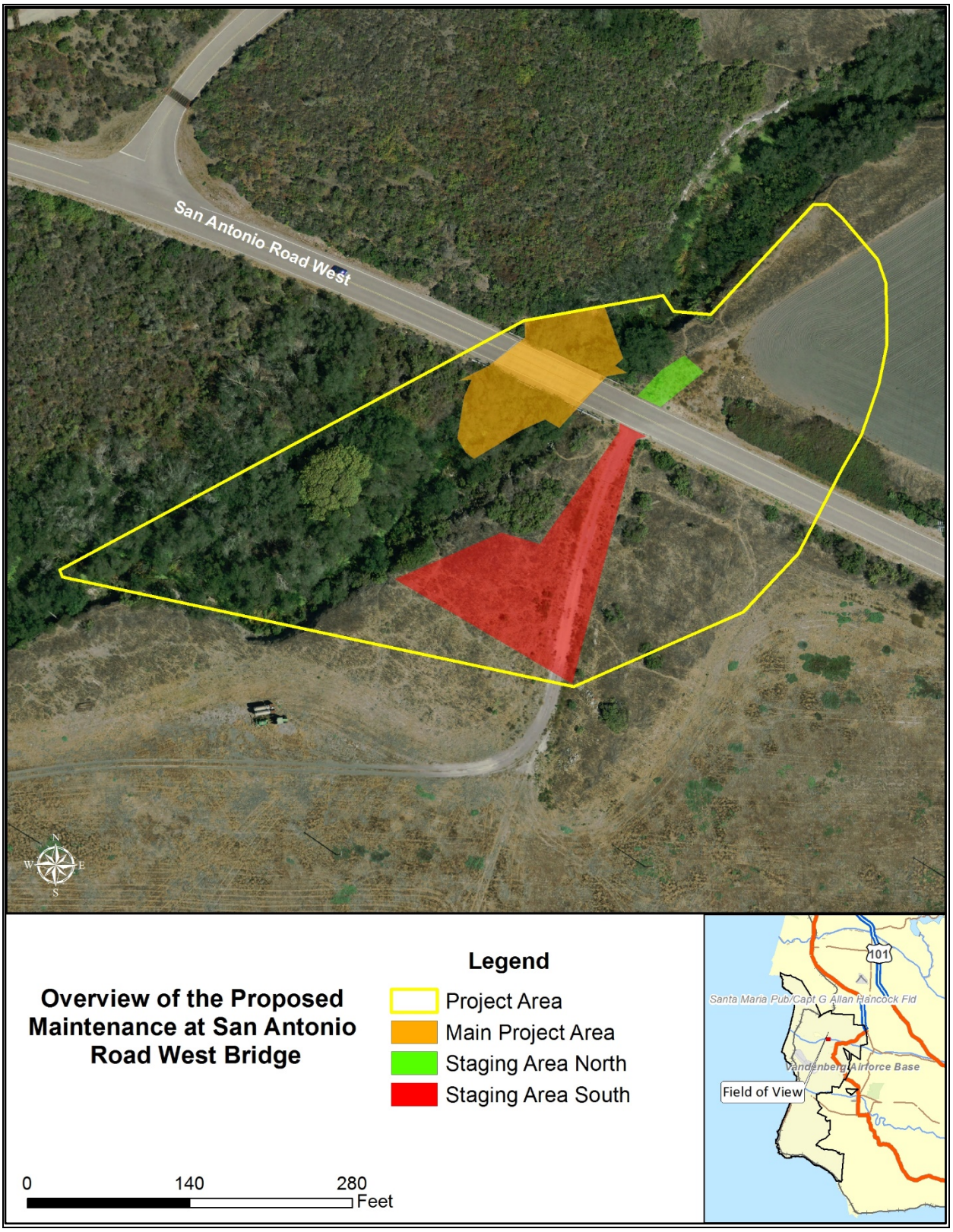

Figure 2-3. Proposed Action Area.

Table 2-1. Area Affected by Proposed Action.

Proposed Action Areas	Acres	Square Feet
Main Construction Area (gabions, vegetation, and a portion of San Antonio Creek)	0.30	13,068
Staging Area – North	0.12	5,227
Staging Area – South	0.40	17,424
Agricultural Depression	0.30	13,068
Riparian Mitigation Area	0.48	20,908
Total of Project Components Above	**1.60**	**69,695**
Total Project Area	**3.42**	**148,975**

Specific aspects of the Proposed Action are as follows:

- **San Antonio Creek Diversion.** Prior to commencing bridge maintenance activities, the project site would be dewatered by installing temporary up and downstream dams within the Main Project Area. Any remaining water would be pumped out of the channel to the adjacent agricultural field in a manner that would not cause erosion or surface backflow into the river. Integrated into the process of dewatering would be the diversion of the active creek channel through culverts that pass through the project site. This would serve to keep soil and debris out of the creek, protect sensitive species and other natural resources, and prevent flowing water from flooding the active project area. The upstream and downstream dams would be constructed in a manner that will allow for two culverts to be installed and activated at separate times during the project period. The first culvert would be installed in the eastern bay of the bridge (hereafter referred to as Bay 2), allowing for work to be conducted on the western bay (hereafter referred to as Bay 1), in an effort to reduce movement and space restrictions of the work crew. At the completion of maintenance activities in Bay 1, the creek would be diverted through a second culvert installed through Bay 1, while the first culvert would be removed to allow work to occur in Bay 2. The exact logistics of damming the creek and installing and removing the culvert(s) and diversion pipes, would be determined by the contractor in consultation with a biological monitor approved by the USFWS, and be approved by 30 CES/CEIE.
- **Repair/Replacement of Gabion Mattresses and Baskets.** The USAF would inspect and replace or repair gabions at the San Antonio Road West Bridge and its hydrologic floodplain. Not all gabions were visible in the 2012 inspection due to sediment build-up (Penfield & Smith 2012).
    - **Sediment Removal.** The USAF would remove sediment from an approximate 0.1 ac. (0.04 ha) area under the bridge deck to facilitate the inspection or replacement and repair of gabions. The gabions were originally installed 3 ft. (0.9 m) below ground surface, but the depth of the gabions is not presently known and likely varies throughout the Main Project Area since some gabions are presently visible.

- **Replacement.** After sediment removal, the USAF would inspect and replace any failed or excessively worn wire fabric. The new wire fabric would be of the same or better quality as the original and be galvanized to slow soil-water-metal interaction that wears the wire fabric.
- **Repair.** Repair would consist of adding additional rock-fill and securely attaching wire fabric over the damaged sections. Fastening methods would follow California Department of Transportation (Caltrans) Standard Plans D100A and D100B.

- **Vegetation Removal.** Vegetation could undermine the erosion control structures by growing into the gabions and breaking them open. Woody vegetation in the channel bottom immediately upstream and downstream of the bridge resulted in sediment buildup and loss of channel capacity in the northerly bay causing diversion of flow to the southerly bay which has exposed and abraded the wire of the gabion mattresses causing them to fail. (Penfield & Smith 2012). Vegetation can also place stress on the bridge structure from the resulting ponding/pooling water (Bengal Engineering, Inc. 2011). Therefore, the USAF would perform mechanical/manual removal of vegetation, as listed below.
  - Manual or mechanical removal of riparian vegetation would occur within an approximate 0.3 ac. (0.12 ha) area under the bridge, extending outward approximately 60–80 ft. (18–24 m) to the northeast and southwest of the creek, respectively, and up to 16–18 ft. (4.9–5.5 m) in width (Figure 2-4). The pink area in Figure 2-4 is the previously cleared area during gabion installation.
  - All woody vegetative material with stems greater than or equal to 2 inches (in.) (5.1 centimeters [cm]) in diameter will be trimmed to within 3 in. (7.6 cm) of the ground or water surface. Vegetation less than 2 in. (7.6 cm) in diameter will remain.
  - Vegetation removal would not require the diversion of San Antonio Creek. The USAF would carry out this work in and around San Antonio Creek and personnel may need to enter San Antonio Creek. Within the dewatering area all vegetation would be removed in order to accomplish wildlife and special status species exclusion.

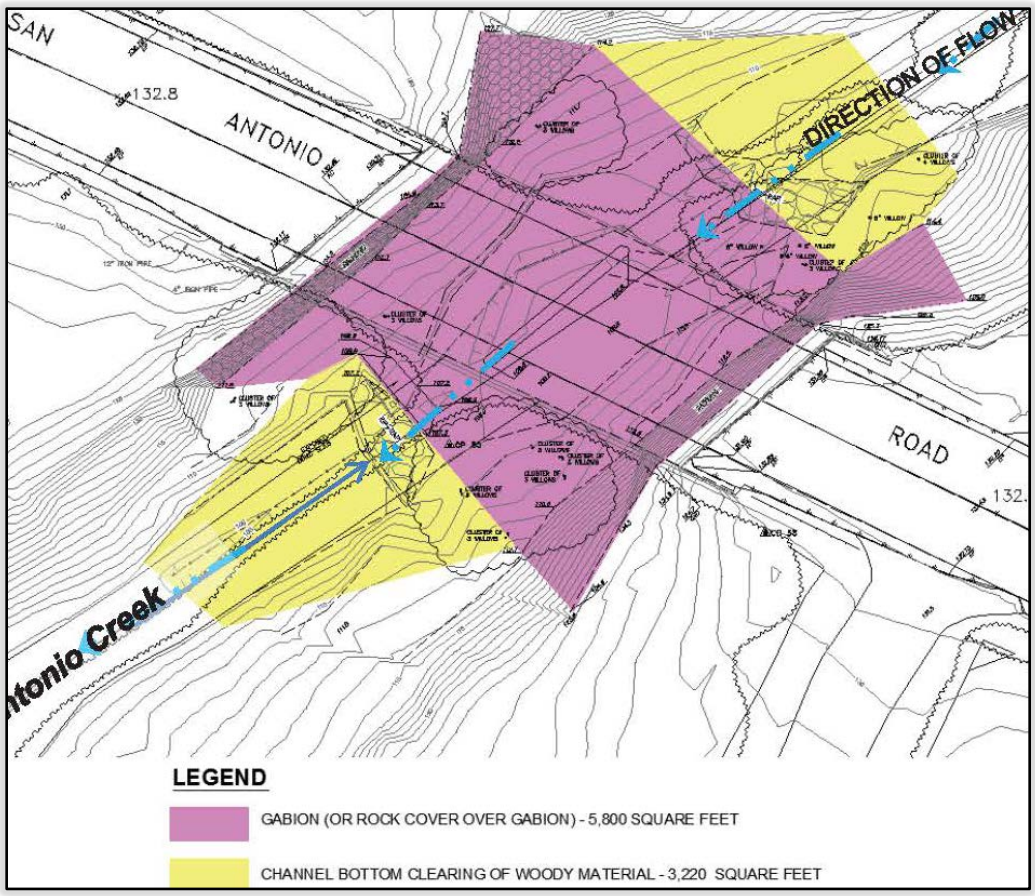

Figure 2-4. Areas of Vegetation Removal.

- **Maintenance requirements.** After the completion of the Proposed Action, the USAF would conduct annual inspections to maintain the erosion protection system in good condition. Additional vegetation clearing may be required on an annual basis, depending on the rate of regrowth. All woody vegetative material with stems greater than or equal to 2 in. (5.1 cm) in diameter will be trimmed to within 3 in. (7.6 cm) of the ground or water surface. Vegetation less than 2 in. (5.1 cm) in diameter will remain.

- **Staging Areas.** Two staging areas would be required to implement the Proposed Action and are located on opposite sides of San Antonio Road West (see Figure 2-3 and Table 2-1). The southern staging area is approximately 0.38 ac. (0.15 ha) and the northern area is approximately 0.03 ac. (0.01 ha.). These areas would be cleared and grubbed of vegetation prior to implementing the Proposed Action. The majority of the vegetation to be cleared in the staging areas consists of non-native invasive species including black mustard (*Brassica nigra*) and sweet fennel (*Foeniculum vulgare*).

- **Site Restoration.** Restoration of the area impacted during the repairs and maintenance to the bridge would begin during the final stages of maintenance activities as machinery and materials are removed. All surplus and waste materials would be removed from the Proposed Action Area, unless they are also required for the restoration of the Proposed Action Area. To the extent practicable, the site contours, river channel, and habitat types

would be restored to pre-maintenance conditions, except directly under the bridge where maintenance activities occurred. Native herbaceous vegetation would be replanted to restore all temporarily disturbed areas, except under the bridge and where it is expected to re-sprout. Permanent and temporary impacts to vegetation would be offset by performing mitigation through further habitat restoration, as described in Section 2.1.1. Riparian Mitigation. All exposed soil areas at the upland staging and access areas would be stabilized with native vegetation. An upland native grass seed mix that is approved by the base botanist would be applied to upland areas. Weed-free mulch would be used to protect the seed and provide temporary stabilization. Once the native grassland is established, native shrub container plantings would be installed in the upland areas. Irrigation may be used in upland areas as needed to help establish native vegetation. Irrigation water would either come from a municipal source or water pumped from the creek. Water pumped from San Antonio Creek would be pumped into containers for hand-watering or into a drip irrigation system. The irrigation pump intake would be placed in a 30-gallon barrel with fine mesh (1/16th in.) screened holes by a qualified biologist to protect listed species from entering the pump intake.

- **Schedule.** The USAF anticipates that the Proposed Action would occur outside of the rainy season (approximately 1 October to 15 April), would take approximately 90 days, be limited to daytime hours, and commence upon completion of the NEPA process.

2.1.2 Riparian Mitigation

2.1.2.1 Summary

The USACE and the RWQCB strive to maintain a "no net loss" of value and physical size of wetlands and other water bodies. The requirements of the Clean Water Act Section 401 and 404 permits that will be issued for the Proposed Action would include mitigation measures for temporary and permanent impacts to waters of the United States and waters of the State. Because vegetation removal under the bridge will be an ongoing maintenance activity, losses of willow riparian vegetation are considered to be a permanent impact to state aquatic resources according to the RWQCB. Permanent impacts to willow riparian would be mitigated at a 3:1 (area mitigated: area impacted). A full description is including in the *Mitigation and Monitoring Plan for the San Antonio Road West Bridge Maintenance at Vandenberg Air Force Base, CA* (MSRS 2018; Appendix F).

There were no feasible riparian mitigation opportunities identified adjacent to the San Antonio Road West Bridge maintenance area. Adjacent sites would require wetland creation on upland benches of the river, approximately 20 ft. (6.1 m) above the water table. This would require excavating significant volumes of soil to reach the water table and potentially create additional erosion problems; therefore, this alternative was eliminated in favor of a nearby mitigation site.

The riparian mitigation area that was identified is 0.48 ac. (0.19 ha) and runs parallel to a riparian zone and is adjacent to a fallow farm field approximately 0.75 mi. (1.21 km) downstream of the bridge (Figures 2-5 and 2-6). Willow planting in this area would establish willow riparian habitat on an existing fallow farm field. The Proposed Action would impact 0.16 ac. (0.10 ha) of central

coast arroyo willow riparian forest and scrub. Permanent impacts to willow riparian habitat would be mitigated at a 3:1 ratio (area mitigated: area impacted). In total, 0.48 ac (0.19 ha) of willow riparian habitat would be restored at the riparian mitigation area.

Mitigation activities would include two main objectives: site preparation and willow pole planting with an overall timeline of approximately three years. Up to an additional five years of monitoring will occur depending on achievement of success criteria. Site preparation will require broadleaf specific herbicide treatment for two consecutive years through the winter into the early spring, harrowing and seed application during the first years' winter, with a follow-up seed application during the winter of the second year, and spot herbicide treatments of non-native grasses as needed. Willow pole planting and container planting of riparian plants such as elderberry (*Sambucus nigra*) and giant rye (*Elymus condensatus*) will occur during the winter of the third year. To reduce competition for newly planted willows and container plantings, spot treatments of whitetop (*Lepidium draba*) will be performed as needed.

Monitoring of the site would be conducted for a minimum of five years to assess the effectiveness of the planting efforts and help provide guidance for follow-up maintenance, based on performance criteria that will be described in the Mitigation and Monitoring Plan (MSRS 2017; Appendix F).

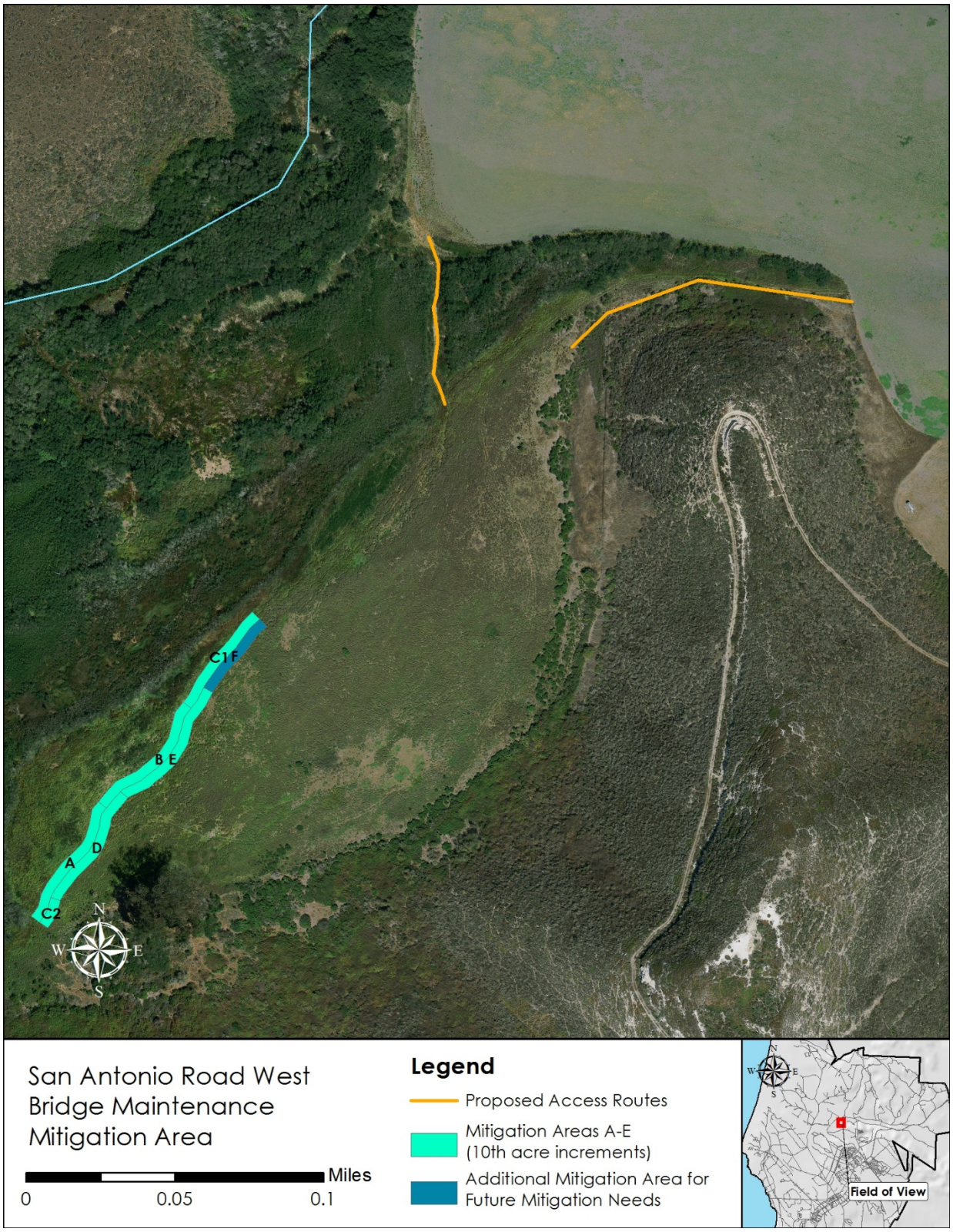

Figure 2-5. Riparian Mitigation Area.

Figure 2-6. Aerial view of riparian mitigation area at fallow farm field.

2.1.2.2 Site Preparation

Before willows could be installed in the riparian mitigation area, significant preparation must be accomplished. In the fall of the first year, a broadleaf selective herbicide, chlorsulfuron (tradename Telar®XP), would be applied to whitetop, an invasive plant species that currently dominates the site. Following herbicide application, in the winter of the first year the site would be dragged with a rigid toothed harrow pulled behind a six-wheel drive utility terrain vehicle (such as a Polaris Ranger) and then seeded with a native mixture of foothill needle grass (*Stipa lepida*), purple needle grass (*Stipa pulchra*), California brome (*Bromus carinatus*), meadow barley (*Hordeum brachyantherum*), and small fescue (*Festuca microstachys*). This mix would help to

reduce the re-infestation of whitetop without compromising the establishment of the willow pole plantings that would be installed in year three of the mitigation. An additional four applications of Telar®XP would be applied after seeding occurs, starting in the winter through mid-summer. During this time, there may be spot treatments of non-native grasses required using an aquatic glyphosate formulation (i.e. Rodeo) with crop oil-based surfactants (e.g. Agri-Dex) and applied with ultra-low volume herbicide applicators. This would ensure that only the target species receive herbicide treatment while minimizing damages to native grasses. This treatment cycle would occur again in the second year; however, the site would not be harrowed during the second winter.

2.1.2.3 Riparian Mitigation Area Revegetation

Willows would be planted in five tracts that are approximately 18 ft. (5.4 m) wide by 242 ft. (74 m) long (Figure 2-5). Willow spacing will be approximately 3 ft. (0.9 m). Willow planting would occur during the winter of year three and would be planted to the depth of the capillary fringe where restored soil moisture is maintained by a wicking effect from the nearby water table or other ground water. Willow cuttings would be prioritized in areas where natural willow recruitment is not already occurring and in areas with suitable soil. Cuttings would be harvested in the vicinity of San Antonio Creek from areas within the San Antonio Creek riparian corridor as approved by a 30 CES/CEIEA biologist. Willow cuttings would be collected and planted in January or early February, when the willows are dormant and at a time that would take advantage of winter rains. No more than 25 percent of a single tree's biomass would be harvested.

Willows would be installed by one or more of the following methods:

- **Water jet installation:** If site conditions are dry and allow for equipment, a truck and trailer or water pump hose would be used to liquefy the soil to create a hole. Willow cuttings would be installed to a depth of the soil's capillary fringe. Using this method, willow cuttings will be installed at a depth of 3-4 ft. (0.9-1.2 m).
- **Hand-held power auger:** An auger would be used to drill a hole that is 4-6 in. (10.2-15.2 cm) in diameter and 2.5-4.5 ft. (0.8-1.4 m) deep. One to three willow cuttings would be set in each hole. The exposed hole would then be filled with a slurry of muddy soil to ensure good soil contact with the planting.
- **Manual:** Where the water table is relatively close to the surface, a hole would be manually driven with a steel rod (0.75 in. [1.9 cm] diameter) to approximately 3-4 ft. (0.9-1.2 m) in depth. A willow cutting would then be installed in the hole and the soil would be compacted around the willow stem.

The water used during the pole planting installation would be supplied from a water tank on a nearby vehicle or pumped from an open section of the creek. Any pumping from the creek would occur with an onsite USFWS approved biological monitor present to ensure that tidewater goby (*Eucyclogobius newberryi*; TWG), unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*; UTS) and California red-legged frog (CRLF; *Rana draytonii*) are not impacted. A wire screen with no larger than 0.125 in (0.318 cm) mesh would be placed around the pump inlet to prevent the entrapment of any organisms. Subsequent irrigation for maintenance purposes

would follow the above procedures and would continue on an as needed basis to promote development of the root systems.

Container plant installation would take place during winter of year three. Container plant species would include elderberry and giant rye. The giant rye would be planted 3 ft. (0.9 m) on center throughout the 0.5 ac. (0.2 ha) site, with elderberry interspersed every tenth plant. To achieve this density, 2,762 giant rye and 306 elderberry plants would be required. These species would help to create a riparian understory for the willows and prevent invasive species from establishing in the area. Seeds would be collected on VAFB. Holes will be dug manually with a hand trowel and approximately 6-12 in. (15.2-30.5 cm) in depth and backfilled with native soil.

Herbivory and browsing of container plant roots and foliage may occur if not properly protected. Therefore, all container plants would be installed with a wire mesh cage placed around the root ball and a fence wire fabricated cage to protect the body of the plant. Irrigation of the container plants would occur as needed if precipitation is insufficient to promote establishment. Herbicide applications targeting whitetop, mustard, and other non-native weeds would occur as necessary.

2.1.3 Project Equipment Needs

The exact type of equipment that would be used during construction may vary slightly from the projections below, depending on contractor capabilities. However, these estimates provide a basis for analyzing related issue areas such as air quality, noise, and traffic. The Proposed Action would require the use of a skid steer loader at the project site (110 hours maximum use), an excavator and soil compactor, crane, dump truck, water truck, soil container/bin, and shovels (Table 2-2). The USAF would use a crane, located in one of the staging areas, to place the skid steer loader and container/bin under the bridge deck, within the San Antonio Creek hydrologic floodplain. The skid steer loader would loosen and load sediment from large patches of sediment under the bridge deck and place it into the container. In addition, personnel with shovels would loosen and remove sediment from smaller patches. The crane would then raise the container, as filled, and transfer the sediment to a dump truck waiting in the staging area. This process will continue until the all the sediment covering the gabions is removed and all gabions are exposed.

Table 2-2. Estimated Equipment Usage under the Proposed Action.

Expected Equipment	Estimated Duration*
2-CAT 257B or similar (61 hp)	110 hours
1-CAT 307C or similar (55 hp)	50 hours
1-40-ton crane (300 hp)	80 hours
1-dump truck (300 hp)	32 Trips
1-water truck (300 hp)	16 hours

* Estimated usage is based on five working days per week at eight hours per day.
Note: hp = horsepower

2.1.4 Environmental Protection Measures

Implementation of the environmental protection measures (EPM), outlined below, should avoid or minimize potential adverse effects to various environmental resources during implementation

of the Proposed Action. Mandatory EPMs (denoted by "shall" or "would") are part of the project design and will be implemented as part of the Proposed Action so as to avoid, minimize, reduce or compensate for the anticipated environmental impacts. Discretionary measures (denoted by "may" or "could") may or may not be implemented to further reduce environmental impacts.

2.1.4.1 Air Quality

The Santa Barbara County Air Pollution Control District (SBCAPCD) applies the following dust control measures to decrease fugitive dust emissions from ground disturbing activities:

- Water (preferably reclaimed) shall be applied at least twice daily to dirt roads, graded areas, and dirt stockpiles to prevent excessive dust at the staging areas. Watering frequency would be increased whenever wind speed exceeds 15 mi. per hour.
- After completion of construction activities, disturbed soil shall be treated by watering, revegetating, or spreading soil binders to prevent wind erosion of the soil.
- All fine material transported off-site shall be either sufficiently watered or securely covered to prevent excessive dust.
- All haul trucks would be required to exit the site via an access point where a gravel pad or grizzly has been installed.
- Stockpiles of soil or other fine loose material shall be stabilized by watering or other appropriate method to prevent wind-blown fugitive dust.
- On-site vehicle speeds shall be limited to 15 mi. per hour.
- Ground disturbance shall be limited to the smallest practical area and to the least amount of time.
- Designated personnel shall monitor project activities to ensure that excessive dust is not generated at demolition sites.
- The Proposed Action shall comply with storm water management plans, including Best Management Practices (BMPs) to reduce dust emissions.
- Any portable equipment powered by an internal combustion engine with a rated horsepower of 50 brake horsepower or greater used for this project shall be registered in the California State-wide Portable Equipment Registration Program or have a valid Santa Barbara County Air Pollution Control District (SBCAPCD) Permit to Operate. Examples of such equipment are portable generators, compressors and light-carts. Copies of each registration or permit along with fuel usage and hours of operation must be submitted to the 30th Space Wing, Installation Management Flight, Environmental Compliance (30 CES/CEIEC) Air Quality section at the end of the project or by 15 January, whichever occurs first.
- Maintenance activities shall comply with SBCAPCD Rule 345, Control of Fugitive Dust from Construction and Demolition Activities. Under Rule 345, construction, demolition, or earthmoving activities are prohibited from causing discharge of visible dust outside the property line and must utilize standard BMPs to minimize dust from truck hauling, track-out/carry-out from active construction sites, and demolition activities.

- Off-road construction equipment shall be compliant with all federal, State and local regulations. A description of each piece of equipment to include make, model, serial number and rated brake-horsepower, along with fuel usage and hours of operation must be provided to the 30 CES/CEIEC Air Quality section at the end of the project or by 15 January, whichever occurs first.

The following control measures will be implemented to decrease diesel emissions, as applicable:

- When feasible, the contractor may use equipment powered with federally mandated "clean" diesel engines.
- The size of the engine in equipment and number of pieces of equipment operating simultaneously for the project should be minimized.
- Engines should be maintained in tune per manufacturer or operator's specification.
- Ultra-low sulfur diesel fuel (15 parts per million by volume [ppmv]) will be used for all diesel equipment.
- Environmental Protection Agency (EPA) or California Air Resources Board (CARB) certified diesel catalytic converters, diesel oxidation catalysts, and diesel particulate filters will be installed on all diesel equipment.
- CARB idling regulations will be followed for diesel trucks during loading and unloading when applicable.
- When practicable, diesel equipment should be replaced with electrical equipment.
- The construction period should be lengthened during smog season (May through October), to minimize the number of vehicles and equipment operating at the same time.
- Alternative-fueled construction equipment, such as compressed natural gas, liquefied natural gas, or electric, should be used if feasible.

2.1.4.2 Biological Resources

The BO received from the USFWS is attached as Appendix D. Although the proposed measures are listed below, the final regulatory documents are the binding documents and they may have more specific requirements as they represent the end of the consultation process.

2.1.4.2.1 General Protection and Monitoring Measures

The following protection and monitoring measures would apply to all aspects of the Proposed Action to protect and minimize effects on biological resources.

- Qualified biological monitors, approved by USFWS and 30th Space Wing, Installation Management Flight, Environmental Conservation (30 CES/CEIEA), including personnel who are familiar with and possess necessary permits to capture, handle, and release UTS, TWG, and CRLF, , shall be present at all times during construction and monitor activities throughout the length of the project to minimize impacts to all special-status plant and wildlife species, jurisdictional wetland resources, and other native plant communities found in the Proposed Action Area. The biological monitors shall be responsible for delineating areas where special-status species are located or concentrated, relocating

special-status species in jeopardy of being killed or injured by construction and dewatering activities, and inspecting equipment and equipment staging areas for gas and oil leaks. Prior to the onset of maintenance activities, the name(s) and credentials of the biologist(s) who would conduct the monitoring, surveying, species relocation, and other biological field activities shall be submitted to the USFWS for their approval.

- A USFWS-approved biologist will be present during annual maintenance activities, which may require entry into San Antonio Creek since it will not be diverted subsequent to this Proposed Action.
- Qualified biologists shall brief all project personnel prior to participating in project implementation activities. At a minimum, the training would include a description of the listed species and sensitive biological resources occurring in the area, the general and specific measures and restrictions to protect these resources during project implementation, the provisions of the ESA and the necessity of adhering to the provisions of the ESA, and the penalties associated with violations of the ESA.
- Disturbances in the creek shall be kept to the minimum extent necessary to accomplish project objectives and limited to placement of the temporary access routes and diversion dams and culverts, and excavation of the bridge gabions.
- All excess materials excavated shall be removed from the creek and transported to a designated waste or fill site.
- All erosion control materials used (i.e. gravel, sand, fill material, wattles etc.) would be from weed-free sources. Only 100% biodegradable erosion control materials (e.g., erosion blankets, wattles, etc.) would be left in place following project completion.
- Portable toilets would only be placed over paved surfaces or within staging areas; portable toilets will not be placed within the creek or riparian corridor.
- All human generated trash at the project site shall be disposed of in proper containers and removed from the work site and disposed of properly at the end of each workday. All construction debris and trash shall be removed from the work area upon completion of the project.
- Equipment and vehicles shall be cleaned of weed seeds prior to use in the Action Area to prevent the introduction of weeds. Prior to transport, any skid plates shall be removed and cleaned. If equipment vehicles move from one watershed to another on base, wheels, undercarriages, and bumpers will be cleaned prior to traveling. If no nearby wash facility or means to collect on site and dispose of rinse water to a sewer is available, air blast equipment and vehicles on site.
- The USAF would ensure equipment operating within the hydrologic floodplain/riparian area is placed on protective mats to prevent contamination of the creek bed. USAF would require vehicles to be maintained and stored outside of the hydrologic floodplain, in the staging areas, to avoid the potential for inadvertent spills into the creek and riparian areas. Fueling of equipment will be conducted in pre-designated location within the South Staging Area at least 100 ft. (30.5 m) from the top of the bank, outside of the live stream, and spill containment materials will be placed around the equipment before refueling. Stationary equipment (e.g., cranes) will be outfitted with drip pans and

hydrocarbon absorbent pads. If it is necessary to refuel or repair equipment within the riparian corridor, a USFWS-qualified biologist will be present to monitor activities.

