Environmental Assessment

Security and Safety Upgrades to Entry Control Facilities

Vandenberg Air Force Base, California

8 July 2009

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FINDING OF NO SIGNIFICANT IMPACT

AND FINDING OF NO PRACTICABLE ALTERNATIVE

Security and Safety Upgrades to Entry Control Facilities at Vandenberg Air Force Base, California

Under the National Environmental Policy Act (NEPA), 42 U.S. Code 4321 *et seq.*, Council on Environmental Quality (CEQ) implementing regulations, 40 Code of Federal Regulations (CFR) 1500-1508, and 32 CFR Part 989, *Environmental Impact Analysis Process*, the U.S. Air Force (Air Force) conducted an assessment of the potential environmental consequences associated with implementing security and safety upgrades to Entry Control Facilities (ECFs) at Vandenberg Air Force Base (AFB).

The Environmental Assessment (EA), incorporated by reference to this finding, considers all potential impacts of the Proposed Action and No-Action Alternative, both as a solitary action, and cumulatively in conjunction with other projects at Vandenberg AFB. The EA analyzes the potential environmental consequences of construction at five of Vandenberg AFB's ECFs, and provides general environmental protection criteria and guidelines for proposed construction and demolition activities that would prevent adverse environmental impacts.

PROPOSED ACTION

The Proposed Action would upgrade the Lompoc, Santa Maria, Solvang, South, and Utah Gates to improve on-base security and safety. These upgrades consist of installing and constructing components, as required at each of the gates, including new fencing, new gates, cable barriers, overwatch facilities, guard booths, vehicle inspection and turn-around areas, vehicle denial barriers, retractable tire shredders, retractable bollards, speed tables, and safety and warning lighting. Construction activities would begin in fiscal year 2009 and would continue through fiscal year 2014. Government funding for each gate is expected during this time frame. Once funding is received work at each gate is estimated to last approximately 240 days.

The EA evaluates the Proposed Action and the No-Action Alternative. The assessment did not identify any other viable alternatives. Implementing the No-Action Alternative would result in non-compliance with the United Facilities Criteria 4-022-001, *Security Engineering: Entry Control Facilities/Access Control Points*, which directs the Air Force and Vandenberg AFB to incorporate features at all ECFs to secure the installation and provide adequate levels of security and safety for Department of Defense personnel and visitors.

SUMMARY OF FINDINGS

The analyses of the affected environment and environmental consequences of implementing the Proposed Action presented in the EA concluded that with implementation of the environmental protection and monitoring measures as described in Chapter 4, no adverse effects should result to Human Health and Safety (Section 4.5), Solid Waste Management (Section 4.6), and Transportation (Section 4.7). In addition, the EA concluded that the Proposed Action would not affect Earth Resources, Environmental Justice, Land Use and Aesthetics, Socioeconomics, and Water Resources.

No cumulative adverse impacts should result from activities associated with the Proposed Action, when considered in conjunction with recent past and future projects within the project area (Section 4.9).

Three areas of environmental consequences evaluated in the EA could have the potential to result in minor impacts to the environment, as described below. Implementing the environmental protection and monitoring measures described under each resource in Chapter 4 should ensure that no significant impacts occur for any of these resource areas.

Air Quality

Fugitive dust emissions generated from equipment operating on exposed ground and combustive emissions from the equipment would cause adverse air quality impacts. However, significant impacts are not anticipated (Section 4.1). Emissions from the Proposed Action would occur over a period of 5 years. With the self-imposed

emission limits and measures described in Section 4.1 of the EA, effects from the Proposed Action would be considered insignificant (Section 4.1).

Biological Resources

Wetlands are present within the project areas at the Santa Maria and South Gates, and surface water drainages occur within the project area of the Lompoc Gate. The wetlands in the vicinity of the Santa Maria and South Gates are contiguous with known California red-legged frog habitat, and the species could potentially be present at the time of construction. While the wetlands at these ECFs would be avoided by careful placement of cable barrier posts, a qualified biologist would survey the area prior to construction to document whether the species is present. If the species is present, the qualified biologist would direct avoidance until the species moves a safe distance from the construction site. At the Lompoc Gate, construction of upgrades would avoid the path of the surface water drainages (Sections 4.2.1.1 and 4.2.1.4).

Construction activities under the Proposed Action would occur over a 5-year period, and some activities could occur during the breeding season for wildlife species. Under the Migratory Bird Treaty Act, disturbances to nesting birds, their nests and young, would be avoided by trimming and or removing trees and shrubs between September and February, to the maximum extent feasible. If removal or trimming is scheduled to occur between March and August, trees and shrubs would be surveyed within one week prior to the work.

Hazardous Materials and Hazardous Waste

Strict compliance with all applicable Hazardous Materials and Hazardous Waste statutes and regulations, local support plans, and instructions would guide the management of such materials as petroleum, oil, and machinery lubricants as well as hazardous wastes generated during the project (Section 4.4.2). Compliance with these statues and regulations should avert the potential for adverse impacts to the environment. In addition, some of the construction activities would occur within boundaries of Installation Restoration Program (IRP) Areas of Interest, and Areas of Concern. Coordination with the 30th Space Wing IRP Office prior to implementing any project under the Proposed Action should avert the potential for adverse effects to human health and safety.

FINDING OF NO SIGNIFICANT IMPACT

Based upon my review of the facts and analyses contained in the attached EA, conducted in accordance with the provisions of NEPA, the CEQ Regulations, and 32 CFR Part 989, I conclude that the Proposed Action will not have a significant environmental impact, either by itself or cumulatively with other projects at Vandenberg AFB. Accordingly, an Environmental Impact Statement is not required. The signing of this Finding of No Significant Impact and Finding of No Practicable Alternative completes the environmental impact analysis process.

FINDING OF NO PRACTICABLE ALTERNATIVE

The Proposed Action, as designed, includes all practicable measures to minimize harm to wetlands and the Santa Ynez 100-year floodplain. Pursuant to Executive Order 11990, *Protection of Wetlands*, Executive Order 11988, *Floodplain Management* and 32 CFR 989.14(g), the authority delegated in SAFO 791.1 and taking the information contained in the attached EA into consideration, I find that there is no practicable alternative to implementing the proposed ECF upgrades in a floodplain given that that the Solvang and South Gates already exist within the 100-year floodplain. As such, the proposed upgrades to these ECFs must also occur in the floodplain. The Air Force considered the Proposed Action alternative and the no action-alternative in this EA. Relocating the Solvang and South Gates to locations outside of the Santa Ynez River 100-year floodplain is not feasible due to geography and land-use around the ECFs, including the presence of the Santa Ynez River and private landowners between north and south VAFB. As such, the Air Force found that the only practicable alternative consistent with the law and with the policy set forth in the EOs requires siting in the 100-year floodplain. In order to minimize potential harm to or within the floodplain, the Proposed Action would not extend into undeveloped areas of the floodplain, and would use accepted flood proofing and other flood protection measures where practicable.

DEPARTMENT OF THE AIR FORCE
AIR FORCE SPACE COMMAND

FINDING OF NO SIGNIFICANT IMPACT and

FINDING OF NO PRACTICABLE ALTERNATIVE

In Conjunction with
Environmental Assessment for Security and Safety Upgrades
to Entry Control Facilities at Vandenberg Air Force Base, California

Approved by:

/S/ [signature], for

28 AUG 09

CARLOS R. CRUZ-GONZALEZ
Colonel, USAF
Deputy Director for Installations

Date

Environmental Assessment

Security and Safety Upgrades to Entry Control Facilities

Vandenberg Air Force Base, California

Prepared for:

Department of the Air Force
30th Space Wing
30th Civil Engineer Squadron Environmental Flight
Vandenberg Air Force Base, California

8 July 2009

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Acronyms and Abbreviations

$\mu g/m^3$	Micrograms per cubic meter
30 CES	30th Civil Engineer Squadron
30 CES/CC	30th Civil Engineer Squadron, Commander
30 CES/CD	30th Civil Engineer Squadron, Deputy Commander
30 CES/CEC	30th Civil Engineer Squadron, Engineering Flight
30 CES/CEV	30th Civil Engineer Squadron, Environmental Flight
30 CES/CEVC	30th Civil Engineer Squadron, Environmental Flight, Compliance Section
30 CES/CEVNC	30th Civil Engineer Squadron, Environmental Flight, Cultural Resources Section
30 CES/CEVNN	30th Civil Engineer Squadron, Environmental Flight, Natural Resources Section
30 CES/CEVV	30th Civil Engineer Squadron, Environmental Flight, Pollution Prevention Section
30 MDOS/SGOAB	30th Medical Operations Squadron Bioenvironmental Engineering Element
30 SW	30th Space Wing
30 SW/XP	30th Space Wing Plans and Programs
30 SW/SE	30th Space Wing, Safety Office
A.D.	Anno Domini
AF	Air Force
AFI	Air Force Instruction
Air Force	United States Air Force
AOC	Area of Concern
AOI	Area of Interest
Base	Vandenberg Air Force Base
BMP	Best Management Practice
C&D	Construction and Demolition
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Cal EPA	California Environmental Protection Agency
CAP	Collection Accumulation Point
CARB	California Air Resources Board
CCA	California Coastal Act
CCAP	Consolidated Collection Accumulation Point
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIWMB	California Integrated Waste Management Board
CO	Carbon monoxide
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	Decibels
DOD	Department of Defense
EA	Environmental Assessment
ECF	Entry Control Facility

EMS	Environmental Management System
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
EPP	Environmental Protection Plan
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FFSRA	Federal Facilities Site Remediation Agreement
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
FR	Federal Register
ft	Feet
ft^2	Square feet
FY	Fiscal Year
GIS	Geographic Information System
H_2S	Hydrogen sulfide
HazMart	Hazardous Materials Pharmacy
Hwy	Highway
ID	Identification
IRP	Installation Restoration Program
JTD	Joint Technical Document
lbs	Pounds
lbs/yr	Pounds per year
LEA	Local Enforcement Agency
LEED	Leadership in Energy and Environmental Design
L_{eq1H}	One-hour average sound level
LOS	Level of Service
MBTA	Migratory Bird Treaty Act
MILCON	Military Construction
MFH	Military Family Housing
mph	Miles per hour
MSRS	ManTech SRS Technologies, Inc.
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	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O_3	Ozone
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
P2	Pollution Prevention
Pb	Lead
$PM_{2.5}$	Particulate matter 2.5 microns or less in diameter
PM_{10}	Particulate matter 10 microns or less in diameter
POV	Privately Owned Vehicle
ppm	Parts per million
POL	Petroleum, Oil and Lubricants
RCRA	Resource Conservation and Recovery Act

ROC	Reactive Organic Compound
RWQCB	Regional Water Quality Control Board
SAIC	Science Applications International Corporation
SAP	Satellite Accumulation Point
SBCAPCD	Santa Barbara County Air Pollution Control District
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office
SO_2	Sulfur dioxide
SO_4	Sulfates
SR	State Route
SWRCB	State Water Resources Control Board
SWFP	Solid Waste Facility Permit
tons/yr	Tons per year
UFC	United Facilities Criteria
U.S.	United States
USAF	United States Air Force
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
USGBC	United States Green Building Council
UXO	Unexploded Ordnance
VAFB	Vandenberg Air Force Base
VAFB Landfill	Vandenberg Air Force Base Sanitary Landfill
VOC	Volatile Organic Compounds
WDR	Waste Discharge Requirement
yd^3	Cubic yards

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Chapter 1. Introduction: Purpose of and Need for the Proposed Action

This Environmental Assessment (EA) evaluates the potential environmental impacts associated with implementing security and safety upgrades at Entry Control Facilities (ECFs) on Vandenberg Air Force Base (VAFB or Base), in Santa Barbara County, California. ECFs are the entrance gates located on VAFB. The National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulations require lead agencies to evaluate the potential impacts of federal actions on the surrounding environment. The United States Air Force (USAF or Air Force) is the lead agency for NEPA compliance on the proposed project. This EA has been prepared in accordance with the NEPA of 1969, as amended (42 United States Code [U.S.C.] 4321 et seq.); as implemented by CEQ Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508); and 32 CFR Part 989.

1.1 Background

VAFB is headquarters for the 30th Space Wing (30 SW). The primary missions of the Air Force at VAFB are to launch and track satellites in space, test and evaluate America's intercontinental ballistic missile systems, and support aircraft operations in the Western Range. As a non-military facet of operations, VAFB is also committed to promoting commercial space launch ventures.

VAFB is located on the south-central coast of California, approximately halfway between San Diego and San Francisco (Figure 1.1). VAFB covers approximately 99,000 acres in western Santa Barbara County (VAFB 2007). The Santa Ynez River and State Route (SR) 246 divide VAFB into two distinct parts, North Base and South Base.

The Global War on Terrorism has resulted in new security requirements for entry control at military installations, including VAFB. Elevated force protection conditions and vulnerability assessments have defined the need for new infrastructure to adequately control installation access points and to protect personnel and mission critical resources. The objective of maintaining ECFs is to secure the installation from unauthorized access and intercept contraband (weapons, explosives, drugs, classified material, etc.) while maximizing vehicle traffic flow.

The Air Force Civil Engineer Support Agency is responsible for administering the United Facilities Criteria (UFC). The UFC are planning, design, and construction criteria applied by United States Department of Defense (DOD) agencies. Application of these criteria is in accordance with the Undersecretary of Defense for Acquisition, Technology and Logistics memorandum dated 29 May 2002.

The UFC document relevant to the proposal addressed in this EA is *Security Engineering: Entry Control Facilities/Access Control Points* (UFC #4-022-01). The UFC document presents a unified approach to the design of ECFs. It identifies design features necessary to ensure that infrastructure constructed today will have the flexibility to support future technologies, a changing threat environment, and changes in operations. Design considerations, in order of priority, are security, safety, capacity, and image. UFC #4-022-01 ensures that ECFs provide the proper level of access control for all DOD personnel, visitors, and commercial traffic to an installation.

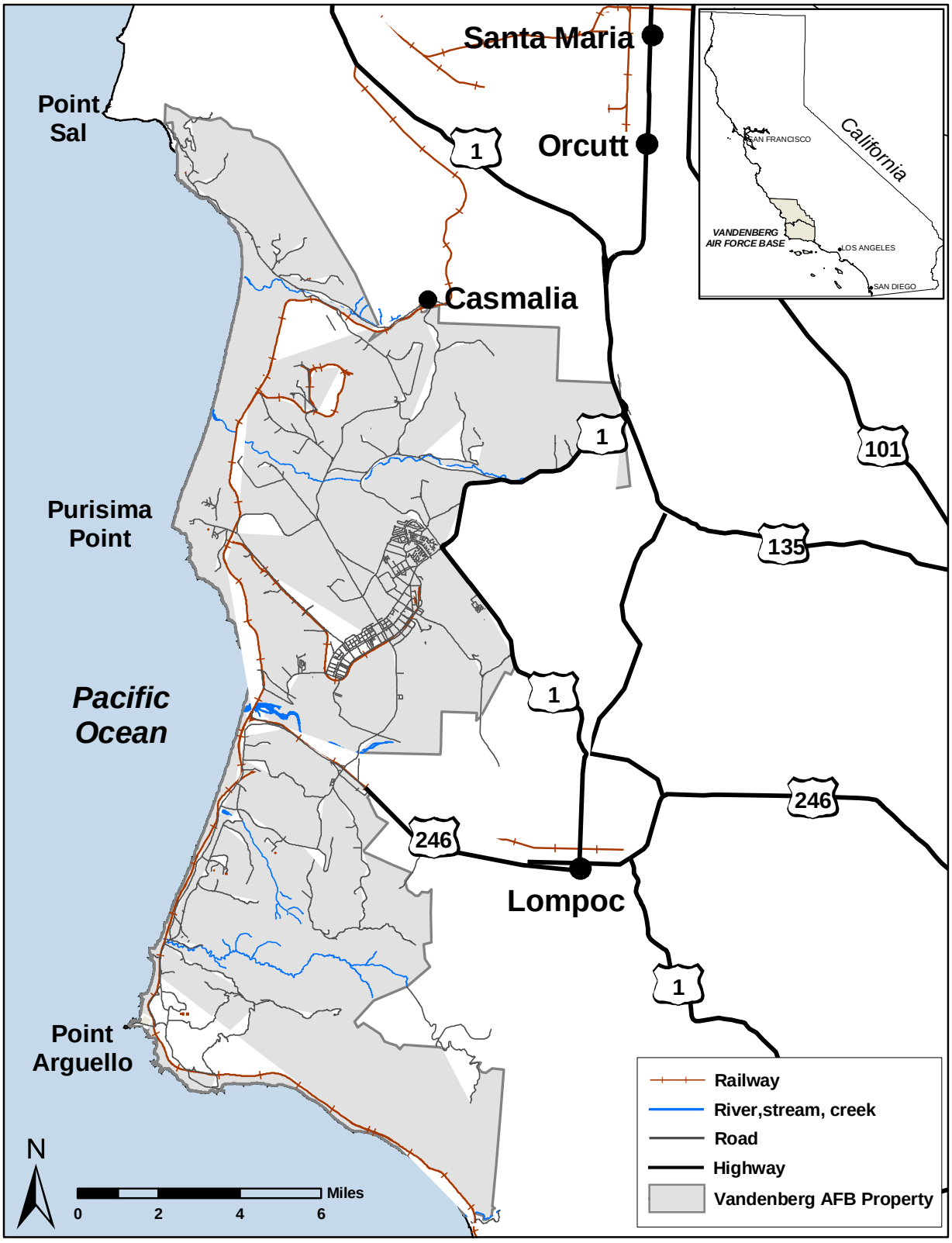

Figure 1.1. Regional Map of VAFB and Surrounding Area.

1.2 Purpose of and Need for the Proposed Action

The Air Force has determined that ECFs at VAFB do not meet the criteria described in UFC #4-022-01; thus, they do not provide adequate levels of security and safety for DOD personnel and visitors. To be compliant with UFC #4-022-01, five ECFs at VAFB require security and safety upgrades. VAFB proposes to implement these upgrades during the fiscal years (FY) 2009-14. The proposed upgrades entail construction activities ranging from replacing gates and fencing, to installing vehicle denial barriers and overwatch facilities. A summary of upgrades at the five ECFs is described as follows:

The **Lompoc Gate** (Figure 1.2) is located near the intersection of Pine Canyon and Santa Lucia Canyon Roads on North Base. This gate is open 12 hours per day, 7 days per week, and serves as the primary truck, large vehicle, recreational vehicle, and hazardous materials transport entry and exit gate on North Base. The Lompoc Gate does not meet anti-terrorism/force protection standards and is extremely vulnerable to attack. The gate is not equipped to prevent a vehicle from running the gate. Additionally, there is no outbound inspection area for vehicles, and personnel at this gate are not protected from adverse environmental conditions when checking vehicles and identifications (IDs).

The **Santa Maria Gate** (Figure 1.2) is located near the intersection of United States (U.S.) Highway (Hwy) 1 and California Boulevard and is the main access gate to VAFB. It is open 24 hours per day, 7 days per week, and provides access for privately owned vehicles (POVs) only. The Santa Maria Gate does not incorporate vehicle denial features, thus it does not meet the anti-terrorism/force protection standards. The layout of the road approaching this gate provides for the possibility of high speed approaches. In addition, personnel at this gate are not protected from adverse environmental conditions and must stand in the middle of traffic lanes to check IDs.

The **Solvang Gate** (Figure 1.2) is located near the intersection of 13th Street and West Ocean Avenue on North Base. This gate is open 24 hours per day, 7 days per week. Currently, the gatehouse is susceptible to being breached because there are no means of denying a motivated and aggressive driver from storming the gate. There are no inspection lanes; the lighting approaching the gate is inadequate making it difficult to properly inspect vehicles and people attempting access to VAFB. In addition, there is ample room on both sides of the gate for a vehicle to gain sufficient speed to run the gate and forcibly enter the installation.

The **South Gate** (Figure 1.2) is located near the intersection of Arguello Road and West Ocean Avenue at the entrance to South Base. This gate is open 24 hours per day, 7 days per week, and is south VAFB's only truck, missile movement, POV, and hazardous materials gate. The gate area terrain and layout does not provide adequate containment of vehicles. This ECF has no way of preventing a vehicle from running the gate. The gate provides access to some of the most critical facilities on VAFB, and their protection is a national security priority.

The **Utah Gate** (Figure 1.2) is located on Utah Street, near the intersection with Lompoc-Casmalia Road. This gate is open 12 hours per day, 7 days per week, and provides POV access to family housing as well as access to the school located approximately 250 feet (ft) southwest of the gatehouse.

1.3 Scope of the Environmental Assessment

Consistent with Title 32 CFR Part 989, and CEQ regulations (40 CFR 1500-1508), the scope of analysis presented in this EA is defined by the potential range of environmental impacts resulting from implementing the Proposed Action and

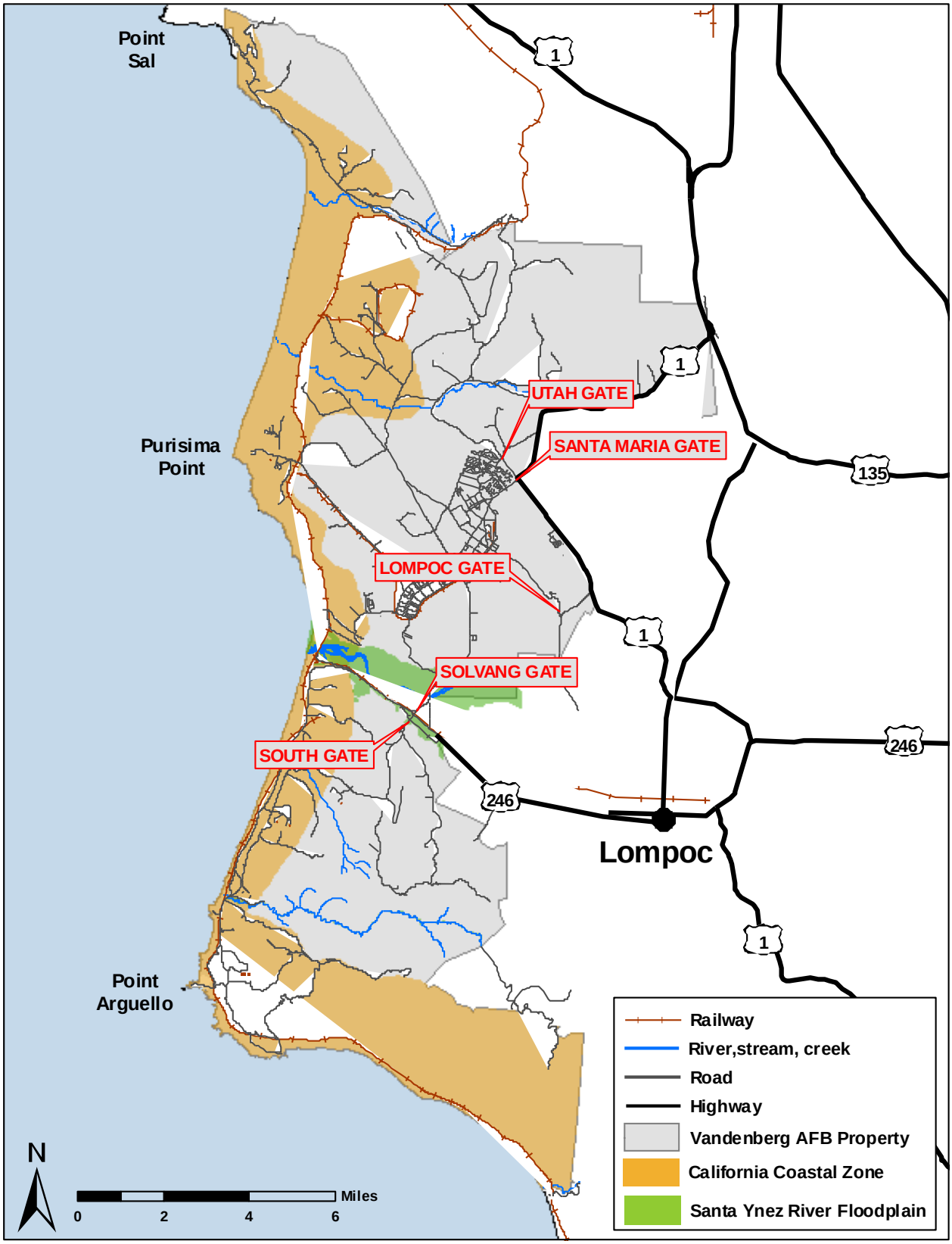

Figure 1.2. Locations of ECFs at VAFB.

Alternatives. Pursuant to 40 CFR Part 1501.4(c), resources potentially impacted are considered in greater detail to provide sufficient evidence and analysis to determine whether or not to prepare an environmental impact statement.

This EA identifies, describes, and evaluates the potential environmental effects that could result from the Proposed Action and the No-Action Alternative. No other alternatives were deemed feasible given the locations of the ECFs, and the UFC security criteria.

The Solvang and South Gates are located within the 100-year floodplain of the Santa Ynez River, as defined by the Federal Emergency Management Agency (FEMA). As a result of NEPA analysis and per 32 CFR Part 989, and Executive Orders (EOs) 11988, Floodplain Management, and 11990, Protection of Wetlands, the Air Force prepared a Finding of No Significant Impact/Finding of No Practicable Alternative (FONSI/FONPA) in conjunction with this EA. Given that the Solvang and South Gates already exist within the 100-year floodplain, the proposed upgrades to these ECFs must also occur in the floodplain. The Air Force considered the Proposed Action alternative and the no action-alternative in this EA. Relocating the Solvang and South Gates to locations outside of the Santa Ynez River 100-year floodplain is not feasible due to geography and land-use around the ECFs, including the presence of the Santa Ynez River and private landowners between north and south VAFB. As such, the Air Force found that the only practicable alternative consistent with the law and with the policy set forth in the EOs requires siting in the 100-year floodplain. In order to minimize potential harm to or within the floodplain, the Proposed Action would not extend into undeveloped areas of the floodplain, and would use accepted floodproofing and other flood protection measures where practicable.

The EA considers 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, it describes in terms of a regional overview or a site-specific description, the affected environment and environmental consequences of the action, and identifies management measures to prevent or minimize environmental impacts.

The resources analyzed in this EA include air quality, biological resources, cultural resources, hazardous materials and hazardous waste management, human health and safety, solid waste, and transportation. The following resources were considered but not analyzed in this EA for the reasons presented:

- *Earth Resources.* Because the Proposed Action entails the construction and/or installation of security and safety upgrades in already developed areas (i.e., existing gates), and all actions being proposed would occur at a maximum depth of 6 ft below the surface, no effects are anticipated on geology or soils. Tsunami or liquefaction hazards are not anticipated in the project areas.

- *Environmental Justice.* Per EO 12898, *Environmental Justice*, the potential effects of the Proposed Action on minority communities and low-income communities were considered. However, because the Proposed Action would occur within VAFB boundaries, the project would not affect low-income or minority populations within the region (i.e., Lompoc Valley and Santa Maria Valley).

- *Land Use and Aesthetics.* The Proposed Action would not change land use or affect land use planning at VAFB. Additionally, there would be no conversion of prime agricultural land to other uses, and no decrease in its productivity. Finally, the Proposed Action would not conflict with environmental plans or goals, Air Force regulations, permit requirements, or existing uses of the project area or other properties.

While land use would not be affected, one aspect of land use, the management of the coastal zone, merits further discussion. Federal activity in, or affecting, a coastal zone requires preparation of a Coastal Zone

Consistency Determination or a Negative Determination, in accordance with the federal Coastal Zone Management Act (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 submitting consistency and negative determinations to the California Coastal Commission for Air Force activities within the coastal zone. The California Coastal Commission reviews federally authorized projects for consistency with the California Coastal Zone Management Program, and either concurs or does not concur with the Air Force's determination.

On VAFB, the coastal zone extends inland from approximately 0.75 mile at the northern boundary to 4.5 miles at the southern end of the base (Figure 1.2). None of the five ECF's is within the California Coastal Zone and thus neither a consistency nor a negative determination is required for the Proposed Actions or alternatives.

- *Socioeconomics.* Socioeconomics were considered but not analyzed in this EA because the minimal manpower requirements associated with the Proposed Action would not affect the socioeconomic environment of the region (i.e., Lompoc Valley and Santa Maria Valley).

- *Water Resources.* Water resources were considered but not analyzed in this EA. No creeks or rivers are present within the project areas for any of the ECFs that may be affected by construction activities. At the Lompoc Gate, one surface water drainage crosses Pine Canyon Road approximately 375 ft north of the Guard Building, within the project area, and a second crosses Pine Canyon Road just south of the southern boundary of the project area. Wetlands are present within the project areas at the Santa Maria and South Gates. These surface water drainages and wetlands are discussed in the Biological Resources sections of this EA, under Waters of the U.S. and Wetlands (sections 3.2.4 and 4.2.4).

Under the Proposed Action, the contractor would be subject to the requirements of a National Pollutant Discharge Elimination System (NPDES) Construction General Permit if the area of ground disturbance at any of the ECFs is anticipated to be greater than 1 acre. This permit ensures that water discharged from a site meets water quality standards at the point of discharge. It also reduces and eliminates storm water and non-storm water discharge associated with construction activities through Best Management Practices (BMPs) controls and site inspections, to evaluate the effectiveness of the permit implementation process. Additionally, there would be no direct discharges from the Proposed Action into any of the Clean Water Act (CWA) Section 303 (d) listed water bodies.

While no adverse impacts to water resources are anticipated under the Proposed Action, the contractor would be required to submit a Notice of Intent to the State Water Resources Control Board (SWRCB). A Notice of Termination would be submitted to the Central Coast Regional Water Quality Control Board (RWQCB) to ensure all permit termination requirements are met. The Notice of Intent and Notice of Termination would be coordinated with the 30th Civil Engineer Squadron, Environmental Flight (30 CES/CEV) and signed by the 30 CES Commander or Deputy Commander (30 CES/CC or 30 CES/CD) prior to submittal.

Implementation of the environmental protection and monitoring measures outlined below should avoid potential adverse effects to water resources during implementation of the Proposed Action. These measures are considered integral elements of the project description, and would be fully implemented:

- BMPs, including erosion and sediment control, proper spill prevention practices for all stored liquids and construction vehicles, and permanent erosion control, would be implemented to prevent sediment or chemicals from entering storm waters.

- Industrial wastewater (water containing prohibited chemical levels) would be taken to the industrial wastewater treatment ponds.

- New building water lines and fire suppression systems would require installation of backflow prevention assemblies to prevent cross-contamination of the VAFB drinking water supply.
- Backflow prevention devices would be required for hoses connected to the VAFB drinking water distribution system (including hydrants).

With the implementation of these measures, the methods selected for constructing and/or installing the security and safety upgrades are not anticipated to: 1) cause flooding or erosion, 2) adversely affect surface water quality of creeks or rivers, or 3) adversely affect groundwater or quality of local water resources. Most security upgrades would be installed at ground surface level. Minimal digging or excavation would be required (i.e., no more than 6 ft below grade) to install some of the components, and groundwater would not be affected at any of the sites.

1.4 Applicable Regulatory Requirements

Federal and state regulatory requirements that would affect the implementation of the Proposed Action are presented in Table 1.1.

Table 1.1. Federal and State Regulations Applicable to the Implementation of the Proposed Action.

Federal Regulation	Activity or Requirement
American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996)	The American Indian Religious Freedom Act states that the policies and procedures of federal agencies must comply with the constitutional clause prohibiting abridgment of religious freedom—including freedom of belief, expression, and exercise—for Native Americans. The American Indian Religious Freedom Act policy is to consider Native American access to sites, use and possession of sacred objects, and freedom to worship, and directs federal agencies to revise policies and procedures to correct conflicts with Native American religious cultural rights and practices.
Archaeological and Historic Preservation Act of 1974 (16 U.S.C. 469a et seq.)	Directed toward the preservation of historic and archaeological data that would otherwise be lost as a result of federal construction or other federally-licensed or -assisted activities. The Archaeological and Historic Preservation Act authorizes the Department of the Interior to undertake recovery, protection, and preservation of archaeological or historic data.
Archaeological Resources Protection Act of 1979 (U.S. 470aa-mm), Supplemental Regulations of 1984	The Archaeological Resources Protection Act secures protection of archaeological resources and sites on public and Indian lands; requires permitting for any excavation or collection of archaeological material from these lands; and provides civil and criminal penalties for violations.
Clean Air Act of 1970 (42 U.S.C. 7401 et seq.)	The Clean Air Act states that applicable state and national ambient air quality standards must be maintained during the operation of any emission source. National Ambient Air Quality Standards include primary and secondary standards for various pollutants. The primary standards are mandated by the Clean Air Act to protect public health, while the secondary standards are intended to protect the public welfare from adverse impacts of pollution, such as visibility impairment.
Clean Air Act Amendments of 1990	These amendments establish new federal non-attainment classifications, new emissions control requirements, and new compliance dates for areas in non-attainment. The requirements and compliance dates are based on the non-attainment classification.

Clean Water Act of 1977 as amended (33 U.S.C. 1251 et. seq.)	Prohibits the discharge of pollutants from a point source into navigable waters of the U.S., except in compliance with a National Pollutant Discharge Elimination System (40 CFR Part 122) permit. Navigable waters of the U.S. are considered to encompass any body of water whose use, degradation, or destruction will affect interstate or foreign commerce. Section 401 of the Act requires that the discharge of dredged or fill material into water of the U.S. does not violate state water quality standards. Generally, Clean Water Act Section 404 permits will not be issued until the state has been notified and the applicant has obtained a certification of state water quality standards. Section 402 of the Act requires that a National Pollutant Discharge Elimination System certification be obtained from the applicable Regional Water Quality Control Board for projects that would disturb 1 or more acres of land. Section 404 of the Act establishes a program to regulate the discharge of dredged and fill material into waters of the U.S., including wetlands. Activities in waters of the U.S. that are regulated under this program include fills for development, water resource projects (e.g., dams and levees), infrastructure development (e.g., highways and airports), and conversion of wetlands to uplands for farming and forestry.
Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9601-9675)	The Comprehensive Environmental Response, Compensation, and Liability Act, commonly known as Superfund, provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. It also established prohibitions and requirements concerning closed and abandoned hazardous waste sites; provided for liability of persons responsible for releases of hazardous waste at these sites; and established a trust fund to provide for cleanup when no responsible party could be identified. The Act was amended by the Superfund Amendments and Reauthorization Act in October 1986.
Federal Regulation	**Activity or Requirement**
Coastal Zone Management Act of 1972 (16 U.S.C. 1451-1464)	The Coastal Zone Management Act plays a significant role in water quality management. Under the Act, 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.
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.)	The Endangered Species Act declares the intention of Congress to conserve threatened and endangered species and the ecosystems on which those species depend. The Act requires federal agencies, in consultation with the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration National Marine Fisheries Service, to use their authorities in furtherance of its purposes by carrying out programs for the conservation of endangered or threatened species.
Section 7 of the ESA (16 U.S.C. 1536)	Contains provisions that require federal agencies to consult with the Secretary of Interior and take necessary actions to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of endangered species and threatened species.
Energy Policy Act of 1992 as amended (42 U.S.C. 8256 et seq.)	The Energy Policy Act requires that federal agencies significantly reduce their use of energy and reduce environmental impacts by promoting the use of energy-efficient and renewable energy technologies.
Migratory Bird Treaty Act of 1918 as amended (16 U.S.C. 703-712)	The Migratory Bird Treaty Act implements various treaties and conventions between the United States and Canada, Japan, Mexico and the former Soviet Union, for the protection of migratory birds. Under the Act, the taking, killing, or possessing of migratory birds is unlawful.
National Environmental Policy Act of 1969 as amended (42 U.S.C. 4321-4347	Requires federal agencies to analyze the potential environmental impacts of major federal actions and alternatives and to use these analyses as a decision-making tool on whether and how to proceed.
National Historic Preservation Act of 1966 as amended (16 U.S.C. 470 et seq.)	The National Historic Preservation Act is the key federal law establishing the foundation and framework for historic preservation in the U.S. The Act: 1) authorizes the Secretary of the Interior to expand and maintain a National Register of Historic Places; 2) establishes an Advisory Council on Historic Preservation as an independent federal entity; 3) requires federal agencies to take into account the effects of their undertakings on historic properties, and to afford the Council an opportunity to comment upon any undertaking that may affect properties listed, or eligible for listing, in the National Register; and 4) makes the heads of all federal agencies responsible for the preservation of historic properties owned or controlled by them.
Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001-3013)	The Native American Graves Protection Act restores certain rights to Native Americans with respect to the disposition of ancestral human remains and cultural objects; vests ownership of these materials (from federal or tribal lands) with designated Native American groups; requires notification of federal agency head when Native American cultural items are discovered on federal or tribal lands; prohibits trafficking in Native American human remains and cultural items; requires inventory and tribal notification of human remains and associated funerary objects held in existing collections by museums or federal agencies; and provides for repatriation of these materials.

Noise Control Act of 1972 (42 U.S.C. 4901 et seq.)	The Noise Control Act establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. To accomplish this, the Act establishes a means for the coordination of federal research and activities in noise control, authorizes the establishment of federal noise emissions standards for products distributed in commerce, and provides information to the public regarding the noise emission and noise reduction characteristics of such products. The Act authorizes and directs that federal agencies, to the fullest extent consistent with their authority under federal laws administered by them, carry out the programs within their control in such a manner as to further the policy declared in 42 U.S.C. 4901. Each department, agency, or instrumentality of the executive, legislative and judicial branches of the federal government having jurisdiction over any property or facility or engaged in any activity resulting, or which may result in, the emission of noise shall comply with federal, state, interstate, and local requirements respecting control and abatement of environmental noise.
Occupational Safety and Health Act of 1970 (29 U.S.C. 659-678)	The Occupational Safety and Health Act was established to assure safe and healthful working conditions for working men and women by: authorizing enforcement of the standards developed under the Act; assisting and encouraging the states in their efforts to assure safe and healthful working conditions; providing for research, information, education, and training in the field of occupational safety and health; and for other purposes.
Pollution Prevention Act of 1990 (42 U.S.C. 13101-13109)	The Pollution Prevention Act establishes that: pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.
Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6901 et seq.)	The Resource Conservation and Recovery Act gives the U.S. Environmental Protection Agency the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. The Act also set forth a framework for the management of non-hazardous wastes.
Federal Regulation	**Activity or Requirement**
Title II of the Toxic Substances Control Act of 1976 (15 U.S.C. 2601 et seq.)	The primary goal of the Toxic Substances Control Act is to control chemical hazards through the regulation of listed chemicals in commerce, including manufacture, import, processing, distribution, use, and disposal. The Act has been amended with Title II to specifically address such substances as asbestos-containing materials.
State Regulation	**Activity or Requirement**
California Coastal Act of 1976	The California Coastal Act provides long-term protection of California's 1,100-mile coastline for the benefit of current and future generations. Coastal Act policies constitute the standards used by the Coastal Commission in its coastal development permit decisions and for the review of local coastal programs prepared by local governments and submitted to the Commission for approval. These policies are also used by the Commission to review federal activities that affect the coastal zone.
California Clean Air Act of 1988	The California Clean Air Act develops and implements a program to attain the California Ambient Air Quality Standards for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter less than or equal to 10 microns in diameter, lead, sulfates, hydrogen sulfide, and vinyl chloride. 40 CFR Part 51 gives state and local agencies the authority to establish air quality rules and regulations. Rules adopted by the local air pollution control districts and accepted by the Air Resources Board are included in the State Implementation Plan. When approved by the U.S. Environmental Protection Agency, these rules become federally enforceable.
Porter-Cologne Water Quality Control Act	Protects all waters of the state for the use and enjoyment of the people of California and declares that the protection of water resources be administered by the regional water quality control boards.
California Integrated Waste Management Act of 1989, California Assembly Bill AB 939	Provides for the proper management and disposal of solid wastes, to include the diversion requirements for construction and demolition debris.

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Chapter 2. Description of the Proposed Action and Alternatives

This chapter describes the Proposed Action and the No-Action Alternative for implementing security and safety upgrades at the five ECFs on VAFB. The Air Force considered other alternatives during the preparation of this EA, but such alternatives would involve relocating the existing ECFs or expanding the footprints of the ECFs. The Air Force determined that while relocating or expanding the ECFs would be possible, it would not be reasonable or feasible. Some of the ECFs are bordered by topographic constraints like the Santa Ynez River, cliffs, or wetlands while others are restrained from expansion due to the VAFB property boundary. These constraints aside, the cost of constructing five new ECF would far exceed the cost of upgrading the current gates, and would incur far greater environmental impacts compared to the Proposed Action. Lastly, the Air Force concluded that the Proposed Action is the only reasonable alternative that would meet the purpose and need of the UCF requirements.

Descriptions included in this Chapter are based on information provided by the 30th Civil Engineer Squadron (30 CES). All upgrades are anticipated to occur over a 5-year period between FY 2009-14. The actual construction effort is anticipated to last 40 months, with some activities occurring simultaneously at multiple locations.

2.1 Proposed Action

In compliance with UFC #4-022-01, the Proposed Action is to upgrade the security and safety of the Lompoc, Santa Maria, Solvang, South, and Utah Gates as described below. At the time of publication of this EA, security and safety upgrades for the Lompoc and Santa Maria Gates were at the 100 percent design submittal, while the remaining gates were at the conceptual design stage. Therefore, specific engineering details were only available for the Lompoc and Santa Maria Gates. Upon completion of designs for the Solvang, South, and Utah Gates upgrades, additional environmental analysis may be required if the final design varies significantly from that provided in this EA.