- A qualified biologist shall inspect any equipment left overnight prior to the start of work. Equipment would be checked for presence of special status species in the vicinity and for fluid leaks. All materials and equipment would be removed from the San Antonio Creek channel at the end of each day to the greatest extent feasible. If materials are to be staged within the bounds of the creek channel overnight, they would be ringed with exclusionary fencing.
- The USAF would continue to remove non-native invasive predators encountered during survey efforts (i.e., bullfrogs).
- Instream construction activities, would be completed or paused and all construction equipment and materials in the hydrologic floodplain of San Antonio Creek would be removed prior to the onset of significant rainfall (0.5 in. within a 24-hour period).

2.1.4.2.2 Vegetation Resources

- To the greatest extent possible, removal of native vegetation and plant communities, particularly riparian woodland and wetland vegetation, would be minimized.
- When and where practicable, non-native vegetation within the Proposed Action Area may be removed during project related activities under the direction of the biological monitor.
- Prior to removing riparian vegetation, the USAF contractor will pre-tag vegetation that is more than 2 in. so that the USAF botanist and biologists can ensure effects within the scope of this EA. Plants less than 2 in. in diameter will not be removed since they do not present a risk of harm to the bridge. In addition, prior to vegetation removal, a biologist capable of identifying ESA-listed plants will confirm lack of presence.

2.1.4.2.3 Fish and Wildlife Resources

- To avoid transferring disease or pathogens between aquatic habitats during the course of surveys and handling of amphibians, the biologist(s) shall follow decontamination procedures described in the Declining Amphibian Population Task Force's Code of Practice (USFWS 2002).
- Wildlife and special status species, including UTS, TWG, and CRLF, shall be removed from an exclusion area within the San Antonio Road West Bridge Project Site and relocated to the nearest suitable habitat by utilizing the following procedures and timeline. These activities would be accomplished prior to the start of construction and only under the direct supervision of a qualified biologist.
    a. An **exclusion area** would be identified where all terrestrial and aquatic areas that will be directly impacted by construction related activities (i.e., areas requiring the removal of vegetation, placement of fill, and removal/exclusion of sensitive species). This exclusion area would encompass, at a minimum, the span of creek to be diverted through culvert pipes and any areas to be cleared or temporarily filled.

b. Within the exclusion area, all aquatic vegetation within and along the river would be removed by hand or with hand tools under supervision of a qualified biologist.

c. All low growing terrestrial vines, shrubs and herbaceous plants, within the exclusion area would be cut at the ground level and removed with hand tools under supervision of biological monitor; all cleared vegetation would be transported off-site daily or stocked piled in an area inaccessible to terrestrial wildlife.

d. The exclusion area would be encircled with minimum 3 ft. (0.9 m) high silt fencing, anchored with metal T-posts, and buried along the bottom edge to the best extent possible to prevent terrestrial wildlife, including CRLF, from entering the site.

e. **Creek Diversion**. The creek will be diverted through culverts that will span the length of the Proposed Action Area. At the site of the upstream river diversion point, a dam would be constructed by hand. Prior to dam construction, blocknets with mesh not wider than 1/16th of an inch would be placed up and down stream of the location of the dam and all animals would be removed via seine and dip-netting by qualified biologists.

f. Following removal of animals, the base of the dam would be installed, upon which concrete collared culvert(s) would be lowered into place (Figure 2-9). At this time, only one water diversion pipe would be fully installed in Bay 1 through the Proposed Action Area, with the second being blocked off until later use mid-way through project completion. Additional sandbags would be cross stacked, sealing the culvert opening(s) into place, if two culverts are installed. The sand bags must be filled with coarse grained sand, as gravel will not effectively block flow. Previous attempts on VAFB projects to employ a combination of gravel bags and plastic wrap to block flow have been ineffective due to continual scouring.

Figure 2-7. Installation of Concreted Collared Culvert.

g. If the site is accessible from the bridge and a crane is available, the concrete collared culvert would be lowered into place by the crane. If this is not feasible, on the day prior to the anticipated installation of the dam, the concrete collared culvert would be constructed on-site and manually carried into place. If necessary, this procedure would be adapted to accommodate multiple collared culvert pipes. For on-site fabrication, quick-set concrete would be poured into a wood form constructed in-situ around the culvert on the bank adjacent to the installation location (note: the concrete collar is essential for preventing issues caused by water scouring around the pipe and infiltrating the dam and Proposed Action Area).

h. Following the placement of the concrete collared culvert, cross stacked sand bags would be built up around the culvert, sealing it in place such that all flow is directed through the culvert.

i. Once flow has been successfully diverted through the culvert in the upstream dam, the blocknets upstream and downstream of the upstream dam would be removed.

j. Additional culvert sections would then be installed through the project site to the approximate location of the downstream dam location, with a collared culvert at the end.

k. Concurrent with culvert installation, blocknets with mesh not wider than 1/16th of an inch would be set up immediately up and downstream of the downstream dam location and animals would be removed and relocated by qualified biologists. Once the animals have been removed, the base of a sandbag dam would be constructed in the same manner used to construct the upstream dam. After the downstream dam base has been completed, blocknets would be removed.

l. The downstream culvert would be connected to the existing culvert pipes and locked into place by building up cross stacked sand bags. At this point, all creek flow would be occurring through the pipe and the exclusion area would be completely cut off from the active river channel. A velocity dissipater or other form of erosion control would be installed at the outflow of the culvert to avoid significant scour.

m. If dewatering is necessary, pumps with screened intakes would be positioned at the lowest points along the creek bottom between the up and downstream dams (within the exclusion area) after creek flow has been successfully diverted. Dewatering of the exclusion area would commence immediately following completion of the downstream dam. Effluent water would be discharged to grade in the agricultural field within the Proposed Action Area northeast of San Antonio Creek Bridge. If necessary, an earthen barrier or silt fence would be installed at the discharge point to allow percolation and prevent surface backflow into the river. The rate of dewatering would be monitored by the biologist so that it does not result in anoxic conditions or cause stranding of animals.

n. Removal and relocation of any animals remaining within the exclusion area would be conducted once the water level drops to manageable levels by a qualified biologist.

o. Following downstream dam completion and concurrent with the de-fishing activities, silt fencing, anchored by sand bags, would be installed over the upstream and downstream sand bag dams and tied into existing wind fencing on the north and south banks to complete the fence around the exclusion area.

p. Following completion of the installation of exclusion fencing, three nights of CRLF removal surveys of the exclusion area would be conducted by qualified biologists. Any remaining pools would be netted and searched for animals and dewatered. All CRLF captured would be transported to the nearest suitable habitat outside of the exclusion area and released by a qualified biologist.

q. Once maintenance activities are completed on Bay 1 of the bridge, the initial diversion culvert would be blocked off at the upstream dam, a diversion pipe would be installed in Bay 2, and creek flow would be diverted into this culvert, allowing for the completion of maintenance and repair activities in Bay 2.

- The number and disposition of all special status species encountered or relocated would be recorded. Native wildlife species, including special status and listed species, would be removed to the nearest suitable habitat within San Antonio Creek, chosen at the discretion of the biologist. All animals would be held in 5-gallon buckets until release. All animals held would be segregated by size and species such that predation would be unlikely. The holding time would be minimized to the greatest extent feasible and the health of all held animals would be continuously monitored to evaluate the need for additional measures to protect the animals, such as aeration of water in holding buckets.
- Qualified biologist(s) would permanently remove any non-native species, such as bullfrogs, crayfish, and Cyprinidae and Centrarchidae fishes, encountered within the Proposed Action Area to the maximum extent possible.
- Any areas of standing water within the exclusion area would be subject to weekly night surveys by a qualified biologist for the duration of construction in order to detect and remove any special status species, including CRLF, which may have potentially entered the site, or were missed during removal surveys.
- The wind fencing would be inspected twice daily by qualified biologists. Prior to the start of work, fencing would be inspected for any breaches that may have been created overnight and allowed terrestrial wildlife to enter the exclusion area. At the end of the work day, the wind fencing would be inspected again to identify any areas that may need repair prior to nightfall. Compromised fence would be repaired immediately. If breaks are discovered during the morning inspection, a survey would be conducted that night to detect and remove any CRLF that may have entered the site.
- Water quality parameters (e.g., salinity, temperature, dissolved oxygen, turbidity) would be monitored prior to and throughout implementation of the Proposed Action. Sampling would be conducted weekly, starting one week prior to commencement of work within the river channel. Measurements would be recorded 65–164 ft. (20–50 m) upstream of the anticipated exclusion area and 65–164 ft. (20–50 m) downstream of the anticipated exclusion area. Measurements would be taken in a manner that would avoid harassment or mortality to CRLF, TWG, and UTS.
- Restoring flow through the site would be accomplished in the following manner to avoid impacts to sensitive and listed species. All activities below would be supervised by a qualified biologist.
    a. A foam pig, attached to a rope, would be inserted into the upstream end of the pipe. Immediately following pig insertion, a net with mesh no wider than 1/16th of an inch would be secured to the upstream end of the pipe to prevent any further entrance of animals into the pipe.
    b. The pig would be pulled through to the outflow of the pipe, followed immediately by affixing a net with mesh no wider than 1/16th of an inch to the downstream end of the pipe. The pipe would be considered free of animals at this point.
    c. Blocknets would be set up immediately upstream and downstream of the dams and all animals would be removed and relocated from these areas.

d. The downstream sand bag dam would be removed prior to removal of the upstream dam. The dam would be removed such that the pipe would be completely exposed and all accessible sand bags cleared. Removal shall be accomplished in tiers, from top to bottom of the dam. There may be backflow of water into the site at this point, but the blocknets would prevent animals from entering the exclusion area.

e. The upstream dam would then be removed in the same manner as the downstream dam.

f. Pipes, culverts, and any remaining sand bags would be then removed. Upstream and downstream blocknets would be continuously maintained throughout this process until all materials have been removed from the creek.

g. Upstream and downstream blocknets would be removed allowing animals to re-enter the site.

- Instream construction activities would be completed or paused and all temporary fill, water diversion, and materials placed in the creek channel would be removed prior to the onset of significant rainfall (0.5 in. within a 24-hour period).
- A contingency plan would be developed by qualified biologists familiar with the species for the recovery and salvage of special status species, including UTS, TWG, and CRLF, in the event of a local toxic spill or accidental dewatering of their habitat.
- To avoid potential project-related impacts to nesting migratory birds, if vegetation clearing is initiated during avian nesting season (February through August), a qualified biologist would conduct nesting bird surveys within 500 ft. (152 m) of the Proposed Action Area prior to project initiation and vegetation clearing activities. If nesting migratory birds are found within the Proposed Action Area, a buffer of adequate size to prevent disturbance from project-related activities (to be determined by the biological monitor) would be marked with flagging tape to avoid disturbance. The nest would be monitored to determine impacts, if any, from project-related disturbance. If any nests are present underneath the existing bridge, they would be inspected for the presence of unfledged swallows or unattended juvenile bats prior to the start of construction activities. If any are found, they would be monitored and disturbance minimized as much as possible.
- Although the USAF has determined that there will be no effects to ESA-listed riparian birds, the USAF as a general matter requires that any vegetation clearing will occur outside of bird nesting season. Bird nesting season is from 15 February through 15 August. In addition to ensuring compliance with the Migratory Bird Treaty Act, this EPM would ensure any undetected ESA-listed birds are not present during vegetation removal. If work occurs during nesting season, a qualified biologist would conduct bird nest surveys prior to project activities. The contractor would coordinate with 30 CES/CEIEA prior to work.

2.1.4.3 Site Restoration and Weed Control Minimization Measures

- Vegetation removal would be would be minimized to the extent practicable and restricted to the level of the bottom substrate, with root systems of native plants and trees to be

left in place wherever possible to enable vegetation to re-sprout quickly after completion of project activities.

- Site revegetation with native plant species and manual/mechanical weed control activities would be overseen by a qualified biological monitor. Any activity that could potentially impact listed species would be monitored by a qualified biologist.
- When pumping water from San Antonio Creek for irrigation or use of the water stinger, the pump intake would be placed in a 30-gallon barrel with fine mesh (1/16th in.) screened holes to protect listed species from entering the pump intake.
- All herbicides would be applied in accordance with the pesticide label and DoD recommendations. All applications within or adjacent to aquatic resources will use appropriately labeled products only. All pesticides applied would be DoD approved.
- Herbicide mixing would occur in non-sensitive areas in accordance with the VAFB Integrated Pest Management Plan.
- All herbicide application will occur during daylight hours.
- Drift of chemicals will be limited by not spraying when wind speeds exceed 10 miles per hour or as indicated by label instructions.
- Plant propagated for restoration planting would be inspected and ensured to be free of invasive species (e.g. Argentine ants, *Linepithema humile*).
- Glyphosate usage in and adjacent to aquatic features would adhere to the following special precautions:
    a. Glyphosate would be used with the surfactant Agri-Dex.
    b. No herbicide would be used in ephemeral aquatic habitats during the rainy season (15 October – 15 March).
    c. No herbicide would be used within 15 ft (4.6 m) of ephemeral aquatic habitats when surface water or surface saturation of soils is present.
    d. No herbicide would be used in ephemeral aquatic habitats 24 hours before or after a significant precipitation event (0.1 inches [2.5 mm] or more).
- No herbicide would be applied directly to water.

2.1.4.4 Cultural Resources

- In the event that previously undocumented cultural resources are discovered during maintenance activities, work will stop and the procedures established in 36 CFR 800.13 and the VAFB Integrated Cultural Resources Management Plan shall be followed.

2.1.4.5 Earth Resources

- Refer to Section 2.1.2.10, no EPMs specific to the protection of earth resources will be required for the Proposed Action.

2.1.4.6 Hazardous Materials and Waste Management

- Hazardous materials would be procured through or approved for use by VAFB Hazardous Materials Pharmacy (HazMart). Monthly usage of hazardous materials will be reported to HazMart to meet legal reporting requirements.
- Hazardous materials would be properly stored and managed in secured areas located outside the riparian corridor.
- Chemical stockpile spill containment, if necessary, would be accomplished to minimize or preclude hazardous releases.
- Standard procedures would be used to ensure that all equipment is maintained properly and free of leaks during operation, and all necessary repairs are carried out with proper spill containment. All equipment operating within the Proposed Action Area would be inspected regularly for fluid leaks. A Spill Prevention Plan would be approved by 30 CES/CEIEC and implemented.
- The USAF would ensure equipment operating within the hydrologic floodplain/riparian area is placed on protective mats to prevent contamination of the creek bed. USAF would require vehicles to be maintained and stored outside of the hydrologic floodplain, in the staging areas, to avoid the potential for inadvertent spills into the creek and riparian areas.
- Fueling of equipment would be conducted in pre-designated location within the South Staging Area at least 100 ft. (30.5 m) from the top of the bank, outside of the live stream, and spill containment materials would be placed around the equipment before refueling. Stationary equipment (e.g., cranes) would be outfitted with drip pans and hydrocarbon absorbent pads. Additionally, per 40 CFR 112, Spill Prevention, Control, and Countermeasure Plan requires that tanks and containers have secondary containment or tanks double-walled. If it is necessary to repair equipment within the riparian corridor, a USFWS-qualified biologist would be present to monitor activities.
- All hazardous materials would be properly identified and used in accordance with manufacturer specifications to avoid accidental exposure to or release of hazardous materials required to operate and maintain construction equipment.
- Hazardous waste shall be managed in accordance with the Hazardous Waste Management Plan (HWMP), 30 SW Plan 32-7043-A. A Community Awareness Emergency Response form would be completed and submitted to CES/CEIEC within 24 hours of a Haz-Mat spill or release.

2.1.4.7 Coastal Zone Management

- The USAF shall coordinate the Proposed Action with the California Coastal Commission CCC in compliance with the CZMA.

2.1.4.8 Solid Waste

- The excavation waste (i.e., vegetation removed from the Proposed Action Area) would be hauled to a municipal landfill and disposed of as green waste to be composted. Other possible waste such as damaged gabion mesh would be recycled if possible.
- Debris shall be segregated to facilitate subsequent pollution prevention (P2) options. P2 options would be exercised in the following order: reuse of materials, recycling of materials, and then regulatory compliant disposal.
- All solid waste disposal and construction and demolition (C&D) debris recycling tonnages would be tracked and reported to 30 CES/CEIEC on a quarterly basis during the demolition portion of the project.

2.1.4.9 Transportation

- Employees may be encouraged to carpool and eat lunch on-site.
- Truck trips should be scheduled during non-peak traffic hours to the greatest extent practicable.

2.1.4.10 Water Resources

- The site must be secured from potential erosion resulting from rain events. Erosion control measures such as silt fences, temporary grass cover, fiber rolls, erosion control mats, and other BMPs would be installed or implemented as appropriate. Only 100-percent biodegradable erosion control materials would be left in place following project completion.
- Site restoration shall meet the 401 Certification mitigation requirements
- BMPs to prevent discharge of waste (construction materials, contaminants, washings, fuels, and oils) shall include the following measures:
    a. Ensure all equipment is properly maintained and free of leaks during operation, and all necessary repairs carried out with proper spill containment.
    b. Place stationary equipment operating within the hydrologic floodplain/riparian area on protective mats to prevent contamination of the creek bed. Maintain vehicles outside of the hydrologic floodplain, in the staging areas, to avoid the potential for inadvertent spills into the creek and riparian areas.
    c. Fueling of equipment would be conducted in pre-designated location within the South Staging Area at least 100 ft. (30.5 m) from the top of the bank, outside of the live stream, and spill containment materials would be placed around the equipment before refueling. Stationary equipment (e.g., cranes) would be outfitted with drip pans and hydrocarbon absorbent pads. If it is necessary to refuel or repair equipment within the riparian corridor, a USFWS-qualified biologist would be present to monitor activities.
    d. Adequate spill response supplies shall be maintained at the construction staging area for immediate response and clean-up of any fuel spills.

e. Hazardous materials shall be stored in proper containers to include secondary containment, within the staging areas outside the riverbed.

f. Vehicle and equipment washing shall be prohibited except within staging areas. High pressure washing of undercarriages and wheel wells shall be prohibited at the project site.

g. Cover waste disposal containers at the end of every business day and during a rain event. Pick up any trash that escapes from containers at the end of each day.

h. Contain and protect loose construction materials and stockpiled waste material from wind and rain at all times unless actively being used.

i. Portable toilets shall have secondary containment and be secured to the ground to prevent falling.

- The diversion of the active channel is described in Section 2.1.2.2.3 (Fish and Wildlife Resources). Any dewatering required between the dams would be discharged to grade in the agricultural field in a manner that would not cause erosion or surface backflow into the river.

2.1.4.11 Human Health and Safety

- The construction contractor would comply with Occupational Safety and Health Administration (OSHA), Air Force Occupational Safety and Health (AFOSH) regulations, and other recognized standards and applicable Air Force regulations or instructions.
- Restricted public access to the proposed construction site would be provided through use of signs and fencing if feasible.
- The contractor must also provide for the health and safety of workers and all subcontractors who may be exposed to their operations or services. The contractor must submit a health and safety plan to the base and appoint a formally trained individual to act as safety officer. The appointed individual would be the point of contact on all problems involving job site safety.
- During performance of work, the contractor must comply with all provisions and procedures prescribed for the control and safety of personnel and visitors to the job site.

2.2 Alternative B: No-Action Alternative

Under the No Action Alternative repairs and maintenance to the erosion protection system at the San Antonio Road West Bridge would not be conducted. Implementing the No Action Alternative has the potential to result in a detrimental impact to the VAFB mission if the bridge were to collapse or become undermined in the future. In addition, bridge collapse, damage, or emergency repairs would have the potential for significant impacts to special status species and Waters of the United States, including Jurisdictional Wetlands. VAFB would continue maintenance and emergency repairs to the structure, as necessary. Future emergency repairs to the bridge may require reinforcing the existing gabions and abutments with additional rip rap.

2.3 Other Alternatives Considered and Eliminated from Further Analysis

2.3.1 Replacement of Existing Gabions with Rip Rap

The complete removal of the existing gabions and the placement of rip rap to protect the bridge structure would sufficiently prevent scour. Additionally, the useful life of rip rap far exceeds the manufacturer listed life expectancy of gabions at 60 years. However, it was eliminated from further analysis as there would be an increased disturbance in the creek during the project and would not eliminate the establishment of willows that causes the displacement of rip rap. In addition, since willows grow at an increased rate in this location due to the soils, slope, water flow rate and velocity, the willows would impede the hydraulic capacity of the creek around the bridge and water would eventually make its way around the bridge causing the potential for bridge failure. Therefore, this alternative was eliminated from further consideration.

2.3.2 Slurry over Existing Gabions

This alternative would provide concrete slurry over the existing gabions eliminating willow growth under the bridge structure; however, the slurry would increase the velocity of the water in the creek, causing erosion and scour downstream of the bridge, potentially decreasing surface water quality and threatened and endangered species habitat. As a result, this alternative was eliminated for further review.

2.3.3 New Bridge with Deeper Foundations

Under this alternative, the USAF would build a bridge spanning 100 ft. (30 m) with deeper foundations using drilled concrete piers. This would eliminate scour under the bridge and would be slightly longer than the existing bridge. However, there would be an increased disturbance in the creek during the project and this alternative would not address the issue of willow growth under the structure thus the hydraulic capacity of the water in the creek could eventually compromise the structural integrity of the bridge. Therefore, this alternative was eliminated from further consideration.

2.3.4 New Bridge Spanning Entire Wetland Area

Under this alternative, the USAF would build a bridge with deeper foundations using drilled concrete piers and span the entire width of the creek. This would prevent long term hydraulic problems associated with willow growth impeding creek flow. Additionally, it would avoid the need to remove vegetation from the creek on a long-term basis. However, this alternative would cause increased disturbance in the creek and impacts to natural resources. As a result, this alternative was eliminated from further consideration.

2.3.5 Replacement of Gabions with Articulating Concrete Blocks

Under this alternative, the USAF would remove the gabions and install a system of articulating concrete blocks with a liner, where interconnecting concrete blocks along with the vegetation prevent erosion and scour. However, the initial project would cause additional disturbance in the creek and would not address the growth of willows causing displacement of the blocks. In

addition, the growth of willows would affect the hydraulic capacity of the creek causing the water to flow around the bridge causing the bridge to wash away. Therefore, this alternative was eliminated from further consideration.

2.3.6 Bank Erosion Control Measures

Under this alternative, a pipe or drain from a catch basin at the top of the stream bank to the creek bed would be installed to remove water from the agricultural field (Penfield & Smith 2012). The concept was discounted due to risks of decreased surface water quality with the introduction of possible pollutants and increased sedimentation. It was also determined that bank erosion control could be accomplished without the use of a drain pipe, thus reducing additional pollutants from entering the creek. As a result, this alternative was eliminated from further consideration.

3 AFFECTED ENVIRONMENT

This chapter describes the existing environment near and within the Proposed Action Area for the Proposed Action and No Action Alternative. The area considered for most resources was confined to the immediate Proposed Action Area. For some environmental resources, a wider regional area was used, as appropriate.

The resources identified for analysis in this EA include: air quality, biological resources, cultural resources, earth resources, hazardous materials and hazardous waste management, human health and safety, coastal zone management, solid waste management, transportation, and water resources. The following resources were considered but not analyzed in this EA:

- Environmental Justice. Per EO 12898, *Environmental Justice*, the potential effects of the Proposed Action on minority communities and low-income communities were considered. The project would neither affect nor disproportionately affect low-income or minority populations. The Proposed Action would occur within an unpopulated area of VAFB and potential environmental impacts would not extend into populated areas.
- Socioeconomics. Implementing the Proposed Action could result in the creation of some temporary new jobs. However, these potential new jobs would have no effect on the socioeconomic environment of the region (i.e., Lompoc Valley and Santa Maria Valley). Implementing the No Action Alternative would neither create nor eliminate jobs from the regional area.
- Land Use and Aesthetics. The Proposed Action does not include any change in the land use or aesthetics of the project area; it only proposes to repair an existing structure, not add to it or replace it. Therefore, the Proposed Action does not include any component that would impact land use and aesthetics and this resource section is not carried forward for analysis in this EA.

VAFB is located in northwestern Santa Barbara County, where agriculture is the main economic and land use influencer. The base encompasses approximately 99,099 ac. (40,104 ha) and is physically divided into North VAFB and South VAFB by the Santa Ynez River. Much of VAFB is open space set aside as security or safety buffer zones for space launch activities. The Proposed Action Area is located within the Lompoc Valley geomorphic region at the point where San Antonio Road West on VAFB crosses San Antonio Creek, approximately 3 mi. (4.8 km) east of the Pacific Ocean. San Antonio Creek traverses both the Los Alamos Valley upstream, and the San Antonio Creek Valley in the downstream portion where the Proposed Action Area is located. This area lies within the Santa Maria Basin-San Luis Range domain of central California, a geologic transition zone between the Transverse Ranges Geomorphic Province to the south and the Coast Ranges Geomorphic Province to the north.

3.1 Air Quality

3.1.1 Definition of Resource

Air quality is defined by ambient air concentrations of specific pollutants determined by the EPA to be of concern with respect to the health and welfare of the general public. Six major pollutants

of concern, called "criteria pollutants," are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), suspended and fine particulate matter (particulate matter less than 10 microns [PM_{10}] and particulate matter less than 2.5 microns [$PM_{2.5}$]), and lead (Pb). The EPA has established National Ambient Air Quality Standards (NAAQS) for these pollutants. Areas that violate a federal air quality standard are designated as non-attainment areas.

Ambient air quality refers to the atmospheric concentration of a specific compound (amount of pollutants in a specified volume of air) that occurs at a particular geographic location. The ambient air quality levels measured at a particular location are determined by the interactions of emissions, meteorology, and chemistry. Emission considerations include the types, amounts, and locations of pollutants emitted into the atmosphere. Meteorological considerations include wind and precipitation patterns affecting the distribution, dilution, and removal of pollutant emissions. Chemical reactions can transform pollutant emissions into other chemical substances. Ambient air quality data are generally reported as a mass per unit volume (e.g., micrograms per cubic meter of air) or as a volume fraction (e.g., ppmv).

Pollutant emissions typically refer to the amount of pollutants or pollutant precursors introduced into the atmosphere by a source or group of sources. Pollutant emissions contribute to the ambient air concentrations of criteria pollutants, either by directly affecting the pollutant concentrations measured in the ambient air or by interacting in the atmosphere to form criteria pollutants. Primary pollutants, such as CO, SO_2, Pb, and some particulates, are emitted directly into the atmosphere from emission sources. Secondary pollutants, such as O_3, NO_2, and some particulates, are formed through atmospheric chemical reactions that are influenced by meteorology, ultraviolet light, and other atmospheric processes. PM_{10} and $PM_{2.5}$ are generated as primary pollutants by various mechanical processes (for example, abrasion, erosion, mixing, or atomization) or combustion processes. However, PM_{10} and $PM_{2.5}$ can also be formed as secondary pollutants through chemical reactions or by gaseous pollutants condensing into fine aerosols. In general, emissions that are considered "precursors" to secondary pollutants in the atmosphere (such as reactive organic gases [ROG] and oxides of nitrogen [NO_x], which are considered precursors for O_3), are the pollutants for which emissions are evaluated to control the level of O_3 in the ambient air.

The State of California has identified four additional pollutants for ambient air quality standards: visibility reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. The CARB has also established the more stringent California Ambient Air Quality Standards (CAAQS). Areas within California in which ambient air concentrations of a pollutant are higher than the state or federal standard are considered to be non-attainment for that pollutant. Table 3-1 shows both the federal and state ambient air quality standards. Toxic air pollutants, also called hazardous air pollutants, are a class of pollutants that do not have ambient air quality standards but are examined on an individual basis when there is a source of these pollutants. The State of California has identified particulate emissions from diesel engines as a toxic air pollutant.

Table 3-1. Ambient Air Quality Standards.

Pollutant	Averaging Time	NAAQS[1]		CAAQS[2]
		Primary[3]	Secondary[4]	Concentration[5]
O_3	1 hour	-	-	0.09 ppm
	8 hour	0.070 ppm	Same as primary	0.070 ppm
Respirable Particulate Matter (PM_{10})	24 hour	150 µg/m^3	Same as primary	50 µg/m^3
	Annual arithmetic mean	-	-	20 µg/m^3
Fine Particulate Matter ($PM_{2.5}$)	24 hour	35 µg/m^3	Same as primary	-
	Annual arithmetic average	12 µg/m^3	15 µg/m^3	12 µg/m^3
CO	1 hour	35 ppm	-	20 ppm
	8 hour	9 ppm	-	9 ppm
NO_2	1 hour	100 ppb	-	0.18 ppm
	Annual arithmetic average	53 ppb	Same as primary	0.030 ppm
SO_2	1 hour	75 ppb	-	0.25 ppm
	3 hour	-	0.5 ppm	-
	24 hour	-		0.04 ppm
Lead	30 day average	-	-	0.15 µg/m^3
	Rolling 3-month average	0.15 µg/m^3	Same as primary	-
Hydrogen Sulfide (HS)	1 hour	No Federal Standards		0.03 ppm (42 µg/m^3)
Sulfates (SO_4)	24 hour			25 µg/m^3
Visibility Reducing Particles	8 hour (10 am to 6 pm, Pacific Standard Time)			In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70%.
Vinyl chloride[6]	24 hour			0.01 ppm (26 µg/m^3)

[1]NAAQS (other than O_3, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The O_3 standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when 99% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. For PM2.5, the 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current federal policies. [2]California Ambient Air Quality Standards for O_3, CO (except Lake Tahoe), SO_2 (1- and 24-hour), NO_2, PM10, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. [3]National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health. [4]National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.[5]Concentration expressed first in units in which it was promulgated. Ppm in this table refers to ppm by volume or micromoles of pollutant per mole of gas.[6]The CARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Notes: CO = carbon monoxide, ft. = feet, NAAQS = national ambient air quality standards, CAAQS = California Ambient Air Quality Standards, NO_2 = nitrogen dioxide, O_3 = ozone, $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 micrometers in diameter, PM_{10} = suspended particulate matter less than or equal to 10 micrometers in diameter, ppb = parts per billion, ppm = parts per million, $\mu g/m^3$ = micrograms per cubic meter, Source: California Air Resources Board 2016

Global temperatures are moderated by naturally occurring atmospheric gases, including water vapor, carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), which are known as greenhouse gases (GHGs). These gases allow solar radiation (sunlight) into the Earth's atmosphere, but prevent radiative heat from escaping, thus warming the Earth's atmosphere. Gases that trap heat in the atmosphere are often called greenhouse gases, analogous to a greenhouse. GHGs are emitted by both natural processes and human activities. State law defines greenhouse gases as any of the following compounds: CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (California Health and Safety Code Section 38505(g)). GHGs have varying global warming potential (GWP). The GWP is the potential of a gas or aerosol to trap heat in the atmosphere; it is the "cumulative radiative forcing effect of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas" (USEPA 2016). The reference gas for GWP is CO_2; therefore, CO_2 has a GWP of 1. The other main greenhouse gases that have been attributed to human activity include CH_4, which has a GWP of 21, and N_2O, which has a GWP of 310. CO_2, followed by CH_4 and N_2O, are the most common GHGs that result from human activity. CO_2 and, to a lesser extent, CH_4 and N_2O, are products of combustion and are generated from stationary combustion sources as well as vehicles. High global warming potential gases include GHGs that are used in refrigeration/cooling systems such as chlorofluorocarbons and hydrofluorocarbons.

3.1.1.1 Regional Setting

VAFB is within Santa Barbara County and under the jurisdiction of the SBCAPCD. The SBCAPCD is the agency responsible for the administration of federal and state air quality laws, regulations, and policies in Santa Barbara County, which is within the South Central Coast Air Basin (SCCAB). The SCCAB includes San Luis Obispo, Santa Barbara, and Ventura Counties.