2.1.1 Lompoc Gate

Figure 2.1 illustrates the project area and Figure 2.2 provides the location of each upgrade at the Lompoc Gate, as described in the 100 percent design submittal. The project would result in the excavation of approximately 17 yd^3 of soil, some of which will be used as backfill, and clearance of approximately 300 ft^2 of vegetation. Total solid waste anticipated includes approximately 193 yd^3 of asphalt and concrete and 420 yd^3 of other solid waste. Asphalt and concrete would be taken off base and recycled. Other solid waste would be taken to the VAFB Landfill.

Estimated construction time at the Lompoc Gate is 240 days. Construction is anticipated to occur July 2009 – September 2010. Upgrades include the following components:

- Construction of a two-story overwatch facility with concrete slab and foundation, masonry walls, ballistic glass with 360-degree visibility, floodlights, unisex restroom, paved parking space, and all required utilities. This facility would be located on the west side of Pine Canyon Road, approximately 750 ft north of the Guard Building. The footprint for this area would be approximately 35 ft by 27 ft. Because this facility would be located on a sloped hillside adjacent to Pine Canyon Road, an 11-foot long concrete masonry unit retaining wall would be constructed on the north side. In addition, a 2-foot wide concrete drainage ditch would be installed along the

west side, and continuing from the southwest side of the facility to the road.

- Installation of a manual final vehicle denial barrier across all traffic lanes on Pine Canyon Road, near the overwatch facility. This barrier would be rated for vehicles up to 15,000 lbs approaching at 50 miles per hour (mph). Because the road width is 40.5 ft and the total width required to install this barrier and supporting warning lights would be 57 ft, the total area for this upgrade would extend approximately 8.25 ft beyond the road on both sides. In addition, a 4-foot concrete swale would be installed between the barrier and the hillside on the west side of the road.

- Installation of retractable tire shredders across all traffic lanes, approximately 90 ft south of the final vehicle denial barrier.

- Replacement of the existing Jersey barriers south of the Guard Building with manual retractable bollards. These bollards consist of a retractable 3-foot high, 8-inch diameter steel pipe filled with concrete. Below grade, concrete anchors for each retractable bollard would measure 4.1 ft in depth and 2 ft on each side.

- Installation of speed tables across traffic lanes at five locations: 1) south of the Guard Building (prior to entering the base); 2) approximately 300 ft north of the Guard Building; 3) 375 ft north of the Guard Building (approximately 125 ft south of the tire shredder); 4) 100 ft north of the final vehicle denial barrier (by the overwatch facility); and 5) 150 ft north of the overwatch facility. Each speed table would be 22 ft long and have 1.5-inch rolled rumble strips to slow traffic velocities. The speed tables would be sloped with the center 10-foot portion approximately 3 inches higher than the existing grade.

- Installation of three guard booths on two concrete islands. One island with one booth would be constructed between the two in-bound traffic lanes, directly across from the Guard Building. This island would measure 7.5 ft wide and 30 ft long. A second island with two guard booths would be constructed on the north side of the Guard Building for in-bound traffic inspections. This island would measure 7.5 ft wide and 40 ft long. Guard booths would be protected from on-coming traffic with concrete masonry unit barriers to be installed on top of the concrete island.

- Installation of a pre-engineered metal building canopy across two in-bound truck inspection lanes. The canopy would be approximately 42.5 ft wide and 62.5 ft long. Drop-arm barriers would be installed across the two traffic lanes near the north end of the canopy. In addition, a small holding building approximately 10 ft by 15 ft would be constructed on the road shoulder, adjacent to the canopy for drivers to use during vehicle and truck inspections.

- Construction of a paved vehicle and truck turn-around area northwest of the Guard Building, and a vehicle parking area for guards west of the Guard Building.

- Installation of warning lights to alert traffic of security devices, and area lighting in approach roadway, at entry gate, and under the metal canopy in the truck and vehicle inspection area.

- Utilities would be provided to required locations through existing overhead and underground equipment. Any new underground conduit and pipes would be installed within project areas (as illustrated in Figure 2.2), and along road shoulders, within 10 ft of the road.

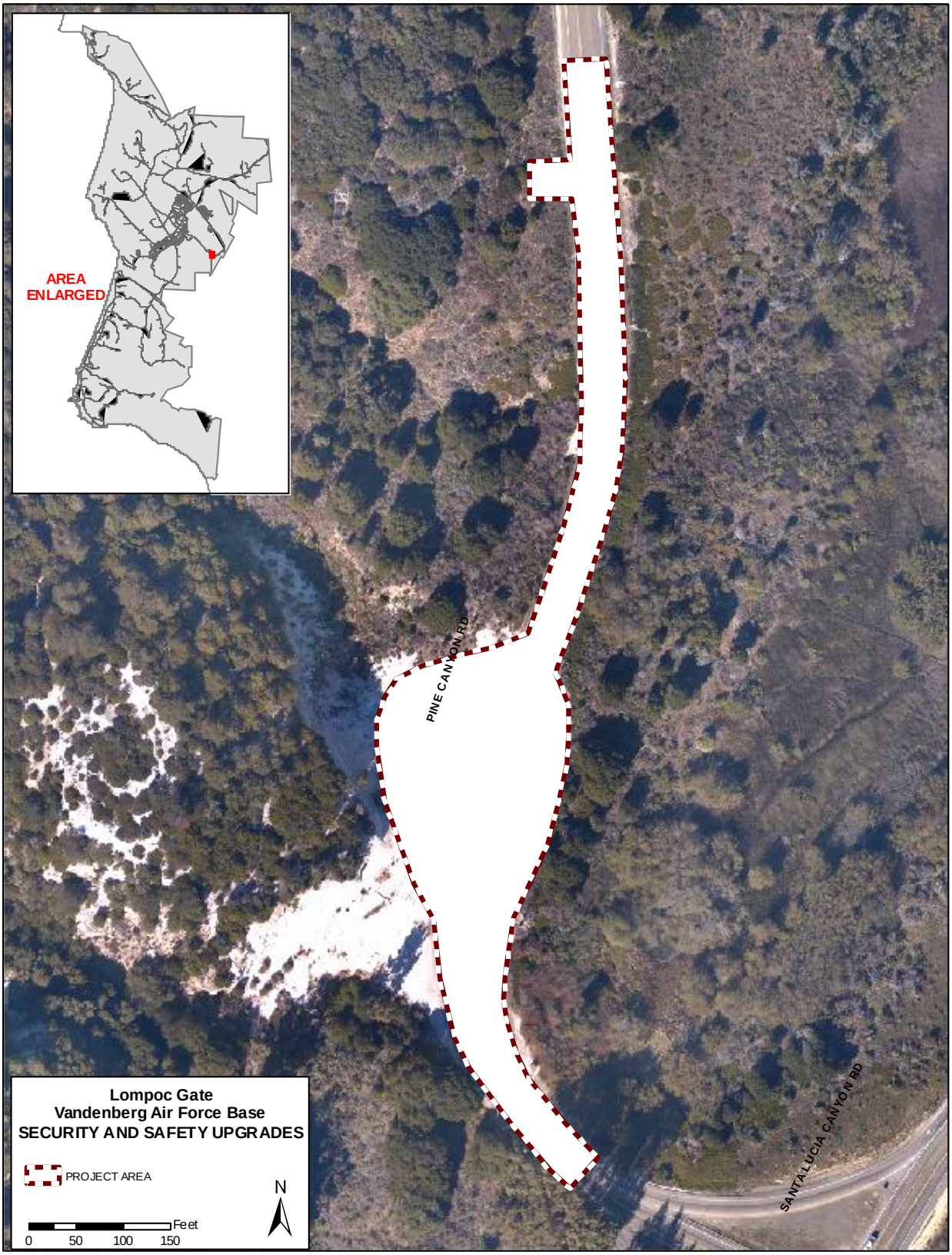

Figure 2.1. Project Area for Security and Safety Upgrades at Lompoc Gate.

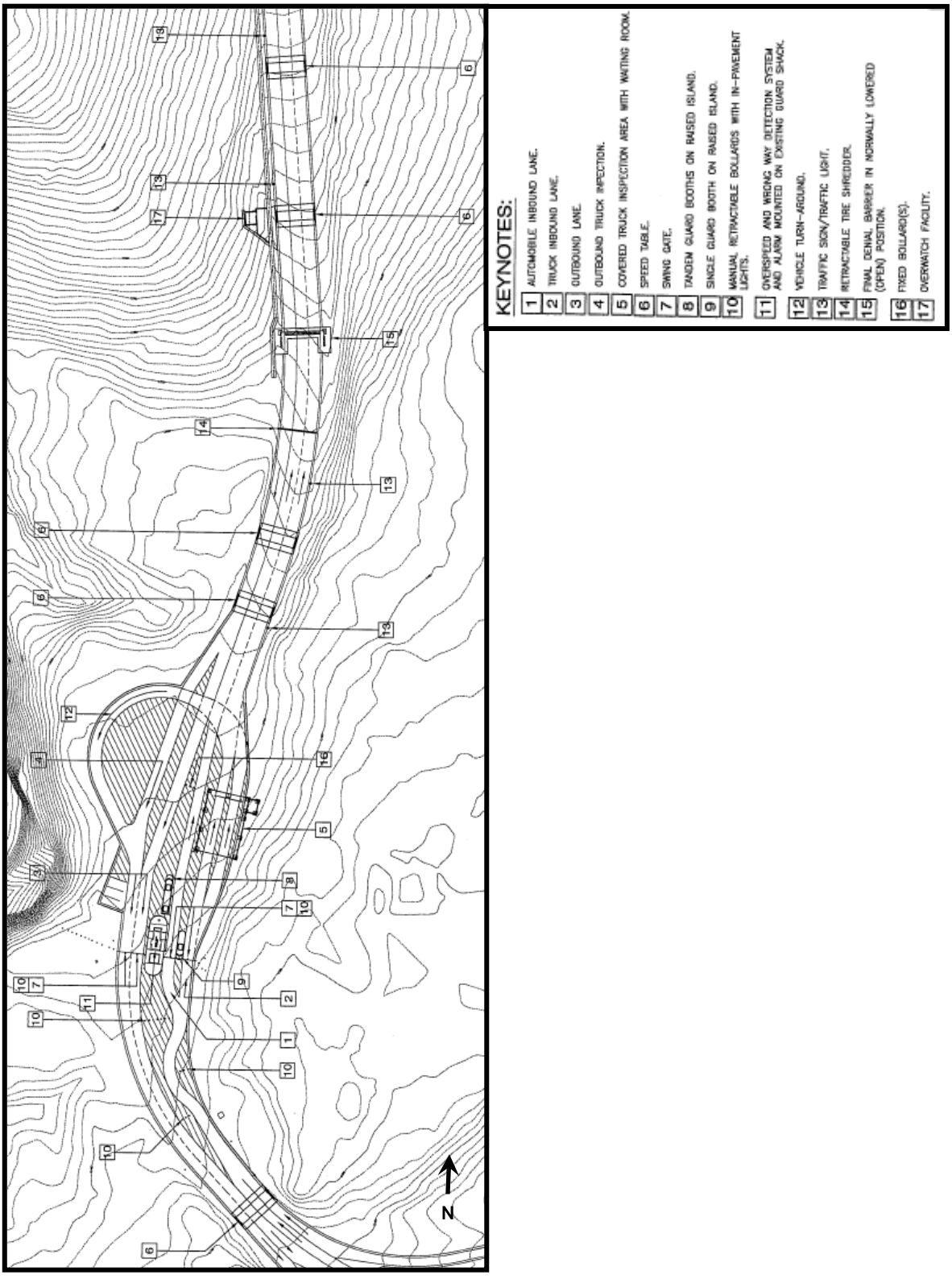

Figure 2.2. Location of Security and Safety Upgrades at Lompoc Gate.

2.1.2 Santa Maria Gate

Figure 2.3 and 2.4 illustrate the project area and Figure 2.5 provides the location of each of the upgrades for the Santa Maria Gate. The project would result in the excavation of approximately 13 yd^3 of soil, some of which would be used as backfill, and the clearance of approximately 500 ft^2 of vegetation. Total solid waste anticipated includes approximately 246 yd^3 of asphalt and concrete and 642 yd^3 of other solid waste. Asphalt and concrete would be taken off base and recycled. Other solid waste would be taken to the VAFB Landfill.

Estimated construction time at the Santa Maria Gate is 240 days. Construction is anticipated to occur between July 2009 and September 2010. Upgrades include the following components:

- Construction of a two-story overwatch facility with concrete slab and foundation, masonry walls, ballistic glass with 360-degree visibility, floodlights, unisex restroom, paved parking space, and all required utilities. This facility would be located on the northwest corner of the intersection of California Boulevard and Juniper Street, and be set-back approximately 26 ft from California Boulevard, and 65 ft from Juniper Street. The footprint for this area would be approximately 28 ft by 20 ft. A parking area would be created parallel to California Boulevard, directly across from the facility. This area would be approximately 41 ft by 10 ft.

- Installation of a manual final vehicle denial barrier across all traffic lanes on California Boulevard, approximately 100 ft east of Juniper Road. This barrier would be rated for vehicles up to 15,000 lbs approaching at 50 mph.

- Installation of speed tables across all traffic lanes at three locations: 1) approximately 150 ft east of the Guard Building (prior to entering the base); 2) approximately 200 ft east of the final vehicle denial barrier; and 3) just east of the intersection of California Boulevard with Lake Canyon Road. Each speed table would be 22 ft long and have 1.5-inch rolled rumble strips to slow traffic velocities. The speed tables would be sloped with the center 10-foot portion approximately 3 inches higher than existing grade.

- Installation of retractable tire shredders across all traffic lanes, approximately 90 ft east of the final vehicle denial barrier.

- Installation of approximately 500 ft of cable barrier consisting of three strands of 1-inch cable strung to a maximum height of approximately 3 ft. The cables would be anchored at each end in reinforced 3 ft by 3 ft concrete blocks buried 3 ft below grade. The concrete cases would be installed below grade and reach a depth of 3.5 ft. Posts, 1-foot in diameter, would be installed every 10 ft to provide sufficient support to stop vehicles of up to 50,000 lbs. Shrubs of species native to VAFB would be planted every 10 ft to visually hide the barrier.

- Installation of a retractable barrier to block vehicle access to the housing area through the fire access lane located just west of the vehicle entrance gate. The gate/barrier would be installed on a 5-inch thick, 10 ft by 23 ft concrete pad. The barrier would be permanently anchored with 3-foot high, 8-inch diameter bollards at each end. Below grade, concrete anchors for each bollard would measure 4.1 ft in depth and 4 ft on each side. In addition, fixed bollards would be placed along either side of the barrier to prevent traffic passage. This vehicle gate/barrier would be rated for vehicles up to 15,000 lbs approaching at 50 mph.

- Installation of four guard booths on two concrete islands set between the inbound traffic lanes east of the Guard Building. The islands would be 7.5 ft wide and 40 ft long. Guard booths would be protected from on-coming traffic with concrete masonry unit barriers to be installed on top of the concrete island.

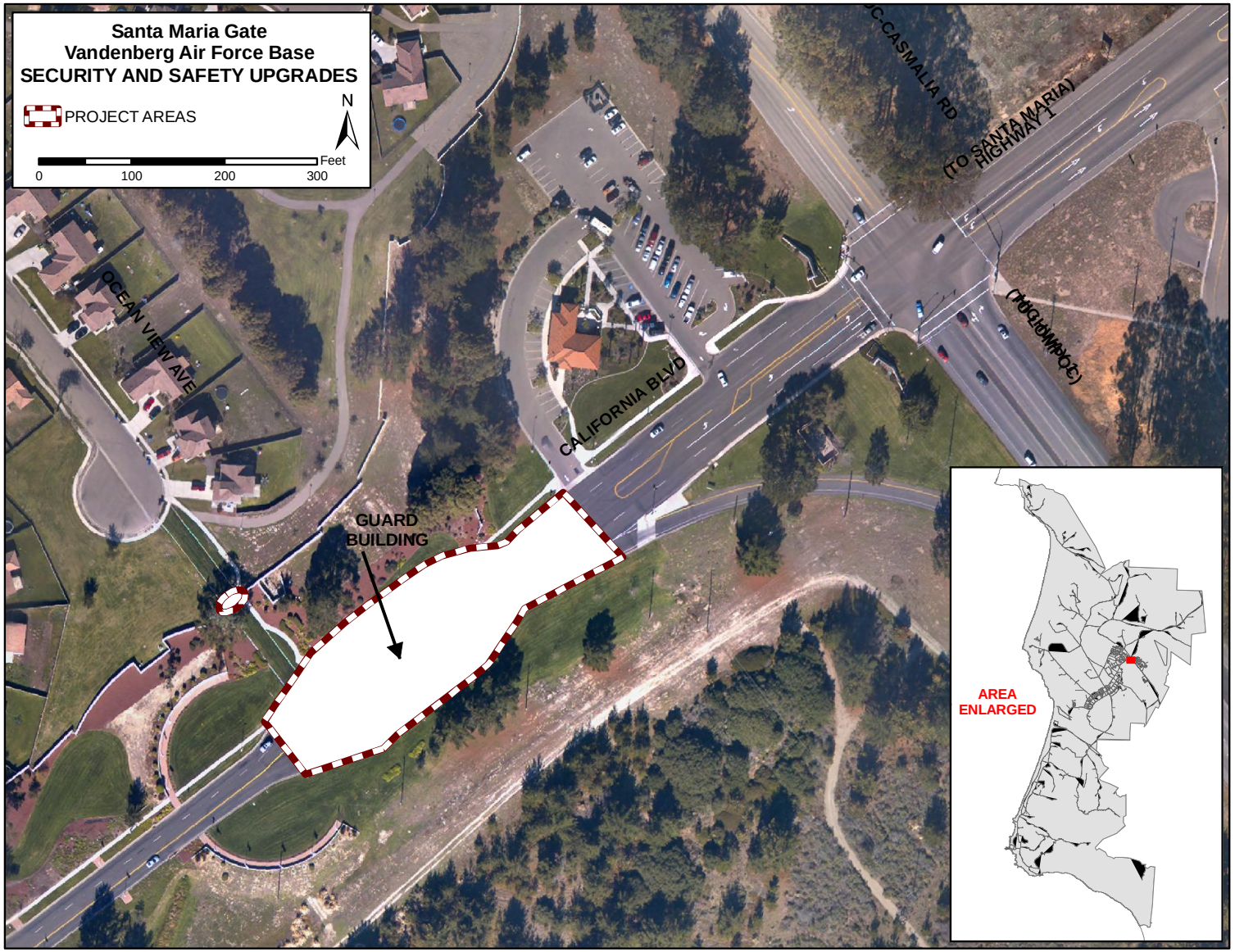

Figure 2.3. Project Area 1 for Security and Safety Upgrades at Santa Maria Gate.

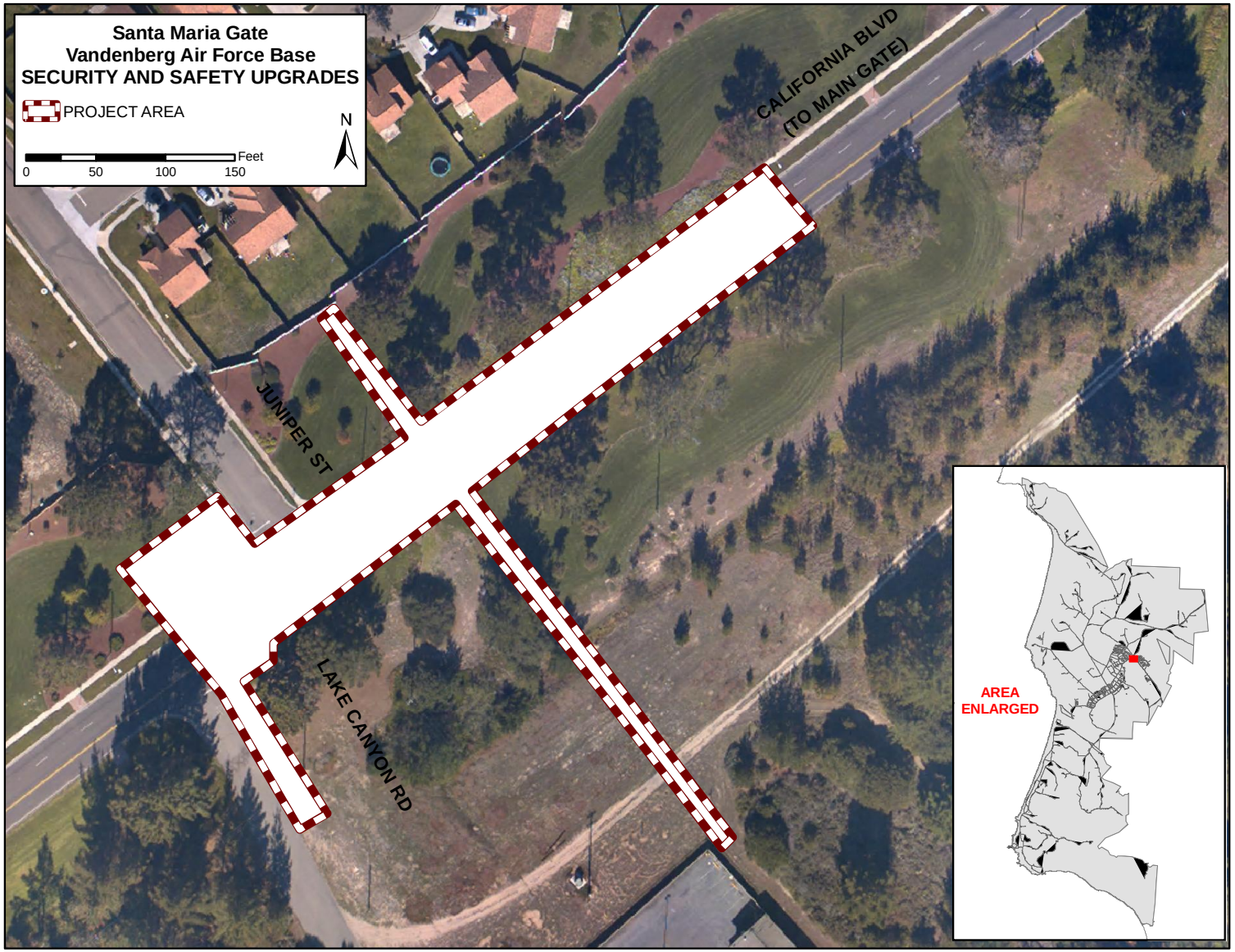

Figure 2.4. Project Area 2 for Security and Safety Upgrades at Santa Maria Gate.