The SCCAB, and all of Southern California, lies in a semi-permanent high-pressure zone of the Eastern Pacific Region. The coast is characterized by sparse rainfall, most of which occurs in the winter season and hot, dry summers, tempered by cooling sea breezes. In Santa Barbara County, the months of heaviest precipitation are November through April, averaging 14.66 in. (37.24 cm) annually. The mean temperature in the VAFB area, as reported by monitors in Lompoc, is 58.3 degrees Fahrenheit (°F) and the mean maximum and mean minimum temperatures are 69.6°F and 47.0°F, respectively (Western Regional Climatic Center 2014).

Santa Barbara County is classified as an attainment/unclassified area for the NAAQS for all criteria pollutants. Santa Barbara County is considered a nonattainment area for the CAAQS for ozone and PM_{10}. Santa Barbara County is classified as an attainment/unclassified area for the CAAQS for all other criteria pollutants.

The Air Resources Board (ARB) and SBCAPCD operate a network of ambient air monitoring stations throughout Santa Barbara County. The purpose of the monitoring stations is to measure ambient concentrations of the pollutants and determine whether the ambient air quality meets

the CAAQS and the NAAQS. The nearest ambient monitoring stations to the project site are the VAFB Space Transportation System monitoring station and the Lompoc South H Street monitoring station. The Vandenberg monitoring station measures O_3, PM_{10}, CO, NO_2, and SO_2, but does not measure $PM_{2.5}$. The Lompoc South H Street monitoring station measures all criteria pollutants.

Table 3-2 presents a summary of ambient air quality measurements for the period from 2012 to 2014. The 1-hour CAAQS for ozone was not exceeded at the VAFB monitoring station during the period from 2012 through 2014. The 8-hour NAAQS and CAAQS for ozone was exceeded once in 2013 and three times in 2014. The Vandenberg station measured one exceedance of the 1-hour NO_2 standard in 2013; however, the standard is not based on a single exceedance and the region remains unclassified/attainment. The 24-hour PM_{10} CAAQS was exceeded in 2013 and 2014. The data from the monitoring stations indicate that air quality is in attainment of all other state and federal standards.

Table 3-2. Ambient Air Quality Measurements.

Pollutant	Averaging Time	2012	2013	2014	CAAQS (ppm)	NAAQS (ppm)	Monitoring Station
Ozone	8 hour	0.062	0.071	0.071	0.070	0.07	Vandenberg
	1 hour	0.069	0.074	0.078	0.09	-	Vandenberg
PM_{10}	Annual Arithmetic Mean	15.9 µg/m³	19.9 µg/m³	21.4 µg/m³	20 µg/m³	-	Vandenberg
	24 hour	47.0 µg/m³	57.6 µg/m³	71.1 µg/m³	50 µg/m³	150 µg/m³	Vandenberg
$PM_{2.5}$	Annual Arithmetic Mean	NA	NA	6.2 µg/m³	12 µg/m³	12 µg/m³	Lompoc
	24 hour	18.1 µg/m³	15.9 µg/m³	16.7 µg/m³	-	35 µg/m³	Lompoc
NO_2	Annual	0.000	0.000	0.000	0.030	0.053	Vandenberg
	1 hour	0.013	0.139	0.038	0.18	0.100	Vandenberg
CO	8 hour	0.41	NA	NA	9.0	9.0	Vandenberg
SO_2	Annual	0.000	0.000	0.000	-	0.030	Vandenberg
	24 hour	0.003	0.001	NA	0.04	0.14	Vandenberg

California averages reported for PM_{10}

Notes: µg/m³ = micrograms per cubic meter, CAAQS = California Ambient Air Quality Standards, CO = carbon monoxide, NAAQS = National Ambient Air Quality Standards, N/A = not available from current website data, NO_2 = nitrogen dioxide, $PM_{2.5}$ = particulate matter less than 2.5 microns, PM_{10} = particulate matter less than 10 microns, ppm = parts per million, SO_2 = sulfur dioxide

Source: www.arb.ca.gov

3.1.1.2 Region of Influence

Specifically identifying the Region of Influence (ROI) for air quality requires knowledge of the type of pollutant, emission rates of the pollutant source, proximity to other emission sources, and local and regional meteorology. For inert pollutants (all pollutants other than ozone and its precursors), the ROI is generally limited to a few miles downwind from the source. However, for

photochemical pollutant such as O_3, the ROI may extend much farther downwind. O_3 is a secondary pollutant that is formed in the atmosphere by photochemical reactions of previously emitted pollutants, or precursors (ROG and NO_x). The maximum effect of precursors on ozone levels tends to occur several hours after the time of emission during periods of high solar load and may occur many miles from the source. Ozone and ozone precursors transported from other regions can also combine with local emissions to produce high local ozone concentrations. The ROI for the San Antonio Road West Bridge includes the SCCAB.

3.1.2 Federal Requirements

3.1.2.1 Clean Air Act, General Conformity, and NEPA

The EPA is the agency responsible for enforcing the Clean Air Act (CAA) of 1970 and its 1977 and 1990 amendments. The purpose of the CAA is to establish NAAQS, to classify areas as to their attainment status relative to the NAAQS, to develop schedules and strategies to meet the NAAQS, and to regulate emissions of criteria pollutants and air toxics to protect public health and welfare. Under the CAA, individual states are allowed to adopt ambient air quality standards and other regulations, provided they are at least as stringent as federal standards. The Clean Air Act Amendments (CAAA) (1990) established new deadlines for achievement of the NAAQS, dependent upon the severity of non-attainment.

The EPA requires each state to prepare a State Implementation Plan (SIP), which describes how that state will achieve compliance with the NAAQS. A SIP is a compilation of goals, strategies, schedules, and enforcement actions that will lead the state into compliance with all federal air quality standards.

The CAAA also requires that states develop an operating permit program that would require permits for all major sources of pollutants. The program would be designed to reduce mobile source emissions and control emissions of hazardous air pollutants through establishing control technology guidelines for various classes of emission sources.

New Source Review: A New Source Review (NSR) is required when a source has the potential to emit any pollutant regulated under the CAA in amounts equal to or exceeding specified major source thresholds (100 or 250 tons per year) which are predicated on a source's industrial category. Through the SBCAPCD's permitting processes, all stationary sources are reviewed and are subject to an NSR process.

EO 13432: This EO, *Cooperation Among Agencies in Protecting the Environment with Respect to Greenhouse Gas Emissions from Motor Vehicles, Nonroad Vehicles, and Nonroad Engines*, was issued to ensure that all necessary actions are taken to integrate environmental accountability in agency day-to-day decision making and long-term planning processes, across all agency missions, activities, and functions. Pollution prevention is highlighted as a key aspect to the environmental management system process.

EO 13693: On 19 March 2015, EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, was revoked with the publication of EO 13693, *Planning for Federal Sustainability in the Next Decade*. The EO outlines guidelines and goals for federal agencies to

establish in the management of energy, environmental water, fleet, buildings, and acquisition management to drive national greenhouse gas reductions and support preparations for the impacts of climate change. Policies directed by EO 13693 intend to reduce agency direct greenhouse gas emissions by at least 40 percent over the next decade as well as drive innovation and reduce federal spending.

General Conformity: Under 40 CFR Part 93 and the provisions of Part 51, Subchapter C., Chapter I, Title 40, Appendix W of the CFR, of the CAA as Amended, federal agencies are required to demonstrate that federal actions conform with the applicable SIP.

The EPA general conformity rule applies to federal actions occurring in non-attainment or maintenance areas. Because Santa Barbara County is an unclassified/attainment area for all NAAQS, the General Conformity Rule does not apply to the Proposed Action at VAFB.

3.1.3 Local Requirements

In Santa Barbara County the SBCAPCD is the agency responsible for the administration of federal and state air quality laws, regulations, and policies. Included in the local air districts' tasks are monitoring of air pollution, maintenance of air quality standards through programs to control air pollutant emissions, and the promulgation of Rules and Regulations. SBCAPCD regulations require that facilities construction, altering, or replacing stationary equipment that may emit air pollutants obtain an Authority to Construct permit. Further, SBCAPCD regulations require stationary sources of air pollutants to obtain a Permit to Operate. The local air districts are responsible for the review of applications and for the approval and issuance of these permits. In addition, the SBCAPCD regulations require a stationary source that would emit 25 tons per year or more of any pollutant except CO in any calendar year during construction to obtain emission reduction credits to offset increased emissions. It is not anticipated that the San Antonio Road West Bridge project would require offsetting. Finally, emissions from the San Antonio Road West Bridge project will not exceed 25 tons per year.

3.2 Biological Resources

3.2.1 Region of Influence

The existing biological setting includes the regional setting of VAFB, the specific Proposed Action Area, and past and present disturbances in and near the San Antonio Creek. Biological resources on VAFB are abundant and diverse compared to other areas of California because VAFB is within an ecological transition zone where the northern and southern ranges of many species overlap, and because the majority of the land within the base boundaries has remained undeveloped. The ROI considered in this EA for biological resources encompasses the lower San Antonio Creek Watershed from the Highway 1 Bridge to the San Antonio Creek lagoon.

San Antonio Creek is a 28 mi. (45.1 km) long, east-west trending creek, entering north VAFB at Barka Slough, on its eastern boundary, approximately 2 mi. (3.2 km) west of the San Antonio Road East/State Route (SR) 135 interchange and emptying into the Pacific Ocean north of Purisima Point. The San Antonio Creek drainage basin is an elongated basin encompassing approximately 154 mi.^{2} (247 km^2) that includes Los Alamos Valley in the upstream portion and

San Antonio Valley in the downstream portion. Although intermittent through much of its course, the creek is perennial west of Barka Slough. The creek flows through the bottom of the valley with a meandering channel lined with riparian vegetation. Although the creek's flow is generally sluggish west of Barka Slough, San Antonio Creek is an actively changing watercourse that is often deeply entrenched 15 ft. (4.5 m) or more from the middle of Barka Slough, west to the San Antonio Creek lagoon.

3.2.2 Methodology

Biological resources in the vicinity of the Proposed Action Area were characterized during fish and wildlife surveys in 2008 and 2016 for the Proposed Action and a literature review of biological survey reports and records pertaining to the area (MSRS 2008a; MSRS 2008b; MSRS 2016a; MSRS 2016b). A wetland delineation of the Proposed Action Area was conducted in 2016 (Appendix F). Complete lists of plant and wildlife species documented within the Proposed Action Area can be found in Appendix E and Appendix F. Potential occurrence of special status and sensitive species not detected during the biological surveys was determined based on the presence of suitable habitat or past records of occurrence of the species. Sources accessed and reviewed to determine potential for occurrence included the California Natural Diversity Data Base (California Department of Fish and Wildlife 2016) and existing local and regional references (Christopher 1996, 2002; Coulombe & Mahrdt 1976; Holmgren & Collins 1999; Keil & Holland 1998; Swift 1999; Lehman 2014; MSRS 2009; MSRS 2013; MSRS 2015b; MSRS 2016a; MSRS 2016b; USAF 2016).

3.2.3 Vegetation Resources

Vegetation types identified within the Proposed Action Area are included in Figure 3-1 and described in more detail below. Table 3-3 provides acreages of each vegetation type anticipated to be impacted by project activities within the Proposed Action Area. Additionally, Appendix E lists plant species in or potentially within the Proposed Action Area and Appendix F lists plant species observed during the potential jurisdictional waters of the US delineation for the Proposed Action.

Vegetation types were classified base wide on VAFB in 2009 using a modified Holland system (Wildscape 2009). Based on the 2009 vegetation classification, the Project Area consists of the following vegetation types: central coast arroyo willow riparian forest and scrub, central coastal scrub, non-native grasses and forbs, and anthropogenic, consisting of agriculture and the developed portion of San Antonio Road. These vegetation types and boundaries were confirmed during jurisdictional determination field surveys (USAF 2016).

San Antonio Road West is classified as a developed area within the Project Area and occupies 0.2 ac. (0.08 ha) of the Project Area. The area beneath the bridge is open and accumulated sediment is moderately vegetated. Potential jurisdictional waters of the United States (Section 3.10.4, Potential Jurisdictional Waters of the United States and State) occur within central coast arroyo willow riparian forest and scrub. The following is a description of each vegetation type within the entire 3.41 ac. (1.38 ha) project area as observed during site visits in June and July 2016.

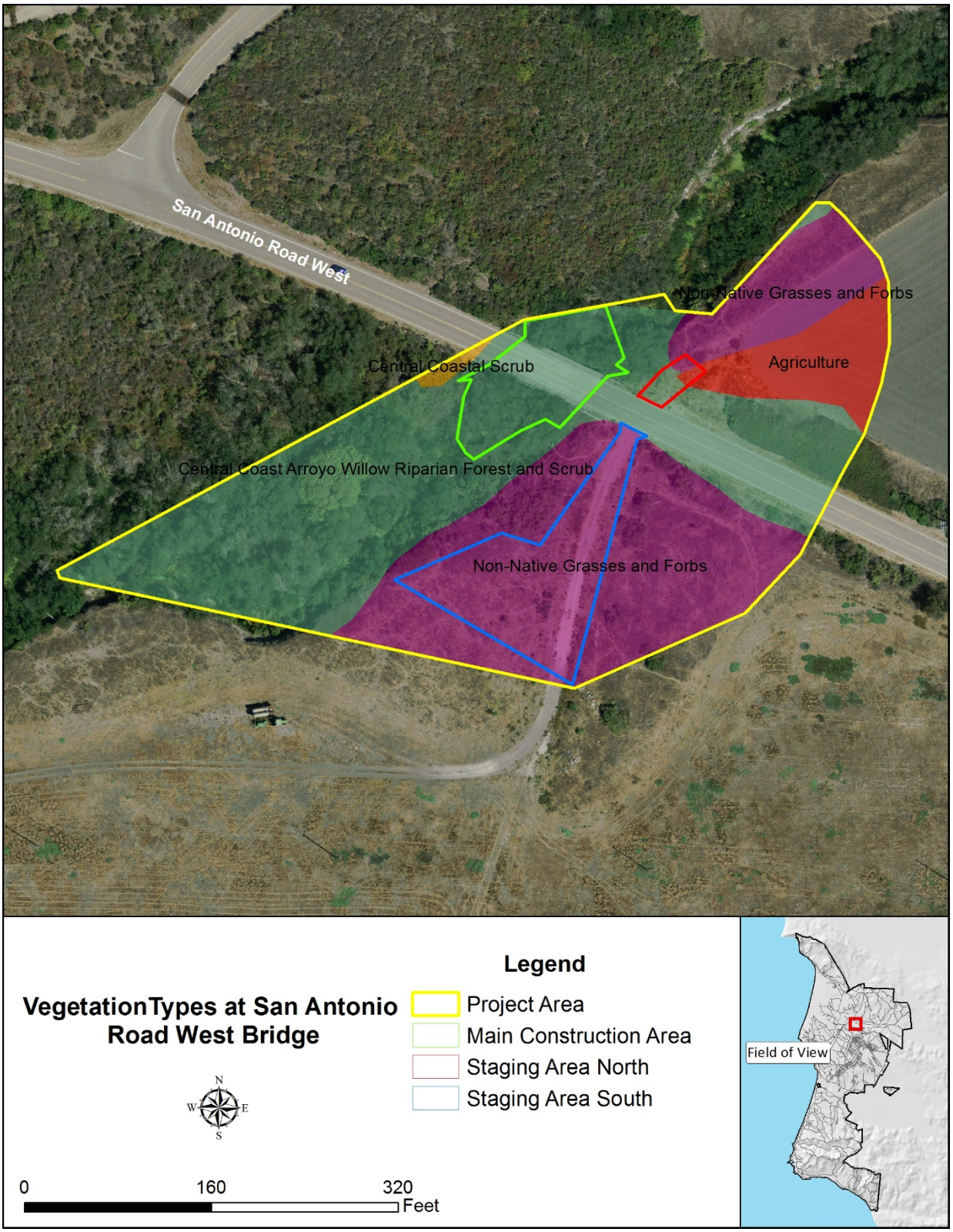

Figure 3-1. Overview of Vegetation Types Within San Antonio Road West Bridge Proposed Action Area.

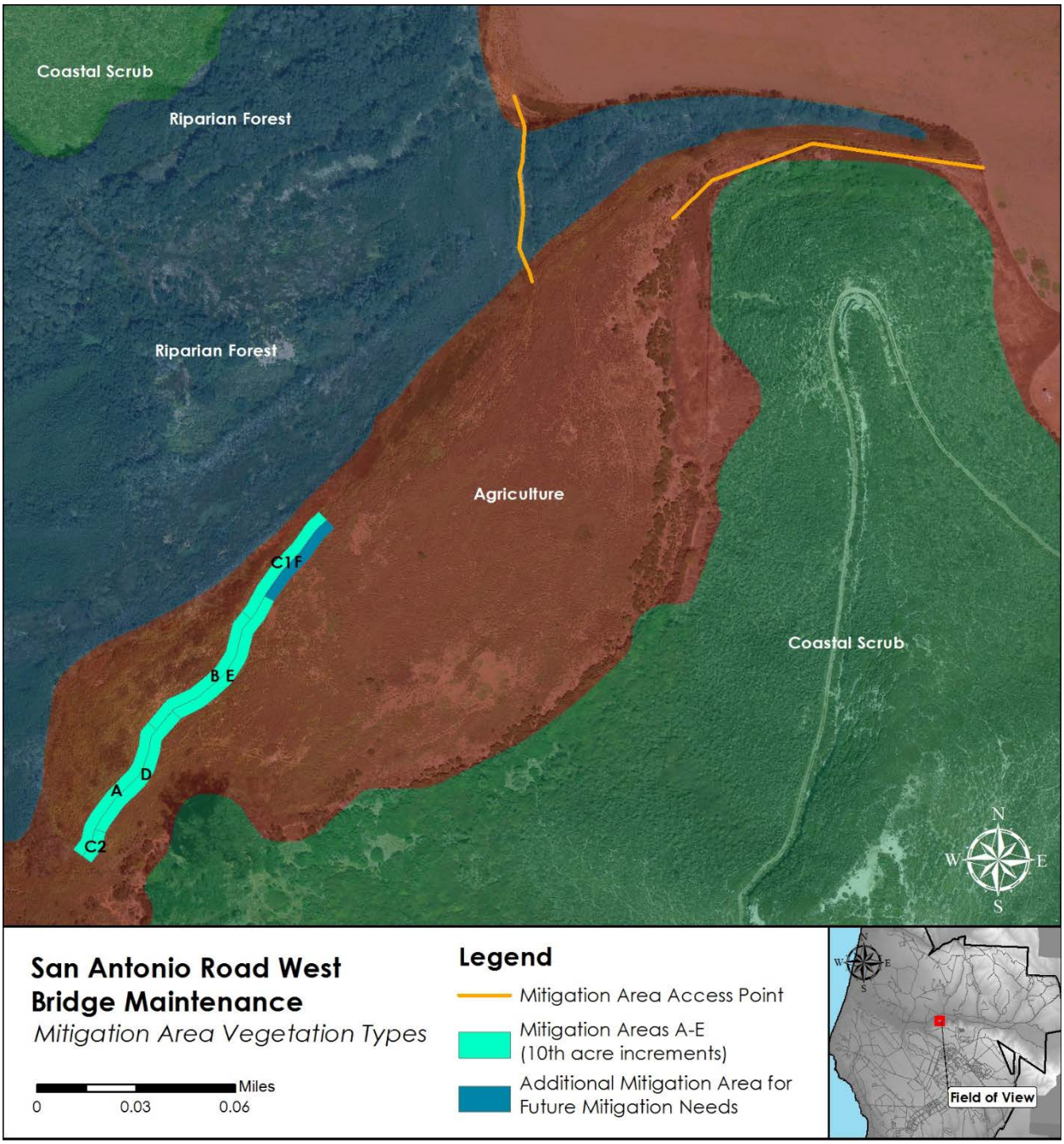

Figure 3-2. Vegetation types at the riparian mitigation area.

Table 3-3. Vegetation Types Potentially Affected by Project Activities within the San Antonio Road West Bridge Proposed Action.

Vegetation Type	Acreage	
	Main Project Area	Mitigation Area
Central Coast Arroyo Willow Riparian Forest and Scrub	1.2	0

Central Coast Scrub	0.1	0
Non-native Grassland and Forbs	1.6	0
Agricultural	0.3	0.48
Developed	0.2	0
Total	**3.4**	**0.48**

Source: USAF 2016

3.2.3.1 Central Coast Arroyo Willow Riparian Forest and Scrub

The main canopy consists of arroyo willow (*Salix lasiolepis*). Within the willow riparian understory, water flows within the San Antonio Creek channel with hydrophytic vegetation growing along the slower moving water areas. The area inundated with slower moving water is primarily dominated by bur-reed (*Sparganium eurycarpum* ssp. *eurycarpum*). Common watercress (*Nasturtium officinale*) is dominant within San Antonio Creek south of the bridge where the canopy is slightly more open. Other associated species include tule (*Juncus* spp.), and duckweed (*Lemna* spp.) with a sparse scattering of broad-leaf cattail (*Typha latifolia*). Plants that tolerate moist soils along the lower banks and shaded by the bridge and arroyo willow include common horsetail (*Equisetum arvense*), celery (*Apium graveolens*), brass buttons (*Cotula coronopifolia*), and seep monkeyflower (*Mimulus guttatus*).

The upland portions consist of drier soils that are shaded by the bridge and canopy of arroyo willow. Species typical of the understory in this region include mugwort (*Artemisia douglasiana*), mulefat (*Baccharis salicifolia* ssp. *salicifolia*), blackberry (*Rubus ursinus*), western poison oak (*Toxicodendron diversilobum*), and stinging nettle (*Urtica dioca* ssp. *holosericea*). Non-native plants include black mustard (*Brassica nigra*), sweet fennel (*Foeniculum vulgare*), and perennial pepperweed (*Lepidium latifolium*). Along the outer riparian edges, native central coastal scrub plants encroach, such as coyote brush (*Baccharis pilularis*) and California sagebrush (*Artemisia californica*).

3.2.3.2 Central Coastal Scrub

This vegetation type is dominated by coyote brush and California sagebrush within the Project Area. Other associated species include blackberry, western poison oak, and blue elderberry (*Sambucus mexicana*). This vegetation type is found in the far eastern portion of the Project Area with a small west end pocket and is outside of all areas that are anticipated to experience disturbance due to Project activities.

3.2.3.3 Non-native Grassland and Forbs

The disturbances contributing to the non-native character of this vegetation type within the Project Area are the adjacent agricultural lands and the roadsides of San Antonio Road West. Black mustard and poison hemlock (*Conium maculatum*) are the dominant plants. Associated non-native invasive species include wild oats (*Avena fatua*), sweet fennel (*Foeniculum vulgare*), milk thistle (*Silybum marianum*), yellow star thistle (*Centaurea solstitalis*), purple star thistle (*Centaurea calcitrapa*), cheat grass (*Bromus tectorum*), and pepperweed.

3.2.3.4 Anthropogenic

Anthropogenic habitat consists of developed paved areas, dirt roads, and active agricultural fields. Agricultural fields undergo regular intense disturbances such as mechanical disking. Due to an intense maintenance regime, perennial species are absent from these areas. Active agricultural areas are adjacent to San Antonio Creek within the Proposed Action Area. Non-native annual grasses and forbs constitute the majority of vegetation present in these areas.

3.2.3.4.1 Agriculture

The agricultural field within the Project Area is currently active. Vegetation cover consists of planted crops.

3.2.3.4.2 Developed

The primary development within the Project Area is San Antonio Road West roadway and supports no vegetative cover.

3.2.4 Wildlife Resources

San Antonio Creek is valuable to wildlife by providing habitat and serving as a travel and migration corridor. The riparian corridor of the creek allows wildlife from upland areas to avoid predators and escape human disturbance and also provides food and water sources for these species. Appendix E lists wildlife species documented within the Proposed Action Area and also includes wildlife species not encountered during surveys but potentially present based on prior records in the vicinity.

Common amphibian and reptile species found within and around the Proposed Action Area include CRLF, Baja chorus frog (*Pseudacris hypochondriaca*), ensatina (*Ensatina eschscholtzii*), western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinata*), side-blotched lizard (*Uta stansburiana*), western skink (*Eumeces skiltonianus*), Pacific rattlesnake (*Crotalus helleri*), kingsnake (*Lampropeltis getula*), common garter snake (*Thamnophis sirtalis*), and gopher snake (*Pituophis catenifer*). The CRLF is a federally threatened species.

Fish species known to occur within San Antonio Creek include TWG, mosquito fish (*Gambusia affinis*), arroyo chub (*Gila orcuttii*), UTS, and prickly sculpin (*Cottus asper*) (Swift et al. 1997). The TWG and UTS are federally endangered species.

More birds are found in riparian forests than in any other habitat type on VAFB. Coulombe and Mahrdt (1976) observed 46 species of birds in this habitat. Common inhabitants include song sparrow (*Melospiza melodia*), Bewick's wren (*Thryomanes bewickii*), yellow warbler (*Setophaga petechia*), spotted towhee (*Pipilo maculatus*), and downy woodpecker (*Picoides pubescens*). Cliff swallows (*Petrochelidon pyrrhonota*) black phoebes (*Sayornis nigricans*), and barn swallows (*Hirundo rustica*) could potentially nest underneath the deck structure of the existing San Antonio Bridge.

Large and medium sized mammal species commonly found in willow riparian forests include Virginia opossum (*Didelphis virginiana*), brush rabbit (*Sylvilagus bachmani*), long-tailed weasel (*Mustela frenata*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), striped skunk (*Mephitis*

mephitis), and bobcat (*Felis rufus*). Small mammals include various species of mice (*Peromyscus* spp.), dusky-footed woodrat (*Neotoma fuscipes*), and Trowbridge's shrew (*Sorex trowbridgii*).

3.2.4.1 Special Status Wildlife Species

Table 3-4 lists federal and state listed wildlife species and other special status species that occur or have the potential to occur within the Proposed Action Area and its vicinity. Potential occurrence was determined based on past documentation of special status species within the vicinity of the Proposed Action Area, surveys in 2016 (MSRS 2016b), and on suitability of habitat and occurrence within the region of a particular species. Several species were excluded from potential occurrence because they either do not occur at the site when project activities would occur, they do not breed within the Proposed Action Area and their special status affords them protection during their breeding period, or they do not occur in a manner that affords them special status protection (i.e., rookeries or nesting colonies).

Golden eagles (*Aquila chrysaetos*, Federal Bird Species of Conservation Concern, California Fully Protected Species) and bald eagles (*Haliaeetus leucocephalus* [Federal Bird Species of Conservation Concern, California Endangered Species, California Fully Protected Species]) are occasionally seen throughout VAFB and may forage in open scrub, grassland, and estuarine habitats. However, these would be expected to be occasional rare sightings and these species are not anticipated to be affected by project activities.

Table 3-4. Federal and State Special Status Wildlife Species with Potential to Occur within the Proposed Action Area.

Species	Status		Potential Occurrence within the Proposed Action Area
	USFWS	CDFW	
Amphibians			
California Red-legged Frog (*Rana draytonii*)	FT	CSC	Resident
Western spadefoot (*Spea hammondii*)	-	CSC	Potential
Invertebrates			
El Segundo blue butterfly (*Euphilotes battoides allyni*)	FE	-	Potential
Reptiles			
Southwestern Pond Turtle (*Actinemys pallida*)	-	CSC	Resident
Coast horned lizard (*Phrynosoma blainvillii*)	-	CSC	Potential
Silvery legless lizard (*Anniella pulchra pulchra*)	-	CSC	Potential
Two-striped garter snake (*Thamnophis hammondii*)	-	CSC	Resident

Species	Status		Potential Occurrence within the Proposed Action Area
	USFWS	CDFW	
Fishes			
Tidewater Goby (*Eucyclogobius newberryi*)	FE	CSC	Potential
Arroyo chub (*Gila orcuttii*)	-	CSC	Resident
Unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*)	FE	-	Resident
Birds			
Ferruginous Hawk (*Buteo regalis*)	BCC	-	Wintering resident upland
Northern harrier (*Circus cyaneus*)	-	CSC	Resident upland
White-tailed Kite (*Elanus leucurus*)	-	CSC	Resident; numbers vary annually
Allen's Hummingbird (*Selasphorus sasin*)	BCC	-	Resident riparian breeder
Nuttall's Woodpecker (*Picoides nuttallii*)	BCC	-	Resident riparian breeder
Olive-sided Flycatcher (*Contopus cooperi*)	-	CSC	Summer resident, potential breeder
Loggerhead Shrike (*Lanius ludovicianus*)	BCC	-	Resident upland breeder
Oak Titmouse (*Baeolophus inornatus*)	BCC	-	Resident riparian breeder
Yellow Warbler (*Dendroica petechia brewsteri*)	BCC	CSC	Summer resident riparian breeder
Yellow-breasted Chat (*Icteria virens*)	-	CSC	Summer resident riparian breeder
Tricolored Blackbird (*Agelaius tricolor*)	BCC	CSC	Resident with historic breeding
Lawrence's Goldfinch (*Spinus lawrencei*)	BCC	-	Summer resident riparian breeder
Mammals			
Pallid Bat (*Antrozous pallidus*)	-	CSC	Resident forager
Western Red Bat (*Lasiurus blossevillii*)	-	CSC	Resident forager
Townsend's big-eared bat (*Corynorhinus townsendii*)	FC	CSC	Potential
American badger (*Taxidea taxus*)	-	CSC	Resident

Species	Status		Potential Occurrence within the Proposed Action Area
	USFWS	CDFW	

Notes: FE = Federal Endangered Species; FT = Federal Threatened Species; FC = Federal Candidate Species; BCC = Federal Bird Species of Conservation Concern; SE = State Endangered Species; CSC = California Species of Special Concern; SC = State Candidate Species; FP = California Fully Protected Species. Abundant = 15+ individuals per day of survey; Common = Over 15 per year of survey; Rare = 1-15 per year of survey; Very Rare = Less than 1 individual per year of survey; Absent = No records of occurrence

California Red-legged Frog (*Rana draytonii*)

CRLF were listed as federally threatened by the USFWS on 23 May 1996 (61 Federal Register [FR] 25813–25833). In 2002, the USFWS issued a Recovery Plan to stabilize and restore CRLF populations (USFWS 2002a). Critical Habitat was designated on 17 March 2010 (50 FR 12816–12959); however, VAFB was not included, since it was excluded under section 4(b)(2) of the ESA, for reasons including impacts on national security.

This highly aquatic federally threatened amphibian inhabits quiet pools of streams, marshes, and occasionally ponds, where it prefers shorelines with extensive vegetation. It is active year-round in coastal areas and can be found in upland areas during the winter and early spring. CRLF may breed as early as November, usually laying egg masses during or shortly following large rainfall events from late December to early April. Surveys conducted from 1995 to 2002 indicate CRLF begin breeding on VAFB in early January (Christopher 2002). CRLF occur in nearly all permanent streams and ponds on VAFB (Christopher 1996; MSRS 2013, 2014, 2015a, MSRS 2016a). This species has been observed at every location surveyed along San Antonio Creek except near U.S. Highway 1 (U.S. 1), where the water is too shallow (Christopher 1996; MSRS 2013; MSRS 2016a). During CRLF surveys of the Proposed Action Area in 2016, CRLF were common throughout. Six egg masses were observed in February 2016 within 1,118 ft. (341 m) downstream and 344 ft. (105 m) upstream of the bridge (MSRS 2016a). By August and September, the majority of CRLF tadpoles would be expected to have metamorphosed. However, CRLF adults and tadpoles may occur anywhere along the creek during construction activities. Both juveniles and adults would be expected to use the Proposed Action Area as resident foraging and refuge habitat, breeding, travel corridor, and for tadpole development and may occur in any vegetation type within the Proposed Action Area where cover is present.

Tidewater Goby (*Eucyclogobius newberryi*)

The TWG was listed as endangered in 1994 (59 FR 5494) with a recovery plan published in 2005 (USFWS 2005). Critical habitat was designated in 2013 (78 FR 8745-8819), but does not include VAFB, because the USFWS determined that VAFB was exempt from critical habitat designation under section 4(a)(3) of the Act. In January 2014, USFWS proposed to reclassify the TWG from endangered to threatened (79 FR 14340-14362); however, a final decision has not yet been issued.

The federally endangered TWG is a small bottom dweller of California's coastal estuaries, wetlands, and lagoons, and lower reaches of coastal streams and rivers. On VAFB, TWGs exist in Shuman Creek, San Antonio Creek, Santa Ynez River, Canada Honda (Honda Creek), and Jalama Creek (USFWS 2005). TWG typically favor areas within the fresh-saltwater interface and salinities

of less than 12 parts per thousand (Swift et al. 1989). In San Antonio Creek, TWG have been collected as far as 3–5 mi. (4.8–8 km) upstream of the lagoon (USFWS 2005).