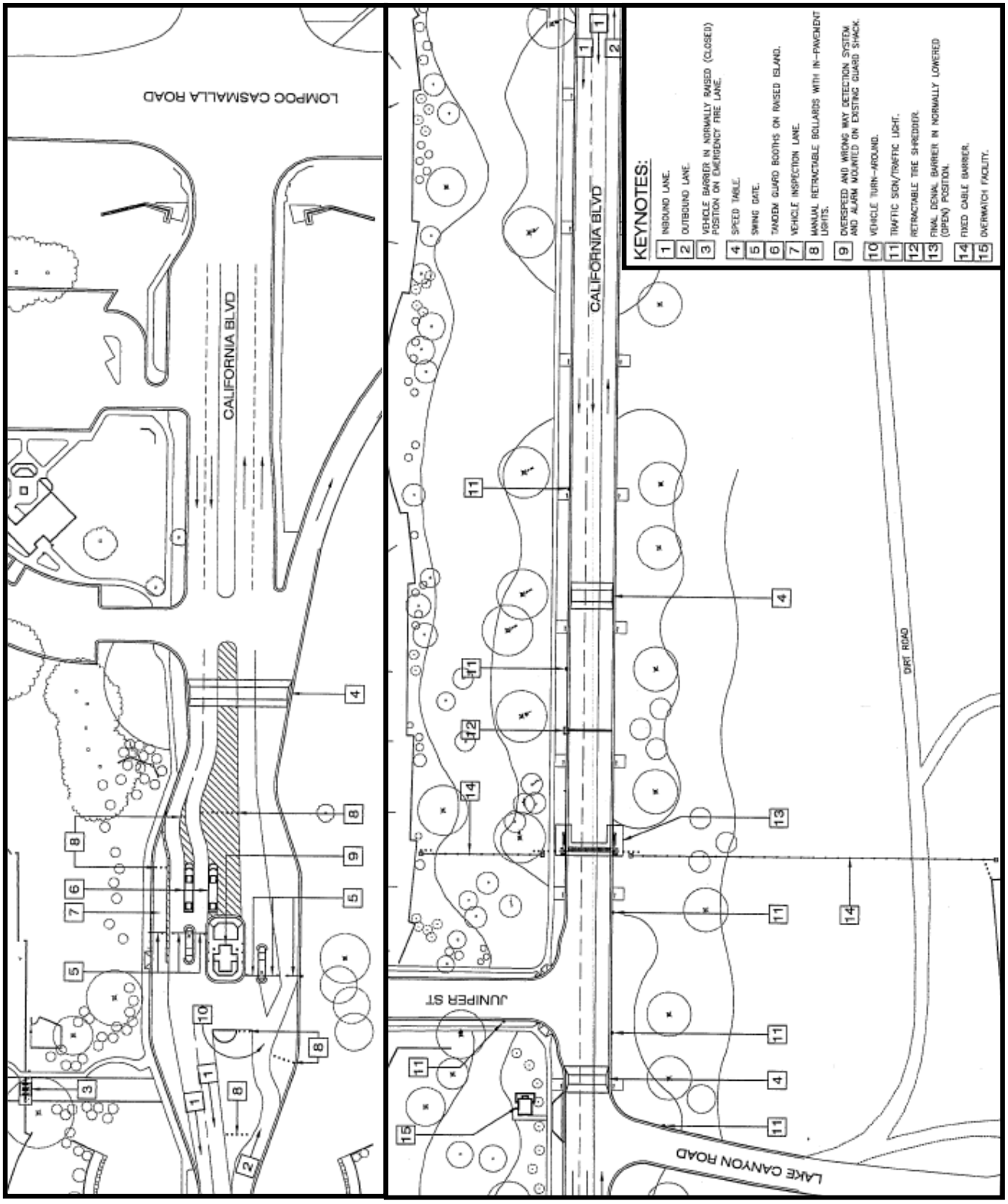

Figure 2.5. Location of Safety and Security Upgrades at Santa Maria Gate.

- Installation of manual retractable bollards. These bollards consist of a retractable 3 ft high, 8-inch diameter steel pipe, filled with concrete. Below grade, concrete anchors for each retractable bollard would measure 4.1 ft in depth and 2 ft on each side. Bollards would be placed at the following locations:
  - Two bollards between inbound traffic lanes east of the Guard Building;
  - Eight bollards across a "no traffic" section of the road between inbound and outbound traffic lanes east of the Guard Building;
  - One bollard by each of the existing three swing gates in the inbound traffic lanes by the Guard Building;
  - One bollard by each of the existing three swing gates in the outbound traffic lanes by the Guard Building;
  - Five bollards across a "no traffic" section of the road on the south side of outermost outbound lane;
  - Three bollards on the south side of the existing concrete curb west of the Guard Building; and
  - Five bollards on the approach outbound lane west of the Guard Building.
- Installation of warning lights to alert traffic of security devices, and area lighting in approach roadway, and at entry gate.

Utilities would be provided to required locations through existing overhead and underground equipment. Any new underground conduit and pipes would be installed within the project areas (as illustrated in Figure 2.5), and along road shoulders.

2.1.3 Solvang Gate

Figure 2.6 provides the conceptual layout for upgrades at the Solvang Gate. The project would result in the excavation of approximately 12 yd^3 of soil and clearance of approximately 100 ft^2 of vegetation. Total solid waste anticipated includes approximately 242 yd^3 of asphalt and concrete and 620 yd^3 of other solid waste. Asphalt and concrete would be taken off base and recycled. Other solid waste would be taken to the VAFB Landfill.

Estimated construction time at the Solvang Gate is 240 days. Construction is anticipated to occur 2010 – September 2012. Upgrades include the following components:

- Installation of a manual final vehicle denial barrier across all traffic lanes, approximately 600 ft north of the Guard Building. Warning lights and rumble strips would warn vehicles that the barrier might be engaged. The precise location of the barrier, warning lights and rumble strips would be determined at the time of engineering design.
- Installation of a cable barrier consisting of three strands of 1-inch cable strung to a maximum height of approximately 3 ft. The cable barrier would be installed perpendicular to the road (13th Street) and extend from the final vehicle denial barrier for approximately 75 ft on either side of the road. The cables would be anchored at each end in reinforced 3 ft by 3 ft concrete blocks buried 3 ft below grade. The concrete cases would be installed below grade and reach a depth of 3.5 ft. Posts, 1-foot in diameter, would be installed every 10 ft to provide sufficient support to stop vehicles of up to 50,000 lbs. The precise location of the barrier would be determined at the time of engineering design.
- Installation of retractable tire shredders across all traffic lanes, approximately 250 ft south of the final vehicle denial barrier. The precise location of the tire shredders would be determined at the time of engineering design.

Construction of a two-story overwatch facility with concrete slab and foundation, masonry walls, ballistic glass with 360-degree visibility, floodlights, unisex restroom, paved parking space, and all required utilities. This facility would be located approximately 600 ft north of the Guard Building, on the south side of 13th Street, near the final vehicle denial barrier. The footprint for this area would be

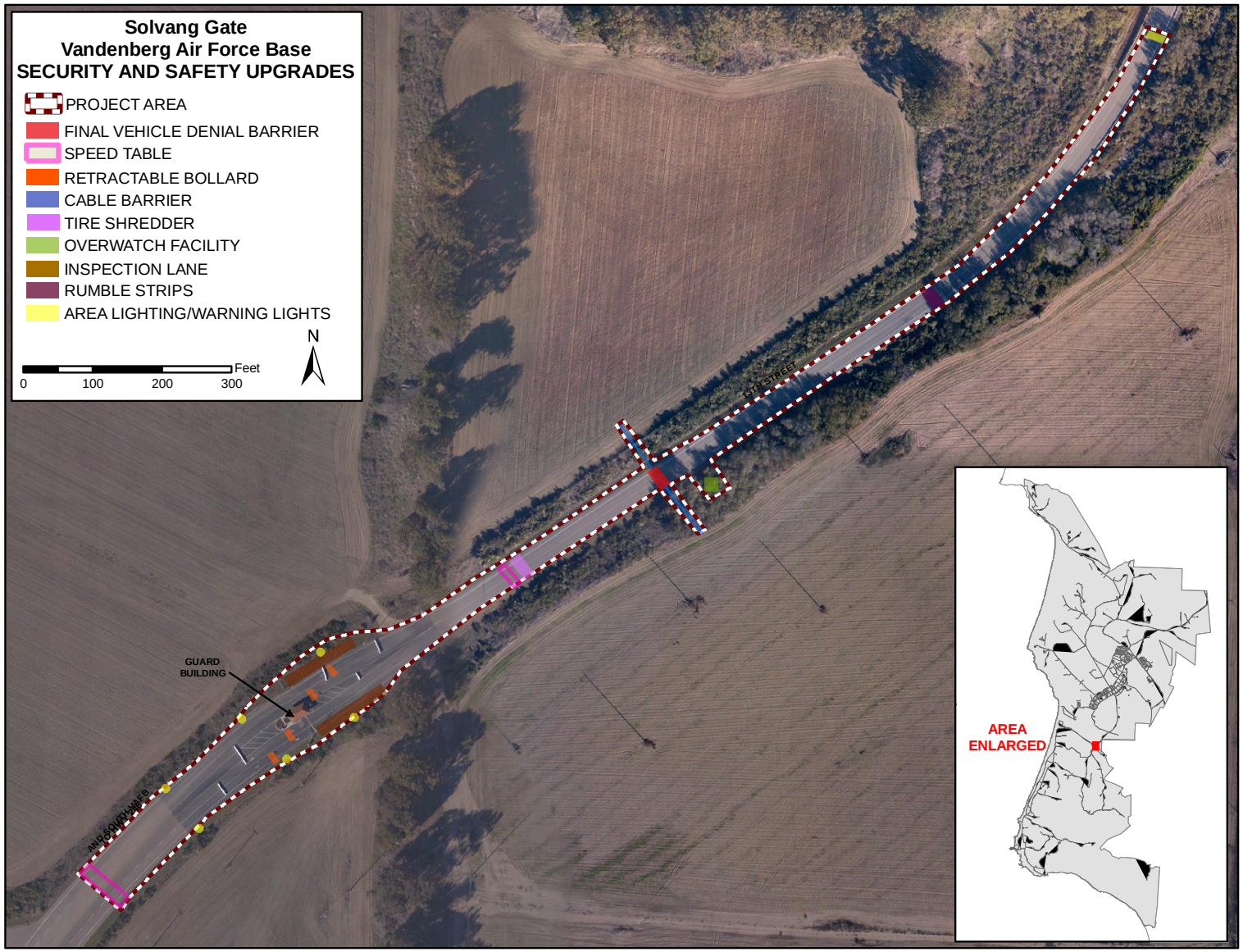

Figure 2.6. Security and Safety Upgrades at Solvang Gate.

approximately 25 ft by 20 ft. The precise location of the overwatch facility would be determined at the time of engineering design.

- Construction of in-bound and out-bound pullout lanes for inspecting vehicles. In accordance with UFC 4-022-01, the lanes would be at least 18 ft wide and 40 ft long.

- Installation of speed tables across all traffic lanes approximately 400 ft north and south of the Guard Building. Each speed table would be 22 ft long and have 1.5-inch rolled rumble strips to slow traffic velocities. The speed tables would be sloped with the center 10-foot portion approximately 3 inches higher than the existing grade. The precise location of the speed tables would be determined at the time of engineering design.

- Installation of manual retractable bollards for queuing traffic. These bollards consist of a retractable 3-foot high, 8-inch diameter steel pipe filled with concrete. Below grade, concrete anchors for each retractable bollard would measure 4.1 ft in depth and 2 ft on each side. The number and precise locations of the bollards would be determined at the time of engineering design.

- Installation of warning lights to alert traffic of security devices, and area lighting in approach roadway, and at entry gate.

Utilities would be provided to required locations through existing overhead and underground equipment. Any new underground conduit and pipes would be installed within the project area, and along road shoulders.

2.1.4 South Gate

Figure 2.7 provides the conceptual layout for upgrades at the South Gate. The project would result in the excavation of approximately 17 yd^3 of soil and the clearance of approximately 600 ft^2 of vegetation. Total solid waste anticipated includes approximately 102 yd^3 of asphalt and concrete, and 505 yd^3 of other solid waste. Asphalt and concrete would be taken off base and recycled. Other solid waste would be taken to the VAFB Landfill.

Estimated construction time at the South Gate is 240 days. Construction is anticipated to occur July 2012 – September 2014. Upgrades include the following components:

- Installation of a manual final vehicle denial barrier across all traffic lanes, approximately 500 ft southwest of the Guard Building on Arguello Road, and on Clark Street at its intersection with Arguello Road. Barriers would be rated for vehicles up to 15,000 lbs approaching at 50 mph.

- Construction of a two-story overwatch facility with concrete slab and foundation, masonry walls, ballistic glass with 360-degree visibility, floodlights, unisex restroom, paved parking space, and all required utilities. This facility would be located by the final vehicle denial barrier on Arguello Road. The footprint for this area would be approximately 25 ft by 20 ft. The precise location of the overwatch facility would be determined at the time of engineering design.

Installation of cable barriers consisting of three strands of 1-inch cable strung to a maximum height of approximately 3 ft. The cables would be anchored at each end in reinforced 3 ft by 3 ft concrete blocks buried 3 ft below grade. The concrete cases would be installed below grade and reach a depth of 3.5 ft. Posts, 1-foot in diameter, would be installed every 10 ft to provide sufficient support to stop vehicles of up to 50,000 lbs. Cable barriers would be installed at three locations: 1) from the final vehicle denial barrier on Arguello Road, north for approximately 75 ft, and south to the proposed overwatch facility; 2) parallel with Arguello Road, from the overwatch facility to the final vehicle denial barrier on Clark Street; and 3) from the final vehicle denial barrier on Clark Street, north for approximately 50 ft. The precise location of the barriers would be determined at the time of engineering design.

- Installation of retractable tire shredders across all traffic lanes, between the Guard Building and the final vehicle denial barrier. The precise location of the tire shredders would be determined at the time of engineering design.

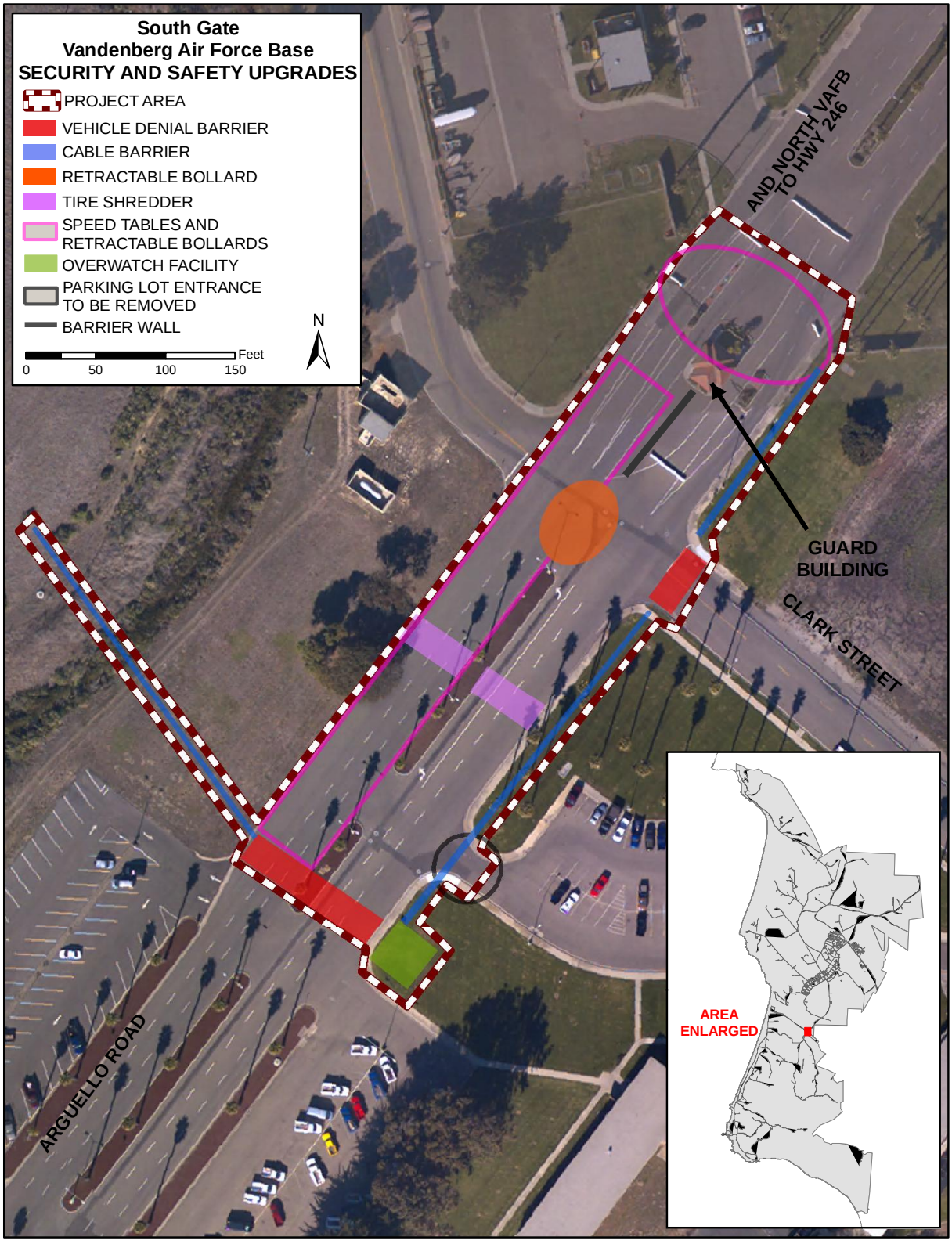

Figure 2.7. Security and Safety Upgrades at South Gate.

- Installation of manual retractable bollards on in-bound traffic lanes between the Guard Building and the final vehicle denial barrier. These bollards consist of a retractable 3-foot high, 8-inch diameter steel pipe filled with concrete. Below grade, concrete anchors for each retractable bollard would measure 4.1 ft in depth and 2 ft on each side. The number and precise locations of the bollards would be determined at the time of engineering design.

- Installation of speed tables across all traffic lanes north of the Guard Building. Each speed table would be 22 ft long and have 1.5-inch rolled rumble strips to slow traffic velocities. The speed tables would be sloped with the center 10-foot portion approximately 3 inches higher than the existing grade. The precise location of the speed tables would be determined at the time of engineering design.

- Construction of a 4-foot high reinforced concrete separation wall between in-bound and out-bound traffic lanes, extending from a few feet south of the Guard Building to a point parallel with Clark Street (approximately 50 ft). Manual retractable bollards would be installed from the separation wall to the Guard Building to prevent vehicle traffic in this gap. The precise location of the separation wall, and number and precise location of bollards would be determined at the time of engineering design.

- Removal of the entrance to the parking lot for Buildings 860 and 861 from Arguello Road.