Population estimates are not readily available for TWG on San Antonio Creek. The USAF evaluates populations on VAFB on a project-by-project basis, since the populations fluctuate yearly. Researchers have identified San Antonio Creek and Santa Ynez lagoons as the most important habitats supporting the TWG, with the Santa Ynez lagoon supporting the largest population (Swift et al. 1997; Swift 1999). In 1999, researchers documented TWG as being concentrated in the San Antonio Creek lagoon as compared to its channel (Swift 1999). Additionally, special status fish surveys conducted in 2009 of San Antonio Creek between the Marshallia Golf Course and the upstream extent of the San Antonio Creek lagoon, and from Marshallia Golf Course upstream to the U.S. 1 Bridge, including a survey location at the proposed Project Area, detected no TWG (MSRS 2009). Additional surveys conducted in 2016 (MSRS 2016b) within the boundaries of the Proposed Action Area detected no TWG as well.

TWG experience population declines when flushed out by the breaching of sandbars and high flow events following storm events (USFWS 2005). Population decline in one area may also lead to colonization of others areas up and down the coast, as is suspected to be the case with Honda Creek (Swift et al. 1997; USFWS 2005).

Unarmored Threespine Stickleback (*Gasterosteus aculeatus williamsoni*)

The UTS was listed as endangered in 1970, critical habitat was proposed in 1980 but determined not to be designated by the USFWS in 2002 (USFWS 1985, 2002b, and a recovery plan was issued in 1985 (USFWS 1985). The USFWS has not yet published a 5-Year Review, but recommendations in the recovery plan include the need to restore and maintain habitat at optimum conditions (i.e., water quality) (USFWS 1985).

The UTS is a small, scaleless, freshwater fish that inhabits slow and quiet waters of streams and rivers. Historically, this species was found throughout southern California. However, by 1985 it only remained in a small portion of the upper Santa Clara River drainage and tributaries, in the lower 8.4 mi. (13.5 km) of the San Antonio Creek drainage and in Cañada Honda Creek (USFWS 1985).

UTS require slow water flow with low turbidity and aquatic vegetation for cover and nest material. While adults can occupy all areas of a stream, they tend to gather in areas of slow moving or standing water. Population size estimates (Baskin and Bell 1976) indicate that the best habitat for UTS is small clean pools in streams with a constant flow of water. UTS are sensitive to excessive sedimentation and the loss of habitat through changes in water flow, water level, and the growth of emergent plants.

Breeding activity of UTS peaks in March; however, it continues at a lower level throughout summer and fall. UTS make their nests where ample vegetation and a gentle flow of water are present. The number of suitable nesting sites may be a limiting factor for this species. Young UTS tend to be found at the shallow edges of streams in areas of dense vegetation.

On VAFB, UTS are native to San Antonio Creek and were introduced into Cañada Honda Creek in 1984 (USFWS 1985). No individuals have been documented in Cañada Honda Creek in the last

18 years. Surveys of San Antonio Creek in 2009 resulted in population estimates of 35.4 fish per linear meter of creek within the VAFB boundary (MSRS 2009).

UTS have been the most common fish species observed in San Antonio Creek during previous survey efforts (Swift et al. 1997; MSRS 2009) and are expected to be present anywhere within the stretch of San Antonio Creek within the Proposed Action Area. MSRS (2009b) recorded 2,047 UTS within the 100 m long survey location at the bridge site, resulting in an estimated density of 20.5 fish per linear meter of stream within the stretch of stream at the bridge location. Surveys conducted in July of 2016 at the same location resulted in the capture of 13 UTS in four 10 m transects of the creek (0.33 fish per linear meter) (MSRS 2016b). The significant decrease in population could be attributed to common fluctuations in population caused by mortality or population movement or resulting from persistent drought conditions.

Other Federally Listed Species Considered

The following federally listed species were considered in preparing this EA: El Segundo blue butterfly (*Euphilotes battoides allyni*) (Endangered); Least Bell's vireo (*Vireo bellii pusillus*) (Endangered); Southwestern willow flycatcher (*Empidonax traillii extimus*) (Endangered); Western yellow-billed cuckoo (*Coccyzus americanus*) (Threatened); and Gambel's watercress (*Rorippa gambelif*) (Endangered). The USAF has determined that the Proposed Action would not affect these species because repeated surveys have failed to detect presence of these species in the Proposed Action Area. As a result, they are not considered further in this EA.

3.3 Cultural Resources

This section begins with a summary of the regional cultural setting and then describes known cultural resources and previously completed cultural resources studies in vicinity of the Proposed Action Area.

3.3.1 Region of Influence

The prehistory of California's central coast spans the entire Holocene and may extend back to late Pleistocene times. Excavations on VAFB reveal occupations dating back 9,000 to 10,000 years (Glassow 1990, 1996; Lebow et al. 2001, 2006, 2007). These early occupants are thought to have lived in small groups that had a relatively egalitarian social organization and a forager-type land-use strategy (Erlandson 1994; Glassow 1996; Greenwood 1972; Moratto 1984). Human population density was low throughout the early and middle Holocene (Lebow et al. 2007). Cultural complexity appears to have increased around 3,000–2,500 years ago (King 1981, 1990). At VAFB, that interval also marks the beginning of increasing human population densities and appears to mark the shift from a foraging to a collecting land-use strategy (Lebow et al. 2006, 2007). Population densities reached their peak around 600–800 years ago, corresponding to the full emergence of Chumash cultural complexity (Arnold 1992).

People living in the VAFB area prior to historic contact are grouped with the Purisimeño Chumash (Greenwood 1978; King 1984; Landberg 1965), one of several linguistically related members of the Chumash culture. In the Santa Barbara Channel area, the Chumash people lived in large, densely populated villages and had a culture that "was as elaborate as that of any

hunter-gatherer society on earth" (Moratto 1984). Relatively little is known about the Chumash in the VAFB region. Explorers noted that villages were smaller and lacked the formal structure found in the channel area (Greenwood 1978). About five ethnohistoric villages are identified by King (1984) on VAFB, along with another five villages in the general vicinity. Diseases introduced by early Euroamerican explorers, beginning with the maritime voyages of Cabrillo in A.D. 1542–1543, substantially impacted Chumash populations more than 200 years before Spanish occupation began (Erlandson and Bartoy 1995, 1996; Preston 1996). Drastic changes to Chumash lifeways resulted from the Spanish occupation that began with the Portolá expedition in A.D. 1769.

VAFB history is divided into the Mission, Rancho, Anglo-Mexican, Americanization, Regional Culture, and Suburban periods. The Mission Period began with the early Spanish explorers and continued until 1820. Mission La Purísima encompassed the Vandenberg area. Farming and ranching were the primary economic activities at the Mission. The Rancho Period began in 1820 and continued until 1845. Following secularization in 1834, the Alta California government granted former mission lands to Mexican citizens as ranchos. Cattle ranching was the primary economic activity during this period. The Bear Flag Revolt and the Mexican War marked the beginning of the Anglo-Mexican Period (1845–1880). Cattle ranching continued to flourish during the early part of this period, but severe droughts during the 1860s decimated cattle herds. The combination of drought and change in government from Mexican to the United States caused substantial changes in land ownership. Sheep ranching and grain farming replaced the old rancho system. Increased population densities characterize the Americanization Period (1880–1915). Beginning in the late 1890s, the railroad provided a more efficient means of shipping and receiving goods and supplies, which in turn increased economic activity. Ranching and farming continued during the early part of the period of Regional Culture (1915–1945), until property was condemned for Camp Cooke. The Suburban Period (1945–1965) began with the end of World War II. In 1956, the army transferred 64,000 ac. (25,900 ha) of North Camp Cooke to the Air Force, and it was renamed the Cooke Air Force Base. In 1958 the base had its first missile launch, the Thor, and was renamed VAFB (Palmer 1999).

3.3.2 Known Cultural Resources

An archaeological site record and literature search encompassing a half-mile radius around the San Antonio Road West Bridge was completed at the 30 CES/CEIEA at VAFB. Background research included a review of archaeological literature, archaeological base maps, and cultural resource records. Data sources examined included the *Base Comprehensive Plan* Geographic Information System and U.S. Geological Survey (USGS) topographic maps.

VAFB delineated and Area of potential Effects for the riparian mitigation area and performed a reasonable and good faith effort to identify historic properties within the area pursuant to 36 CFR 800.4(a)-(d). No cultural resources were encountered within or adjacent to the area during this study (Appendix B).

3.3.3 Archaeological Sites

Although archaeological sites are recorded within half a mile of San Antonio Road West Bridge, none are recorded within the Proposed Action Area or even within 656 ft. (200 m) of the bridge.

3.3.4 Cultural Resources Studies

Background research identified eleven previously completed archaeological projects within a half-mile radius of the San Antonio Road West Bridge (Table 3-5). Several of these included surveys that encompass all or parts of the Proposed Action Area. Berry (1991) completed a survey for the A-6 Power Line, which ran alongside San Antonio Road West, including the bridge area. Carbone and Mason (1998) documented the base wide survey, which encompassed all of the Proposed Action Area. Lebow (2000) conducted surveys of the San Antonio Creek cutbanks to look for buried archaeological deposits, an effort that extended from the El Rancho Road Bridge upstream to the VAFB boundary and included the cutbanks in the San Antonio Road West Bridge vicinity. Those efforts provided extensive surface and subsurface survey coverage. None of them identified archaeological resources at or near the San Antonio Road West Bridge.

Table 3-5. Previous Archaeological Studies within 0.25 Mile of the Proposed Action Area.

Author	VAFB Report No.	Report Title
Westec Services (1981)	1981-04	*Geophysical Evaluation, Vandenberg Air Force Base, Santa Barbara County, California, for Union Oil Company of California.*
Chambers Consultants and Planners (1984)	1984-26	*Archaeological Investigations on the San Antonio Terrace, Vandenberg Air Force Base, California, in Connection with MX Facilities Construction.*
Foster and Greenwood (1985)	1985-12	*Archaeological Investigation: Northwest Lompoc/Jesus Maria Project, Union Oil Company of California, Vandenberg Air Force Base.*
Foster (1985)	1985-19	*Archaeological Investigations: Vandenberg Air Force Base Communication Line #1976, Santa Barbara County, California.*
Gibson (1987)	1987-08	*Results of Archaeological Surface Survey for Two Fence Improvement Projects on Vandenberg Air Force Base, California.*
Rudolph (1988)	1988-08	*Phase I Archaeological Survey for a Proposed Fence Line in Honda Canyon, Vandenberg Air Force Base.*
Berry (1991)	1991-03	*A-6 Power Line Surface Survey, Vandenberg Air Force Base, Santa Barbara County, California.*
Imwalle et al. (1995)	1995-18	*Archaeological Survey Report, Combat Arms Training and Maintenance Facility, Vandenberg Air Force Base, Santa Barbara County, California.*
Price et al. (1996)	1996-08	*Cultural Resource Investigations for the Combat Arms Training and Maintenance Facility, Vandenberg Air Force Base, Santa Barbara County, California.*
Carbone and Mason (1998)	1998-03	*Phase I, II, and III Archaeological Surveys for Cultural Resources Inventory, Vandenberg Air Force Base, Santa Barbara County, California.*
Lebow (2000)	2000-17	*Cultural Resource Studies in Support of the El Rancho Road Bridge Project, Including an Archaeological Survey of the San Antonio Creek Cutbanks, Vandenberg Air Force Base, Santa Barbara County, California.*

3.4 Earth Resources

3.4.1 Geology and Soils

VAFB is a geologically complex area that includes the transition zone between the Southern Coast Range and Western Transverse Range geomorphic provinces of California. The geologic features of VAFB have been an important factor in the development of the diverse natural habitats found in this primarily undeveloped stretch of California coastline. VAFB is underlain predominantly by marine sedimentary rocks of Late Mesozoic age (140 to 70 million years before the present) and

Cenozoic age (70 million years to the present). The basal unit underlying the entire base is the Franciscan Formation of upper Jurassic age (Dibblee 1950). The Franciscan Formation consists of a series of sedimentary and volcanic rocks with numerous serpentine intrusions. Extensive folding and faulting throughout the VAFB area has created four structural regions: the Santa Ynez range, the Lompoc lowland, the Los Alamos syncline, and the San Rafael Mountain uplift (Reynolds et al. 1985). The Santa Ynez range consists of a very thick Cretaceous-Tertiary sedimentary section uplifted along the Santa Ynez fault; it was subsequently folded. The Lompoc lowland is an area of low relief that is structurally synclinal but has Franciscan basement relatively close to the surface. The Los Alamos syncline is a deep structural down warp traversing the Los Alamos and upper Santa Ynez valleys. Faulting along the southwestern margin of the mountain range uplifted the San Rafael Mountains. The majority of the folds in these structural regions are oriented to the northwest.

The two major riparian environments in the east/west trending valleys of VAFB are San Antonio Creek and the Santa Ynez River. The Proposed Project Area is located within the San Antonio Valley along the north side of the Purisima Hills. The San Antonio Valley lies within the Santa Maria Basin-San Luis Range domain of central California, a geologic transition zone between the Transverse Ranges Geomorphic Province to the south and the Coastal Ranges Geomorphic Province to the north. The region between these ranges is a structural depression, with Tertiary age rocks forming a series of broad folds (synclines and anticlines) with westward trending axes (Worts 1951).

Soils within the Proposed Project Area consist primarily of Agueda silty clay loam, Arnold sand, and gullied land. Agueda soils are on nearly level to moderately steep slopes and are at elevations of 50 to 1000 feet. They formed in alluvium from calcareous sedimentary rocks. They are well to moderately well drained with medium runoff and moderate permeability. Agueda soils are used for growing small grain, pasture, range, and irrigated field crops. Non-cultivated areas have annual grass and forbs with scattered live oak (USDA 2003). Arnold soils are on hills and hilly uplands at elevations of 100 to 2,500 feet with slopes ranging from nine to 75-percent. The soils formed in material weathered from soft sandstone. Some of the sandstone may be a relic of a cemented sandy soil (USDA 1998). Gullied land refers to areas where all diagnostic soil horizons have been removed by flowing water, resulting in a network of V-shaped or U-shaped channels. Generally, gullies are so deep that extensive reshaping is necessary for most uses. They cannot be crossed with normal farm machinery. While gullied land can occur on any land, they are often most prevalent on loess, sandy, or other soils with low cohesion.

Subsurface conditions within the proposed project area generally consist of a variable thickness of existing fill, and alluvium overlying Sisquoc Formation and landslide deposits (Fugro 2006). The Sisquoc Formation typically consists of thickly bedded shale, siltstone and claystone, and weathers to a dark, clay rich soil at the ground surface that can be expansive and prone to landsliding. The alluvium and landslide deposits consist of interbedded sand and clay. Weaker artificial fill and alluvium materials are prone to erosion. Dibblee (1989) maps display relatively large landslides along the north facing hillsides south of U.S. 1. A geotechnical study (Fugro 2006) conducted approximately 2 mi. (3.11 km) upstream of the proposed project area reports some of the landslides may be larger than shown by Dibblee, and indicates the presence of active debris flows, surficial instability, and smaller landslides along the flanks of some of the larger landslides.

The conditions are similar at the San Antonio Road West Bridge project area. If movement of the landslides or debris flows occur in response to erosion, earthquakes or weather conditions, there is potential for the movement to impact San Antonio Creek upstream of the project area near the U.S. 1 Bridge.

3.4.2 Seismology

The Santa Barbara County region is seismically active with a major earthquake occurring in the region about every 15 to 20 years (USAF 1987; Alterman et al. 1994). The Santa Ynez-Pacifico Fault Zone, the Lompoc-Solvang (Santa Ynez River)-Honda Fault Zone, the Lions Head-Los Alamos-Baseline Fault Zones, and their potential offshore extensions, are three of the primary fault zones that project through VAFB (Alterman et al. 1994).

These fault systems within the Transverse Ranges are considered active (Jennings 1994) and capable of generating damaging earthquakes. Moderate or major earthquakes along these systems could generate strong or intense ground motions in the area, and possibly result in surface ruptures of unmapped faults along the northern and southern boundaries, as well as the central part of VAFB.

3.4.3 Geological Hazards

The ROI considered for purposes of this EA is Santa Barbara County. The Proposed Action Area at the San Antonio Road West Bridge on San Antonio Road West is located in a seismically active portion of Central California. Potential hazards that could affect the site and result in structural damage include faulting, ground shaking, liquefaction, lateral spreading and flooding. The hazards consist of seismically induced settlement, collapse (hydroconsolidation), and tsunami potential.

The potential for surface fault rupture on VAFB is generally considered to be low (USAF 1987). At the present, there are no known areas where liquefaction has occurred. Areas most prone to liquefaction are those in which there is sandy to silty soil, the water table is within 50 ft. (15 m) of the surface, and earthquake loading exceeds 20% of gravity. The areas that are most prone to liquefaction on VAFB are near San Antonio Creek and the Santa Ynez River. The potential for liquefaction on VAFB, despite these areas, is still considered low (USAF 1987).

Tsunamis, sea waves associated with offshore earthquakes, along the Central and Southern California coast have not been well recorded and documented until recently. Since 1946, only five significant tsunamis have been recorded, and each was associated with distant earthquakes. Tsunami flooding of the VAFB coastline could occur in low-lying areas such as the mouth of the Santa Ynez River and San Antonio Creek Lagoon. The recurrence intervals for tsunamis have not been predicted for the VAFB coastline (USAF 1987).

3.5 Hazardous Materials and Waste Management

Hazardous materials and wastes are those substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9675), the Toxic Substances Control Act (15 U.S.C. 2601-2671), the Solid Waste Disposal Act as amended by

the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. 6901-6992), and Title 22 of the California Code of Regulations (CCR). In addition, federal and state OSHA regulations govern protection of personnel in the workplace. In general, the definitions within these citations include substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health (to workers), welfare, or the environment, when released into the environment. The ROI for hazardous materials and waste management for the Proposed Action is VAFB.

3.5.1 Hazardous Materials Management

Hazardous material use on VAFB is regulated by AFI 32-7076, Hazardous Materials Management, and emergency response procedures for hazardous materials spills are established in VAFB's Hazardous Materials Emergency Response Plan (USAF 2014). In accordance with AFI 32-7076, VAFB requires that all hazardous materials be obtained through the HAZMART, a base function that centrally manages the procurement of hazardous materials. Specifically, the HAZMART approves the use of hazardous materials only after it reviews the composition of the commodity and how it is to be used to ensure compliance with environmental, safety, and occupational health regulations and policies. Hazardous materials potentially used during construction and demolition projects are petroleum, oils and lubricants in demolition equipment and vehicles, solvents for paint abatement or equipment cleaning, and compressed gases for welding or cutting equipment.

3.5.2 Hazardous Waste Management

Management of hazardous waste at VAFB complies with the RCRA Subtitle C (40 CFR Part 240-299) and with California Hazardous Waste Control Laws as administered by the California Environmental Protection Agency (Cal EPA) Department of Toxic Substances Control, under CCR Title 22, Division 4.5. These regulations require that hazardous wastes be handled, stored, transported, disposed of, or recycled according to defined procedures. The VAFB *Hazardous Waste Management Plan* (HWMP) (USAF 2002) outlines the procedures to be followed for hazardous waste management on VAFB.

3.5.3 Installation Restoration Program

The federal Installation Restoration Program (IRP) was implemented at DoD facilities to identify, characterize, and restore hazardous substance release sites. There are currently 136 IRP sites throughout VAFB grouped into six Operable Units based on similarity of their characteristics. The IRP sites are remediated through the Federal Facilities Site Remediation Agreement, a working agreement between the Air Force, the Regional Water Quality Control Board – Central Region, and the Department of Toxic Substances Control. In addition to IRP sites, there are identified Areas of Concern (AOC), where potential hazardous material releases are suspected; and Areas of Interest (AOI), defined as areas with the potential for use or presence of a hazardous substance.

The following criteria were used to determine the sites included in this discussion:

- IRP sites, AOCs, and AOIs within 2,000 ft. (609 m) of the project site

- Sites containing surface water drainage or groundwater flow within the San Antonio Creek watershed upstream of Lompoc-Casmalia Road
- Sites upstream of the project site

No IRP sites, AOCs or AOIs have been identified within 2,000 ft. (609 m) of San Antonio Road West Bridge or the Proposed Action Area.

3.5.4 Hazardous Materials and Waste Transport

The Department of Transportation (DOT) regulates the transport of hazardous materials and waste. Anyone transporting hazardous materials or waste must obtain EPA identification numbers as transporters. The EPA has incorporated DOT statutes (49 U.S.C.) into its regulatory scheme and has added other requirements such as record keeping and cleanup of spills. Transporters of hazardous materials and waste at VAFB are regulated by the aforementioned laws and are DOT certified transporters. VAFB follows the Caltrans requirements for traveling with hazardous materials on SR 1, which runs through part of the eastern edge of VAFB, and SR 246, which physically divides the base into North and South VAFB.

3.6 Human Health and Safety

Hazards associated with some past and present mission activities and operations on VAFB can constrain locations where projects can be sited in order to ensure the health and safety of workers. The following hazard zones have been established on VAFB to protect workers from various hazards:

- **Toxic hazard zones** are areas established downwind of launch site operations to protect workers from exposure to toxic vapors emitted during the transfer or loading of liquid propellants or maintenance of launch systems. These zones can extend 20,000 ft. (6096 m) or more from a launch site.
- **Missile/Space Launch Vehicle Flight Hazard Zones and Explosive Safety Zones** are established under the flight path of missile or space launch vehicle launches to protect personnel from debris fall-out under the launch trajectory. Explosive safety zones are established from 75 ft. (22 m) to 5,000 ft. (1,524 m) around launch sites and buildings where rocket propellants are stored to protect personnel from potential explosive hazards. Both of these hazard zones must be evacuated before any launch.
- **Radiofrequency Radiation Hazard Areas** are established around transmitters on VAFB that can present radiation hazards to people and potentially detonate electroexplosive devices. The sizes of the hazard areas vary depending on the transmitter power and antenna reception.
- **Airfield Clear Zones, Lateral Clear Zones (LCZs), and Accident Potential Zones (APZs)** are established around the VAFB airfield runway and contain restrictions on certain land uses. Clear zones and LCZs are areas where the accident potential is so high that land use restrictions prohibit reasonable use of the land. Clear zones occur at both ends of the runway, and LCZs extend 1,000 ft. (304 m) from both sides of the centerline along the

length of the runway. The ground surface within the LCZ must be graded to certain requirements and kept clear of fixed or mobile objects, except for necessary navigational aids and meteorological equipment. There are two APZs, APZs I and II, which are less critical than clear zones but still possess significant potential for accidents. Acceptable uses within APZ I areas include industrial or manufacturing, communication and utilities transportation, wholesale trade, open space, recreation, and agriculture, but not uses that concentrate people in small areas. Acceptable uses within APZ II areas include low business services and commercial retail trade uses of low intensity or scale of operation, but not high-density operations.

- **Air Installation Compatible Use Zones** are areas where certain land uses are restricted due to the combination of the potential for accidents and noise and the need for clearance of obstacles.
- **Unexploded Ordnance Closure Areas** are areas on VAFB that were used as ordnance training ranges and have the potential to contain unexploded ordnance (UXO). On 27 September 2010, all areas known or suspected to contain UXO on VAFB were closed to non-mission/recreational activities. Any proposed work in these areas must be coordinated with the Weapons Safety and Explosive Ordnance Disposal offices. Depending on the area, escorts may or may not be required.

The affected environment for Health and Safety is the regulatory environment for health and safety issues established to minimize or eliminate potential risk to the general public and personnel involved in the proposed project. The Proposed Action would involve manual labor and heavy equipment operation activities where workers would potentially be exposed to conditions that could adversely impact their health and safety. The ROI of these potential impacts is the Proposed Action Area and surrounding vicinity.

- Hazardous materials, primarily petroleum, oil, and lubricants (POLs), would be used for operating heavy equipment under the Proposed Action. The potential exists for unexpected releases of these POLs, which would generate hazardous waste.
- The construction contractor would transport hazardous material used in or resulting from the Proposed Action. A permitted hazardous waste hauler would transport hazardous waste. The transportation of these materials is discussed in Section 3.10 (Water Resources) of this EA.
- Heavy equipment operation activities create noise, discussed below.

Because of the above conditions, the potential exists for persons participating in the bridge maintenance and repair activities to become exposed to hazardous materials and hazardous waste. In addition to these more obvious risks to human health and safety, the following, more mundane, physical features, which have the potential to be present in the vicinity of the proposed project, also have the potential to adversely impact the health and safety of the site workers:

- Physical hazards including road traffic, holes and ditches, uneven terrain, sharp or protruding objects, slippery soils or mud, and unstable ground.

- Biological hazards such as animals (insects, spiders, and snakes), and disease vectors (ticks and rodents).

3.6.1 Noise

The Noise Control Act (NCA) (42 U.S.C. 4901 *et seq.*) sought to limit the exposure and disturbance that individuals and communities experience from noise. It focuses on surface transportation and construction sources, particularly near airport environments. The NCA also specifies that performance standards for transportation equipment be established with the assistance of the DOT. Section 7 of the NCA regulates sonic booms and gave the Federal Aviation Administration regulatory authority after consultation with the EPA. In addition, the 1987 Quiet Community amendment gave state and local authorities greater involvement in controlling noise.

Noise is often defined as unwanted sound that can interfere with normal activities or otherwise diminish the quality of the environment. Depending on the noise level, it has the potential to disrupt sleep, interfere with speech communication, or cause temporary or permanent changes in hearing sensitivity in humans and wildlife. Noise sources can be continuous (e.g., constant noise from traffic or air conditioning units) or transient (e.g., a jet overflight or an explosion) in nature. Noise sources also have a broad range of frequency content (pitch) and can be nondescript, such as noise from traffic or be specific and readily definable such as a whistle or a horn. The way the acoustic environment is perceived by a receptor (animal or person) is dependent on the hearing capabilities of the receptor at the frequency of the noise, and their perception of the noise.

The amplitude of sound is described in a unit called the decibel (dB). Because the human ear covers a broad range of encountered sound pressures, decibels are measured on a quasi-logarithmic scale. The dB scale simplifies this range of sound pressures and allows the measurement of sound to be more easily understood.

There are many methods for quantifying noise, depending on the potential impacts in question and on the type of noise. One useful noise measurement in determining the effects of noise is the one-hour average sound level, abbreviated L_{eq1H}. The L_{eq1H} can be thought of in terms of *equivalent* sound; that is, if a L_{eq1H} is 45.3 dB, this is what would be measured if a sound measurement device were placed in a sound field of 45.3 dB for one hour. The L_{eq1H} is usually A-weighted (dBA) unless specified otherwise. A-weighting is a standard filter used in acoustics that approximates human hearing and in some cases is the most appropriate weighting filter when investigating the impacts of noise on wildlife as well as humans. Examples of A-weighted noise levels for various common noise sources are shown in Table 3-6.

Existing noise levels on VAFB are generally quite low due to the large areas of undeveloped landscape and relatively sparse noise sources. Background noise levels are primarily driven by wind noise; however, louder noise levels can be found near industrial facilities and transportation routes. Rocket launches and aircraft overflights create louder intermittent noise levels. On VAFB, general ambient L_{eq1H} measurements have been found to range from around 35 to 57 dB (Berg et al. 2002). Most activities associated with the Proposed Action would generate relatively continuous noise throughout the implementation period.

Table 3-6. Comparative A-weighted Sound Levels.

Noise Level (dBA)	Common Noise Levels	
	Indoor	**Outdoor**
100–110	Rock band inside New York subway	Jet flyover at 304 meters
90–100	Food blender at one meter	Gas lawnmower at one meter
80–90	Garbage disposal at one meter	Diesel truck at 15 meters; noisy urban daytime
70–80	Shouting at one meter; vacuum cleaner at three meters	Gas lawnmower at 30 meters
60–70	Normal speech at one meter	Commercial area heavy traffic at 100 meters
50–60	Large business office; dishwasher next room	
40–50	Small theater or large conference room (background)	Quiet urban nighttime
30–40	Library (background)	Quiet suburban nighttime
20–30	Bedroom at night	Quiet rural nighttime
10–20	Broadcast and recording studio (background)	
0–10	Threshold of hearing	

Notes: dBA = A-weighted decibel, m = meter(s)

3.7 Coastal Zone Management

Federal activity in, or affecting, a coastal zone requires preparation of a Coastal Zone Consistency Determination or a Negative Determination, in accordance with the CZMA of 1972. The California Coastal Zone Management Program was formed through the California Coastal Act (CCA) of 1972. The Air Force is responsible for making final coastal zone consistency determinations or negative determinations for its activities occurring within the state coastal zone or having effects on it. The CCC reviews federally authorized projects for consistency with the California Coastal Zone Management Program.

The AF has determined that the Proposed Action would not affect any coastal resources within the state coastal zone. As defined in Section 304 of the CZMA, the term "coastal zone" does not include "lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal government." The Proposed Action will occur within VAFB, which is wholly owned and operated by the DoD, and therefore is excluded from the coastal zone. However, the Air Force recognizes that actions outside the state coastal zone may affect land or water uses or natural resources within the state coastal zone and therefore are subject to the provisions of the Act. Consequently, an analysis of the impacts of the Proposed Action on the coastal zone was conducted.

3.8 Solid Waste Management

In 1989, the California Integrated Waste Management Act (Assembly Bill 939) mandated a 50% reduction of the quantity of solid waste disposed of in California landfills from a 1990 baseline. The 50% reduction was to be accomplished by 1 January 2000. The most recent Air Force

mandate regarding solid waste diversion came from Headquarters Air Force Space Command in 2008, requiring a 50% diversion rate goal for all solid waste generated at Air Force Systems Command installations (USAF 2012).

The Pollution Prevention Act of 1990 focused the national approach to environmental protection toward P2. Implementation of the Air Force Environmental Management System (EMS) carries P2 a step further toward mission sustainability principles. The P2 program is defined in detail in the VAFB Pollution Prevention Management Plan, 30 SW Plan 32-7001 and is aimed at achieving 30 SW EMS objectives and targets, through documented practices, procedures, and operational requirements. VAFB implements EMS and its associated P2 program elements by following the P2 hierarchy:

- Reduce (source reduction to prevent the creation of wastes);
- Reuse (keep item or material for its intended purpose);
- Recycle (use item or material for some other beneficial purpose);
- Disposal (in an environmentally compliant manner, only as a last resort).

The State of California passed Senate Bill 1374, amending the Public Resources Code, Section 42912, which addresses the issue of C&D debris, diversion requirements, and the development of a model ordinance to be implemented by local jurisdictions (e.g., Santa Barbara County). EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, was signed on 5 October 2009. With respect to solid waste diversion, EO 13514 requires federal agencies to have as a goal to achieve 50% or higher diversion rate for non-hazardous solid waste and construction and demolition materials and debris by fiscal year 2015. In August 2010, the DoD issued its updated Strategic Sustainability and Performance Plan (SSPP), which was followed up by Headquarters Air Force releasing its SSPP Implementation Plan in October 2011. The established diversion goals of the SSPP are 60% diversion, by weight, for construction and demolition debris by 2015. AFI 32-7042 requires installations to strive to divert as much solid waste as economically feasible and the VAFB Integrated Solid Waste Management Guide (USAF 2012) requires source segregation of recyclable materials to the greatest extent possible. The ROI of potential impacts to solid waste management as a result of the Proposed Action is VAFB.

3.9 Transportation

For the purpose of this EA, the ROI for transportation would be the combination of highway, arterial, and local roads that provide service to VAFB and the Proposed Action Area. Existing roadway conditions are evaluated based on roadway capacity and traffic volume. The capacity, which reflects the ability of the network to serve the traffic demand of a roadway, depends on the roadway width, number of lanes, intersection control, and other physical factors. Traffic volumes can be reported as the number of vehicles averaged over a daily period (Average Daily Traffic or ADT) or an annual period (Annual Average Daily Traffic or AADT). Peak-hour volume is defined as the highest volume of traffic in a 24-hour period that is recorded on a roadway or intersection during a one-hour period.

The performance of a roadway is generally expressed in terms of Level of Service (LOS). As shown in Table 3-7, the LOS scale ranges from A to F, with each level defined by a range of volume-to-capacity (V/C) ratios. LOS A, B, and C are considered good operating conditions with minor to tolerable delays experienced by motorists. LOS D represents below-average conditions. LOS E reflects a roadway at maximum capacity, and LOS F represents traffic congestion.

Table 3-7. Level of Service Scale.

LOS	Description	Criteria (V/C)		
		Multi-Lane Arterial	Two-Lane Highway	Delays[(a)]
A	Free flow with users unaffected by presence of other roadway users	0–0.30	0–0.15	< 10.0
B	Stable flow, but presence of the users in traffic stream becomes noticeable	0.31–0.50	0.16–0.27	10.0–20.0
C	Stable flow, but operations of single users becomes affected by interaction with others in traffic stream	0.51–0.70	0.28–0.43	20.0–35.0
D	High density, but stable flow, speed and freedom of movement are severely restricted; poor level of comfort and convenience	0.71–0.84	0.44–0.64	35.0–55.0
E	Unstable flow; operating conditions at capacity with reduced speeds; maneuvering difficult and extremely poor levels of comfort and convenience	0.85–1.00	0.65–1.00	55.0–80.0
F	Forced breakdown flow with traffic demand exceeding capacity; unstable stop-and-go traffic	> 1.00	> 1.00	> 80.0

Notes: V/C = Volume-to-Capacity (a) Average stop delay at intersections.

3.9.1 Region of Influence

VAFB is located approximately 5 mi. (8 km) west of the City of Lompoc. As shown in Figure 1-1, the main access route to VAFB is U.S. Highway 101 (U.S. 101). U.S. 101 is a coastal four-lane divided freeway connecting northern California to southern California. The VAFB connections to U.S. 101 are U.S. 1, SR 135, and SR 246. U.S. 1, a north-south highway, traverses VAFB and provides access to Santa Maria to the northeast, and Santa Barbara to the southeast. When used in conjunction with U.S. 101, SR 246, an east-west highway, provides access to Lompoc to the east, and Santa Barbara to the southeast. SR 135 and SR 246 are mostly two-lane undivided highways with four-lane rural expressway portions.

Roadways in the vicinity of the Proposed Action Area lie within the jurisdiction of VAFB and Caltrans. These roadways include U.S. 1 and San Antonio Road West.

VAFB is a federal military installation, and access to portions of Base is only permitted to authorized military personnel and their families, civilian employees of Base with approved

identification, and visitors with pre-approved authorization. Roadways within the Proposed Action Area are not restricted to public access, except during special military events or operations.

Exiting roadway conditions are evaluated based on roadway capacity and traffic volume. The capacity, which reflects the ability of the network to serve the traffic demand of a roadway, depends on the roadway width, number of lanes, intersection control, and other physical factors. A road's ability to accommodate different volumes of traffic is generally expressed in terms of LOS. The LOS scales range from A to F, with each level defined by a range of traffic volume to roadway capacity (see Table 3-7). LOS A, B, and C are considered good operating conditions with minor to tolerable delays experienced by motorists. LOS D represents below-average conditions. LOS E reflects a roadway at maximum capacity, and LOS F represents traffic congestion. Most roads on VAFB operate at a LOS between A and C (USAF 2007).

The Proposed Action Area is located on San Antonio Road West. Project personnel and equipment would access the location via U.S. 1, turning onto San Antonio Road West from Hwy 1. San Antonio Road West is a 34 foot-wide, two-lane roadway with paved shoulders (Figure 3-3). This roadway is an east-west roadway that connects U.S. 1 with Lompoc-Casmalia Road. East of Lompoc-Casmalia Road, San Antonio Road West carries 733 average daily trips and operates in the LOS A range (USAF 2002). During the bridge maintenance period, which is estimated to be 90 days, there would be no lane closures.

3.9.2 Project Traffic and Haul Routes

The haul route to an off-base landfill from the San Antonio Road West Bridge Proposed Action Area would be: To Santa Maria Landfill, travel east on San Antonio Road West, then north onto U.S. 1 to proceed onto U.S. 101 north to Santa Maria, approximately 20 mi. (32 km), one way.

There is one route available to traffic leaving the local area, accessible by exiting the project site traveling east on San Antonio Road West, turning north onto U.S. 1, and continuing straight to connect to U.S. 1/U.S. 101.

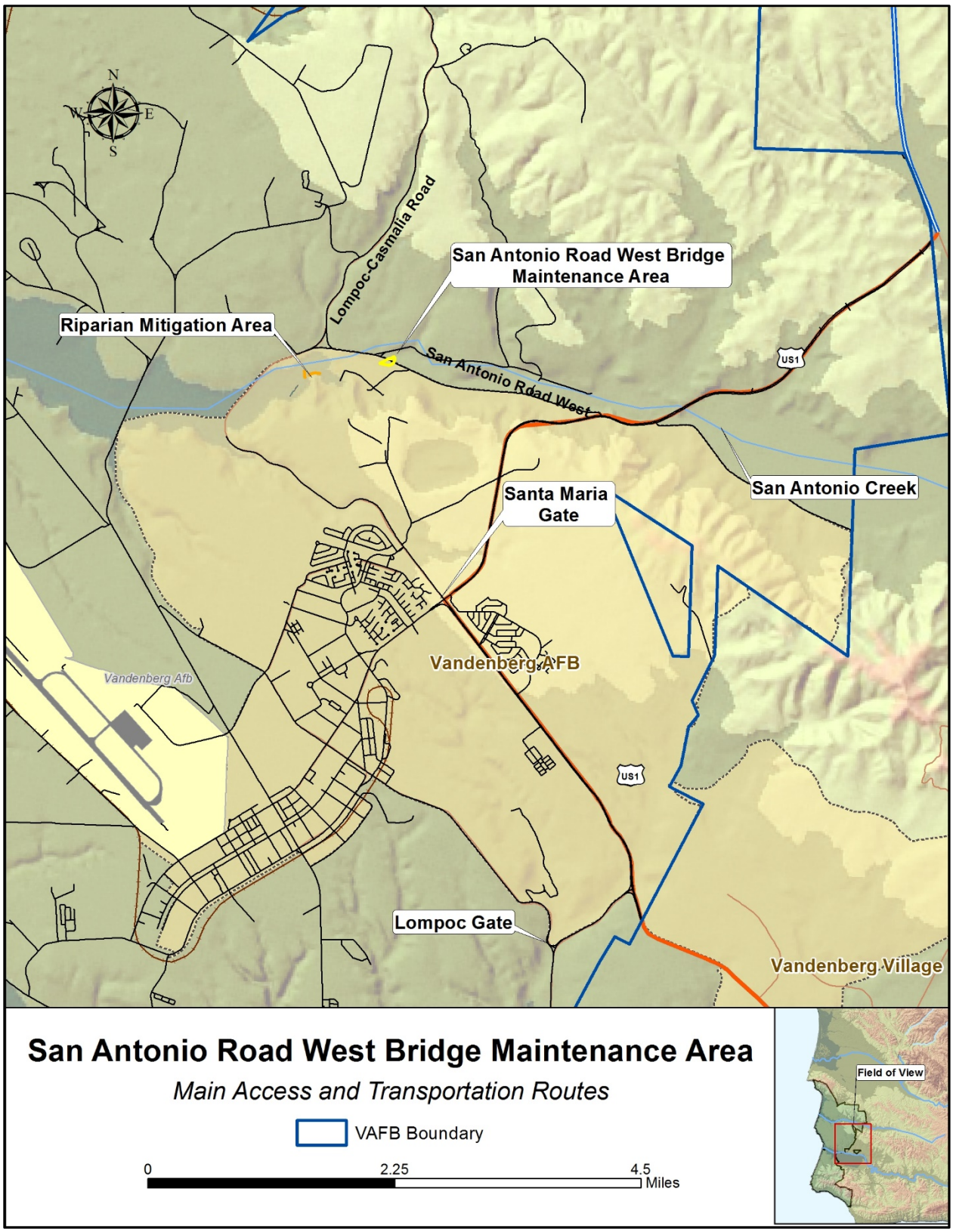

Figure 3-3. Main Access and Transportation Routes Associated with the Proposed Action.

3.10 Water Resources

The California Porter-Cologne Water Quality Act provides a framework for establishing beneficial uses of water resources and the development of local water quality objectives to protect these beneficial uses. Additionally, the State Water Resources Control Board and the RWQCB administer the CWA and state water regulations. The CWA mandates that point source discharges to surface water or to the ocean are subject to the NPDES permit program. The RWQCB is responsible for management of the NPDES Construction General Permit process for California. The Central Coast RWQCB is the local agency responsible for the VAFB area. The NPDES Construction General Permit for construction activities ensures that water discharged from a site meets water quality standards at the point of discharge. The NPDES Construction General Permit also reduces and eliminates storm water and non-storm water discharges associated with construction activities through BMP controls, site inspections, and monitoring to evaluate the effectiveness of the permit implementation actions.

The NPDES Program is a federal program which has been delegated to the State of California for implementation through the State Water Resources Control Board and the nine Regional Water Quality Control Boards. In California, NPDES permits are also referred to as waste discharge requirements that regulate discharges to waters of the United States. NPDES General Permit coverage for Construction Activities is required for construction projects equal to or greater than one acre in size and requires the development of a SWPPP, which describes BMPs to prevent pollutant and sediment discharges from the construction site. In addition, EO 11988, *Floodplain Management*, directs all federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. Therefore, preparation of a Finding of No Practicable Alternative would be required for Air Force projects having the potential to impact floodplains, in accordance with this EO.

Under Section 401 of the CWA, a federal agency cannot issue a permit or license for an activity that may result in a discharge to Waters of the United States until the state where the discharge would originate has granted or waived Section 401 Water Quality Certification. Section 404 of the CWA regulates the discharge of dredged or fill material into Waters of the United States, including wetlands. Section 404 permits are reviewed and issued by the USACE. These activities will require authorization under Section 404 of the CWA. This Project will be authorized under Nationwide Permit 3 (Maintenance). Since waters of the U.S. "may be" present within the Project Area as discussed in this Preliminary Jurisdictional Determination (PJD), a PJD form and Pre-Construction Notification will be submitted to USACE.

3.10.1 Region of Influence

VAFB encompasses portions of two major drainage basins – San Antonio Creek and the Santa Ynez River. Aquifers capable of yielding large quantities of water usable for water supply are generally restricted to the deeper portions of these two waterways (USAF 1998). San Antonio Creek drains an area of approximately 154 mi.^{2} (248 km^2) flowing westward and discharging into the Pacific Ocean. Groundwater from the San Antonio Creek basin supplies water for irrigation, domestic, industrial, and municipal purposes through pumping. The only local

ground drinking water sources are the water wells located upstream, near Barka Slough, which are approximately 2 mi. (3 km) upstream from the bridge maintenance area. The Proposed Action Area is located in San Antonio Creek (see Figure 1-1) and the ROI for water resources is the San Antonio Creek basin from the site of the San Antonio Road West Bridge, downstream to the Pacific Ocean.

3.10.2 Surface Water and Floodplains

The San Antonio Creek watershed consists of mostly undeveloped riparian, scrublands, rangelands, and agricultural fields. Flow in San Antonio Creek is seasonal because of generally very little precipitation from June to November. Higher discharges generally occur during the rainy season, from November to May. The long-term average precipitation in the area is 14.7 in. per year (Santa Barbara County Flood Control District 2014).

The San Antonio Road West Bridge maintenance project is subject to EOs 11988, *Floodplain Management*, requirements and objectives because its intended location is in a floodplain. EO 11988 requires federal agencies to reduce the risk of flood loss, minimize the impact of flood on human safety, and to restore and preserve the natural and beneficial values served by floodplains. EO 11988 requires an evaluation of alternatives prior to proceeding with federal actions that may affect floodplains. The Air Force requested advance public comment in compliance with EO 11988 to determine if there were any public concerns regarding the project's potential impacts or comments on potential project alternatives. The 100-year floodplain for the San Antonio Creek basin is depicted in Figure 3-4.

Runoff and high flows increase the sediment load of the San Antonio Creek. Peak sediment loads occur during the wet season due to the increased flow at that time.

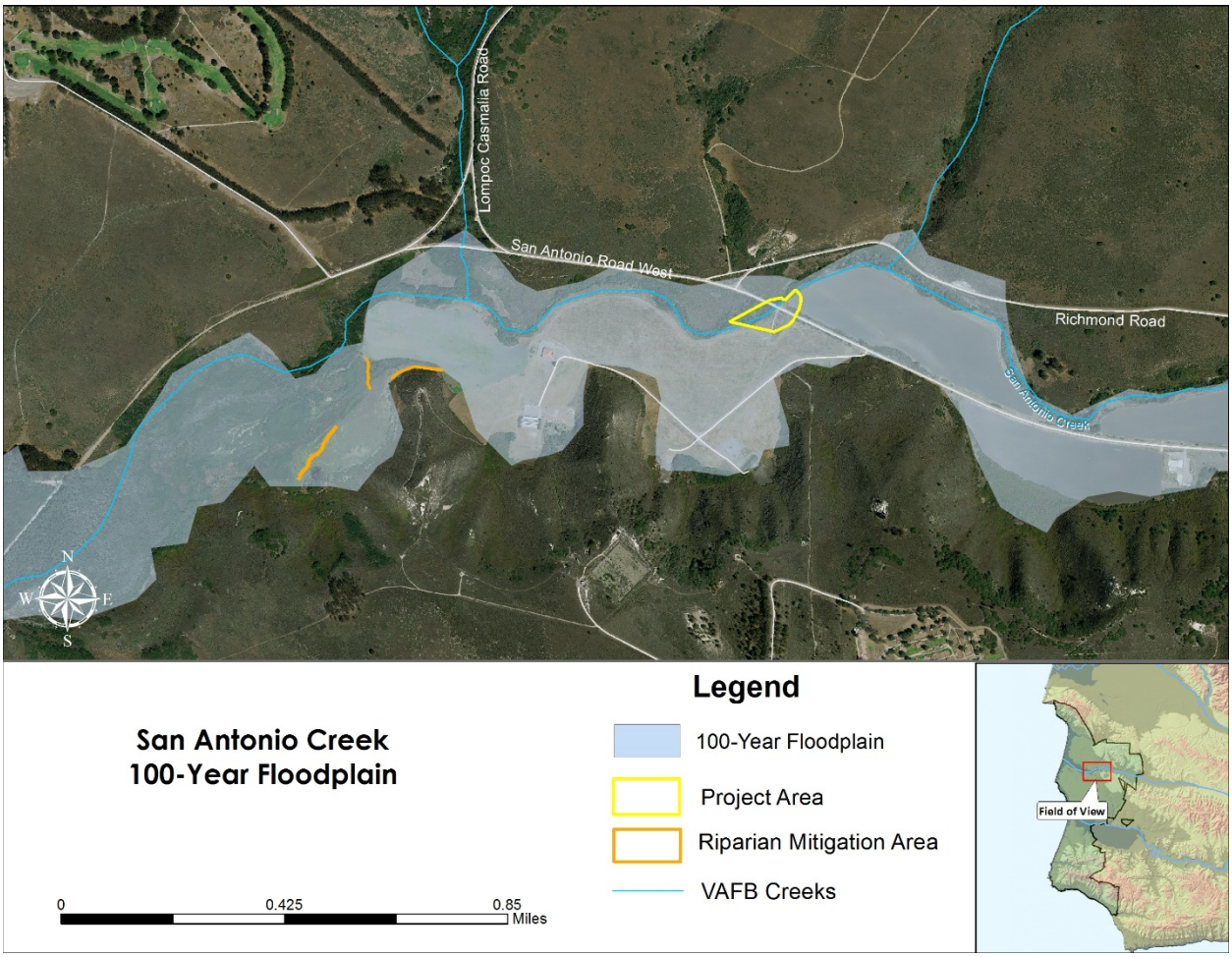

Figure 3-4. San Antonio Creek 100-Year Floodplain.

3.10.3 Groundwater

VAFB includes parts of two major groundwater basins, and at least two sub-basins. Most of the northern third of the base is within the San Antonio Creek Basin, while most of the southern two-thirds of the base are within the Santa Ynez River Basin and associated Lompoc Terrace and Cañada Honda Sub-basins.

Groundwater in the San Antonio Creek Valley occurs in most of the unconsolidated deposits (deposits through which water flows easily) that have filled the San Antonio Trough (a notch cut through the consolidated Tertiary rocks by San Antonio Creek). The water-bearing deposits in San Antonio Creek include alluvium, Orcutt Sand, the Paso Robles Formation, and Careaga Sand.

Groundwater in the area moves from the hills surrounding the San Antonio Creek Valley toward the center of the valley, and from there west to the Pacific Ocean. At Barka Slough groundwater rises to the surface, creating a freshwater marsh, and flows westward into San Antonio Creek as surface flow. Within the Proposed Action Area, west of Barka Slough, the movement of groundwater is restricted to a relatively thin, narrow strip of alluvium that has filled a notch cut through the consolidated Tertiary rock by San Antonio Creek.

Following the enactment of the Sustainable Groundwater Management Act in January 2015, the Board of Directors of the Santa Barbara County Water Agency approved a comprehensive basin water resources study that is to be completed in the San Antonio Creek Groundwater Basin with the USGS. The study, which is in progress and expected to take approximately 5 years, will provide information about the basin, including geologic and geohydrologic characteristics, updated water budget analysis, and water quality information. The existing basin boundary for the San Antonio Creek Groundwater Basin was initially developed by the California Department of Water Resources using the best information available at the time, including topographic and geologic maps. Geologic and geohydrologic evidence indicates the presence of an impermeable geologic barrier east of the Pacific Ocean that is creating the Barka Slough and the termination of the aquifer (County of Santa Barbara 2015).

The groundwater downstream of Barka Slough has relatively high total dissolved solid (TDS) concentrations at up to 3,780 milligrams per liter, as measured from the extreme western end of the Valley and westward of the Barka Slough (CDWR 2004). These TDS concentrations are in excess of acceptable drinking water standards; however, the groundwater is suitable for drinking water purposes with the addition of chlorine and fluorine. In addition, groundwater in this area has a sodium level that is beyond the limits for safe irrigation use (Muir 1964).

Vineyards and other agricultural properties located upstream of VAFB draw water from the Paso Robles Formation and other unconsolidated formations. Groundwater levels within the Proposed Action Area vary seasonally due to changes in runoff, storm conditions, and wells upstream that pump groundwater for irrigation. Stream flow during the wet season is derived primarily from rain runoff and tributaries. During the dry season the flow may be primarily derived from groundwater discharge from Barka Slough. The groundwater depth within the Proposed Action Area is within 10 ft. (3 m) of the creek bed (Fugro 2006).

The VAFB water supply primarily comes from the State Water Project (80–90%) in non-drought years. During drought periods (most recently 2007–2009 and 2014–current), groundwater supply is primarily provided by the San Antonio Groundwater Basin. Aquifers capable of yielding large quantities of water usable for water supply are generally restricted to the deeper portions of the Santa Ynez River and San Antonio Creek (USAF 1998). Four groundwater production wells located in the San Antonio Creek-Barka Slough area are used to supplement the VAFB state water during annual maintenance periods and periods of drought as mentioned above. The greatest threat to groundwater is contamination from hazardous material or waste releases that could infiltrate an aquifer. Groundwater from the San Antonio Creek basin supports irrigation, domestic, industrial, and municipal water needs through pumping. The local ground drinking water sources are the water wells located near Barka Slough, which are approximately 4 mi. (6.4 km) upstream from the bridge maintenance area.

Groundwater quality in the region meets all National Primary Drinking Water Regulation standards (CDWR 2004). Continued overdraft of the groundwater basins could lead to degradation in the water table levels and a compaction of the basins. Groundwater monitoring is conducted for basins that are used for drinking water.

3.10.4 Waters of the United States and Wetlands

EO 11990, *Protection of Wetlands*, requires federal activities and programs to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. EO 11990 requires an evaluation of alternatives prior to proceeding with federal actions that may affect wetlands. In addition, any activity that may result in discharge to waters of the state must obtain a Section 401 certification under the CWA, a through consultation with the RWQCB.

Delineation of wetlands within the Proposed Action Area was completed in June 2016 (USAF 2016). A report summarizing the results of this delineation is included in Appendix F. In addition to wetlands, the limits of jurisdictional waters of the United States were determined using the ordinary high-water mark (OHWM) as indicated by drift lines and shelving present on the bank.

Waters of the United States encompass the jurisdictional limits of the authority of the USACE and include streams and their tributaries that have defined bed and banks or that have an OHWM, which is a line on the shore established by the fluctuations of ordinary water flows, as well as adjacent jurisdictional wetlands (FR 33 CFR 320–330). Wetlands were delineated in accordance with the USACE methodology, *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008), which requires an area to meet specific criteria for each of three wetland parameters (vegetation, hydrology, and soils) in order to be considered a wetland.

According to section 33 CFR 328.4, the limits of jurisdiction of the USACE are bound by the OHWM of San Antonio Creek and the tributary channel and any adjacent wetlands.

Throughout the Project Area, San Antonio Creek exhibits a defined bed, bank, and channel, as well as an identifiable OHWM. Water flows slowly through this area, with a combination of pools and riffles (due to rip-rap). The OHWM is obscured in some areas due to the placement of rip-rap both upstream and downstream of the bridge. Features such as vegetation changes, drift deposits, and features present at topographically similar locations across the channel were utilized to identify the OHWM.

The active channel upstream of the bridge feature exhibits a large pooled area. This pool averages between 2 and 4 ft. (0.6 and 1.2 m) in depth and is heavily vegetated with bur reed within the OHWM around the perimeter. Where the rip-rap has been placed, water flows through and vegetation is prevalent, as the rip rap has caused sediment to accumulate. Beneath the bridge structure, water typically only flows within the western half of the bridge structure with the eastern section not experiencing inundation regularly, only during high flow events. There is a large amount of accumulated sediment within the eastern section of the bridge. Upstream of the bridge, the eastern bank is approximately 20 ft. (6.1 m) in height and heavily eroded and near vertical in most areas, averaging 35–50% slopes. The western bank upstream of the bridge has a gently sloping terrace that is approximately 2–5 ft. (0.6–1.5 m) above the OHWM and varies from 4 to 8 ft. (1.2 to 2.4 m) wide before it reaches a near vertical bank with a 40–50% slope.

Within the project area, saturation within the upper 12 in. was the most common indicator of wetland hydrology. Due to prolonged drought conditions and field work being conducted during

the dry season, hydrology indicators tended to provide the least useful measure of wetland determination. Within the study area, 77% of dominant plant species consisted of hydrophytic vegetation. Within the main channel of San Antonio Creek, the soils are primarily loam and sandy loam. The appearance of a depleted matrix was the most common indicator present and had soils with a value of six and a chroma of two.

Waters of the United States encompass adjacent wetlands as well as areas of open water and areas bound by the OHWM (non-wetland waters). A total of 0.08 ac. (0.03 ha) are classified as waters of the United States within the Main Project Area, and 0.35 ac. (0.14 ha) within the project area (Table 3-8; Figure 3-5). Additionally, 0.01 ac. (0.004 ha) of palustrine, forested non-tidal wetlands were also identified within the Proposed Project Area (Table 3-9; Figure 3-5).

Table 3-8. Project area within waters of the United States.

	Acreage	Length (ft.)	Width (ft.)
Project Area	0.35	606	10-36
Main Project Area	0.08	178	10-33

Note: ft. = feet

Table 3-9. Project area within jurisdictional adjacent wetlands.

	Acreage	Length (ft.)
Project Area	0.01	60
Main Project Area	0.01	60

Note: ft. = feet

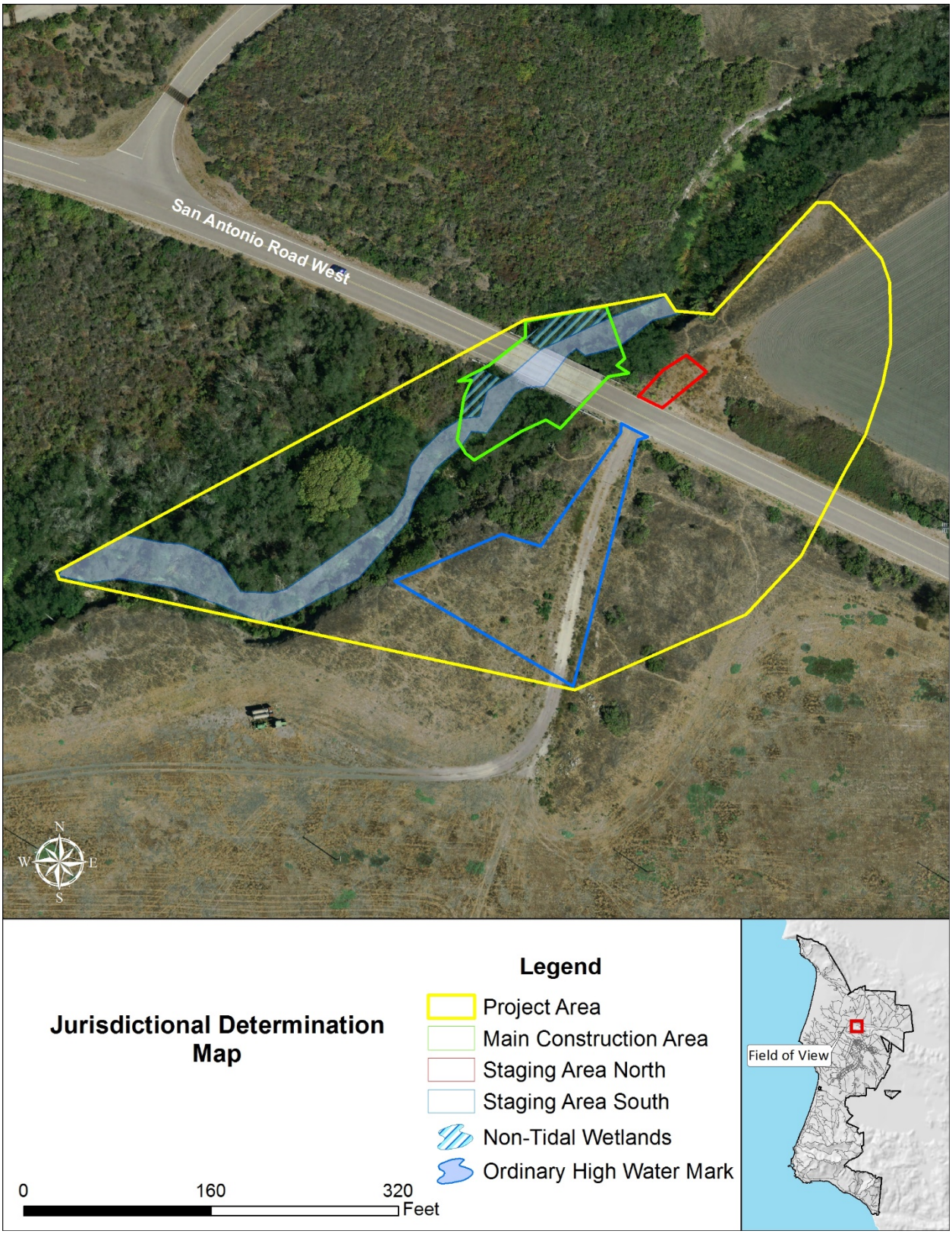

Figure 3-5. Jurisdictional Determination Map.

4 ENVIRONMENTAL CONSEQUENCES

The following analysis of environmental consequences is based on the potential direct, indirect, short-term and long-term, and cumulative effects of the Proposed Action and the No Action Alternative as described in Chapter 2. A list of factors to be considered in determining whether impacts are significant, for purposes of NEPA, are provided in each subsection. Both beneficial and adverse effects are considered. Whether beneficial impacts may occur will be discussed in the analysis of each subsection since the listing of factors to be considered in each subsection is normally focused on the potential for adverse impacts. The decision as to whether to prepare an Environmental Impact Statement is based on the impacts of the action as a whole considering context and intensity of the potential impacts.

4.1 Air Quality

Factors considered in determining whether implementing an alternative may result in significant impacts to air quality include the extent or degree to which implementation of an alternative would

- expose people to localized (as opposed to regional) air pollutant concentrations that potentially violate federal or state ambient air quality standards, or
- exceed caps (limits) as imposed by federal and state GHG regulations.

To determine the significance of operational impacts, emissions from the project were compared with the federal major source thresholds. The federal major source threshold for criteria pollutants is 100 tons per year, which is the major source threshold under 40 CFR 70, the Federal Operating Permit Program, for all pollutants.

Standard dust control measures (see Section 2.1.4, Environmental Protection Measures) must be implemented for any discretionary project involving earth-moving activities. Some projects have the potential for construction-related dust to cause a nuisance. Since Santa Barbara County violates the state standard for PM_{10}, dust mitigation measures are required for all discretionary construction activities regardless of the significance of the fugitive dust impacts based on the policies in the 1979 Air Quality Attainment Plan.

On 01 August 2016, the CEQ released final guidance on addressing climate change in NEPA documents. Although similar, this provides a more comprehensive climate policy than the 2010 draft guidance, which recommended quantification of GHG emissions, and proposed a threshold of 25,000 metric tons of carbon dioxide equivalent (CO_2e) emissions. The 2010 guidance indicated that use of 25,000 metric tons of CO_2e emissions as a reference point would provide federal agencies with a useful indicator, rather than an absolute standard of significance, to provide action-specific evaluation of GHG emissions and disclosure of potential impacts. This analysis complies with the recommendations of both the 2010 and 2014 versions of the draft guidance.

For purposes of this air quality analysis, project emissions within the VAFB region would be potentially significant if they exceed these thresholds. This is a conservative approach, as the

analysis compares emissions from both project-related stationary and mobile sources to these thresholds.

4.1.1 Proposed Action

4.1.1.1 Criteria Pollutant Emissions

Potential impacts to air quality from the San Antonio Road West Bridge maintenance would be mainly associated with sediment removal under the bridge. The analysis therefore involves estimating emissions generated from the proposed maintenance activities and assessing potential impacts on air quality. No increase in emissions is associated with operation of the San Antonio Road West Bridge, as the bridge itself would remain unchanged and in the same operational condition as prior to the project.

The Proposed Action would occur over a period of approximately 90 days. Emissions associated with the Proposed Action include fugitive dust from grading activities and import of dirt, exhaust emissions from heavy construction equipment, and emissions from worker vehicles and trucks. The assumptions of construction equipment, vehicles, and workforce required to implement the Proposed Action that were used for the analysis are shown in Table 2-2.

To calculate emissions associated with construction, the California Emissions Estimator Model (CalEEMod), Version 2013.2.2 (ENVIRON 2013) was used. The CalEEMod is the latest version of the land use model in California and considers emission factors for construction equipment from the ARB's OFFROAD model and emission factors for on-road vehicles from the ARB's EMFAC2011 model. As shown in Table 4-1, emissions produced during implementation of the Proposed Action would not exceed the significance thresholds for any criteria pollutant. Moreover, the implementation of EPMs, including fugitive dust control measures and measures designed to decrease diesel emissions, described in detail in Section 2.1.4.1 (Air Quality), would reduce potential emissions. The increase in construction related PM_{10} emissions would not have a substantial effect on the 24-hour CAAQS and would not exacerbate the annual standard. Therefore, the Proposed Action would have a less than significant impact to air quality.

Table 4-1. Proposed Action Emissions (tons/year).

Emissions, tons/year						
Construction Phase	**ROG**	**NOx**	**CO**	**SOx**	**PM_{10}**	**$PM_{2.5}$**
Skid Steer Loader	0.00008	0.00065	0.00037	0.00000	0.00005	0.00005
Skid Steer Loader (borrow Pit Site)	0.00003	0.00024	0.00014	0.00000	0.00002	0.00002
Soil Compactor (Excavator Attachment)	0.00005	0.00052	0.00040	0.00000	0.00004	0.00003
Hydraulic Crane	0.00004	0.00050	0.00034	0.00000	0.00002	0.00002
Dump truck	0.00001	0.00014	0.00007	0.00000	0.00001	0.00000
Water truck	0.00001	0.00007	0.00003	0.00000	0.00000	0.00000
Subtotal	**0.00022**	**0.00212**	**0.00135**	**0.00000**	**0.00014**	**0.00013**
Significance threshold	50	100	100	100	100	100
Exceeds threshold?	No	No	No	No	No	No

Notes: ROG = reactive organic gases, NO_x = oxides of nitrogen, CO = carbon monoxide, SO_x = oxides of sulfur, PM_{10} = particulate matter less than 10 microns, $PM_{2.5}$ = particulate matter less than 2.5 microns

4.1.1.2 Greenhouse Gas Emissions

Emissions of GHGs are considered to have a potential cumulative impact on global climate. The emissions associated with maintenance of the San Antonio Road West Bridge would generate a diminutive amount of regional emissions of CO_2 and other GHGs. Scientists are in general agreement that the Earth's climate is gradually changing, and that change is due, at least in part, to emissions of CO_2 and other GHG from manmade sources. The anticipated magnitude of global climate change is such that a significant cumulative impact on global climate exists.