- Installation of warning lights to alert traffic of security devices, and area lighting in approach roadway and entry gate. The precise location of the warning lights and signage would be determined at the time of engineering design.

Utilities would be provided to required locations through existing overhead and underground equipment. Any new underground conduit and pipes would be installed within the project area, and along road shoulders.

2.1.5 Utah Gate

Figure 2.8 provides the conceptual layout for upgrades at the Utah Gate. The project would result in the excavation of approximately 15 yd^3 of soil and clearance of approximately 600 ft^2 of vegetation. Total solid waste anticipated includes approximately 135 yd^3 of asphalt and concrete, and 403 yd^3 of other solid waste. Asphalt and concrete would be taken off base and recycled. Other solid waste would be taken to the VAFB Landfill.

Estimated construction time at the Solvang Gate is 240 days. Construction is anticipated to occur between July 2012 and September 2014. Upgrades include the following components:

- Installation of a manual final vehicle denial barrier across all traffic lanes on Utah Street, east of the intersection with Korina Avenue. The barrier would be rated for vehicles up to 15,000 lbs approaching at 50 mph. The precise location of the barrier would be determined at the time of engineering design.

- Installation of retractable tire shredders across all traffic lanes, between the Guard Building and the final vehicle denial barrier. The precise location of the tire shredders would be determined at the time of engineering design.

- Installation of permanent concrete filled steel pipe bollards on the north side of Utah Street at two locations: 1) between the final vehicle denial barrier and the tree line; and 2) between the Guard Building and the tree line. The specifications, number, and precise locations of the bollards would be determined at the time of engineering design.

- Installation of cable barriers consisting of three strands of 1-inch cable strung to a maximum height of approximately 3 ft. The cables would be anchored at each end in reinforced 3 ft by 3 ft concrete blocks buried 3 ft below grade. The concrete cases would be installed below grade and reach a depth of 3.5 ft. Posts, 1-foot in diameter, would be

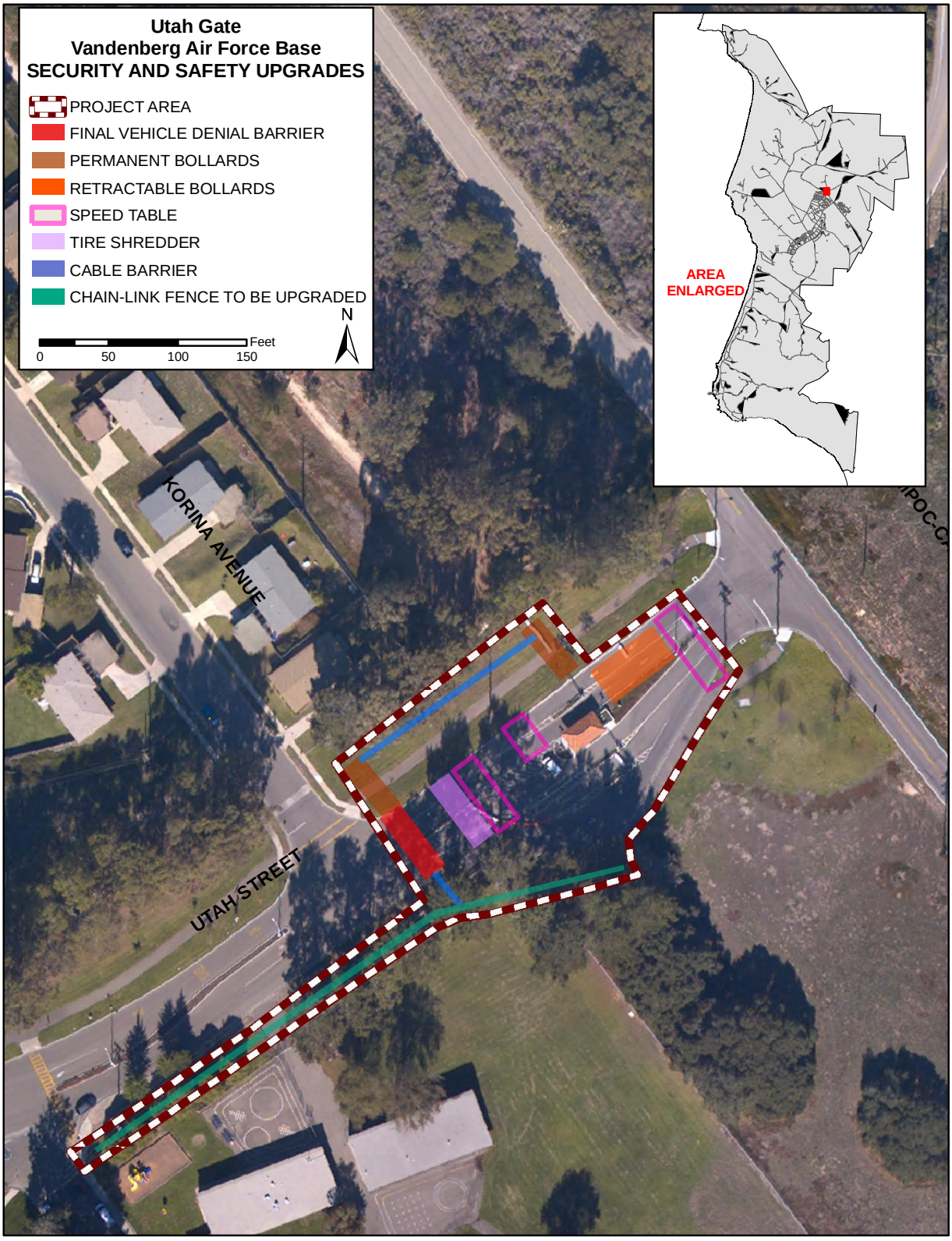

Figure 2.8. Security and Safety Upgrades at Utah Gate.

installed every 10 ft to provide sufficient support to stop vehicles of up to 50,000 lbs. Cable barriers would be installed at two locations: 1) between the final vehicle denial barrier and the school chain-link fence; and 2) on the north side of Utah Street between the permanent bollards. The precise location of the cable barriers would be determined at the time of engineering design.

- Upgrading the existing chain-link fence between the outbound lane on Utah Street and Crestview Elementary School, with the addition of cables. The specifications for this upgrade would be determined at the time of engineering design.

- Installation of manual retractable bollards on in-bound traffic lanes prior to reaching the Guard Building. These bollards consist of a retractable 3-foot high, 8-inch diameter steel pipe filled with concrete. Below grade, concrete anchors for each retractable bollard would measure 4.1 ft in depth and 2 ft on each side. The number and precise location of the bollards would be determined at the time of engineering design.

- Installation of speed tables across all traffic lanes east of the Guard Building, across in-bound traffic lanes just west of the Guard Building, and across all traffic lanes between the Guard Building and the final vehicle denial barrier. Each speed table would be 22 ft long and have 1.5-inch rolled rumble strips to slow traffic velocities. The speed tables would be sloped with the center 10-foot portion approximately 3 inches higher than existing grade. The precise location of the speed tables would be determined at the time of engineering design.

- Installation of warning lights to alert traffic of security devices, and area lighting in approach roadway, and at entry gate. The precise locations for lighting and signage would be determined at the time of engineering design.

Utilities would be provided to required locations through existing overhead and underground equipment. Any new underground conduit and pipes would be installed within the project area, and along road shoulders.

2.1.6 Project Personnel and Equipment

Table 2.1 lists the equipment required for these upgrades and the estimated usage for the equipment. It is anticipated that upgrades at each ECF would be accomplished with a crew of five to seven workers, with 8-hour workdays, 5 days per week.

Table 2.1. Construction Equipment Usage During Security and Safety Upgrades of ECFs.

Equipment	Function	Gas/ Diesel
Generator	Portable power	Gas
Flatbed truck	Work truck	Diesel
Dump truck	Dump truck	Diesel
Asphalt paver	Paving	Diesel
Cement truck	Slurry/concrete	Diesel
Portable concrete mixer	Slurry/concrete/grout/mortar	Electric
Pick up	Crew truck	Gas
Line maintenance truck	Powerline relocation	Diesel
Chain trenching machine	Powerline relocation	Diesel
Dump truck	Dump truck	Diesel
Backhoe	Excavation	Diesel
Vibratory drum compactor	Compaction	Diesel
Excavator	Mini excavator	Diesel
Water truck	Dust control/other	Diesel

2.2 No-Action Alternative

Under the No-Action Alternative security and safety upgrades to ECFs at VAFB would not be implemented. There would be no project-related environmental impacts resulting from construction activities under this alternative. However, without the security and safety upgrades, the installation and its personnel would continue to be at an elevated risk of terrorist threats, and the safety and health of VAFB personnel and its visitors would also continue to be compromised, which is a significant impact in itself. Additionally, under the No-Action Alternative, VAFB would continue to be out of compliance with DOD requirements under UFC 4-022-01.

Chapter 3. Affected Environment

This chapter describes the existing conditions of areas that have potential to be affected by the Proposed Action and includes air quality, biological and cultural resources, hazardous materials and hazardous waste management, human health and safety, and transportation. Other areas considered but not analyzed in this EA for reasons described in Section 1.3, *Scope of the Environmental Assessment*, include earth resources, environmental justice, land use and aesthetics, socioeconomics, solid waste, and water resources.

3.1 Air Quality

Air quality is described based upon the concentration of pollutants in the atmosphere. These concentrations are expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The type and amount of pollutants emitted into the atmosphere, together with the size and topography of the air basin and the prevailing meteorological conditions, determine air quality. Comparing the concentration to state and federal ambient air quality standards assists with determining the significance of any particular pollutant concentration. These standards represent the maximum allowable atmospheric concentrations that may occur while still providing protection for public health and safety with a reasonable margin of safety.

The Clean Air Act (CAA) required the U.S. Environmental Protection Agency (EPA) to establish ambient ceilings for certain criteria pollutants. Subsequently, the U.S. EPA promulgated regulations that set the National Ambient Air Quality Standards (NAAQS). NAAQS have been established for carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter 10 microns or less in diameter (PM_{10}), particulate matter 2.5 microns or less in diameter ($PM_{2.5}$), and sulfur dioxide (SO_2). Of these seven Criteria Pollutants, five are primary pollutants, emitted directly from a source. $PM_{2.5}$ is both primary and secondary sources. O_3 is a secondary pollutant – i.e., it is not directly emitted, but is formed from the reaction of nitrogen oxides (NO_X) and reactive organic compounds (ROCs). The NAAQS are presented in Table 3.1.

Under the California CAA, California established air quality standards for the state, known as the California Ambient Air Quality Standards (CAAQS). CAAQS are generally more stringent than the NAAQS and there are additional CAAQS for sulfates (SO_4), hydrogen sulfide (H_2S), vinyl chloride, and visibility-reducing particulate matter. The CAAQS are also presented in Table 3.1.

The area affected by the emissions from the Proposed Action includes VAFB and the surrounding portions of northern Santa Barbara County. For CO, NO_2, PM_{10}, and SO_2, the affected area is generally limited to a few miles downwind of the emission source, while for O_3 it can extend many miles downwind. Because the reaction between reactive organic compounds (ROCs) and NO_Xs usually occurs several hours after they are emitted, the maximum O_3 level can be many miles from the source; therefore, the area affected by O_3 and its precursors produced by VAFB, could include most of northern Santa Barbara County. In addition, O_3 and its precursors transported from other regions can combine with local emissions to produce high, local O_3 concentrations.

3.1.1 Regional Climate and Meteorology

The climate at VAFB can be characterized as cool and wet from November through April, and warm and dry from May through October. The average annual rainfall is approximately

Table 3.1. Ambient Air Quality Standards.

Pollutant	Averaging Time	CAAQS(1,3)	NAAQS(2,3)	
			Primary(4)	Secondary(5)
Ozone	8-hour	0.07 ppm (137 μg/m^3)	0.08 ppm (157 μg/m^3)	Same as Primary
	1-hour	0.09 ppm (180 μg/m^3)	--	
Carbon Monoxide	8-hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	None
	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	
Nitrogen Dioxide*	Annual Arithmetic Mean	0.03 ppm (56 μg/m^3))	0.053 ppm (100 μg/m^3)	Same as Primary
	1-hour	0.18 ppm (338 μg/m^3)	--	
Sulfur Dioxide	Annual Arithmetic Mean	--	0.03 ppm (80 μg/m^3)	--
	24-hour	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)	--
	3-hour	--	--	0.5 ppm (1300 μg/m^3)
	1-hour	0.25 ppm (655 μg/m^3)	--	--
PM_{10}	Annual Arithmetic Mean	20 μg/m^3	--	Same as Primary
	24-hour	50 μg/m^3	150 μg/m^3	
$PM_{2.5}$	Annual Arithmetic Mean	12 μg/m^3	15 μg/m^3	Same as Primary
	24-hour	No State Standard	35 μg/m^3	
Sulfates	24-hour	25 μg/m^3	No Federal Standards	
Lead	30-day average	1.5 μg/m^3	--	--
	Calendar Quarter	--	1.5 μg/m^3	Same as Primary
Hydrogen Sulfide	1-hour	0.03 ppm (42 μg/m^3)	No Federal Standards	
Vinyl Chloride	24-hour	0.01 ppm (26 μg/m^3)	No Federal Standards	
Visibility Reducing Particles	8-hour	Extinction coefficient of 0.23 per kilometer – visibility of ten miles or more due to particles when relative humidity <70%.	No Federal Standards	

NOTES:

*The Nitrogen Dioxide ambient air quality standard was amended on February 22, 2007, to lower the 1-hr standard to 0.18 ppm and establish a new annual standard of 0.03 ppm. These changes become effective after regulatory changes are submitted and approved by the Office of Administrative Law.

(1) California Standards for ozone, carbon monoxide, sulfur dioxide (1- & 24-hour), nitrogen dioxide, PM_{10}, $PM_{2.5}$, and visibility reducing particles are not to be exceeded. Sulfate, lead, hydrogen sulfide, and vinyl chloride standards are not to be equaled or exceeded.

(2) National Standards, (other than ozone, particulate matter, and those based upon annual averages or average arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight-hour concentration in a year, averaged over three-years, is equal to or less than the standard. For PM_{10}, the 24-hours standard is attained when 99% of the daily concentrations, averaged over three years, are equal to or less than the standard. For $PM_{2.5}$, the 24-hours standard is attained when 98% of the daily concentrations, averaged over three years, are equal to or less than the standard.

(3) Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature and pressure of 25 degrees Celsius (^{O}C) and 760-millimeters (mm) Hg, respectively. Most measurements of air quality are to be corrected the reference temperature of 25 ^{O}C and reference pressure of 760-mm Hg; ppm in this table refers to ppm by volume or micromoles of pollutant per mole of gas.

(4) National Primary Standards: The level of air quality necessary, with an adequate margin of safety to protect the public health.

(5) National Secondary Standards: The level of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

14.7 inches, most of which falls between November and May (unpub. data, 30 SW).

Winds are usually light during the nighttime hours, reaching moderate speeds of approximately 12 mph by the afternoon. Winds are most often northwesterly on North Base and north to northeasterly on South Base. The strongest winds are associated with rainy season storms.

VAFB is subject to early morning and afternoon temperature inversions about 96 and 87 percent of the time, respectively. In an inversion, air temperature rises with increasing altitude, which confines the surface air and prevents it from rising (VAFB *In Progress*). This restricts the vertical dispersion of pollutants and, therefore, increases local pollutant concentrations.

Pollutants are "trapped" under an inversion layer until either solar radiation produces enough heat to lift the layer or strong surface winds disperse the pollutants. In general, these conditions occur most frequently during the nighttime and early morning hours.

3.1.2 Existing Air Quality

The U.S. EPA classifies air quality within each air quality control region with regard to its attainment of NAAQS. The California Air Resources Board (CARB) does the same for CAAQS. An area with air quality better than state or federal ambient air quality standards for a specific pollutant is designated as attainment for that pollutant. Any area not meeting those standards is classified as non-attainment. Santa Barbara County is in attainment or unclassified for all the ambient air quality standards except for the state standards for PM_{10} and O_3.

The estimated emissions for Santa Barbara County and VAFB are presented in Tables 3.2 and 3.3. In Table 3.2, the Santa Barbara County emissions are 2000 daily planning emissions taken from the 2004 Santa Barbara County Air Pollution Control District (SBCAPCD) Clean Air Plan, while the VAFB emissions are annual emissions taken from the 2001 Comprehensive Emission Inventory Draft Report.

On January 24, 2007, President Bush issued EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*. One of the main requirements established under this EO is the reduction of greenhouse gases through a reduction in energy intensity of 3 percent per year or 30 percent by the end of fiscal year 2015. These energy reduction measures also assist in the implementation of the Air Force policy that the design of all vertical military construction (MILCON) projects be capable of achieving Leadership in Energy and Environmental Design (LEED) Silver Certification. LEED was created by the United States Green Building Council (USGBC) to assess the green design of facilities. The rating system categories award points for energy reduction measures.

Table 3.2. Existing Emissions.

Source	2002 Emissions			
	Annual (Tons/Year)		Planning Day (Tons/Day)	
	NO_x	ROC	NO_x	ROC
Santa Barbara County	*16,155.94*	*43,439.57*	*41.2055*	*40.8432*
Stationary Sources	2,468.61	3,210.78	6.1160	9.3072
Area-Wide Sources	412.42	3,731.71	0.6326	9.9218
Mobile Sources	12,412.43	7,888.88	33.9613	21.6142
Natural Sources		28,608.20		882.4800
Outer Continental Shelf Sources	*14,324.89*	*3,499.34*	*39.2558*	*3.8761*
Stationary Sources	305.16	425.88	0.8361	1.1667
Mobile Sources	14,019.73	994.56	38.4197	2.7094
Natural Sources		2,078.90		
Total	***30,480.83***	***46,938.91***	***80.4613***	***44.7193***
VAFB Annual	***1,134***	***229***	***ND***	***ND***

ND = Not determined

SOURCE: 2007 Clean Air Plan, Santa Barbara County's plan to maintain the federal 8-hour ozone standard and attain the state 1-hour ozone standard, August 2007.

NOTE: These emissions represent the most current data available.

Table 3.3. VAFB Annual Emissions (tons) in 2006.

	CO	NO_x	PM_{10}	SO_x	ROC
Mobile					
On-Road	402.75	160.71	2.08	NE	46.06
Off-Road	575.78	20.02	2.34	0.91	20.60
Aircraft/Launch Vehicles	97.45	14.69	6.87	1.60	37.19
Permitted Sources	NE	1.35	0.48	0.42	3.30
Exempt Source	NE	19.63	NE	NE	32.96
Total	**1,075.98**	**216.40**	**11.77**	**2.93**	**140.11**

NE = Not estimated
SOURCE: VAFB, 30 CES/CEV, unpublished data
NOTE: These emissions represent the most current data available.

3.2 Biological Resources

This section provides a description of the biological resources present at and near the ECFs where security and safety upgrades would be implemented. The scope of the survey includes vegetation and wildlife resources, as well as waters of the U.S. and wetlands. All project areas depicted in the maps in Chapter 2 were surveyed and/or surrounding habitat assessed for potential presence of special status plant and wildlife species. VAFB is located in a transitional ecological region that lies at the northern and southern distributional limits of many species, and contains diverse biological resources of considerable importance. The base provides habitat for many federal and state listed threatened, endangered, and special concern plant and animal species. Fourteen major vegetation types have been described and mapped on base (VAFB *In Progress*).

3.2.1 Methodology

A literature search, general biological survey, and special status species survey were used to characterize the biological resources within the proposed project areas. In addition, the project areas were assessed based on existing Geographic Information System (GIS) data collected for prior projects either within the affected areas or as part of special status species surveys completed within the last 5 years (SRS Technologies Inc. [SRS] 2006, 2007. Field surveys were completed in June and July 2007 and covered the areas depicted in the maps in Chapter 2. Follow-up surveys at the Lompoc and Santa Maria Gates were also completed in January 2008 to encompass project design changes. Dominant plant species, special status plant species, and vegetation types were identified. Sight, sound, tracks, or other signs determined presence of common and special status wildlife species. Special status wildlife species surveys were also completed in suitable habitats occurring at each of the sites when appropriate.

Potential occurrence of plant and wildlife species, including special status species, undetected during field surveys was determined based on suitable habitat preferences and on known occurrence based on literature searches and other existing documentation. Sources used to determine potential occurrence include literature and maps of natural resources present at VAFB, California Natural Diversity Database (California Department of Fish and Game [CDFG] 1999, 2001, 2008a, 2008b); and existing local and regional references (Christopher 1996, 2002; Coulombe and Mahrdt 1976; Holmgren and Collins 1999; Keil and Holland 1998; Lehman 1994).

3.2.2 Botanical and Wildlife Resources

The biological surveys identified five natural vegetation types within the project areas of the ECFs: Central Coastal Scrub, Non-native Grassland, Arroyo Willow Riparian Forest,

Wetland, and Ruderal. In addition non-native woodlands, ornamental plants, and turf grass are present at the Santa Maria, South, and Utah Gates.