On the issue of global climate change, however, there are no adopted federal plans, policies, regulations, or laws mandating reductions in the GHG emissions that cause global climate change. The climate change research community has not yet developed tools specifically intended to evaluate or quantify end-point impacts attributable to the emissions of GHGs from a single source. In particular, because of the uncertainties involving the assessment of such emissions regionally and locally, the very minor incremental contribution of the Proposed Action to climate change cannot be determined given the current state of the science and assessment methodology.

To calculate GHG emissions associated with the Proposed Action, emissions attributable to Scopes 1, 2, and 3 as defined in EO 13693 have been estimated. Scope 1 emissions include those emissions attributable to sources that are owned and operated by the Federal government. Scope 2 emissions include those emissions that are direct greenhouse gas emissions resulting from the generation of electricity, heat, or steam purchased by a Federal agency. Scope 3 emissions include greenhouse gas emissions from sources not owned or directly controlled by a Federal agency but related to agency activities such as vendor supply chains, delivery services, and employee travel and commuting. For the Proposed Action, these GHG emissions include emissions associated with maintenance of the San Antonio Road West Bridge.

On 1 August 2016, the CEQ released final guidance on addressing climate change in NEPA documents. This EO adopted much of what the draft guidance proposed, recommending quantification of GHG emissions, and a threshold of 25,000 metric tons of CO_2e emissions per year for a source. The CEQ indicates that use of 25,000 metric tons of CO_2e emissions as a reference point provides federal agencies with a useful indicator, rather than an absolute standard of significance, for agencies to provide action-specific evaluation of GHG emissions and disclosure of potential impacts.

The Proposed Action's emissions have been compared with the proposed federal threshold of 25,000 metric tons of CO_2e emissions. Table 4-2 summarizes the annual GHG emissions associated with maintenance of San Antonio Road West Bridge. These data show that the annual CO_2e emissions estimated for the Preferred Alternative would be less than the proposed significance threshold of 25,000 metric tons of CO_2e. Cumulative impacts to global climate change would not be significant.

Table 4-2. Proposed Action GHG Emissions.

Scenario/Activity	Metric Tons per Year[1]			
	CO_2	CH_4	N_2O	CO_2e
Total GHG Emissions	0.18882	0.00006	0.00113	0.52649

[1] CO_2e = (CO_2 * 1) + (CH4* 21) + (N2O * 298).

In sum, given the small-scale and short duration of the Proposed Action, coupled with the EPMs set forth in Section 2.1.4.1 (Air Quality), net emissions change would not significantly affect regional air quality and, therefore, represent a less than significant impact.

4.1.2 No Action Alternative

Under the No Action Alternative, the proposed repairs and maintenance to the erosion protection system at the San Antonio Road West Bridge would not be conducted. There would be no change to baseline air emissions and no additional impacts associated with the No Action Alternative. Therefore, implementation of the No Action Alternative would not have a significant effect on air quality.

4.2 Biological Resources

Factors considered in determining whether implementing an alternative may result in significant impacts on biological resources include the extent or degree to which implementation of an alternative would result in:

- unmitigable loss of important quantities of declining vegetation communities (including wetlands) that are considered rare,
- impacts to endangered, threatened, or protected species, or
- alteration of regionally- and locally important wildlife corridors that would severely and permanently limit their use.

Impacts to biological resources would occur if species (endangered, threatened, rare, candidate, or species of concern) or their habitats, as designated by federal and state agencies, would be affected directly or indirectly by project-related activities. These impacts can be short- or long-term impacts, for example, short-term or temporary impacts from noise and dust during maintenance activities and long-term impacts from the loss of habitat to support wildlife populations.

VAFB initiated formal Section 7 consultation with the USFWS to address potential adverse impacts to federally protected wildlife species, associated with the maintenance and repair of erosion control measures on San Antonio Road West Bridge. Completed consultation was in the form of a BO issued by USFWS (see Appendix D) and the requirements will be fully implemented.

4.2.1 Proposed Action

Potential impacts to biological resources as a result of the Proposed Action include:

- short-term (temporary) and long-term (permanent) loss of habitat from construction related activities such as access, excavation and construction;

- loss of individuals within the work area due to excavation, crushing, or burial;
- loss of individuals in habitats adjacent to work areas due to soil erosion;
- abandonment of breeding or roosting sites due to project related noise and associated disturbance;
- disruption of foraging or roosting activities due to project related noise and associated disturbance;
- soil erosion into wetlands or open water adjacent to the project site;
- exposures to herbicide residue; and
- degradation of water quality due to turbidity.

4.2.1.1 Vegetation Resources

As discussed in Section 3.2.3 (Vegetation Resources), native vegetation types identified in the Proposed Action Area (see Figure 3-1 and Table 3-3) include central coastal scrub and central coast arroyo willow riparian forest and scrub. Disturbances to native plant communities within the footprint of the Proposed Action Area would be unavoidable. Temporary disturbances would occur as a result of the containment of the river channel, installation of silt fencing, staging area construction, and potential increased turbidity immediately downstream of the Proposed Action Area. Permanent losses within the project footprint would occur as a result of the removal of approximately 0.3 ac. (0.12 ha) of native vegetation under the bridge.

Removal of native plant communities, and temporary disturbances to these communities, would be necessary during project implementation. However, the removal of native vegetation would be minimized to the extent practicable and native vegetation would be replanted to restore all temporarily disturbed areas, except under the bridge. As much as feasible, vegetation removal would be restricted to the minimum areas possible and restricted to the level of the bottom substrate, with root systems of native plants and trees to be left in place wherever possible to enable vegetation to re-sprout quickly after completion of project activities. Permanent impacts to willow riparian habitat would be mitigated at a 3:1 ratio (area mitigated: area impacted). In total, 0.48 ac (0.19 ha) of willow riparian habitat will be enhanced in the designated riparian mitigation area (Appendix F). In addition, BMPs would be implemented to control erosion as a result of disturbed soils.

Long-term maintenance (e.g., weeding and plant replacement) and monitoring would ensure the successful restoration of native plant communities and wetland habitats to the maximum extent possible. The process of restoring the project area and riparian mitigation area would include maintenance, monitoring, success criteria, and contingency measures to ensure restoration success. With implementation of the environmental protection and monitoring measures, impacts to native plant communities would be temporary and less than significant.

No special-status plant species have been documented within the footprint of the Proposed Action Area during the biological surveys in support of this project (USAF 2016) or prior surveys of the project area.

4.2.1.2 Wildlife Resources

Native plant communities within the Proposed Action Area are highly productive wildlife habitats. Temporary and permanent impacts to these habitat types during project implementation would have potential adverse effects on wildlife species. Project activities involving the use of heavy equipment also generate noise that could result in temporary disturbances to wildlife resources.

Temporary disturbances due to noise and human presence could disrupt foraging and roosting activities or cause common bird and wildlife species to avoid the work area during maintenance activities. Temporary disturbances could also potentially result in the loss of wildlife species that are present during project activities. Adult birds would likely move to adjacent suitable habitat due to project related disturbances and are not anticipated to experience direct physical effects. In addition, qualified biologists would be present during all maintenance activities and additional minimization measures designed to protect nesting birds and native wildlife would be implemented (Section 2.1.4.2, Biological Resources).

The Main Project Area is located in a rural and undeveloped area. Ambient noise in rural areas ranges between 35 and 40 dBA (WSDOT 2015) and background noise levels in an area with low population density (1–100 people per square mile) is estimated at 35 L_{eq} dBA (daytime noise levels exclusive of traffic) (WSDOT 2015). Predictions of non-transient noise levels associated with activities such as those that would occur during bridge maintenance are depicted in Table 4-3, with the assumption that equipment is located in one area and operating simultaneously.

Table 4-3. L_{eq1H} Noise Levels as a Result of Continuous Construction Activities.

Construction Category and Equipment	Predicted Noise Level at 50 feet (dBA)
Front End Loader	79–80
Excavator	81–85
Crane	75–87
Dump Truck	76–84

Source: U.S. Department of Transportation 2006
Note: dBA = A-weighted decibels

The construction equipment used to conduct bridge maintenance activities would be a temporary source of disturbance to wildlife. Most wildlife species would avoid the project area or have adapted to some level of ongoing human activity in the area. It is expected that most wildlife species would continue to use the adjacent areas in the intervals between disturbances.

Removal of sediment, replacement of wire fabric, repair of wire fabric, vegetation removal, bank erosion control measures, maintenance activities, and site restoration have the potential to disturb, injure, or crush wildlife species in and near the Proposed Action Area. The Air Force proposes to relocate terrestrial native wildlife out of the Proposed Action Area to the extent

practicable to suitable habitat in the surrounding areas, thus minimizing the threat of noise, vibration, and other construction-related disturbances that would adversely affect these species. In addition, the EPMs described in Section 2.1.4.2 (Biological Resources), would be implemented and, therefore, impacts to wildlife species would be less than significant.

4.2.1.2.1 Effects to Habitat

The Proposed Action would result in the temporary loss of habitat for special status species. Changes in water flow, temporary increases in turbidity, and removal of riparian vegetation associated with implementing the Proposed Action have the potential to temporarily adversely impact habitat for special status fish and aquatic herpetofauna. Specifically, water quality and quantity, substrate, and vegetative overstory could be affected in, and possibly downstream, of the Proposed Action Area; however, the potentially affected area would be small.

Impacts to special status species habitat are expected to be largely restricted to the duration of maintenance activities. In the short term, the area of the channel temporarily diverted would not be available for breeding or foraging habitat for the duration of the bridge maintenance, for approximately 90 days. Permanent loss of special status species habitat within the Proposed Action Area is expected to be restricted to the area directly under the bridge where vegetation removal would occur, approximately 0.3 ac. (0.12 ha) (Table 4-4). After bridge maintenance is complete, the area would once again receive creek flow and should again function as habitat for special status species. Disturbed areas would be restored with appropriate vegetation. Permanent impacts to willow riparian habitat will be mitigated at a 3:1 ratio (area mitigated: area impacted). In total, 0.48 ac (0.19 ha) of willow riparian habitat will be enhanced in the designated mitigation area. Additionally, the Air Force would monitor and eradicate non-native invasive plant species in the Proposed Action Area following the completion of the project.

The potential impacts of the Proposed Action on special status wildlife species would be minimized to the greatest extent practicable. Most of the potential impacts would be avoided by the establishment of an exclusion area around the active Proposed Action Area, from which qualified biologists would capture and relocate special status wildlife species to suitable adjacent habitat prior to the onset of maintenance activities. The implementation of additional minimization and monitoring measures, described in Section 2.1.4.2 (Biological Resources), would minimize the potential impact of project-related activities on special status wildlife species. Additionally, since the area of potential impacts would be relatively small, the impacts temporary, relatively little habitat would be impacted, and the disturbed areas restored, the Proposed Action would not have significant effects on habitat for special status species.

Table 4-4. Listed Species Habitats within the Proposed Action Area (no Critical Habitat is designated within the Proposed Action Area).

Habitat Type	Temporarily Removed or Disturbed	Post-Action[3, 4]	Habitat Loss
CRLF			
Aquatic (Breeding) Habitat	0.35	0.35	**0**
High Quality Upland Habitat[1]	0.85	0.55	**-0.3**
Low Quality Upland Habitat[2]	1.7	1.68	**-0.023**
TWG			
Aquatic (Breeding) Habitat	0.35	0.35	**0**
UTS			
Aquatic (Breeding) Habitat	0.35	0.35	**0**

[1] High quality upland CRLF habitat comprised of riparian and freshwater marsh habitats.
[2] Low quality upland CRLF habitat comprised of upland habitats including central coast scrub and non-native habitat types. Ruderal and anthropogenic habitats are excluded; management of these habitats prevents the establishment of sufficient vegetative cover to support CRLF.
[3] Estimated acres are based on the assumption that the channel location, depth, and width after the action is complete are similar to the morphology documented during 2016 surveys. Because the river is a dynamic system, the actual post-action acreage may differ from those predicted here as a result of significant rainfall and flow events.
[4] Post-Action includes estimates of habitat that would be fully restored after construction and demolition.

4.2.1.3 Special Status Wildlife Species

Several special status wildlife species occur or have the potential to occur within or near the Proposed Action Area. Table 4-5 presents a summary of potential project-related impacts on special status wildlife species. Removal of sediment, replacement and repair of wire fabric, vegetation removal, and bank erosion control measures have the potential to result in take of some special status wildlife species from activities. Activities associated with the Proposed Action have the potential to result in temporary adverse effects to populations of CRLF, TWG, UTS, migratory birds, and other special status wildlife in the immediate area of disturbance. The activities that could directly or indirectly adversely affect these species include removal of sediment, repair and replacement of wire fabric, bank erosion control measures, maintenance activities, and site restoration. The specific potential effects and the potentially affected species or types of animals are discussed in detail below.

Biological monitors would be present throughout the project duration to document the presence of special status species and minimize impacts to these species within the Proposed Action Area. Measures described in Section 2.1.4.2 (Biological Resources) would be implemented for minimizing or preventing adverse effects to special status wildlife species.

The Proposed Action Area is not located within designated or proposed Critical Habitat for any wildlife species; therefore, the Proposed Action would not adversely affect Critical Habitat.

Table 4-5. Potential Impacts to Special Status Wildlife Observed Within Proposed Action Area.

Species	Status		Potential Impacts
	USFWS	CDFW	
Amphibians			
California Red-legged Frog (*Rana draytonii*)	FT	CSC	Disturbance from noise, vibration, & light, decreased water quality, relocation, increased predation, direct physical impacts, exposure to herbicide residue, temporary loss of habitat.
Reptiles			
Western Pond Turtle (*Antinemys pallida*)	-	CSC	Disturbance from noise, vibration, & light, decreased water quality, relocation, increased predation, direct physical impacts, exposure to herbicide residue, temporary loss of habitat.
Two Striped Garter Snake (*Thamnophis hammondii*)	-	CSC	Disturbance from noise, vibration, & light, increased predation, direct physical impacts, exposure to herbicide residue, temporary loss of habitat.
Fishes			
Unarmored Threespine Stickleback (*Gasterosteus aculeatus williamsoni*)	FE		Disturbance from noise, vibration, & light, decreased water quality, relocation, increased predation, direct physical impacts, exposure to herbicide residue, temporary loss of habitat.
Tidewater Goby (*Eucyclogobius newberryi*)	FE	CSC	Disturbance from noise, vibration, & light, decreased water quality, relocation, increased predation, direct physical impacts, exposure to herbicide residue, temporary loss of habitat.
Arroyo Chub (*Gila orcuttii*)	-	CSC	Disturbance from noise, vibration, & light, decreased water quality, relocation, increased predation, direct physical impacts, exposure to herbicide residue, temporary loss of habitat.
Birds			
Ferruginous Hawk (*Buteo regalis*)	BCC	-	Disturbance from noise, temporary loss of foraging and nesting habitat
Northern Harrier (*Circus cyaneus*)	-	CSC	Disturbance from noise, temporary loss of foraging and nesting habitat
White-tailed Kite (*Elanus leucurus*)	-	CSC	Disturbance from noise, temporary loss of foraging and nesting habitat
Allen's Hummingbird (*Selasphorus sasin*)	BCC	-	Disturbance from noise, temporary loss of foraging and nesting habitat
Nuttall's Woodpecker (*Picoides nuttallii*)	BCC	-	Disturbance from noise, temporary loss of foraging and nesting habitat
Olive-sided Flycatcher (*Contopus cooperi*)	-	CSC	Disturbance from noise, temporary loss of foraging and nesting habitat

Loggerhead Shrike (*Lanius ludovicianus*)	BCC	-	Disturbance from noise, temporary loss of foraging and nesting habitat
Oak Titmouse (*Baeolophus inornatus*)	BCC	-	Disturbance from noise, temporary loss of foraging and nesting habitat
Yellow Warbler (*Dendroica petechia brewsteri*)	BCC	CSC	Disturbance from noise, temporary loss of foraging and nesting habitat
Yellow-breasted Chat (*Icteria virens*)	-	CSC	Disturbance from noise, temporary loss of foraging and nesting habitat
Tricolored Blackbird (*Agelaius tricolor*)	BCC	CSC	Disturbance from noise, temporary loss of foraging and nesting habitat
Lawrence's Goldfinch (*Spinus lawrencei*)	BCC	-	Disturbance from noise, temporary loss of foraging and nesting habitat
Mammals			
Pallid Bat (*Antrozous pallidus*)	-	CSC	Disturbance from noise, temporary loss of foraging habitat.
Western Red Bat (*Lasiurus blossevillii*)	-	CSC	Disturbance from noise, temporary loss of foraging habitat.

Notes: FE = Federal Endangered Species, FT = Federal Threatened Species, BCC = Federal Bird of Conservation Concern; SE = State Endangered Species, CSC = California Species of Concern, CDFW = California Department of Fish and Wildlife

4.2.1.3.1 California Red-legged Frog

Physical Effects

The Proposed Action would involve intrusive activities within the Main Project Area (i.e., creek damming, diversion and dewatering, removal of sediment currently covering gabions, repair/replacement of gabions, and cutting willow riparian vegetation), which could result in physical injury and death of CRLFs. Under the Proposed Action, CRLFs (all life stages) could be inadvertently crushed or otherwise harmed by vehicles, equipment, or people during pre-maintenance activities (creek diversion, dewatering), and if CRLFs enter the Main Project Area during maintenance activities (e.g., sediment removal).

During creek diversion activities (damming, culvert installation, and use of culverts), CRLFs may be subject to physical injury. Currently, a beaver dam is located just upstream of the bridge and has resulted in a large backup of water (several feet deep and wide) that would need to be lowered, for manageability, prior to damming or diverting the creek. The USAF anticipates lowering this upstream area to a desired water depth (approximately 2–3 ft. [0.6–0.9 m]) by piercing a small hole in the upstream beaver dam. A USFWS-approved biological monitor would be present during these activities to ensure that the rate of water release from the beaver dam is not too fast, creating excessive turbulence downstream, or causing anoxic conditions or the stranding of animals, including the CRLF, in any backwater pockets.

After achieving the desired water depth, the USAF would install a dam upstream of the beaver dam, to control downstream flow, and install a dam downstream of the Main Project Area, to facilitate creek diversion and prevent backflow once the culvert is installed. Prior to installing the dams, the USFWS-approved biologist would inspect and relocate any CRLFs that remain in the upstream beaver pond.

After dam installation, up to two culverts (pipes) would be installed through the Main Project Area, one through each bay, connecting the upstream and downstream dams. The culvert pipes would also pass through the upstream beaver dam since it would be retained. Once installed, the USAF would have the ability to direct creek flow through either bay via the culverts. As designed, the culverts would allow the continued flow of San Antonio Creek while bypassing the area under the bridge where ground-disturbing activities are occurring. The culverts would serve to keep soil and debris out of the creek, protect sensitive species like the CRLF, and prevent flowing water from flooding the construction site. During these activities, a USFWS-approved biologist would be present to monitor for CRLFs and relocate any CRLF observed. As the USAF switches between the use of the two culverts, a USFWS-approved biologist would be present during these activities to monitor for CRLFs and relocate any observed.

After creek diversion activities are complete, the USAF would dewater the Main Project Area, as needed, to implement the Proposed Action. This would involve activating the dams and then using water pumps to remove any water remaining in the Main Project Area, after creek diversion, as well as any groundwater encountered during digging (to access the gabion baskets) and thereafter directing the water onto an adjacent agricultural field. The use of water pumps could result in the suctioning or trapping of CRLFs. In response to these potential effects, the water pump intake would be placed in a 30-gallon barrel with fine mesh (1/16th inch) screened holes by a qualified biologist to protect fish and wildlife from entering the pump intake. Once dewatering begins, the USAF would ensure that the dewatering rate would not exceed the ability of the biologist to confirm whether CRLFs are entering the pumps.

During maintenance activities associated with gabion inspection, repair and replacement, CRLF have the potential to be inadvertently crushed if they enter the Main Project Area. In response, the USAF would relocate CRLFs and install temporary exclusionary fencing prior to work (see Section 2.1.2.4.3, Fish and Wildlife Resources). Temporary exclusionary fencing is intended to prevent CRLFs from entering the Main Project Area. However, the fencing may be passable at the edges of the Main Project Area; CRLFs could get around the barrier/pass through rock crevices in the gabions that line the banks in the Main Project Area. As a result, the USAF intends to require daily biological monitoring by a USFWS-approved biologist to ensure CRLFs are not located in the Main Project Area, as best as can be determined. The USAF may incorporate some attractant (e.g., shelter feature) at the edges of the exclusionary fencing, to aid in the relocation of CRLFs that may pass through the sides of the fencing by attracting CRLFs to certain areas within the Main Project Area. Biological monitors would be onsite to minimize the number and occurrence of CRLFs that enter the area with active operations. Any CRLFs found in the exclusion area would be relocated to an appropriate location in San Antonio Creek.

Relocation of CRLFs has the potential to result in injury and transmission of the chytrid infection, which was long-present but recently confirmed in San Antonio Creek (MSRS 2014). To prevent inadvertent adverse effects, only a USFWS-approved biologist would relocate CRLFs. In addition, all personnel working in the Main Project Area would adhere to the requirements stated in *The Declining Amphibian Populations Task Force Fieldwork Code of Practice* (Declining Amphibian Populations Task Force 1998), which includes a list of sanitation practices for the protection of species, such as the CRLF.

Despite the foregoing conservation measures, the Proposed Action would tend to adversely affect early life phases of CRLF (eggs and juveniles) to a greater extent than adults, with eggs being more at risk than juveniles, which normally can be observed and relocated. The USAF intends to implement the Proposed Action in the daytime during anytime of the year, including the breeding season. Juveniles are active during both the day and night and are restricted to aquatic habitats during certain life cycle phases, which make them less able to move away from certain threats as compared to adult CRLFs. The USFWS-approved biological monitor may be able to relocate CRLF tadpoles, but they may avoid detection due to their small size. In addition, CRLFs generally breed from November to April, and metamorphosis from tadpoles to juveniles (terrestrial phase) may take up to 28 weeks (5 months), but could be delayed up to one year. As a result, early life phases of CRLFs (eggs and juveniles) may occur in the Main Project Area throughout the year and adverse effects to early life stages may occur from the Proposed Action. For example, the potential loss of eggs during vegetation reduction activities (discussed below) could prevent an increase in population of the CRLF population in San Antonio Creek. The USAF could attempt to relocate observed CRLF egg masses, but this has not normally been conducted at VAFB and no information is readily available on the methods or probable success of relocating egg masses.

Therefore, the Proposed Action may result in adverse effects to CRLF from accidental physical injury or death, but it would be implemented with EPMs designed to avoid or minimize the potential adverse effects to the maximum extent practicable (Section 2.1.4.2, Biological Resources).

Reduction in Prey

The Proposed Action may contribute to reduction in CRLF prey, aquatic and terrestrial invertebrates, because of the reduction of willow riparian vegetation canopies. Under the Proposed Action, the USAF would initially cut vegetation (2-in. diameter or larger) within an approximate 0.3 ac. (0.12 ha) area with subsequent vegetation cutting required periodically for regrowth of the same diameter. This area is presumed to contain both aquatic and non-aquatic riparian vegetation. Cutting willow riparian vegetation would lead to the loss of some willow riparian canopies.

Riparian canopies provide litter input, which is a major energy source for aquatic communities (Inoue et al. 2012). It is estimated that more than 50% of net primary production directly enters food webs as detritus (i.e., dead organic matter), which is broken down by invertebrates (Bottollier-Curtet 2015; Ferreira 2015 et al. Inoue et al. 2012). One study documented that headwater streams with herbaceous riparian buffers had greater invertebrate diversity than those with no buffers (Smiley et al. 2011). Another study documented that the presence and diversity of aquatic plants and littoral aquatic vegetation was positively correlated with the abundance of littoral macro-invertebrates (Jurca et al. 2012). San Antonio Creek may presently have high invertebrate diversity because it is a perennial stream that has persisted through droughts, is high quality riparian habitat, and likely supports aquatic vegetation (Ferreira 2015 et al.; MSRS 2014; MSRS 2015b).

Cutting some willow trees down to a stump could cause a possible change in the invertebrate community in the Proposed Action Area because there would be a reduced canopy and leaf litter input, but vegetation less than 2 in. in diameter would remain. However, the reduction may not be detrimental to the persistence of invertebrate communities if they are able to move into adjacent and more suitable habitats until return to a favorable condition (D'Ambrosio et al. 2014). Dense riparian vegetation exists both upstream and downstream of the Main Project Area and any detritus or broken-down organic matter would pass through the Main Project Area and be available for CRLFs. As a result, invertebrates in the Main Project Area could remain present or, at worst, relocate into adjacent habitats until conditions in the Main Project Area become favorable again. Finally, the Proposed Action would not directly change any of the features of San Antonio Creek (i.e., stream size, gradient, and connectivity to a floodplain) that could further affect invertebrate communities (D'Ambrosio et al. 2014).

Therefore, the Proposed Action could result in adverse effects to CRLF as a result of the effects of vegetation reduction on CRLF prey populations; however, this impact would be temporary, and post project restoration would allow prey to recover. In addition, adjacent suitable habitat would provide adequate prey to CRLF and, considering the small size of the Proposed Project area, impacts would be minimal.

Construction Noise

The Proposed Action would result in short-term noise effects during bridge maintenance activities, which could adversely affect CRLFs because it may cause avoidance of or result in exposure to noise from the Main Project Area. The CRLF recovery plan indicates that increased noise in an area can degrade CRLF habitat (USFWS 2002).

The Main Project Area is located in a rural and undeveloped area. Ambient noise in rural areas ranges between 35 to 40 dBA (WSDOT 2015) and background noise levels in an area with low population density (1 – 100 people per square mile) is estimated at 35 Leq dBA (daytime noise levels exclusive of traffic) (WSDOT 2015). Although the Main Project Area is undeveloped, farming activities occur at the top of the bank and vehicles use the bridge crossing San Antonio Creek on a daily basis.

The calculated traffic noise level in the Main Project Area is approximately 73.9 dbA L_{eq} (hour) at 50 ft. (15 m). This is based on an average number of 2,000 vehicles per hour at a speed of 55 mi. per hour for a two-lane undivided highway (CalTrans 2014, DMV 2015, WSDOT 2015). However, this is an overestimate of traffic volume on San Antonio Road West. A maximum of 1,937 vehicles travel northbound on VAFB per hour (from traffic counting station), but not all continue onto San Antonio Road West (CalTrans 2014). A recent vehicle count at the Main Project Area provided a more accurate estimate of 246 cars per hour using San Antonio Road West; based on a 10-minute vehicle count. Therefore, it is likely that traffic noise in the Main Project Area is less than initially calculated, approximately 64.9 dbA L_{eq} (hour) at 50 ft. (15 m) (WSDOT 2015).

Noise measurements in the Main Project Area were collected using a handheld mobile device. In-air noise levels under the bridge (no vehicles passing) is approximately 43.9 L_{eq}/45.7 maximum sound level (L_{max}) dBA and 41.6 L_{eq}/55.7 L_{max} dBA (with vehicles passing). In-air noise levels on top of the bridge (vehicle passing) was greater – approximately 56 Leq/78 L_{max} dBA. Noise levels

with vehicles passing would represent background levels at the Main Project Area. In addition, this data suggests a potential 14.4 L_{eq}/22.3 L_{max} dBA buffering effect from topography in the Main Project Area due to the approximate 16 to 18-ft. elevation differential. Therefore, noise generated under the bridge may have a lesser effect on receptors on the top of the bank and vice versa.

Under the Proposed Action, the USAF would need to remove accumulated sediment requiring the use of a crane, front loader, and dump truck. The potential construction noise from the equipment, combined, is approximately 84 L_{max} dBA (crane L_{max} = 81 dBA, front loader Lmax = 79 dBA, and dump truck L_{max} = 76 dBA at 50 ft. (15 m) from the noise source (FHWA 2006; WSDOT 2015). Based on these values, Table 4-6 shows the potential in-air noise levels from the Proposed Action considering potential attenuation over distance. The Proposed Action would constitute a point noise source and therefore a 6 dB reduction factor applies per doubling of distance from the Main Project Area (WSDOT 2015). An additional 1.5 dBA reduction is applied for a "soft site" because the Main Project Area is near water and the majority of the area is not paved (WSDOT 2015).

Table 4-6. Noise Attenuation at the Main Project Area.

Distance from noise source (feet/mile)	Construction Noise (L_{max} dBA at 50 feet) (using 7.5 dBA reduction factor)	Background Noise (L_{max} dBA) (includes vehicle noise)	
		Top of Bridge	Under Bridge
0/MPA*	N/A	78	55.7
50 (0.01)	84	78	55.7
100 (0.02)	76.5	**78**	55.7
200 (0.04)	69	78	55.7
400 (0.08)	61.5	78	55.7
800 (0.15)	54	78	**55.7**

Source: WSDOT 2015. Note: N/A = not available, MPA = Main Project Area.

CRLFs would be expected to perceive noise generated from the Proposed Action approximately 100 ft. (30 m) and 800 ft. (244 m) from the Main Project Area for CRLFs located on the top of the bank and under the bridge, respectively. This assumes CRLF have adapted to background noise (noise typical traffic flow over the San Antonio Road West Bridge) and anything in excess would be perceptible to CRLFs. This does not necessarily indicate the threshold of adverse effects to CRLF. Using the 7.5 dBA reduction factor in reverse, the potential noise at the Main Project Area would be 91.5 dBA. No information exists on what noise levels would adversely affect the CRLF physiologically or behaviorally, based on a review of available information. However, since wildlife may adapt to increased noise in the environment, it is possible that the noise generated in excess of background noise would still not have any adverse effect on CRLFs. Since San Antonio Creek has adjacent suitable habitat for CRLF, if noise did cause any interference with CRLF activities/behavior, CRLFs would be able to retreat to areas further away from the Main Project

Area. This may be the case under the Proposed Action where noise disturbance would be temporary, within a 90-day schedule.

Finally, the Proposed Action anticipates periodic maintenance within San Antonio Creek and its riparian corridor to include manually or mechanically cutting vegetation, which may generate noise depending on the method selected. If a chainsaw is used, there would be some noise and vibration generated. A chainsaw has an average noise level of 84 L_{max} dBA at 50 ft. (15 m) from the noise source (FHWA 2006; WSDOT 2015). This is consistent with the cumulative noise value estimated for implementing the other aspects of the Proposed Action (84 L_{max} dBA for all equipment to be used). In contrast, use of a chainsaw would generate noise only once per year and for no more than a few days as compared to noise generated over a 3-month period for the initial aspects of the Proposed Action. In addition, maintenance activities would not require use of the other heavy-duty vehicles and equipment that would be required to implement the Proposed Action, initially.

The Proposed Action could potentially result in short-term noise effects during bridge maintenance activities, which could adversely affect CRLFs as it may cause avoidance of or result in exposure to noise from the Main Project Area; however, considering the short duration and small area affected, long-term impacts are not anticipated.

Predation Risk

The Proposed Action may contribute to increased predation risk because of the alteration of potential refuge habitat used to avoid predators and the potential interference caused by noise generating activities within the Main Project Area. Under the Proposed Action, the USAF would cut willow riparian vegetation (including aquatic vegetation if 2 inches or more in diameter), which may include refuge habitat. In San Antonio Creek, CRLF predators include bullfrogs and fish; fish tend to prey upon CRLF larvae. In one study, it was found that bullfrogs and mosquito fish adversely affected CRLF tadpoles with bullfrogs more strongly associated with predation on CRLF tadpoles, preventing population recruitment (Lawler et al. 1999). Therefore, even if the Proposed Action compromises some refuge habitat, CRLFs would be able to find suitable adjacent habitat in the watershed and even in the Action Area since some vegetation would remain (vegetation less than 2 in.). Additionally, CRLF may perceive noise and vibrations associated with the Proposed Action, which would potentially interfere with their activities and behaviors in such as way so as to increase their risk of exposure to predators. As a normal practice, the USAF would continue to remove non-native invasive species during VAFB species surveys in San Antonio Creek, which would tend to reduce predation of CRLFs to some degree.