3.2.2.1 Lompoc Gate

Ruderal vegetation types and mixed central coastal scrub/non-native grassland cover most of the project area at the Lompoc Gate. Ruderal areas east of the current Guard Building are predominantly unvegetated, consisting of exposed shale. Most of the sparse vegetation within this area is composed of non-native annual forbs and grasses. Ruderal communities along Pine Canyon Road are subjected to regular mowing, and are dominated by non-native annual forbs and grasses.

The mixed central coastal scrub/non-native grassland at the northwest side of the project area represents a clearing within the surrounding mixed oak woodland/Burton Mesa chaparral community. Dominant scrub species include California sagebrush and black sage (*Salvia mellifera*). The non-native grassland is dominated by a mix of non-native annual grasses and native herbaceous species such as California spine flower (*Mucronea californica*), croton (*Croton californica*) and deerweed (*Lotus scoparius*).

The project area provides habitat for reptiles such as western fence lizard, California horned lizard (*Phrynosoma coronatum frontale*), and for a variety of birds including western scrub-jay (*Aphelocoma californica*), bushtit (*Psaltriparus minimus*), and house finch (*Carpodacus mexicanus*). Mammals such as Botta's pocket gopher, California ground squirrel, and coyote (*Canis latrans*) also utilize the project area.

No federal special status plant or wildlife species were observed within the project area.

3.2.2.2 Santa Maria Gate

Vegetation present at the two project sites for the Santa Maria Gate consists mostly of turf grasses and ornamental plantings. Vegetated areas are irrigated and ornamental plantings consist of both forbs and mature trees such as Monterey pine (*Pinus radiata*).

The cable barrier to be installed along the south side of California Avenue would traverse non-native grassland, wetland and non-native woodland vegetation types. Non-native grasses such as veldt (*Ehrharta calycina*) dominate the non-native grassland. Wetland vegetation includes arroyo willow (*Salix lasiolepis*) and herbaceous species such as sedges (*Carex* sp.). Wetland vegetation occurs within an earthen drainage ditch paralleling California Boulevard southeast of the irrigated lawn. The water sustaining this community appears to originate from runoff from the road and irrigated lawn. The non-native woodland is dominated by Monterey pines which are spreading from trees originally planted along California Boulevard into adjacent vegetation. Wildlife species such as southern alligator lizard (*Elgaria multicarinata*), western fence lizard, house finch, American crow (*Corvus brachyrhynchos*), dark-eyed junco (*Junco hyemalis*), Nuttall's woodpecker (*Picoides nuttallii*), Brewer's blackbird (*Euphagus cyanocephalus*), Botta's pocket gopher, and California ground squirrel were detected within the project area during field surveys.

No federal special status plant or wildlife species were found within the project area. The wetlands on the south side of California Boulevard do not provide suitable habitat for California red-legged frogs.

3.2.2.3 Solvang Gate

Multiple natural vegetation types occur within the Solvang Gate project area. Ruderal vegetation subjected to regular infrequent mowing is the most extensive. Non-native annual forbs and grasses and Mediterranean mustard (*Hirschfeldia incana*) dominate this vegetation type.

Mixed central coastal scrub/non-native grassland dominated by coyote brush (*Baccharis pilularis*) and non-native forbs and grasses, central coastal scrub dominated by coyote brush and wild blackberry (*Rubus*

ursinus), and arroyo willow riparian forest dominated by arroyo willow are also present within the project area. In addition, the northern cable barrier transects non-native grassland dominated by annual forbs and grasses, Mediterranean mustard, and an agricultural field.

No federal special status plant or wildlife species were found to occur within the project area. Wildlife species such as Pacific treefrog (*Pseudacris regilla*), western fence lizard, yellow warbler (*Dendroica petechia brewsteri*), Wilson's warbler (*Wilsonia pusilla*), Cooper's hawk (*Accipiter cooperii*), red-shouldered hawk (*Buteo lineatus*), Trowbridge's shrew (*Sorex trowbridgii*), California vole (*Microtus californicus*), and striped skunk (*Mephitis mephitis*), are likely to occur within the project area.

3.2.2.4 South Gate

Irrigated lawns and mowed non-native grassland dominated by non-native annual forbs and grasses are the only vegetation types within the project area at the South Gate. The western cable barrier would be strung above a wetland bordered by coyote brush and dominated by cattails (*Typha* spp.) and rushes (*Scirpus* spp.), as well as areas of non-native grassland, variously dominated by black mustard (*Brassica nigra*) and non-native annual forbs and grasses.

No federal special status plant or wildlife species were documented within the project area. The wetland present within this area is contiguous with potential habitat for the federally threatened California red-legged frog (*Rana aurora draytonii*). In order to avoid disturbances to California red-legged frogs, the western cable barrier would be strung three ft. above the wetland and secured by posts outside the wetland. No activities would occur within the wetland. Since the species could potentially be present in the wetland at the time of construction, a qualified biologist would survey the area prior to construction to document whether the species is present. If the species is present, the qualified biologist would direct avoidance until the species moves a safe distance from the construction site.

3.2.2.5 Utah Gate

Natural vegetation types are not present within the project area. Vegetation consists of turf grasses and ornamental plantings. Vegetated areas are irrigated and ornamental plantings consist of landscape trees such as blue gum eucalyptus (*Eucalyptus globulus*).

No federal special status plant or wildlife species were found within the project area. Wildlife species such as house finch, Brewer's blackbird, and Botta's pocket gopher are likely to occur in the project area.

3.2.3 Sensitive Habitats and Special Status Species

Wetlands occurring within the project areas for the proposed upgrades are discussed in Section 3.2.4, Waters of the U.S. and Wetlands. No other sensitive habitats occur within any of the project areas for the proposed upgrades.

Table 3.4 summarizes the locations of federal and state special status species known or expected to occur within project areas at the ECFs. No state listed threatened or endangered species are expected to occur within any of the project areas.

The federally protected golden eagle (*Aquila chrysaetos*) could fly over the project areas but is unlikely that project activities would affect it; therefore, this species is not discussed further in this EA. Two federal Birds of Conservation Concern, loggerhead shrike (*Lanius ludovicianus*), and Lawrence's goldfinch (*Carduelis lawrencei*), and four California species of special concern, coast (California) horned-lizard, silvery legless lizard, northern harrier, and yellow warbler, have the potential to occur within project areas. Environmental protection measures incorporated to the construction projects, and described in Chapter 4 (Section 4.2) of this EA, should avoid any potential adverse effects on these species; therefore, they are not discussed further in this EA.

Table 3.4. Occurrence and Potential Occurrence of Special Status Species Within the Project Areas for Security and Safety Upgrades at ECFs on VAFB.

Description	Status	Location	Occurrence	Comments
Aquila chrysaetos Golden eagle	FP/CSC	Lompoc Gate Santa Maria Gate South Gate	Potential Potential Potential	Flyovers
Lanius ludovicianus Loggerhead shrike	BCC/CSC	Lompoc Gate	Potential	Year-round
Carduelis lawrencei Lawrence's goldfinch	BCC/CSC	Lompoc Gate	Potential	Year-round
Phrynosoma coronatum frontale Coast (California) horned lizard	CSC	Lompoc Gate	Potential Potential	
Anniella pulchra pulchra Silvery legless lizard	CSC	Lompoc Gate	Potential	
Circus cyaneus Northern harrier	CSC	South Gate	Potential	Year-round
Dendroica petechia brewsteri Yellow warbler	CSC	Lompoc Gate Solvang Gate	Potential Potential	Summer migrant Mar – Aug

NOTES:
FP – Federally Protected (Bald and Golden Eagle Act) BCC – Federal Bird of Conservation Concern CSC – California Species of Concern.

3.2.4 Waters of the U.S. and Wetlands

For the wetland hydrology criterion to be met a site must be inundated or saturated or exhibit features that show the area was inundated or saturated for the required period of time (i.e., 45 days). A hydric soil is defined as "…a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophilic vegetation (Environmental Laboratory 1987). Wetlands occur within the project area of the Santa Maria and the South Gates (Figures 3.1 and 3.2 respectively). At the Santa Maria Gate, this wetland vegetation occurs within an earthen drainage ditch paralleling California Boulevard southeast of an irrigated lawn. The water sustaining the wetland appears to originate from runoff from the road and irrigated lawn. At the South Gate, the water sustaining the wetland originates from a drainage ditch that parallels Arguello Boulevard.

At the Lompoc Gate, one surface water drainage crosses Pine Canyon Road approximately 375 ft north of the Guard Building, within the project area; a second crosses Pine Canyon Road just south of the project area (Figure 3.2).

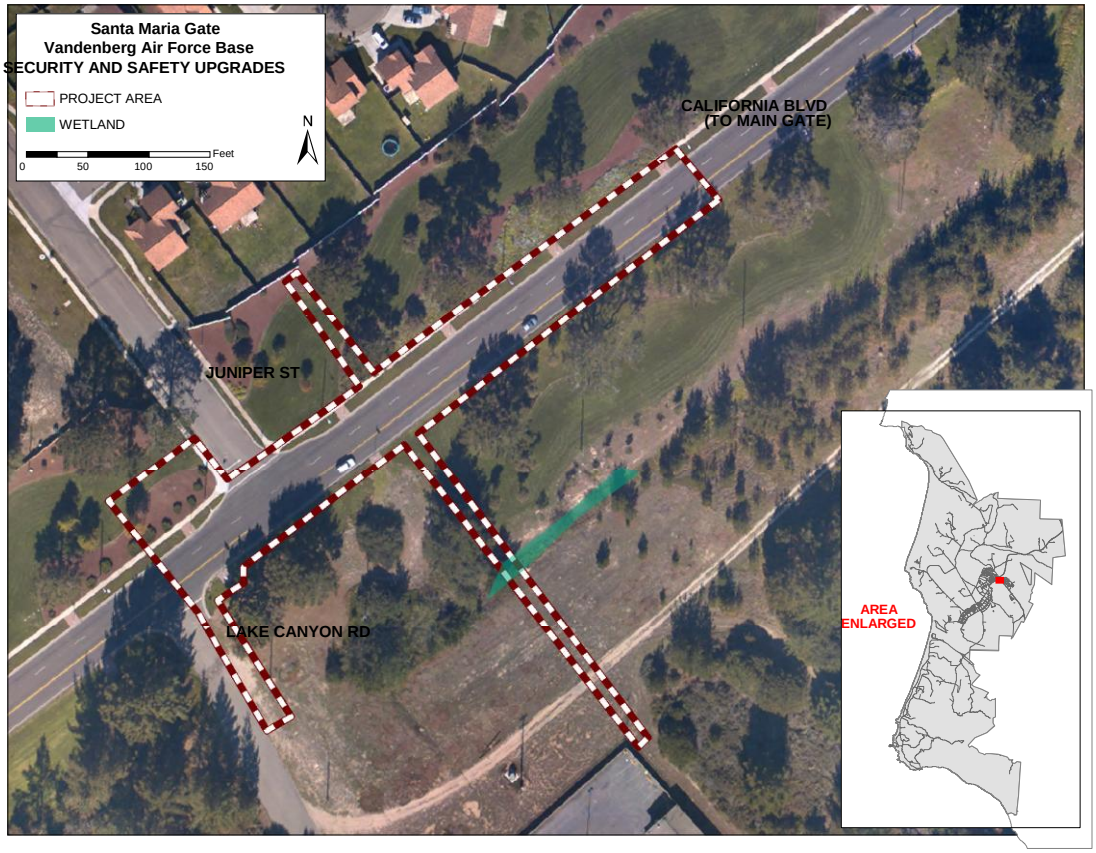

Figure 3.1. Location of Wetlands Within the Santa Maria Gate Project Area.

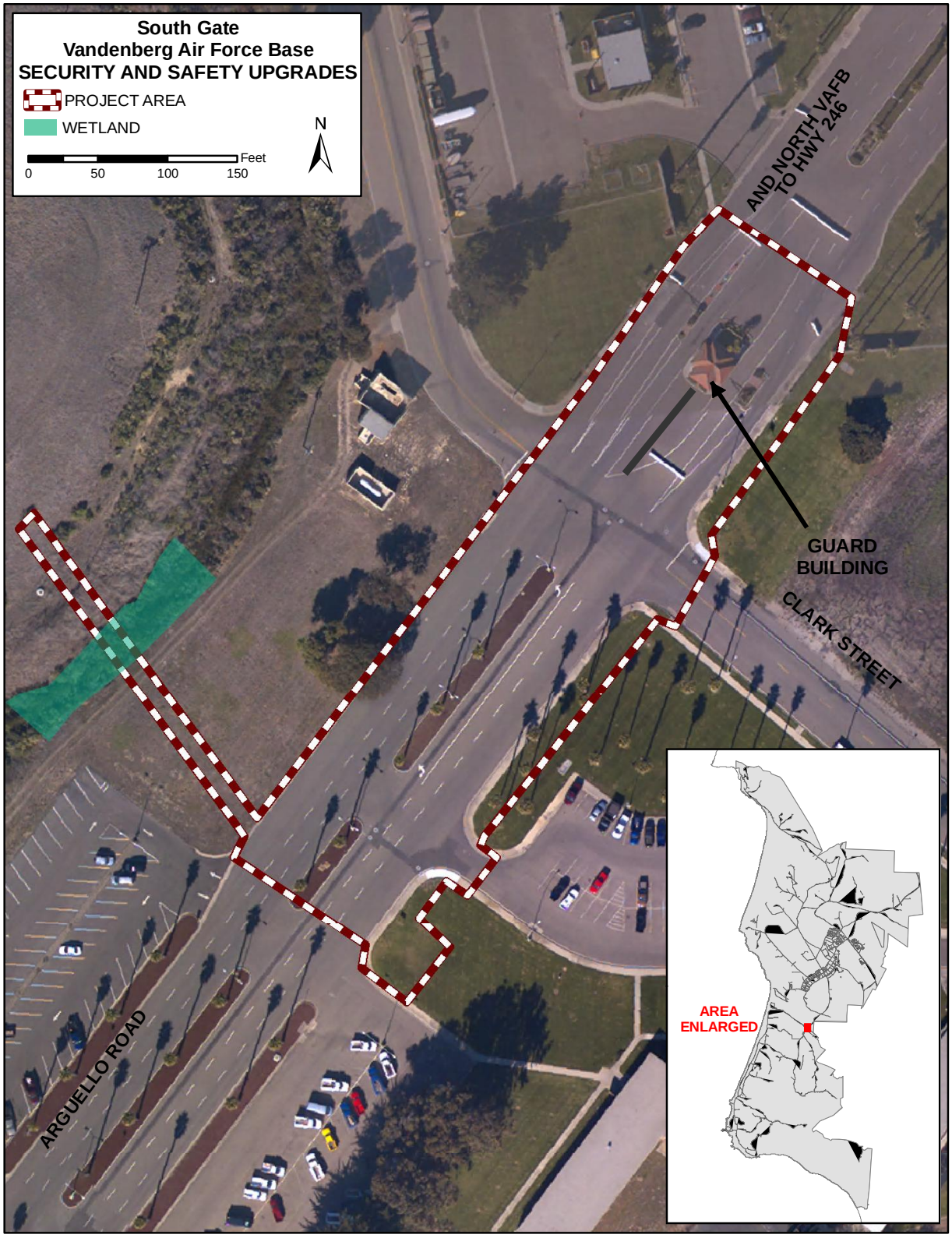

Figure 3.2. Location of Wetlands Within the South Gate Project Area.

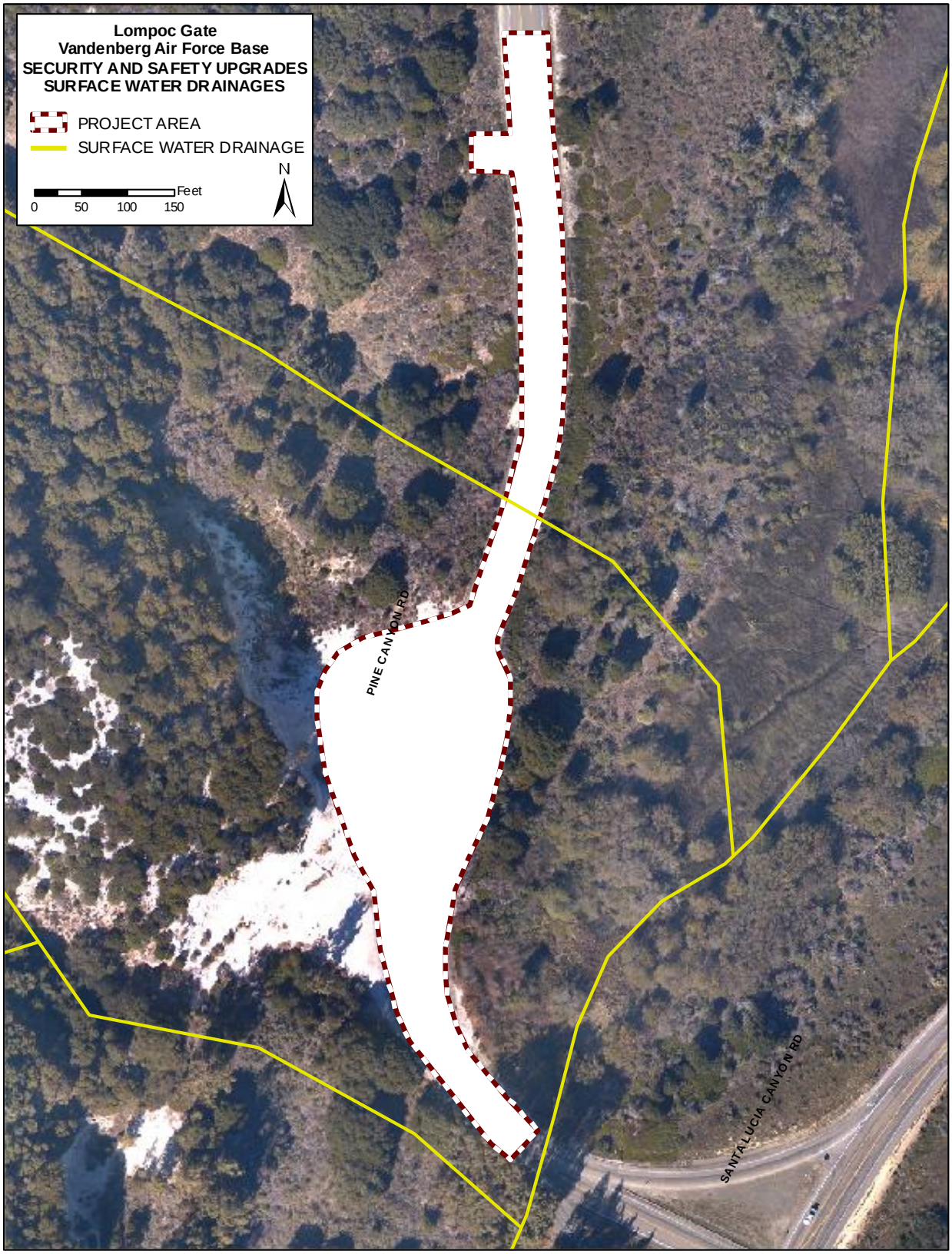

Figure 3.3. Location of Surface Water Drainages at the Lompoc Gate Project Area.

3.3 Cultural Resources

3.3.1 Cultural Setting

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), but cultural complexity appears to have increased around 2,500 to 3,000 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 Vandenberg region, but explorers noted that villages were smaller and lacked the formal structure found in the channel area (Greenwood 1978). Five ethnohistoric villages are identified by King (1984) on VAFB, along with another five in the general vicinity. Beginning with the maritime voyages of Cabrillo in anno Domini (A.D.) 1542–43, diseases introduced by early Euro-American explorers 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 (Palmer 1999). The Mission Period began with the early Spanish explorers and continued until 1820. During this period, the Vandenberg area was within the lands controlled by Mission La Purísima, and farming and ranching were the primary economic activities. 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 and 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 World War II when property was condemned for construction of Camp Cooke. The Suburban Period (1945–1965) began with the end of World War II. In 1956, the army transferred 64,000 acres of North Camp Cooke to the Air Force, and it was renamed Cooke Air Force Base. In 1958 the base had its first missile launch, the Thor, and was renamed Vandenberg Air Force Base (Palmer 1999).

3.3.2 Existing Cultural Resources

An archaeological site record and literature search was completed at 30 CES/CEV at VAFB and at the Central Coast Information Center, University of California Santa Barbara. Background research included a review of archaeological literature, archaeological base maps, and cultural resource records. Previous archaeological studies and known archaeological resources within 0.25 mile of the gate locations were identified during the record search.

Background research indicated that 50 archaeological studies had been completed within 0.25 mile of the ECFs upgrades. A pedestrian archaeological survey of two small areas not covered by previous studies was completed in October 2007 (Peterson and Lebow 2008). No new cultural resources were identified.