A potential indirect effect of the proposed project is an increase in the number of predators, such as raccoons (*Procyon lotor*) and opossums (*Didelphis virginiana*), at the project site. Increased human presence and the potential for human-generated and discarded trash or food to be left at the site may result in an increase in the number of predators that may disturb, injure, or kill adult special status wildlife species. Disposal of all food and trash in closed containers and daily removal from the project site would likely minimize the number of predators attracted to the site, resulting in a less than significant effect from increased predator presence.

Although there is a potential for an increased presence of predators as a result of the Proposed Action, the EPMs set forth in Section 2.1.4.2 (Biological Resources) would minimize those threats, and therefore it is not anticipated to cause adverse effects to CRLF.

Habitat Effects

The Proposed Action would involve intrusive work, including cutting willow riparian vegetation, within CRLF habitat. Within the Proposed Action Area, San Antonio Creek constitutes CRLF aquatic breeding habitat because it has standing water that is shallow and slow moving. Aquatic habitat may overlap with upland habitat, as both may contain riparian habitat or wetlands. Although upland habitat generally extends up to 1 mi. (1.6 km) from aquatic habitats, upland areas within 200 ft. (61 m) of the edge of riparian areas or its drip line may constitute the outer limit of terrestrial-phase CRLF habitat (USEPA 2015). As a result, the USAF uses a 200 ft. (61 m) buffer, from the edge of aquatic features (i.e., creek, wetland), to delimit the outer extent of upland habitat since those features represent the potential location of riparian habitat. Finally, CRLF dispersal habitat is the remainder of the land outside of upland habitat, which can be up to 2 mi. (3.2 km) away.

Under the Proposed Action, the USAF would mechanically or manually cut vegetation within the 0.27 ac. (0.11 ha) Main Project Area, including aquatic or riparian vegetation. Woody vegetative material with stems greater than or equal to 2 in. in diameter would be cut down to within 3 in. of the ground or water surface and vegetation less than 2 inches would not be cut. Vegetation cutting would primarily affect willow riparian vegetation, but effects to aquatic vegetation could result since some vegetation is present in the creek. Within the Main Project Area there is 0.25 and 0.05 ac. (0.10 and 0.02 ha) of aquatic/riparian and upland CRLF habitat, respectively. In addition, clearing and grubbing of vegetation in the staging areas would affect 0.03 and 0.49 ac. (0.01 and 0.20 ha) of aquatic/riparian and upland habitat, respectively. Therefore, approximately 0.82 ac. (0.33 ha) of CRLF habitat could be affected by vegetation reduction under the Proposed Action.

In addition to these initial vegetation reduction estimates, periodic future vegetation reduction (maintenance) could affect a similar area. The area of vegetation cut depends on the rate of regrowth, but the initial estimates provide an upper limit since the existing vegetation is the accumulation of years of growth. Therefore, periodic future vegetation reduction would occur as needed and may affect up, but not exceed, the initial area estimates.

Both adult and juvenile CRLFs could be affected by vegetation reduction, if it causes a change in habitat structure or function. The USAF does anticipate some canopy reduction, but the root structure of cut vegetation would remain intact and any cut willow trees would be able to regrow. Since juvenile CRLFs are less discriminatory in habitat type than adults, any change to the habitat structure in the Main Project Area may affect adult CRLFs to a greater degree than juveniles. However, larval and juvenile CRLFs rely on food sources that are linked with the presence of riparian vegetation (e.g. diatoms, algae, detritus, and terrestrial invertebrates). Finally, CRLF egg masses tend to be located on emergent vegetation and bordering riparian areas. As a result, cutting vegetation may affect the use of this area by CRLF for breeding, foraging, or refuge, but

since CRLF are not deterred by obstacles, an area with reduced vegetation cover would likely still be used for dispersal and transit by some phases of CRLF to upstream or downstream locations.

In addition, the potential effects of the Proposed Action from vegetation reduction may contribute to existing habitat degradation issues within the watershed already affecting CRLF. For example, San Antonio Creek is incised in the upstream reaches and impervious surfaces border the creek. Channel incision occurs when long-term erosion exceeds sedimentation (Fischenich and Morrow 2000). Impervious surfaces (e.g., roads and roofs) lead to increased overland flow, resulting in storm flows that are of greater magnitude and frequency than in areas with less impervious surfaces (Barrett et al. 2010; Novotny 2003). Vegetated buffers can store floodwaters and reduce flood peaks resulting in decreased overland flow velocity and sediment transport (Kenwick et al. 2009; Larose et al. 2011). In addition, soil compaction could reduce soil permeability (infiltration) (Novotny 2003). As a result, high runoff velocities resulting from these existing conditions may adversely affect CRLFs that prefer areas of slow-moving water within San Antonio Creek. A study on stream breeding amphibians (salamander) found that higher water velocities in urban streams resulted in decreased larval retention in streams (Barrett et al. 2010). The Proposed Action may compromise the effectiveness of existing riparian vegetative buffers along San Antonio Creek in the Main Project Area due to cutting willow riparian trees to within 2 inches of the ground or water surface. However, since the root structure of all vegetation would be retained and allowed to regenerate, until future vegetation reduction (maintenance) is required, the vegetation in the Main Project Area would still provide some ecosystem services such as slowing erosion/sedimentation (by stabilizing soils/trapping sediment) and slowing storm flow velocities. However, use of heavy equipment in undeveloped areas may cause soil compaction, which could contribute to increased flow velocity. Because of the prolonged drought in California, the soils in the Proposed Action Area may already be somewhat compacted and impermeable. Although the Proposed Action would occur in an area where CRLF habitat is somewhat degraded or undergoing constant changes from urbanization, it is not anticipated that the Proposed Action would significantly contribute to further degradation to the detriment of the CRLF.

Therefore, the Proposed Action could result in adverse effects to CRLF because of changes to existing habitat from vegetation reduction activities; however, these impacts would be temporary and not result in significant effects to CRLF habitat.

Effects of Sedimentation

Excavation associated with the removal of sediments and vegetation, construction of staging areas, repair and maintenance of wire fabric, and vegetation removal may cause isolated erosion which can lead to sedimentation and smother CRLF and reduce the availability of plants and insects that serve as their habitat and food sources. Installing silt fencing, implementing BMPs, and diverting the active river channel around the work areas for the duration of work within the riparian corridor to ensure unimpeded flow would minimize this effect. In addition, no construction or maintenance activities would be conducted within the active channel and downstream water quality would be monitored throughout the project. The effects of sedimentation would therefore be temporary (only during installation and removal of the

diversion culverts and exclusion area) and have less than a significant effect on special status wildlife species.

Although long-term scour at the San Antonio Road West Bridge has been minimal, in the absence of the current scour countermeasures, the abutments would experience approximately 21 ft. (6.4 m) of scour and the pier would experience 14 ft. (4.3 m) during a 100-year storm runoff event. Overbank drainage conditions on the easterly bank may contribute to bank erosion during heavy rainfall events. The current countermeasures at the bridge, when repaired, and proposed overbank drainage control would provide adequate protection from scour (Penfield and Smith 2012). Therefore, the proposed maintenance activities to minimize bridge scour may result in adverse effects to CRLF; however, sedimentation impacts would be less than significant.

Contamination Effects

Accidental spills of hazardous materials, careless fueling or oiling of vehicles or equipment could degrade aquatic habitat or dispersal habitat to a degree where special status wildlife species are adversely affected or killed. This effect would be greatly reduced because the Air Force would implement a spill prevention plan; store hazardous materials and stage, repair, and maintain project equipment outside of the riparian corridor in designated areas; use catch pans or protective mats to prevent the contamination of the creek bed; and implement all EPMs for herbicide application (Section 2.1.4.2, Environmental Protection Measures). Therefore, impacts from contamination would be less than significant.

Effects of Relocation

During establishment of the exclusion area and subsequent biological monitoring, native wildlife would be relocated to suitable adjacent habitat (Section 2.1.4.2, Biological Resources). Mortality, injury, and reduced fitness may occur to special status wildlife species that are captured and relocated due to improper handling, containment, a lack of familiarity with the site, increased competition, or from releasing them into unsuitable habitat. Only qualified biologists would handle special status wildlife species to minimize this risk. Relocation sites would be selected within the San Antonio Creek watershed, which appear to support the necessary environmental conditions for these species to maximize the likelihood of survival. Therefore, the impacts to relocated species would be less than significant.

Chytrid fungus is a water-borne fungus that can be spread through direct contact between aquatic animals and spores that can move short distances through the water. The fungus only attacks the parts of an amphibian's skin that have keratin (thickened skin), such as the mouthparts of tadpoles, and the tougher parts of adults' skin, such as the toes. The fungus can decimate amphibian populations, causing fungal dermatitis which usually results in death in 1 to 2 weeks, but not before infected animals may have spread the fungal spores to other ponds and streams. Once a pond has become infected with chytrid fungus, the fungus stays in the water for an undetermined amount of time. The Air Force would reduce the risk of spreading chytrid fungus to less than significant by using qualified biologists that would implement the Declining Amphibian Population Task Force's Code of Practice (see Section 2.1.4.2, Biological Resources).

4.2.1.3.2 Tidewater Goby

Physical Effects

Under the Proposed Action, TWG could be physically injured during relocation and maintenance activities due to its small size and its presence may not be so apparent within the Action Area (Section 3.2.4.1, Special Status Wildlife Species). However, since TWG mostly exist in the downstream lagoon, there would be a lesser potential for physical injury in the Main Project Area, located approximately 6 mi. upstream from the lagoon. In addition, TWG peak breeding/spawning season is spring to summer (Section 3.2.4.1, Special Status Wildlife Species), but reproduction would not likely occur in the Main Project Area (no tributaries) (Section 3.2.4.1, Special Status Wildlife Species). Conservation Measures for TWG are the same as those applied to CRLF except that the requirements in The Declining Amphibian Populations Task Force Fieldwork Code of Practice do not apply. A USFWS-approved biologist would oversee maintenance activities having the potential to adversely affect TWG in addition to being present during subsequent annual inspection/maintenance activities, since San Antonio Creek would not thereafter be diverted.

Therefore, the Proposed Action could result in adverse effects to the TWG by inadvertent physical injury associated with relocation or exclusion if they are present in the Action Area; however, these effects would be temporary and not expected to be significant.

Reduction in Prey

Under the Proposed Action, removal of riparian vegetation in the Action Area would not tend to adversely affect TWG by causing a reduction in prey. TWG prey includes invertebrates, which are dependent on riparian vegetation. However, since TWG are largely confined to the downstream lagoon, loss of a small portion of riparian vegetation 6 mi. upstream would not appreciably affect the prey of TWG that exist in the lagoon due to reduction in leaf litter/temporary displacement in the Action Area.

Therefore, the Proposed Action would be unlikely to cause a reduction in TWG prey in the Action Area because TWG habitat is largely in lower San Antonio Creek.

Construction Noise

Under the Proposed Action, construction equipment used in the Main Project Area may generate noise/sound that is perceptible to TWG, if they are present in the Action Area. TWG are less sensitive to the effects of sound than other fish species as they do not have a specialized anatomical feature such as a gas/swim bladder; it is lost after their larval phase. TWG only detect particle motion via their sensory hair cells ("hearing generalist"). Studies conducted on the Mad River analyzed noise-related effects of a pile driver experienced by juvenile steelhead trout, a fish species that does have a gas/swim bladder. The results showed that the only effect directly related to the noise disturbance was behavioral effects in the form of stress (CalTrans 2010). In comparison, the Proposed Action would use construction equipment with a lesser average dBA values (combined maximum is 84 dBA) than a pile driver (96–101 dBA) (FHWA 2006) used in Mad River, which would likely result in less, actual received noise levels. Furthermore, it is unlikely TWG would have an avoidance response. As a result, no distance buffer is required for the

protection of TWG from noise. Additionally, the Proposed Action would not result in effects from vibration that would adversely affect fish embryos or mature fish.

Therefore, the Proposed Action could result in adverse effects to TWG; however, due to the large buffer that exists between TWG known habitat and the project area, these impacts would be temporary and not expected to be significant.

Predation Risk

Under the Proposed Action, the removal of riparian vegetation may result in loss of refuge habitat, which may result in an increased risk of predation by exposure. The bullhead is also a predator of the TWG, but the Proposed Action would not cause any loss of habitat in the San Antonio Creek lagoon where most TWG are known to congregate. Additionally, the USAF would continue to remove non-native invasive predators during species surveys on San Antonio Creek.

Therefore, increased predation due to vegetation removal and noise/vibration disturbance caused by the Proposed Action could result in temporary adverse impacts to TWG; however, these impacts would be temporary and not result in significant effects to TWG.

Habitat Effects

The Proposed Action would affect approximately 606 linear ft. (185 m) of San Antonio Creek. The removal of riparian vegetation is not likely to affect TWG if present in the Action Area, as TWG are more dependent on submerged aquatic vegetation for shelter and less so on riparian habitat. Further, the habitat important to TWG is likely not in the Action Area, but downstream in the lagoon or tributaries to San Antonio Creek.

The Proposed Action would not likely cause a loss of TWG habitat in the Action Area because TWG habitat is largely in lower San Antonio Creek. Additionally, if effects to TWG habitat occurred, it would be temporary in nature and confined to a small section of San Antonio Creek; therefore, impacts would be less than significant.

Effects of Sedimentation

Under the Proposed Action, increased erosion and sedimentation in the creek from ground disturbing activities may occur in the Main Project Area. However, the potential effects from sedimentation/increased turbidity would not likely affect TWG that tend to congregate further down the Creek (approximately 6 mi. [9.7 km]) and sediments would have time to settle out of the main water column.

Therefore, significant adverse impacts caused by erosion and sedimentation would not be anticipated because TWG habitat is largely in lower San Antonio Creek and TWG may not be sensitive to sedimentation/increased turbidity as their habitat includes a variety of substrates including silt (Section 3.2.4.1, Special Status Wildlife Species).

Contamination Effects

Accidental spills of hazardous materials, careless fueling or oiling of vehicles or equipment could degrade aquatic habitat or dispersal habitat to a degree where special status wildlife species are

adversely affected or killed. This effect would be greatly reduced because the Air Force would implement a spill prevention plan; store hazardous materials and stage, repair, and maintain project equipment outside of the riparian corridor in designated areas; use catch pans or protective mats to prevent the contamination of the creek bed; and implement all EPMs for herbicide application (Section 2.1.4, Environmental Protection Measures). Therefore, impacts to TWG from contamination would be less than significant.

4.2.1.3.3 Unarmored Threespine Stickleback

Physical Effects

The Proposed Action could adversely affect UTS during relocation efforts or inadvertently crushed during intrusive activities in the Main Project Area. The USAF would divert San Antonio Creek from flowing through the Main Project Area during the gabion work, but not during vegetation removal prior to maintenance activities and yearly maintenance. Since UTS are confined to San Antonio Creek, they are not able to avoid potential impacts of the Proposed Action; however, the relocation of UTS and diversion of San Antonio Creek would avoid most effects to UTS (i.e., adults and juveniles that are visible). A USFWS-approved biologist would relocate and oversee construction activities having the potential to adversely affect UTS in addition to being present during subsequent annual inspection/maintenance activities, since San Antonio Creek would not thereafter be diverted.

The Proposed Action may result in adverse effects to UTS from accidental physical injury or death, but it would be implemented with EPMs designed to avoid or minimize the potential adverse effects to the maximum extent practicable (Section 2.1.4.2, Biological Resources); therefore, impacts to UTS would be less than significant.

Reduction in Prey

The Proposed Action could adversely affect UTS prey by causing a temporary loss of aquatic habitat. Removal of riparian vegetation within the Main Project Area could result in a reduction in leaf litter along with a reduction of invertebrate productivity. Consequences of decreased prey within the Action Area could lead to UTS displacement to adjacent habitat, impairment, or death. However, vegetation less than 2 in. in diameter would remain and all activities would be monitored by a qualified biologist.

Therefore, the Proposed Action could result in adverse effects to UTS as a result of the effects of vegetation reduction on UTS prey populations; however, this impact would be temporary, and post project restoration would allow prey to recover. In addition, adjacent suitable habitat would provide adequate prey to UTS, and considering the small size of the Proposed Project area, impacts would be minimal.

Construction Noise

The Proposed Action would involve noise-generating activities within the San Antonio Creek riparian area/hydrologic floodplain. There would be no in-water work, however the noise generated near the creek may still result in effects to fish that may be located near the Main Project Area.

A recent study evaluating noise effects from pile driving on fish in Northern California (CalTrans 2010) found that, even with equipment with greater average noise levels than required in the Proposed Action, the only observed effects to juvenile steelhead (a hearing specialist, has a swim bladder, similar to UTS) was behavioral in the form of stress. Although the Proposed Action would not involve a pile driver, this study provided data that is useful to support a conclusion of no adverse effects from the Proposed Action where the primary noise effects would be from non-impact devices, likely resulting in less intense effects from noise or vibrations. UTS may be able to perceive vibrations associated with noise generating equipment/vehicles, and noise generated by the Proposed Action may cause an avoidance response in UTS, if it is within their hearing capabilities. Although the study did not include UTS, other similar species were evaluated. The findings confirmed that noise, generally, does not bother fish without anatomical specializations, but may trigger an avoidance response in fish with anatomical specializations.

Therefore, the Proposed Action could result in adverse effects to UTS if noise or vibration results in interference with UTS activities/behavior. However, the USAF would avoid or minimize effects by diverting San Antonio Creek at least 14.1 ft. (4.3 m) away from construction activities, if feasible based on site conditions, and impacts from noise or vibration would therefore be less than significant.

Predation Risk

Vegetation removal and noise/vibration from construction activities could increase predation on UTS by causing UTS to find other refuge habitat or interfering with UTS activities/behavior, making them more susceptible to predation. UTS may perceive noise/sound generated by the Proposed Action, which at the least could interfere with UTS activities/behavior. UTS predators in San Antonio Creek include the brown bullhead. As a normal practice, the USAF would continue to remove non-native invasive species during VAFB species surveys in San Antonio Creek, which would tend to reduce predation of UTS to some degree.

Therefore, the Proposed Action could result in adverse effects to UTS from increased predations incidental to vegetation removal and noise/vibration disturbance; however, these impacts would be temporary and are not anticipated to cause significant effects to UTS.

Habitat Effects

Under the Proposed Action, the USAF would remove riparian vegetation, which could adversely affect UTS by removing up to 0.3 ac. (0.12 ha) of refuge, breeding, or feeding habitat within the Main Project Area. Within the Main Project Area, San Antonio Creek is shallow and slow flowing with dense riparian vegetation and some apparent aquatic vegetation. San Antonio Creek including the lateral areas of its floodplain up to 10 ft. (3 m) out from the creek is essential habitat for the UTS, providing refuge, breeding and feeding habitat. Although there is a lack of information about UTS's specific use of habitat in San Antonio Creek (i.e., breeding locations), the USAF assumes that vegetation removal may affect some aspect of UTS habitat. However, the USAF anticipates that UTS habitat would not be completely lost since some vegetation would remain (less than 2 in. diameter).

In addition, the loss of riparian vegetation could eventually adversely affect stream flow, temperature and chemistry of UTS habitat, which affects suitability of habitat. Riparian vegetation provides temperature control for fish populations (Kenwick et al. 2009). By removing riparian vegetation, the Proposed Action may contribute to increased temperature in San Antonio Creek. In addition, when long-term erosion exceeds sedimentation, channel incision occurs (Fischenich and Morrow 2000). Channelization eliminates shallow backwaters and reduces aquatic vegetation important to UTS, which affects UTS populations since they are more abundant in pools versus stream channels. Although San Antonio Creek is not channelized (i.e., concrete lined), it is largely bound by roads, which may be contributing to channel incision; potentially resulting similar effects (Simon and Rinaldi 2006). It is possible that removal of riparian vegetation could lead to further incision of the creek because there would be no vegetation present to slow the flow of floodwaters or minimize erosion in the Main Project Area. As a result, the Proposed Action could contribute to the degradation of UTS habitat that is already occurring under existing conditions. However, since the Proposed Action would divert storm water runoff away from San Antonio Creek, the Proposed Action may curb continued erosion, to some extent, including its incidental effects.

Therefore, the Proposed Action could result in adverse effects to UTS caused by changes to existing habitat from vegetation reduction activities; however, these impacts would be temporary and not result in significant effects to UTS habitat.

Effects of Sedimentation

Under the Proposed Action, the removal of riparian vegetation could result in increased pollutant loads entering San Antonio Creek at the Action Area due to decreased soil stabilization and riparian buffers that filter out pollutants. This results in increased sedimentation or turbidity. Since San Antonio Creek is shallow and slow flowing, any increase in sedimentation could have greater short-term effects on UTS than in a larger and faster flowing river where sediments could settle out more quickly. Increased turbidity is an adverse effect to UTS, who may be intolerant to turbidity. This may not be a major concern, however, because San Antonio Creek is not currently impaired for turbidity (CCRWQCB 2015). In addition, since the USAF would only remove vegetation more than 2 in. in diameter, some soil stabilizing/filtering capacity may remain in the Action Area. However, since the USAF plans to re-direct stormwater flow coming from the agricultural depression away from San Antonio Creek, the Proposed Action may have an overall beneficial effect on water quality. The USAF would operate construction equipment and vehicles in the hydrologic floodplain of San Antonio Creek, however, standard EPMs and BMPs would be implemented (Section 2.1.4.2, Biological Resources), significantly reducing potential adverse effects.

Therefore, the Proposed Action may result in adverse effects to UTS caused by increased sedimentation from vegetation removal and construction equipment operating in the hydrologic floodplain; however, these impacts would be temporary and minimized by the implementation of EPMs and are not anticipated to be significant.

Contamination Effects

Accidental spills of hazardous materials, careless fueling or oiling of vehicles or equipment could degrade aquatic habitat or dispersal habitat to a degree where special status wildlife species are adversely affected or killed. This effect would be greatly reduced because the Air Force would implement a spill prevention plan; store hazardous materials and stage, repair, and maintain project equipment outside of the riparian corridor in designated areas; use catch pans or protective mats to prevent the contamination of the creek bed; and implement all EPMs for herbicide application (Section 2.1.4.2, Biological Resources). Therefore, impacts from contamination would be less than significant.

4.2.1.3.4 Avian Species

The removal of vegetation from the Proposed Action Area as a task of bridge maintenance activities would result in the loss of existing breeding and roosting habitat for special status avian species. However, given the abundance of suitable habitat in the vicinity, this adverse impact would be less than significant. In addition, the removal of vegetation during the non-breeding season for avian species (September through February) would prevent adverse effects on these species.

Other potential adverse impacts of disturbance to breeding birds in the vicinity of but outside the Proposed Action Area include abandonment of breeding sites, egg breakage by "panicked" adults, physical damage to the eggs due to noise, heating and cooling from exposure during periods of nest abandonment, and increased vulnerability to predation. Increased levels of human activity and associated noise could potentially displace special status species from adjacent nesting habitat. The severity of the impact would depend in a large part on the timing of the activity-related disturbance. If disturbance occurs after nesting has already been initiated, project-related noise could adversely impact reproductive success.

The measures outlined in Section 2.1.4.2 (Biological Resources) would serve to avoid or minimize potential adverse effects to special status avian species, including special status wildlife species, during implementation of the Proposed Action. In addition, restoration of areas temporarily disturbed during project activities should restore native habitats to the maximum extent feasible. Thus, implementing these measures would result in less than significant adverse effects to avian species.

4.2.1.3.5 Special Status Mammals

It is possible that western red bats and pallid bats use the area in the vicinity of the Proposed Action Area for foraging and may use the bridge as a night roost. Project activities, including noise and vibration from equipment operating the Main Project Area, may disturb roosting bats and cause them to abandon the roost site. Direct physical effects are unlikely since the bats would flush due to vibration and noise prior to risk of injury; however, bats may be exposed to greater risk of predation when flushed during daylight. Although predation of individuals may increase when flushed, the number of individuals potentially affected would be relatively small and the Proposed Action would not have a significant effect on bat populations on VAFB. Removal of mature riparian habitat could result in the short-term loss of potential roosting and breeding habitat for western red bats although there are none documented with the project area. Therefore, the Proposed Action could result in adverse effects to special status mammals

caused by noise/vibration and loss of riparian habitat; however, these impacts would be temporary and not result in significant effects to special status mammals.

4.2.2 No Action Alternative

Under the No Action Alternative, the proposed repairs and maintenance to the erosion protection system at the San Antonio Road West Bridge would not be conducted. While construction and disturbances to native plant communities and special status wildlife species would be avoided, erosion and scouring of the existing bridge structure would continue to occur as a result of high flow, especially during storm events. As a result, there would be a greater need for bridge repair in the future and the risk of bridge failure, which could result in more serious adverse impacts to native vegetation and special status species. Therefore, implementation of the No Action Alternative would not have an immediate significant effect on biological resources, but may result in greater long -term impacts than the Proposed Action.

4.3 Cultural Resources

Factors considered in determining whether implementing an alternative may result in significant adverse impacts on cultural resources include the extent or degree to which implementation of an alternative would result in

- the permanent loss of a significant cultural resource or the loss of a value or characteristic that qualify a historic resource for listing on the National Register of Historic Places (NRHP), or
- substantially alter the natural environment or access to it in such a way that traditional cultural or religious activities were restricted.

Effects to cultural resources would be considered adverse if they resulted in disturbance or loss of value or data that qualify a site for listing in the NRHP; if there is substantial disturbance or loss of data from newly discovered properties or features prior to their recordation, evaluation and possible treatment; or if the project substantially changes the natural environment or access to it such that the practice of traditional cultural or religious activities would be restricted. For known cultural resource sites, rerouting or redesigning to avoid impacts is typically the recommended option. If rerouting or redesigning is not possible, subsurface testing is usually recommended to determine a site's value or data potentials relative to the NRHP, to assess possible adverse project effects, and to establish the physical relationship of site boundaries with the Area of Potential Effects (APE). In addition, 30 CES/CEIEA requires archaeological monitoring during construction through or adjacent to any known site, regardless of a site's NRHP eligibility. Per VAFBs Integrated Cultural Resources Management Plan, archaeological monitoring is also typically required in areas where buried sites are possible (Applied Earthworks 2005).

4.3.1 Proposed Action

Archival research indicates that no archaeological sites were previously recorded within the Proposed Action Area. Furthermore, the San Antonio Road West Bridge Proposed Action Area has been surveyed for archaeological resources, including a survey of the creeks' cutbanks to look for buried sites (Lebow 2000). No archaeological resources have been identified at or near the

Proposed Action Area or the riparian mitigation area. Therefore, the Proposed Action is not anticipated to impact archaeological resources and the Air Force determined that no historic properties are within the APE. In compliance with Section 106 of the NHPA of 1966 (54 U.S. Code Section 306108), as amended, and its implementing regulation at 36 CFR Part 800, VAFB requested SHPO concurrence that the Air Force has appropriately delineated the APE and conducted a reasonable and good faith effort to identify historic properties within the APE and SHPO concurrence was received for the bridge maintenance on 14 January 2016 (OHP File Reference No. USAF_2015_1228_001) (Appendix B).

The Santa Ynez Band of the Chumash Indians was consulted on the Proposed Action and determined that a Native American monitor would be unnecessary (Appendix C). In the event that previously undocumented cultural resources are discovered during construction activities, procedures established in 36 CFR 800.13 would be followed. In addition, the EPMs described in Section 2.1.4.4 (Cultural Resources) would be implemented. Therefore, the Proposed Action would not have a significant effect on cultural resources.

4.3.2 No-Action Alternative

Under the No-Action Alternative, the proposed repairs and maintenance to the erosion protection system at the San Antonio Road West Bridge would not be conducted. Thus, cultural resources would not be affected.

4.4 Earth Resources

Factors considered in determining whether implementing an alternative may have a significant adverse impact on geology and earth resources include the extent or degree to which implementation of an alternative would

- result in substantial soil erosion or the loss of topsoil, or
- expose people or structures to potential substantial adverse effects, involving rupture of a known earthquake fault, strong seismic ground shaking, or liquefaction.

These hazards have the potential to cause significant damage to the bridge structure even after completion of maintenance.

4.4.1 Proposed Action

Implementation of the Proposed Action would require the removal of vegetation and disturbance of soil during excavation and repair of gabions. These activities typically loosen the soil and tend to promote erosion during periods of wind or rainfall. Because soils in the area are subject to high wind erosion, appropriate sediment and soil control techniques would be used to minimize soil loss. Soil erosion at conclusion of the project would be prevented through the revegetation of the Proposed Action Area following the guidelines described in the Comprehensive Mitigation and Monitoring Plan for this project. In addition, the EPMs described in Section 2.1.4.5 (Earth Resources) would be implemented, including implementation of BMPs and preparation of a SWPPP. Therefore, based on a review of the documentation available on the geological

characteristics and seismic activity of the region, no significant impacts on geology and soils are anticipated from implementing the Proposed Action.

4.4.2 No-Action Alternative

Under the No-Action Alternative, the proposed repairs and maintenance to the erosion protection system at the San Antonio Road West Bridge would not be conducted. In the foreseeable future, there would be no additional impacts to earth resources beyond the status quo; however, if the existing bridge were to fail, there would likely be significant erosion at the bridge site and emergency repairs or replacement would be required.

4.5 Hazardous Materials and Waste Management

Factors considered in determining whether implementing an alternative may have a significant adverse impact on hazardous materials and waste management include the extent or degree to which implementation of an alternative would result in

- non-compliance with applicable regulatory requirements, or
- human exposure to hazardous materials and wastes, or environmental release above permitted limits.

Potential impacts as a result of hazardous materials and hazardous waste are evaluated using federal, state and local regulatory requirements, contract specifications, and base operating constraints, as outlined in Chapter 3. Hazardous materials management requirements are found in federal and state EPA and OSHA regulations and the AFI 32-7086, Hazardous Materials Management. Hazardous waste management requirements are found in federal, state, and local regulations and the VAFB HWMP (30th Space Wing Plan [30 SWP] 32-7043A). Non-compliance with applicable regulatory requirements, human exposure to hazardous materials and wastes, or environmental release above permitted limits, would be considered adverse impacts.

4.5.1 Proposed Action

Implementing the Proposed Action would require the use of hazardous materials. As described in Chapter 3, these hazardous materials are commonly used for construction projects, and would be the same types as currently used and managed on VAFB. Because the Proposed Action would last only 90 days and the construction team would be relatively small (approximately 11 workers), there would not be a significant increase in the amounts of hazardous materials present on VAFB. Thus, no significant adverse impacts are anticipated.

Potential adverse effects at the project site could result from accidental releases of POLs from vehicle and equipment leaks and from hazardous wastes generated by abatement actions. The contractor would be subject to hazardous materials and waste management regulations as required by federal, state and local laws and regulations, and would follow procedures as outlined in the AFI 32-7086, Hazardous Materials Management and VAFB HWMP (30 SWP 32-7043A). All hazardous wastes would be properly managed and disposed of in accordance with applicable federal, state and local hazardous waste regulations, and the VAFB HWMP (30 SWP 32-7043A). Prior to project implementation, the contractor would prepare a hazardous material

Spill Prevention and Response Plan and obtain concurrence from 30 CES/CEI. All hazardous wastes would be managed either during release response and clean-up, or during abatement removal actions. In addition, the EPMs described in Section 2.1.4.6 (Hazardous Materials and Waste Management) would be implemented. As a result, the Proposed Action would not have a significant impact caused by the use and generation of hazardous materials and hazardous wastes.

4.5.2 No-Action Alternative

Under the No-Action Alternative, the proposed repairs and maintenance to the erosion protection system at the San Antonio Road West Bridge would not be conducted. The No-Action Alternative would create no additional hazardous materials or waste on VAFB than current baseline conditions. Therefore, no significant impacts to hazardous materials or waste management would occur in the foreseeable future. However, if the existing bridge were to fail, hazardous materials which are part of the existing structure may be released unabated into San Antonio Creek, potentially causing a significant impact on biological resources and human health and safety.

4.6 Human Health and Safety

Factors considered in determining whether implementing an alternative may have a significant adverse noise impacts include the extent or degree to which implementation of an alternative would expose people to noise levels in excess of applicable standards, or at levels that may be harmful.

4.6.1 Proposed Action

Construction sites, in general, can be dangerous to the public. For the activities associated with the Proposed Action, the contractor would comply with Federal-OSHA, and AFOSH regulations, as required and appropriate, to provide for the health and safety of the public who may be exposed to the operations, hazardous materials in use, and hazardous wastes generated and transported. Therefore, human health and safety would not be adversely impacted by general construction hazards.

Section 2.1.4.6 (Hazardous Materials and Waste Management) of this EA describes health and safety guidelines that would be implemented in the handling and transportation of hazardous materials and waste.