Background research identified 19 previously recorded archaeological sites and 10 isolated artifacts within 0.25 mile of the ECFs upgrades. No cultural resources are within the project area at any of the ECFs.

3.4 Hazardous Materials and Hazardous Waste Management

Hazardous materials and wastes are those substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act (42 U.S.C. 9601-9675); the Toxic Substances Control Act (15 U.S.C. 2601-2671); the Solid Waste Disposal Act as amended by the Resources 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 Occupational Safety and Health Administration (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.

3.4.1 Hazardous Material Management

VAFB uses approximately 5,000 hazardous materials items to accomplish mission and mission support activities, with the hazard potential of the materials ranging across the spectrum of toxicity. Organizations using hazardous materials on VAFB must comply with California Business Plan requirements. Management of hazardous materials used on VAFB follows procedures found in 30th Space Wing Plan (SWP) 32-7086, *Hazardous Materials Management Plan*. The Base operates using a Hazardous Materials Pharmacy (HazMart) concept, wherein the HazMart maintains inventories of hazardous materials, whether purchased by the Air Force or its contractors. Before releasing hazardous materials to the user, HazMart staff ensures a copy of the Material Safety Data Sheet is available and verifies that the material is suitable for use on VAFB. By providing handling and use information, VAFB controls the potential misuse of hazardous materials, maintains an accounting of the types of hazardous materials used on base, and accomplishes use and emissions reports as required by federal, state and local environmental regulations. Hazardous materials potentially used during security and safety upgrades to ECFs include petroleum, oils and lubricants (POLs) in equipment and vehicles.

In addition to VAFB requirements, contractors operating on VAFB are subject to all federal, state, and local hazardous materials regulations, and are subject to inspection by a variety of federal, state and local regulatory agencies.

3.4.2 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 EPA (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* (30 SWP 32-7043A) outlines the procedures to be followed for hazardous waste management on VAFB.

Contractors generating hazardous wastes in support of a government contract are required to follow federal, state, and local laws and regulations, and use the VAFB Generator Identification Number to account for hazardous wastes generated. Because of the amount of hazardous waste generated per month under its Generator Identification Number, VAFB is classified as a large quantity, fully regulated generator, required to comply with all laws regulating the generation, storage, transportation, and disposal of hazardous waste. VAFB employs a "cradle to grave" waste management approach. Generally, hazardous waste follows the 90-day accumulation rules as allowed by regulation, or is stored up to 270 days at authorized "satellite accumulation" points (SAPs). SAPs are located at the point of generation, and wastes may be stored until 55 gallons of hazardous waste or 1 quart of extremely or acutely hazardous waste is accumulated. When the SAP limit is reached, the waste is transferred in a properly labeled Department of Transportation approved container from its point of origin to the Consolidated Collection Accumulation Point (CCAP) at Building 6830, or to a permitted off-site treatment storage or disposal facility. Appendix 4 of the VAFB *Hazardous Waste Management Plan* (30 SWP 32-7043A) provides detailed procedures for hazardous waste accumulation. Construction/demolition contractors would use the VAFB Generator Identification Number, and would have to comply with the VAFB *Hazardous Waste Management Plan* (30 SWP 32-7043A). A Base contractor operates the CCAP for the Air Force and is responsible for receiving waste, inspecting waste containers for proper storage, and labeling, and preparing DOD Form 1348-1A, issue/turn-in documentation, required to fund disposal of hazardous waste. Hazardous waste is then removed from VAFB under hazardous waste manifest, and shipped off-site for final disposal.

3.4.3 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 Central Coast RWQCB, and the Department of Toxic Substances Control. In addition to IRP sites, there are identified Areas of Concern (AOCs), where potential hazardous material releases are suspected; and Areas of Interest (AOIs), defined as areas with the potential for use and/or presence of a hazardous substance. Various contaminants could be present at these sites including trichloroethylene, polychlorinated biphenyl, volatile organic compounds (VOCs), total petroleum hydrocarbons, asbestos, and other hazardous contaminants.

A number of AOCs and AOIs occur within or adjacent to three of the ECFs project areas including the Santa Maria Gate, the Solvang Gate, and the South Gate. No IRP sites, AOCs, or AOI occur within one-half mile of either the Utah or Lompoc Gates. Construction and demolition activities at the Santa Maria, Solvang, or South Gates may encounter contaminated soils or sites managed under the IRP program. Table 3.5 lists sites presently known to occur within or adjacent to the ECFs project areas and provides their status. Many of the AOIs have not yet been surveyed or are presently under investigation, thus actual extent and type of contamination is unknown at this time.

Table 3.5. AOCs and AOIs Within or Adjacent to ECF Project Areas.

Site	Affected ECF	Description	Status/Comments
AOC-048	Santa Maria Gate		Closed.
AOC-060	South Gate		Closed.
AOC-081	Santa Maria Gate	Former Camp Cooke building with barracks.	Open.
AOI-061	South Gate	Missile Space, Research and Engineering Building. Abandoned underground storage tank stained on floor.	Open; not investigated.
AOI-423	Solvang Gate		Open; not investigated.
AOI-425	South Gate		Open; not investigated.
AOI-426	South Gate		Open; not investigated.

3.5 Human Health and Safety

All construction and demolition activities, and facility operations and maintenance on VAFB are subject to the requirements of the federal OSHA. Relevant health and safety requirements include industrial hygiene and ground safety. Industrial hygiene is the joint responsibility of the 30 SW Safety Office (30 SW/SE), 30th Medical Operations Squadron, Bioenvironmental Engineering Element (30 MDOS/SGOAB), and contractors safety departments. Responsibilities include monitoring of exposure to workplace chemicals and physical hazards, hearing and respiratory protection, medical monitoring of workers subject to chemical exposures, and oversight of all hazardous or potentially hazardous operations. Ground safety is the responsibility of 30 SW/SE and includes protection from hazardous situations and hazardous materials.

The Proposed Action would involve activities where workers could be exposed to conditions that may adversely impact their health and safety:

- Hazardous materials, primarily 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.
- Contractors would transport hazardous material used in or resulting from the Proposed Action. Permitted hazardous waste haulers would transport hazardous waste.
- Because of the above conditions, the potential exists for persons participating in the 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 construction or demolition sites, also have the potential to adversely impact the health and safety of the site workers:
- Physical hazards including traffic in the roads, 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).

Unexploded Ordnance

Several areas on VAFB were used as ordnance training ranges and have the potential to contain unexploded ordnance (UXO). Special precautions need to be taken in known areas of VAFB that were used as practice ranges for artillery firing, referred to as Explosive Ordnance Disposal (EOD) Zones. Since ordnance can be found almost anywhere on base, the EOD Flight must coordinate on all ground disturbing projects. According to EOD guidance, if ordnance is found on-site, it should not be disturbed. Workers in the vicinity must be alerted to the danger and directed away from it, and the EOD Flight must be contacted.

Project 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 Department of Transportation. Section 7 of the NCA regulates sonic booms and gives the Federal Aviation Administration regulatory authority after consultation with the U.S. 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. (URS Corporation 1986)

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 to a scale of 0 to 140 dB 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 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.

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	

Another useful acoustical metric for describing sound events is the A-weighted sound exposure level (SEL). The A-weighted SEL is the total sound energy in a sound event *if that event could be compressed into 1 second.* In essence, SEL is an average sound level that is condensed into 1 second. This provides a time-normalized metric and allows for analysis of events with different durations. As an example, an F-16 aircraft overflight (85 percent full power, altitude 210 ft, speed of 443 knots) was measured to have an A-weighted SEL of 113.1 dB (Berry et al. 1991).

The "peak sound level" is the greatest instantaneous sound level reached during a sound event. Peak levels also have various frequency weightings applied to them. Peak levels, though useful in some cases, can often be misleading. It can occur that a single peak in a complex waveform can be substantially greater than the majority of a sound event. Therefore, peak levels should always be presented along with one or more of the metrics described above to better describe the sound event. An unweighted peak sound level is simply the peak sound level with no frequency weighting applied.

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 over flights create louder intermittent noise levels. On VAFB, general ambient L_{eq1H} measurements have been found to range from around 35 to 60 dB (Thorson et al. 2001). Most activities associated with the Proposed Action would generate relatively continuous noise. Noise levels of typical heavy construction equipment, as would be used under the Proposed Action, are presented in Table 3.7

Table 3.7: Noise Levels of Heavy Construction Equipment.

Equipment Item	Maximum Noise Level (dBA) at 15 meters (50 ft)	Equipment Item	Maximum Noise Level (dBA) at 15 meters (50 ft)
All other equipment > 5 Hp	85	Gradall	85
Auger Drill Rig	85	Grader	85
Backhoe	80	Horizontal Boring Hydraulic Jack	80
Bar Bender	80	In-situ Soil Sampling Rig	84
Boring Jack Power Unit	80	Jackhammer	85
Chain Saw	85	Paver	85
Compactor (ground)	80	Pickup Truck	55
Compressor (air)	80	Pneumatic Tools	85
Concrete Batch Plant	83	Pumps	77
Concrete Mixer Truck	85	Rock Drill	85
Concrete Pump	82	Scraper	85
Crane (mobile or stationary)	85	Slurry Plant	78
Dozer	85	Slurry Trenching Machine	82
Dump Truck	84	Soil Mix Drill Rig	80
Excavator	85	Tractor	84
Flat Bed Truck	84	Vacuum Excavator (vac-truck)	85
Front End Loader	80	Vacuum Street Sweeper	80
Generator (25 KVA or less)	70	Vibratory Concrete Mixer	80
Generator (more than 25 KVA)	82	Welder	73

SOURCE: Commonwealth of Massachusetts, Section 721.560 Construction Noise Control - http://www.nonoise.org/resource/construc/bigdig.htm

3.6 Solid Waste Management

In 1989, the California Integrated Waste Management Act (Assembly Bill 939) mandated a 50 percent reduction in the quantity of solid waste disposed of in California landfills. The 50 percent reduction was to be accomplished by January 1, 2000, and was measured against a 1990 baseline. In 1994, the Air Force mandated similar waste diversion requirements, using a 1992 baseline. The most recent solid waste diversion requirements applicable to this EA were enacted through California Senate Bill 1374, *Solid Waste: Construction and Demolition Waste Materials: Diversion Requirements Model Ordinance.* On March 1, 2004, the California Integrated Waste Management Board (CIWMB) promulgated a model ordinance for local agencies to follow for implementing a 50 to 75 percent diversion of construction and demolition (C&D) debris waste materials from landfills. Currently, the local enforcement agency (LEA), the Santa Barbara County Environmental Health Services Division, has not promulgated its final model ordinance. A locally adopted diversion ordinance would affect requirements and operations at the VAFB Landfill because the Federal Facilities Compliance Act waived sovereign immunity with respect to California solid waste programs, and VAFB is within the Santa Barbara County waste shed.

30 CES/CEV will require a minimum 85 percent diversion rate by weight overall, for C&D materials generated by these efforts. Inert materials are highly recyclable with proper pre-planning for segregation and on-site management. Steel, non-chemically treated wood, concrete, waste soil, and asphalt generated because of the demolition actions would be expected to have a diversion rate higher than 85 percent. Typically, such materials are 100 percent divertible with proper planning and practices. VAFB policy is that C&D materials be managed on VAFB to the maximum extent possible. Efforts to minimize capacity consumption of off-base Santa Barbara County recyclers are incorporated into all project planning.

Due to the detailed tracking requirements for waste disposal and diversion levied by the state of California, VAFB is required to track all materials going off base for diversion, recycling, or disposal. VAFB must report on the weight (in tons), type of material, and destination. Additionally, any materials recycled on base by processes other than the VAFB Landfill, must be reported to the 30th Civil Engineer Squadron, Environmental Flight, Pollution Prevention Office (30 CES/CEVV) Solid Waste Manager at least quarterly, with copies of weight tickets and receipts provided. The party/unit responsible for the diversion, disposal, or recycling is responsible for reporting the information to the Solid Waste Manager.

Through a 30 SW contract, a commercial contractor collects refuse and recyclables generated on base and operates the VAFB Landfill. Operational oversight of the contractor is provided by the 30 CES Operations Flight, with environmental oversight provided by 30 CES/CEV. The contract includes pre-arranged collection routes for both recycled material and refuse in the base industrial and military family housing (MFH) areas. The contractor provides all personnel, equipment, tools, materials, supervision, and other items and services necessary to meet contract requirements. Collected refuse is disposed of in the VAFB Landfill. Recyclable materials are prohibited at the VAFB Landfill and are taken to off-base recovery facilities.

Special projects are authorized to use the VAFB Landfill if their contract with the Air Force so stipulates. Project contractors arrange to use the VAFB Landfill but are required to segregate and transport their solid wastes to designated disposal areas within the landfill. The VAFB Landfill does not charge a tipping fee to authorized base organizations, base contractors, and residents of MFH and dormitories. A part of the Lompoc waste-shed, the Federal Correction Institute and U.S. Penitentiary, use

the VAFB Landfill for disposal of their wastes and are charged $32.50 per ton for solid waste disposal. Commercial space operations with leased facilities on VAFB do not have access to the VAFB Landfill, and make their own arrangements for solid waste management.

The VAFB Landfill is 172 acres; while the RCRA Subtitle D disposal footprint is 46 acres (that part of the facility that has received or is receiving wastes and that has not been closed in accordance with 40 CFR Part 258). It is classified as a Class III Sanitary Landfill, pursuant to Solid Waste Facility Permit (SWFP) #42-AA-0012 issued on August 19, 2005, by the CIWMB; and enforced by the LEA. The VAFB Landfill is also subject to requirements found in RWQCB Waste Discharge Requirement (WDR) Order No. R3-2004-151, dated November 19, 2004; and Monitoring and Reporting Program No. R3-2004-151, dated November 19, 2004. In June 2006, VAFB submitted a Joint Technical Document (JTD) amendment, #42-AA-0012, which was accepted by the LEA. The LEA concluded that the JTD did not require any change to the August 2005 SWFP. Pursuant to requirements of the existing permits and other federal and state regulations, the VAFB Landfill has groundwater monitoring wells, a landfill gas monitoring procedure, and leachate and run-on/run-off control systems.

The VAFB Landfill has several designated disposal areas: the active face of the landfill; a non-friable asbestos disposal area; an animal cemetery; and a wood yard. SWFP #42-AA-0012 allows disposal of 400 tons per day, and a traffic volume of 99 vehicles per day. Under WDR No. R3-2004-0151 *Waste Type & Classification (paragraph 18)*, of the 400 tons of waste per day: 374 tons are allotted for general non-hazardous waste, 18 tons for separated or commingled recyclables, and 8 tons for miscellaneous non-hazardous waste as allowed in Section 14 of the permit. Section 14 items include: non-friable asbestos; small animal carcasses; separated C&D debris; wood or green wastes to be chipped for recycling or alternate daily cover; waste tires to be hauled off-site for recycling or incineration; and properly treated medical waste as defined in the California Health and Safety Code, Chapter 8, Section 117600, et seq. (medical wastes are not accepted and are managed under separate contract). The VAFB Landfill is prohibited from accepting: liquid wastes, including grease; sewage sludge and septic tank pumping; burning waste; hot ashes; untreated medical waste; non-hazardous waste requiring special handling; designated waste; hazardous waste; radioactive waste; and treated wood waste.

As stated in the VAFB June 2006 *Application for Solid Waste Facility Permit/Waste Discharge Requirements,* the current permitted capacity is 2,464,000 yd^3 with a remaining site capacity of 2,179,447 yd^3 (Dec-04, data). Based upon a waste to cover ratio of 4:1, an in-place waste density of 1,000 pounds per cubic yard, and historical disposal tonnage, the closure date for the VAFB Landfill is estimated to be 2089. Although permitted for a peak daily tonnage of 400 tons, the average daily tonnage is approximately 35 tons per operating day. The four most recent Quarterly Reports (July 2006 to June 2007) show daily disposal tonnages of 26, 28, 29, and 36 tons per day. The recent increase is attributable to a large project for the demolition of MFH.

3.6.1 Construction and Demolition Debris

VAFB C&D projects generally originate from 30 CES program management and planning requirements. Projects for new construction range from multi-story administrative buildings to space launch complexes. Demolition projects range from removal of World War II wooden structures to MFH replacement, to demolition of obsolete launch complexes and facilities. The debris from these projects includes, but is not limited to, concrete, asphalt, wood waste, dry wall material, and glass. The large majority of demolition debris for the security and safety upgrades would be resultant from the road demolition necessary at the project areas. There are different processes established for handling and disposing of C&D debris.

Debris from new construction is typically uncontaminated and is reused or recycled whenever feasible. Material segregation and storage are also less of a problem with new construction than with demolition. Debris from demolition projects is sometimes less amenable to reuse or recycle because, based on facility age, the structure may be painted with lead-based paint, contain asbestos-containing materials, and have treated woods in structural and finishing materials. This debris may have to be managed as hazardous waste. In addition, the federal government has specific rules that apply to the transfer of government property to local jurisdictions or commercial enterprises. Demolition projects must also overcome cost differentials wherein it may be less expensive to demolish a structure than to deconstruct or dismantle it. Cost differentials between tipping fees and costs associated with reuse or recycling also influence disposal decisions.

VAFB has a resident Defense Reutilization and Marketing Office to accomplish reutilization, transfer, donation, and sale of excess property. The first three elements of this process (reutilization, transfer, and donation) are internal to the federal government or to government-approved entities such as state or local government agencies. The final step (sale) makes property available to commercial enterprises and the public.

3.6.2 Pollution Prevention

Both the state of California and the Air Force have mandated reduction goals in the quantity of solid waste disposed of in landfills. The Pollution Prevention Act of 1990 refocused the national approach to environmental protection toward pollution prevention (P2). Implementation of the Air Force Environmental Management System (EMS) will carry P2 a step further toward mission sustainability principles. The P2 program at VAFB, including the 30 SWP 32-7080 *Pollution Prevention Management Plan*, is evolving to promote EMS and provide a policy aimed at achieving 30 SW EMS objectives and targets, through documented practices, procedures, and operational requirements. VAFB will continue to implement 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); and
- Disposal (in an environmentally compliant manner, only as a last resort).

The VAFB Materials Diversion Center, located in Building 11510, allows for the recycling of furniture, tools, and other materials. These items are diverted back for VAFB use, thus recycling items that would otherwise be scraped. Base units and personnel can obtain materials from the Materials Diversion Center free of charge.

3.7 Transportation

VAFB is located approximately five miles west of the City of Lompoc. Two main highways connect VAFB and metropolitan areas in the region (Figure 1-1). Hwy 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. Hwy 101. SR 246, an east-west highway, provides access to Lompoc to the east and Santa Barbara to the southeast, when used in conjunction with U.S. Hwy 101. Vehicles enter VAFB from these two roads through several gates, as described in Chapter 1, Section 1.2.

On VAFB, roads are categorized as highways, primary, local (secondary roads), and patrol (VAFB 2007). Primary roads serve large volumes of traffic, are divided, and provide limited access to adjacent land uses. They act as the main circulation routes into and through the cantonment areas and connect to local streets. Local streets provide

for traffic movement between primary roads and access roads and provide access to community facilities, parking lots, and housing and service areas. They make up the majority of the road network in the cantonment area and have frequent traffic stops and low speeds. Patrol roads are remote roads that are paved or unpaved and are used for security patrol and monitoring of infrastructure.

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. A road's ability to accommodate different volumes of traffic is generally expressed in terms of Level of Service (LOS). The LOS scales ranges from A to F, with each level defined by a range of traffic volume to roadway capacity. 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.

All primary roads on VAFB operate at a LOS between A and C (VAFB 1994). Local (secondary) roads operate at a LOS between A and B (VAFB 1994). Informal traffic studies indicate gates operate at LOS A to C range (VAFB 2005).

Given that the Proposed Action would entail worker commuting and construction truck traffic off base, for purposes of this EA, the affected environment, as it relates to transportation, would consist of: local major highways/roads connecting to Santa Maria and Lompoc, including U.S. Hwy 1 and SR 246; primary and local roadways on VAFB that service project areas; and routes between project areas and the VAFB Landfill for activities that include road demolition. Approximately three truck trips per day are estimated for ECF upgrade activities for tasks such as delivering cement, disposing of solid waste at the landfill, and supplying water for dust control measures.

On North Base, the primary roads serve as the principle circulation routes into and through the main cantonment area and include: California Boulevard, 13th Street, Utah Avenue, Nebraska Avenue and Washington Avenue. On South Base, the primary roads include Arguello Road, Bear Creek Road and Coast Road. Of these primary roads on VAFB, construction or demolition activities associated with ECF upgrades would occur on California Boulevard, 13th Street, Utah Avenue, Arguello Road, and Coast Road.

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Chapter 4. Environmental Consequences

This chapter presents the results of the analysis of potential environmental effects of implementing the Proposed Action and the No-Action Alternative as described in Chapter 2.