Several known health and safety issues occur within the Proposed Action Area:

- The Proposed Action Area is in the floodplain and specifically within and adjacent to the creek bed of San Antonio Creek which is prone to flooding during significant rain events.
- Physical hazards, including holes or ditches, uneven terrain, sharp or protruding objects, slippery soils or mud, quicksand, loose soil, steep grades, and unstable ground are or could be present throughout the Proposed Action Area.

- Biological hazards, including vegetation (i.e., poison oak and stinging nettle), animals (i.e., insects, spiders, and snakes), and disease vectors (i.e., ticks, rodents), exist at and in the vicinity of the Proposed Action Area, and have the potential to adversely impact human health and safety.

Adherence to federal OSHA and AFOSH regulations would minimize the exposure of the public to these hazards, and result in no significant effects as they relate to human health and safety from the Proposed Action.

4.6.1.1 Noise

The Proposed Action Area is located at the crossing point of San Antonio Creek by San Antonio Road West. The immediate vicinity is currently undeveloped, apart from the VAFB weapons training facility approximately 0.5 mi. (0.8 km) away (Figure 4-1). Existing noise levels near this project site are low due to the large areas of undeveloped landscape and sparse noise sources.

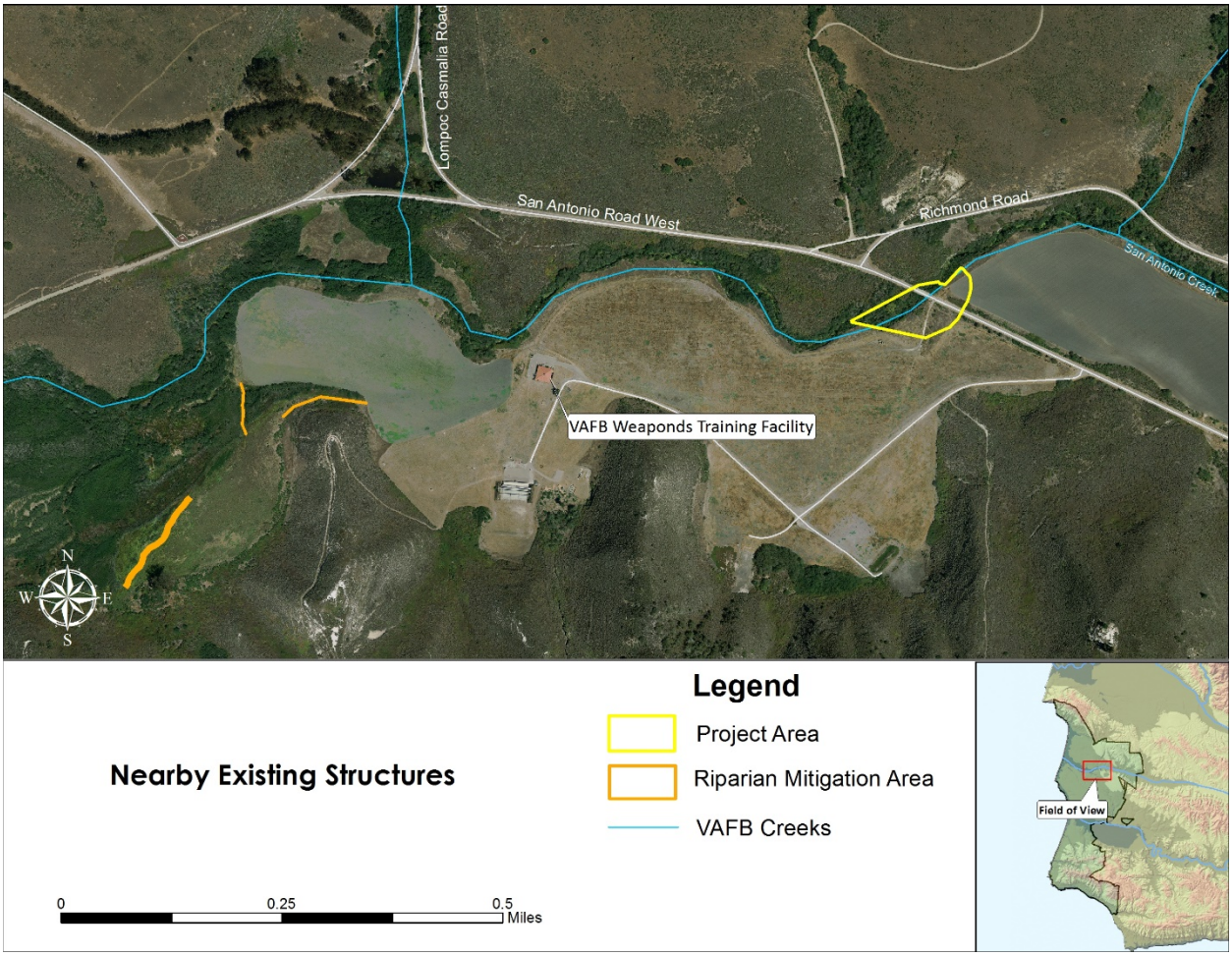

Figure 4-1. Proposed Action Area in Relation to Existing Structures.

The Proposed Action would temporarily increase the ambient noise levels within the Proposed Action Area and in neighboring areas during project implementation activities. Relatively continuous noise would be generated during project activities. These continuous noise levels are

generated from equipment that has source levels (at one meter) ranging from approximately 70 to 110 dB. As a sound source gets further away, the sound level decreases. This is called the attenuation rate. The rates are highly dependent on the terrain over which the sound is passing and the characteristics of the medium in which it is propagating. The rate used in these estimates was a decrease in level of 4.5 dB per doubling of distance. This average rate has been shown to be an accurate estimate from field data on grassy surfaces (Harris 1998). At 164 ft. (50 m) these levels range from 50 to 95 dB. Typical noise levels of heavy construction equipment are presented in Table 4-7.

The project site is not located adjacent to inhabited areas; therefore, it is not likely that sensitive receptors exist within the vicinity of the Proposed Action Area. Adverse impacts as a result of noise are expected to be less than significant.

Table 4-7. Noise Levels of Heavy Construction Equipment

Construction Category and Equipment	Predicted Noise Level at 50 feet (dBA)
Front End Loader	79-80
Excavator	81-85
Crane	75–87
Dump Truck	76-84

Source: U.S. Department of Transportation 2016

4.6.2 No-Action Alternative

Under the No-Action Alternative, the proposed repairs and maintenance to the erosion protection system at the San Antonio Road West Bridge would not be conducted. Therefore, there would be no health and safety impacts resulting from project activities. However, if the bridge were to collapse, access to North VAFB from U.S. 1 would be impeded. This would result in a significant impact to health and safety of personnel at VAFB, since emergency vehicle access would be limited from quickly accessing some portions of North VAFB.

4.7 Coastal Zone Management

4.7.1 Proposed Action

The CZMA and the CCA mandate that the scenic and visual qualities of coastal areas be considered and protected as a resource of public importance. The Proposed Action would not occur within the California Coastal Zone. However, the Proposed Action could have downstream or indirect effects on the coastal zone. The Air Force, therefore, conducted an analysis of the Proposed Action to determine whether there would be adverse impacts to the coastal zone, as defined by the CZMA and CCA. The Air Force determined that there would be no significant impacts to the coastal zone as a result of the Proposed Action and prepared a Negative

Determination. The California Coastal Commission concurred with the Air Force determination (Appendix G) based on the proposed EPMs incorporated into the Proposed Action.

4.7.2 No-Action Alternative

Under the No-Action Alternative, the proposed repairs and maintenance to the erosion protection system at the San Antonio Road West Bridge would not be conducted thus, no changes to coastal resources such as shoreline public access and recreation, lower cost visitor accommodations, terrestrial and marine habitat protection, visual resources, landform alteration, agricultural lands, commercial fisheries, industrial uses, water quality, offshore oil and gas development, transportation, development design, power plants, ports, and public works would result (CCA 2016). However, if the bridge were to collapse, emergency repair would be required, involving intensive construction activities. Such an action could affect the agricultural lands near the approaches to the bridge, to accommodate construction staging areas and emergency activities and could result in significant impacts to coastal zone resources.

4.8 Solid Waste Management

Factors considered in determining whether implementing an alternative may have significant adverse impacts on solid waste management include the extent or degree to which implementation of an alternative would result in non-compliance with applicable regulatory requirements.

Solid waste impacts are evaluated using federal, state, and local regulatory requirements, permit conditions, contract specifications, VAFB Solid Waste Management Guide, and operating constraints as outlined in Chapter 3.

4.8.1 Proposed Action

Activities at the San Antonio Road West Bridge Proposed Action Area would involve excavation of approximately 500 cubic yards (CY) of sediment and vegetation removal. It is unknown as to how much new material (i.e. gabion fill and soil), would be needed to conduct repairs and bank stabilization. The contractor would determine material requirements and quantities once the excavation under the bridge is complete.

The generation of C&D debris during implementation of the Proposed Action does not have the potential to adversely affect waste diversion rates on VAFB as disposal of any solid waste would be transported to a municipal landfill. Unrecyclable wastes generated during construction and demolition would be disposed of off base by the contractor. However, to the greatest extent practicable, the contractor would segregate all waste generated during the Proposed Action and manage the wastes separately. To the extent practicable, C&D would be reused or transported to a recycler. In addition, all metals would be recycled at the VAFB Materials Diversion Center. Soils that are not reused at the Proposed Action Area would be transported to an on-base borrow pit for storage and use on future VAFB projects.

The evaluation of potential P2 impacts includes solid waste diversion requirements, particularly as applied to demolition debris. Non-compliance with applicable regulatory requirements or

disposal of quantities of solid waste that would cause the proposed project to exceed mandated diversion rates would be considered an adverse impact. Debris would be segregated to facilitate subsequent P2 options. P2 options would be exercised in the following order: reuse of materials, recycling of materials, and then regulatory compliant disposal.

Compliance with all applicable federal, state and local regulations, rules and requirements, and applicable VAFB plans would govern all actions associated with implementing the Proposed Action; therefore, no significant effects to solid waste management are anticipated.

4.8.2 No-Action Alternative

Under the No-Action Alternative, the proposed repairs and maintenance to the erosion protection system at the San Antonio Road West Bridge would not be conducted. Because solid wastes would not be generated, there would be no significant impact to solid waste management in the foreseeable future. However, if the existing bridge were to fail, a large amount of concrete, metal, asphalt, and other materials would likely be released into San Antonio Creek, requiring emergency retrieval and proper disposal and a large influx of waste onto VAFB infrastructure without the benefits of planning. Additionally, retrieval of all materials would be unlikely. Therefore, if the existing bridge were to collapse, it would likely result in significant impacts to solid waste management on VAFB.

4.9 Transportation

Factors considered in determining whether implementing an alternative may have significant adverse impacts on transportation include the extent or degree to which implementation of an alternative would

- result in the inability of primary roadway to service existing traffic demands, or
- result in traffic to shift to a roadway that was incompatible with those traffic increases (e.g., inadequate pavement structure or design capacity), or could cause potential safety hazards.

The criteria for determining the significance of project-generated traffic were obtained in part from Santa Barbara County Planning and Development Department (SBCPD) guidelines (SBCPD 2008). Impacts would be considered adverse if:

- The addition of project trips at an intersection causes an increase in the V/C ratio by the value shown in Table 4-8. Project traffic would [use] a substantial portion of an intersection(s) capacity where the intersection is currently operating at acceptable levels of service (A-C) but with cumulative traffic would degrade to or approach LOS D (V/C 0.81) or lower. Substantial is defined as a minimum change of 0.03 for intersections that would operate from 0.80 to 0.85 and a change of 0.02 for intersections that would operate from 0.86 to 0.90, and 0.01 for intersections operating at anything lower.
- Project access to a major road or arterial road would require a driveway that would create an unsafe situation or a new traffic signal or major revisions to an existing traffic signal.

- Project adds traffic to a roadway that has limiting design features or receives use that would be incompatible with substantial increases in traffic, which would become a potential safety problem with the addition of project or cumulative traffic. Limiting design features include, but are not limited to, narrow width, roadside ditches, sharp curves, poor sight distance, and inadequate pavement structure. Examples of roadways receiving incompatible use include: a large number of heavy trucks on rural roads used by farm equipment, livestock, horseback riding, or residential roads with heavy pedestrian or recreational use.

Table 4-8. LOS Significance Thresholds.

LOS	Threshold
A	An increase of V/C > 0.20
B	An increase of V/C > 0.15
C	An increase of V/C > 0.10
D	Adding 15 Trips to baseline conditions
E	Adding 10 Trips to baseline conditions
F	Adding 5 Trips to baseline conditions

4.9.1 Proposed Action

Given the short duration low ADT volumes and good LOS currently experienced on the roadways that would be affected by project activities on VAFB and its vicinity, and the relatively small increase in daily truck traffic that would be generated by the Proposed Action, no adverse effects to capacity would occur in the Proposed Action Area roadways. However, brief restrictions to traffic may occur occasionally throughout the projects' duration. Alternate routes during this time would not be necessary. All roadway sections would continue to operate at an LOS in the range of A to B with project-added traffic. Increased truck activity affects the integrity of roadway sections by increasing the flexures of the pavement. The design life for asphalt pavement, generally selected as either 10 or 20 years, drives engineering specifications for the road based upon the strength of the base soil and the Traffic Index (TI) for the design life. The TI is calculated based upon the number of truck trips that are expected during the design life of the pavement. The theory states that the pavement, during its lifetime, can tolerate a finite number of flexures due to loaded trucks. If the number of truck trips is increased, the life of the pavement is shortened. For example, if a 20-year design were based upon an AADT of 1,000 trucks for 20 years and the volume increases to 2,000 ADT, the structural life of the pavement would be reduced to 10 years. While the current condition of the pavement on all of the affected roads is fair to good, added truck traffic could cause faster than estimated deterioration of the pavement surface and require additional maintenance. Although an adverse effect, it would not be considered significant given that the number of truck trips per day anticipated from the Proposed Action are not high. Therefore, the Proposed Action is not anticipated to create any significant impacts to transportation. In addition, the recommended EPMs, described in Section 2.1.4.9 (Transportation), would further reduce the potential for adverse effects on transportation.

4.9.2 No-Action Alternative

Under the No-Action Alternative, the proposed repairs and maintenance to the erosion protection system at the San Antonio Road West Bridge would not be conducted. Therefore, there would be no effect on existing transportation beyond baseline conditions. However, if the bridge were to collapse, traffic would be forcibly diverted to other roads, and result in an interruption of mission essential transportation to North VAFB. In addition, such a situation would result in emergency repair involving intensive construction activities. Such an action could affect local traffic conditions and cause significant impacts on local transportation routes.

4.10 Water Resources

Factors considered in determining whether implementing an alternative may have significant adverse impacts on water resources include the extent or degree to which implementation of an alternative would

- cause substantial flooding or erosion,
- reduce surface water quality to creeks, rivers, streams, lakes, or the ocean, or
- reduce surface or groundwater quality or quantity.

4.10.1 Proposed Action

The Proposed Action would not require a NPDES Construction General Permit under Section 402 of the CWA because the total disturbed area of the Proposed Action would be less than one acre.

A CWA Section 401 Water Quality Certification from the RWQCB and CWA Section 404 Permit from the USACE would be required under the Proposed Action because it involves dredge or fill in water bodies or wetlands. VAFB and the contractor would follow the conditions of the CWA 401 Water Quality Certification. All permit conditions and EPMs described in detail in Section 2.1.2 would be implemented to minimize the potential for adverse impacts to local water resources. The contractor would incorporate these requirements into work practices and procedures to ensure compliance for all project-related activities. In addition, the 401 Certification includes compensatory mitigation requirements and success criteria that must be met through restoration and site maintenance.

With the implementation of 401 Water Quality Certification conditions, restoration at the riparian mitigation area, and EPMs described in Section 2.1.4.10 (Water Resources), adverse effects to water resources would be less than significant.

4.10.1.1 Surface Water and Floodplains

Water quality could be adversely affected by hazardous materials spills, sedimentation and erosion, and improper disposal of waste. Disturbances to the creek banks and the creek bed during project implementation may result in an increase in sediment load as a result of removing vegetation, loosening and exposing soils, and stockpiling materials. Increases in sediment load in the vicinity of the Proposed Action area would be minimized by implementing the EPMs described in detail in Section 2.1.4 (Environmental Protection Measures), including diverting the

active creek channel within temporary culverts, implementing erosion control devices where needed, working outside of the channel during significant rainfall and runoff, and restoring the site. In addition, all disturbed areas within the Proposed Action Area would be revegetated upon conclusion of bridge maintenance activities, except for the area where vegetation was removed from gabions. Therefore, the risk of potential sediment loading would be significantly reduced through the soil stabilization and revegetation of project affected areas.

The containment of the active channel in culverts through the exclusion area would minimize the exposure of stream water to any project-related contaminants. Maintenance and refueling of equipment would occur in the staging areas outside of the channel; however, if it is necessary to refuel or repair equipment within the riparian corridor, spill containment materials would be used and a USFWS-qualified biologist would be present to monitor activities. All refuse and construction debris would be properly handled, stored, and removed from the site as soon as possible. As a result, the Proposed Action is not anticipated to have a significant effect on surface water quality.

The San Antonio Road West Bridge is located within the San Antonio Creek floodplain (see Figure 3-3). Maintenance of the bridge would increase its ability to withstand a 100-year flood event (Penfield and Smith 2012). The floodplain limits in the vicinity of the Proposed Action Area would not be altered by activities associated with the Proposed Action. The 100-year floodplain limit and duration of flooding within the Proposed Action Area would remain approximately the same as those currently present.

The existing conditions of the bridge and associated scour protection measures have proved to be effective, and long-term scour at the bridge has been minimal. However, in the absence of the current scour countermeasures, the abutments would experience approximately 21 ft. (6.4 m) of scour and the pier would experience 14 ft. (4.2 m) during a 100-year storm runoff event. Additionally, overbank drainage conditions on the easterly bank may contribute to bank erosion during heavy rainfall events. The current countermeasures at the bridge, when repaired, and proposed bank stabilization, would provide adequate protection from scour. Furthermore, the study conducted by Penfield and Smith (2012) found that the current sedimentation conditions within the vicinity of the bridge both up and down stream were in general equilibrium. Therefore, the maintenance and repair outlined in the Proposed Action would help to maintain the structural integrity of the bridge and the stability of the underlying creek.

Maintenance activities within the floodplain of San Antonio Creek have the potential for short-term effects on the hydrology of the creek, to include the alteration of scour patterns, increased downcutting, erosion, and sedimentation. To avoid potential short-term impacts, the active creek channel at the Proposed Action Area would be temporarily contained in culverts during maintenance activities, allowing for unimpeded flow through the work area.

Alternative bridge maintenance activities were considered; however, due to the scope of work, there is no reasonable alternative to achieving the desired outcome without potentially increasing impacts to floodplains and wetlands by replacing the erosion protection structures or the bridge itself. Additionally, the alternatives had the potential to increase negative impacts to the creek including increased sedimentation, agricultural pollution, and the possible introduction of herbicides into the watershed.

The Proposed Action would not have any significant negative effects on the floodplain of San Antonio Creek and may have beneficial effects since the maintenance would allow less restricted flow through the creek than the existing conditions, reducing erosion/sedimentation and decreasing the possibility of bridge failure. Therefore, the Proposed Action is consistent with EO 11988 because it seeks to maintain an existing bridge needed for access to north VAFB, to withstand a 100-year flood event and thereby ensuring federal funds are spent in consideration of the risk of flood hazards while also ensuring that adverse effects to the floodplains are minimized. Therefore, the Proposed Action is not likely to result in significant impacts to floodplains.

4.10.1.2 Groundwater

Groundwater is not likely to be encountered under the Proposed Action, as the only excavation would be that of sediment deposits on and near the bridge gabions. No project activity requires the removal of soil or excavation to a depth that would disturb groundwater.

Potential effects to groundwater from the accidental release of hazardous materials within San Antonio Creek do exist. However, with the EPMs outlined in section 2.1.4 (Environmental Protection Measures), it is unlikely that such an event would occur; therefore, the Proposed Action is not anticipated to have a significant effect on groundwater resources.

4.10.1.3 Waters of the United States and Wetlands

Since EO 11990, *Protection of Wetlands*, is similar in content to EO 11988, the discussion in Section 4.10.1.1 would also apply because the wetlands associated with the Proposed Action are largely confined to the floodplain.

During proposed maintenance activities associated with the Proposed Project, only temporary effects to waters of the U.S. and waters of the state would occur, no permanent impacts are proposed. These temporary impacts include dewatering, sediment removal, and repair/replacement of gabions. All temporary impacts would occur within the Main Project Area and would include impacts to San Antonio Creek, a water of the U.S. and state, and two areas identified as potential jurisdictional non-tidal wetlands.

Within the OHWM, excavation and repair/replacement of gabions would occur within a portion of the dewatered area. Dewatering activities are anticipated to occur at the upstream and downstream extents of the defined Main Project Area, encompassing the largest area of temporary impacts within the OHWM. Thus, the entire portion of San Antonio Creek OHWM that occurs within the Main Project Area would potentially experience impacts, though it is likely that a smaller area could be dewatered depending on project activity needs. Approximately 3,528 square ft. (0.08 ac.) of San Antonio Creek would be temporarily impacted by the Proposed Project (Table 4-9). Of this area, approximately 120 CY of sediment would be removed and approximately 95 CY of gabion material would be added.

Table 4-9. Proposed Discharge of Dredge or Fill Material.

Water Body Type	Affected Area	
	Permanent	Temporary

	Area (ft^2.)/(acres)	Length (ft.)	Area (ft^2.)/(acres)	Length (ft.)
Non-tidal Wetlands	-	-	600/0.01	60
Perennial Creek	-	-	3,528/0.08	178
Total:	0	0	4,128/0.09	238

Notes: ft. = feet, $ft.^2$ = square feet

The Clean Water Act Section 401 and 404 permits that will be issued for the Proposed Action include mitigation measures for temporary and permanent impacts to jurisdictional waters. Because vegetation removal under the bridge will be an ongoing maintenance activity, losses of willow riparian vegetation are considered to be a permanent impact to state aquatic resources according to the RWQCB. Permanent impacts to the riparian would be mitigated at a 3:1 (area mitigated: area impacted) (Appendix F).

The Proposed Action would impact 0.16 ac. (0.10 ha) of central coast arroyo willow riparian forest and scrub. Permanent impacts to willow riparian habitat would be mitigated at a 3:1 ratio (area mitigated: area impacted). In total, 0.48 ac (0.19 ha) of willow riparian habitat would be restored at the riparian mitigation area. As a result, the Proposed Action would not have a significant impact on waters of the U.S. and wetland resources.

4.10.2 No-Action Alternative

Under the No-Action Alternative, the proposed repairs and maintenance to the erosion protection system at the San Antonio Road West Bridge would not be conducted. Therefore, no impacts to water resources would occur. However, if the existing bridge were to fail, the water quality of San Antonio Creek, downstream of the location of the bridge, would be adversely affected by debris, bank erosion, and emergency bridge repair.

4.11 Cumulative Impacts

The effects of the Proposed Action and No Action Alternative in combination with the effects of other relevant past, present, and reasonably foreseeable future projects have been evaluated in this cumulative effects analysis. A list of relevant past, present, and reasonably foreseeable projects that have been/would be constructed on VAFB is provided in Table 4-10. The foregoing analysis is based on the same resource thresholds as discussed in Sections 4.1 to 4.11.

4.11.1 Past, Present, and Reasonably Foreseeable Future Actions in the Region of Influence

The region of influence for the Proposed Action is defined as the area over which effects of the Proposed Action could contribute to cumulative impacts on the environment. Therefore, the region of influence includes both North and South VAFB. Future large projects on VAFB that are currently projected for the next several years have the greatest potential to result in cumulative impacts. VAFB projects contain environmental contract specifications and are individually evaluated for their environmental impacts. Based on the environmental impacts associated with each specific project, environmental protection measures and requirements are included in the

project activities to reduce adverse environmental effects. Thus, individually implemented measures provide cumulative protection reducing overall adverse effects on VAFB environmental resources. Table 4-10 lists the past, present, and reasonably foreseeable future federal actions that may contribute to cumulative effects of the Proposed Action and may be under construction at the same time as the Proposed Action.

Table 4-10. Federal and Non-Federal Projects

Federal Projects	Status
13th Street Bridge Replacement	NEPA complete. Action completed in 2017.
Falcon 9 and Falcon 9 Heavy Launch Vehicle Programs from Space Launch Complex 4 East	NEPA complete. Actions ongoing.
Boost-back and Landing of the Falcon 9 First Stage at SLC-4 West and Offshore	NEPA complete. Actions ongoing.
Atlas V System from SLC-3E	NEPA complete. Actions ongoing.
D1 Powerline Replacement	NEPA underway.
South VAFB Wastewater Treatment Plant	NEPA underway.
Repairs to San Antonio Road West Bridge	NEPA underway.
Installation of Cabins at Wall Beach	NEPA underway.
Golf Course	NEPA underway.
SLC-2 Deactivation	NEPA beginning.

4.11.2 Proposed Action

4.11.2.1 Air Quality

VAFB has several other construction or demolition projects in the region of influence for the Proposed Action. Air emissions from other projects would be localized and short-term in nature. Long-term emissions from the projects are not anticipated to increase. Cumulative emissions from the Proposed Action combined with other concurrent construction projects and launch operations would not exceed the significance thresholds in Santa Barbara County and would not produce any significant cumulative air quality impacts. This determination was made by reviewing the total emission impact of this project with the cumulative emissions from all planned concurrent projects.

4.11.2.2 Biological Resources

The Proposed Action and other construction and launch projects that involve ground-disturbing activities and related noise and traffic impacts could have temporary and localized effects on biological resources. Cumulative adverse impacts could result if concurrent projects, along with the Proposed Action, cause disturbances to special-status species or their habitats. Implementation of the Proposed Action would result in temporary loss of habitat, potential loss

of individual special status species, and potential disruption of foraging and breeding activities. Although the Proposed Action and other concurrent projects may disturb wildlife, these disturbances would be temporary and wildlife would continue to use habitat in the periphery of the projects. Through habitat restoration, the implementation of the EPMs listed in Section 2.1.4, and the requirements stated in the BOs issued by the USFWS for the Proposed Action, potential adverse effects would be less than significant and not affect special status species populations. Additionally, VAFB routinely implements projects and specific measures and procedures set forth in the *Integrated Natural Resources Management Plan* (USAF 2011), which would tend to ensure project-specific and cumulative adverse effects to biological resources are avoided and minimized. As a result, the Proposed Action, in combination with other past and planned activities, should not result in significant adverse cumulative impacts on biological resources.

4.11.2.3 Cultural Resources

Implementing the Proposed Action and other construction activities on VAFB involving activities that disturb intact, native soils or demolish structures over 50 years of age could result in impacts to cultural resources. Cumulative impacts would result if maintenance activities cause major ground disturbances in areas of high paleontological sensitivity that may contain intact subsurface prehistoric or historic archaeological resources. However, there are no sites of special sensitivity within a half-mile radius of the Proposed Action Area; therefore, historic archaeological resources would not be affected, and would not contribute to cumulative effects on cultural resources.

EPMs would be implemented to minimize impacts on sensitive archaeological resources. If cultural resources are discovered during project-related ground-disturbing activities, all excavation would be halted until the significance of the find is assessed. Significant cumulative impacts from other projects and the Proposed Action are not expected.

4.11.2.4 Earth Resources

Cumulative projects at VAFB involving grading, excavations, and construction or demolition could result in erosion-induced sedimentation of adjacent drainages and water bodies. Potential cumulative effects would include an increase in soil disturbance associated with construction, demolition, and road building activities that could substantially increase erosion, landslides, soil creep, mudslides, and unstable slopes. These impacts would be minimized by the use of BMPs and site restoration to minimize soil erosion and reduce fugitive dust. Erosion-induced sedimentation of surface drainages could occur as a result of cumulative projects at VAFB.

All projects located in the region are subject to seismically induced ground shaking due to an earthquake on a local or regional fault. By incorporating modern construction engineering and safety standards, all adverse seismic-related impacts at the project site, as well as the projects in the region, should be avoided. Therefore, the Proposed Action would not result in significant adverse cumulative impacts to geology and earth resources.

4.11.2.5 Hazardous Materials and Waste Management

Management of any hazardous materials for all projects would occur under compliance with AFI 32-7086, and emergency responses to spills would follow the Hazardous Materials Emergency Response Plan. Projects must also follow the Integrated Solid Waste Management Plan (SWMP). EPMs would be implemented to minimize hazardous materials or hazardous waste management impacts. The Proposed Action would not contribute to cumulative effects to hazardous materials and wastes in or around VAFB. The Proposed Action and other projects would not result in significant cumulative impacts.

4.11.2.6 Human Health and Safety

The Proposed Action and other concurrent projects on VAFB could result in increased risks to human health and safety. Implementation of the Proposed Action and other similar actions at VAFB would slightly increase the short-term risk associated with construction contractors performing work at project locations. Contractors would be required to establish and maintain safety programs that would provide protection to their workers and limit the exposure of Base personnel to construction hazards. Impacts would be minimal and confined to the immediate project site. The safety program would include coordination with the Air Force Civil Engineer Center/Comprehensive Zoning Ordnance Military Munitions Response Program manager and contact with the weapons safety specialist for 30th Space Wing, Weapons Safety Office for information on VAFB policies on UXO safety for construction work at VAFB. With implementation of required safety measures, there would be no significant cumulative impacts resulting from the Proposed Action and other anticipated projects.

4.11.2.6.1 Noise

Construction and demolition activities within the Proposed Action Area and for other projects would result in temporary, intermittent impacts localized to each project site. Construction projects are typically temporary in duration and the noise impact from the Proposed Action would not be a major contributor to the noise setting on VAFB. In addition, the cumulative projects listed in Table 4-10 are not located in the immediate vicinity of the Proposed Action and would therefore not combine with it to produce a cumulative noise impact.

4.11.2.7 Coastal Zone Management

The Proposed Action would not adversely affect land use or CZMA and CCA policies. The cumulative projects identified in Table 4-10 are all on VAFB and would conform to Air Force regulations and planning principles or comply with County/State requirements. Cumulative projects would be modified during the project review process to ensure compatibility with existing land uses and consistency with management plans. These projects have been and would be assessed separately under NEPA and the effects would be analyzed and disclosed. The Proposed Action and other cumulative projects are not expected to result in significant adverse cumulative effects on land use or coastal zone resources.

4.11.2.8 Solid Waste Management

The cumulative projects listed in Table 4-10, including the Proposed Action, would result in an overall increase in solid waste generation resulting from construction, renovation, and demolition. Solid waste would be minimized by compliance with VAFB's Integrated SWMP and the implementation of EPMs, including segregating, reusing, and recycling waste to the greatest extent practicable, would reduce cumulative impacts of solid waste. Local landfills would be able to process the projected temporary increases in solid waste. No significant cumulative impacts on solid waste management are expected.

4.11.2.9 Transportation

Cumulative construction and demolition projects on VAFB would contribute to increased traffic volumes in the region. However, given the low ADT volumes and good levels of service currently experienced on the roadways that would be affected by project activities on VAFB and its vicinity, and the relatively small and temporary increase in daily truck traffic that would be generated by the Proposed Action, no cumulative adverse effects to capacity are expected to occur as a result of the Proposed Action.

4.11.2.10 Water Resources

Cumulative impacts to water resources could occur if concurrent projects were to inadequately address water resources at project locations. However, projects on VAFB, including the Proposed Action, are required to utilize site-specific BMPs to control runoff and conduct site restoration, as necessary, to minimize impacts to water quality. Impacts tend to be localized and temporary during the project duration. In addition, VAFB would follow the conditions of the CWA 401 Water Quality Certification. The Proposed Action is expected to improve baseline conditions, which is expected to reduce scour, erosion, and sedimentation. Therefore, no significant cumulative effects on water resources are expected.

4.11.3 No Action Alternative

Under the No-Action Alternative, the proposed maintenance of San Antonio Road West Bridge would not occur. Therefore, no impacts to cumulative impacts would be expected in the short-term. However, if the bridge were to fail, significant adverse impacts to the environment would be expected. Since failure would likely occur in an unplanned fashion, it would necessitate emergency repairs or demolition and replacement. Without the benefit of environmental planning and review, this scenario would likely result in significant impacts to biological resources, earth resources, hazardous materials and waste, human health and safety, solid waste management, transportation, and water resources and therefore have a significant adverse contribution to cumulative effects on the environment.

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