4.1 Air Quality

The criteria for determining the significance of air quality impacts are based upon federal, state, and Santa Barbara County standards and regulations. Impacts would be considered significant if project emissions increase ambient pollutant concentrations from below the NAAQS or CAAQS to above these standards, or if they contribute measurably to an existing or projected ambient air quality standard violation.

In non-attainment or maintenance areas, federal agencies are required to prepare a conformity determination to prevent federal actions from causing an exceedance of a national ambient air quality standard. To reduce the time and resources federal agencies expend in preparing conformity determinations, the U.S. EPA developed de minimis levels that serve as thresholds for focusing on those actions likely to have the most significant impacts. The U.S. EPA deemed that emission levels below the de minimis levels were not significant.

As of June 15, 2005, Santa Barbara is in attainment of all federal air quality standards, and federal agencies are no longer required to prepare conformity determinations. However, VAFB believes the threshold levels used in conformity determinations are still relevant for use as thresholds for determining if air quality impacts would be significant. The rationale used by the U.S. EPA to develop the thresholds for nonattainment areas is no less applicable for areas in attainment. Although VAFB is no longer required to observe the significance levels required in conformity determinations, voluntary use of them provides a conservative approach to determining air quality impacts.

Maintenance areas have de minimis levels of 100 tons per year (tons/yr) for NO_x. The VOC limits are 50 tons/yr for areas inside an ozone transport region and 100 tons/yr outside that region. Using a 365-day year, these de minimis levels equate to significance levels of 548 pounds per day (lbs/day) of NO_x, and 274 or 548 lbs/day for VOCs for areas inside and outside of an ozone transport region, respectively. VAFB will apply the 100 tons/yr or 548 lbs/day VOC significance threshold. If Santa Barbara County becomes part of an Ozone Transport Region under the CAA, VAFB will reassess its VOC significance threshold. These are the levels, 100 tons/yr or 548 lbs/day of NO_x, or VOC, VAFB will use for determining whether air quality impacts are significant.

4.1.1 Proposed Action

Construction activities for the Proposed Action would last for 1,120 workdays and occur over a five-year period. Fugitive dust emissions generated from equipment operating on exposed ground and combustive emissions from the equipment would cause adverse air quality impacts. The largest adverse impacts would occur when vehicles disturb the soil on-site; smaller impacts would occur during the transport of construction debris and material handling.

Painting of new buildings and facilities would also contribute to air emissions. One of the key ingredients contributing to ozone formation are solvents commonly found in many architectural coatings, including house paints, lacquers, sealers, maintenance coatings, primers, stains, and enamels.

These coatings generate VOC emissions from the evaporation of solvents they contain. Painting structures with architectural coatings and related equipment cleanup activities release ROCs and toxic air contaminant emissions (e.g., benzene, toluene and xylene). Emissions can be reduced by selecting the lowest VOC paint available. In addition, the SBCAPCD is limiting the ROC content in solvents used to clean application equipment to 25 grams per liter.

For purposes of this analysis, it was estimated that an average of 0.02 acre per day would be disturbed. It was further estimated that on a reasonable worst-case day, 0.05 acre would be disturbed. With a disturbance of 8-hours per day, the reasonable worst-case day fugitive dust emissions would be 28.29 lbs of PM_{l0} per day. These emissions would not be expected to cause an exceedance of any ambient air quality standard and therefore there would be no significant impacts from PM_{10}.

Daily emissions were estimated to be 32.31 lbs of CO, 28.24 lbs of NO_x, 29.85 lbs of PM_{10}, 2.94 lbs of ROC, and 0.34 lbs of SO_x. The project emissions were estimated to be 18.09 tons of CO, 11.12 tons of NO_x, 6.15 tons of PM_{10}, 2.59 tons of ROC, and 0.19 tons of SO_x. Emissions from the Proposed Action would not exceed the significance thresholds of 548 lbs per day or 100 tons per year. Therefore, no adverse impacts to the region's air quality would occur from the Proposed Action. The Environmental Protection and Monitoring Measures described in Section 4.1.2, would be implemented to ensure compliance with regulatory requirements and further reduce the potential for adverse effects to air quality.

Given the requirements of EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, and the increasing concerns that greenhouse gases contribute to Global Climate Change, 30 CES/CEV will take into consideration and encourage measures that promote efficiency and conservation through education, programs, and incentives to increase efficiency and conserve energy in development projects on VAFB. Beginning in FY 2009, Air Force policy requires all vertical, MILCON projects with climate control to be designed so that they are capable of achieving LEED Silver Certification. The 30 CES Engineering Flight (30 CES/CEC) will ensure all affected projects meet the requirements of this Air Force policy. Therefore, any effect on air quality would be insignificant.

4.1.2 Environmental Protection and Monitoring Measures

Implementation of the environmental protection and monitoring measures outlined below should avoid or minimize potential adverse effects to air quality during implementation of the Proposed Action. These measures are considered integral elements of the project description, and would be fully implemented.

- Before construction begins for any project covered under the Proposed Action, portable equipment meeting the criteria defined in the *Final Regulation Order*, effective September 12, 2007, for the California Portable Equipment Registration Program, would be registered in the program or have a valid SBCAPCD Permit to Operate.
  - Portable diesel equipment would comply with the Airborne Toxic Control Measure for Diesel Particulate Matter from Portable Engines rated at 50 horsepower and Greater dated September 12, 2007.
  - Equipment usage and fuel consumption would be reported to 30 CES/CEV to facilitate tracking construction emissions for inclusion in the VAFB Air Emissions Inventory.
  - Idling of heavy-duty diesel trucks during loading and unloading shall be limited to five minutes, with auxiliary power units used whenever possible.

Although significant emissions are not anticipated from any of the projects covered under the Proposed Action, the following SBCAPCD dust control measures would be

implemented to further decrease fugitive dust emissions from ground disturbing activities:

- Water would 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 the wind speed exceeds 15 mph. Chlorinated water would not be allowed to run into any waterway.
- Vehicle speeds would be minimized on exposed earth.
- Ground disturbance would be limited to the smallest practical area and to the least amount of time.
- Personnel would be designated to monitor project activities to ensure excessive dust is not generated at demolition sites.
- If importation, exportation, and stockpiling of fill material are involved, soil stockpiled for more than two days would be covered, kept moist, or treated with soil binders to prevent dust generation. Trucks transporting fill material to and from a site would be tarped from the point of origin.

In addition to the above dust control measures, the following control measures would be implemented to decrease diesel emissions:

- When feasible, equipment powered with federally mandated ultra-low sulfur diesel engines would be used.
- Engine size in equipment used for the project would be minimized.
- The use of equipment would be managed to minimize the number of pieces of equipment operating simultaneously and total operation time for the project.
- Engines would be maintained in tune per manufacturer or operator specification.
- CARB-certified low diesel fuel would be used.
- If feasible, U.S. EPA or CARB-certified diesel catalytic converters, diesel oxidation catalysts, and diesel particulate filters would be installed.
- CARB-developed idling regulations for trucks during loading and unloading would be followed. Idling of heavy-duty diesel trucks during loading and unloading shall be limited to five minutes, with auxiliary power units used whenever possible.
- When feasible, equipment powered by diesel engines retrofitted or re-engined to meet the Air Toxics Control Measures for Off-Road Vehicles would be used.
- If feasible, diesel equipment would be replaced with electrical equipment.

4.1.3 No-Action Alternative

Under the No-Action Alternative, no construction activities would occur. Air quality would not be affected under this alternative.

4.2 Biological Resources

Federal agencies are required under Section 7 of the ESA of 1973, as amended (16 U.S.C. 1531 *et seq.*), to assess the effect of any project on federally listed threatened and endangered species. Section 7 requires consultation with the USFWS and the National Oceanic and Atmospheric Administration National Marine Fisheries Service for federal projects, if such actions could directly or indirectly affect listed species or destroy or adversely modify critical habitat. The present assessment determined that the Proposed Action would not directly or indirectly affect any federally listed species or adversely modify critical habitat.

It is also Air Force policy to consider listed and special status species recognized by state agencies when evaluating impacts of a project. Impacts to biological resources would occur if special status species (i.e., endangered, threatened, rare, or candidate) or their habitats, as designated by federal and state agencies, would be directly or indirectly affected by project-related activities. These impacts can be short- or long-term impacts, such as short-term impacts from noise and dust during construction, and long-term

impacts from the loss of the capacity of habitats to support wildlife populations.

Different species are subject to different impacts, and different sites support different densities due to spatial variation in the number and type of habitats, the presence or absence of unique habitat features such as streams or vernal wetlands, and the degree of human-induced disturbance.

Potential impacts to biological resources include:

- Short-term (temporary) and long-term (permanent) loss of habitat from construction related activities such as access, excavation and construction;
- Short-term (temporary) and long-term (permanent) loss of habitat from construction activities.
- Loss of individual animals or plants within the work area due to excavation, crushing or burial;
- Loss of individual animals or plants in habitats adjacent to work areas due to soil erosion;
- Soil erosion in wetlands or open water adjacent to the project site;
- Abandonment of breeding and/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; and
- Degradation of water quality due to turbidity.

4.2.1 Proposed Action

Potential adverse impacts anticipated from the security and safety upgrades of ECFs are expected to be temporary and short-term. Potential project impacts specific to vegetation types, habitats, and plant and wildlife species are discussed in further detail in the sections that follow.

4.2.1.1 Botanical Resources

Vegetation types present within project areas include central coastal scrub, wetland, arroyo willow riparian forest, oak woodland, non-native woodland, non-native grassland, ornamental plantings, turf grasses, and ruderal. Most project activities would occur within established roadways or other paved areas. Effects on native vegetation types would be minimal in the overall project implementation at the various ECFs. Disturbance to and removal of native vegetation would be minimized to the greatest extent practicable.

Lompoc Gate

Vegetation would be disturbed and some lost for construction of the overwatch facility, and installation of the final vehicle denial barrier and the holding building adjacent to the in-bound truck lanes. The affected vegetation in all three cases would be a central coastal scrub/non-native grassland mix. Construction of the paved vehicle and truck turn-around would occur on an unvegetated area, and the holding building adjacent to the in-bound truck lanes would occur on a road shoulder dominated by ruderal vegetation. Disturbances and loss of vegetation would not represent an adverse effect to biological resources. Disturbed areas would be revegetated after project completion to prevent the establishment of non-native invasive vegetation.

Santa Maria Gate

Turf grasses and ornamental plantings are the two vegetation types that would be subject to disturbance and/or loss within the two project areas associated with the Santa Maria ECF upgrade. Installation of the cable barrier on the south side of California Avenue would traverse a small wetland area, approximately 7 to 8 feet wide. This wetland would be avoided by placing posts outside of this area. Disturbances and loss of vegetation would not represent an adverse effect to biological resources.

Solvang Gate

Construction of the outbound inspection lanes at the Solvang Gate would disturb ruderal vegetation. Installation of the cable barrier facility would result in the disturbance and loss of mixed central coastal scrub/non-native grassland. Construction of the overwatch facility would occur in an area where arroyo willows are present. Given the small area required for construction of this facility (25 ft by 20 ft), careful siting at the time of final project design would avoid disturbing these trees. Disturbances and loss of vegetation would not represent an adverse effect to biological resources.

South Gate

Installation of cable barriers and the overwatch facility at the South Gate would occur within irrigated lawns, and mowed non-native grassland. One section of the cable barrier would bisect a wetland. Careful siting of the posts during final project design would avoid affecting the wetland. Disturbances and loss of vegetation would not represent an adverse effect to biological resources

Utah Gate

Installation of permanent bollards and cable barriers and upgrading the chain link fence at the Utah Gate would result in the disturbance and loss of some turf grasses and ornamental plantings. Disturbances and loss of vegetation would not represent an adverse effect to biological resources.

4.2.1.2 Wildlife Resources

Wildlife, including mammals, amphibians, reptiles, and birds, present in the vicinity of project areas would be subject to disturbance during construction activities. Most individuals are expected to leave the area of disturbance and seek cover in adjacent habitat. These disturbances would be considered short-term and temporary and would not be considered of a magnitude to result in adverse effects to populations within the vicinity of project areas. To minimize potential for wildlife entrapment, trenches and holes would not be left open overnight, whenever possible. Trenches or holes that must be left open at the end of the workday would be ramped at a 45-degree angle or less to minimize potential for entrapment.

Construction activities under the Proposed Action would occur over a 24-month period, and some activities could occur during the breeding season for wildlife species. Under the MBTA, disturbances to nesting birds, their nests and young, would be avoided by trimming and or removing trees and shrubs between September and February, to the maximum extent feasible. If removal or trimming is scheduled to occur between March and August, trees and shrubs would be surveyed within one week prior to the work.

4.2.2 Environmental Protection and Monitoring Measures

Implementation of the environmental protection and monitoring measures outlined below should avoid or minimize potential adverse effects to Biological Resources during implementation of the Proposed Action. These measures are considered integral elements of the project description, and would be fully implemented.

- Contractors would minimize the area of disturbance.
- Removal of native vegetation would be minimized to the greatest extent practicable.
- At the Lompoc Gate project area, disturbed areas would be revegetated after project completion to prevent the establishment of non-native invasive vegetation.
- To minimize the potential for wildlife entrapment, trenches and holes would not be left open overnight, whenever practicable. Trenches or holes that must be left open at the end of the workday would be ramped at a 45-degree angle or less to minimize the potential for entrapment of wildlife.

4.2.3 No-Action Alternative

Under the No-Action Alternative, security and safety upgrades to ECFs would not be

implemented, thus no construction would occur. Biological resources would not be affected under this alternative.

4.3 Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires federal agencies to consider the effects of proposed federal undertakings on cultural resources that are listed in or eligible for listing in the NRHP (a.k.a. historic properties). Part of compliance with Section 106 requires the federal agency to determine if the undertaking would have no effect to historic properties, no adverse effect to historic properties, or an adverse effect to historic properties (which would then require resolving). The Section 106 implementing regulations [36 CFR Part 800] prescribe the process for making these determinations.

4.3.1 Proposed Action

VAFB has determined that the Security and Safety Upgrades to Entry Control Facilities project would have no effect on historic properties. A report stating as such was submitted to the State Historic Preservation Office (SHPO) for review, and with a request for concurrence with the finding of no historic properties affected. The AF received a concurrence letter from the SHPO on 6 April 2009. The cultural resources investigation for the Security and Safety Upgrades to Entry Control Facilities project was a coordinated review that satisfies federal agency responsibilities under Section 106 of the NHPA as well as NEPA.

4.3.2 No-Action Alternative

Under the No-Action Alternative, the proposed security and safety upgrades would not be installed. Under this alternative, no impacts to cultural resources would occur.

4.4 Hazardous Materials and Hazardous Waste Management

Potential impacts resulting from 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, Section 3.4. Hazardous materials management requirements are found in federal and state EPA and OSHA regulations, contract specifications and the VAFB *Hazardous Materials Management Plan* (30 SWP 32-7086). Hazardous waste management requirements are found in federal, state, and local regulations, contract specifications and the VAFB *Hazardous Waste Management Plan* (30 SWP 32-7043A). Non-compliance with applicable substantive regulatory requirements, human exposure to hazardous materials and wastes, or environmental release above permitted limits, would be considered adverse impacts.

4.4.1 Proposed Action

The contractor would be subject to hazardous materials and waste management regulations as required by federal, state and local laws, and would follow procedures as outlined in the VAFB *Hazardous Materials Management Plan* (30 SWP 32-7086) and VAFB *Hazardous Waste Management Plan* (30 SWP 32-7043A). 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, and would minimize the potential for adverse effects.

Implementing the Proposed Action would require the use of hazardous materials. As described in Chapter 3, Section 3.4, these hazardous materials are commonly used for construction projects and demolition, and would be the same types as currently used and managed on VAFB. Because activities under the Proposed Action would be spread over a 24-month period and would utilize a maximum of five to seven workers per ECF,

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 could result from accidental releases of POLs from vehicle and equipment leaks. All hazardous wastes would be properly managed and disposed of in accordance with applicable federal, state and local hazardous waste regulations, and the VAFB *Hazardous Waste Management Plan* (30 SWP 32-7043A). All hazardous wastes would be managed during release response and clean-up.

Installation Restoration Program

Potential IRP impacts are evaluated using DOD and Air Force guidance, and the Federal Facilities Site Remediation Agreement (FFSRA), as negotiated between VAFB and the regulatory agencies with oversight of VAFB IRP activities. Non-compliance with the substantive provisions of the FFSRA and applicable regulatory requirements, human exposure to contaminants, or environmental release above permitted limits, would be considered adverse impacts. The Proposed Action would not incur impacts to any IRP sites on VAFB.

4.4.2 Environmental Protection and Monitoring Measures

Implementation of the environmental protection and monitoring measures outlined below should avoid or minimize potential adverse effects to hazardous materials and waste during implementation of the Proposed Action. These measures are considered integral elements of the project description, and would be fully implemented. Therefore, any effects to hazardous materials and waste would be insignificant.

- All hazardous materials would be properly identified and used in accordance with manufacturer's specifications to avoid accidental exposure to or release of hazardous materials required to operate and maintain construction equipment.
- Proper disposal of hazardous waste would be accomplished through identification, characterization, sampling and analysis of wastes generated.
- All equipment would be properly maintained and free of leaks during operation. All necessary equipment maintenance and repairs would be performed in pre-designated controlled, paved areas to minimize risks from accidental spillage or release.

For demolition of existing roads associated with proposed ECFs upgrades, the following measures would also be implemented:

- In compliance with California Business Plan requirements, contractors would submit a Business Plan or Disclaimer based upon amount of hazardous materials present on site for more than 30 days.
- Per VAFB requirements, contractors would submit an Environmental Protection Plan (EPP) to the 30 CES/CEV prior to the start of demolition activities.
- 30 CES/CEC would require demolition contractors to submit a Spill Prevention and Response Plan prior to the start of demolition activities and would obtain concurrence from 30 CES/CEV.

4.4.3 No-Action Alternative

Under the No-Action Alternative, the proposed security and safety upgrades at ECFs would not be installed. There would be no change in the management or levels of hazardous materials and waste on VAFB.

4.5 Human Health and Safety

Potential impacts to human health and safety are evaluated using federal, state, and local regulatory requirements, contract specifications, and base operating procedures. Non-compliance with applicable substantive regulatory requirements, and human exposure to health and safety hazards

above permitted limits, would be considered adverse impacts.

4.5.1 Proposed Action

The contractor would comply with OSHA regulations, and other recognized standards and applicable Air Force regulations or instructions. Restricted public access to the construction sites would be provided through use of signs and fencing. The contractor would 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. Therefore, human health and safety would not be adversely impacted by general construction hazards.

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 near the proposed project sites, and have the potential to adversely impact the health and safety of construction personnel. Adherence to federal OSHA regulations and awareness training incorporated into worker health and safety protocols would minimize the exposure of workers to these hazards.

Unexploded Ordnance

Special precautions need to be taken in certain areas of VAFB that were used as practice ranges for artillery firing, referred to as areas of potential UXO. Coordination with the EOD Flight prior to implementing the Proposed Action would ensure that no adverse effects on human health and safety occur.

Noise

According to regulations of the federal OSHA, employees should not be subjected to sound exceeding a L_{eq1H} of 90 dB for an 8-hour period. This sound level increases by 5 dB with each halving of time (e.g., 4-hour period at 95 dB). Exposure up to a L_{eq1H} of 115 dB is permitted for a maximum of only 15 minutes during an 8-hour workday and no exposure above 115-dB is permitted. For this analysis, OSHA standards are used as the "not to exceed" criteria as they are the most appropriate standards available.

The Proposed Action would temporarily increase the ambient noise levels within the project area and in neighboring areas during project implementation activities. Relatively continuous noise would be generated by construction equipment. These continuous noise levels are generated from equipment that have source levels (at 1 meter) ranging from approximately 72.7 to 112.7 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 50 meters, these levels range from 47.3 to 87.3 dB. Adverse effects as a result of noise are expected to be minimal and less than significant.

4.5.2 Environmental Protection and Monitoring Measures

Implementation of the environmental protection and monitoring measures outlined below should avoid or minimize potential adverse effects to Human Health and Safety during implementation of the Proposed Action. These measures are considered integral elements of the project description, and would be fully implemented. Therefore, any effects to human health and safety would be insignificant.

- To provide for the health and safety of workers and visitors who may be exposed to construction and demolition operations included under the Proposed Action, contractors would comply with federal OSHA requirements over the entire project.
- Contractors would supply a health and safety plan to VAFB and appoint a formally trained individual to act as safety officer.
- Contractors would coordinate with the EOD Flight prior to implementing the Proposed Action, to ensure no adverse effects on human health and safety would occur from unexploded ordnance issues.
- To minimize potential adverse impacts from biological hazards (e.g., snakes and poison oak) and physical hazards (e.g., rocky and slippery surfaces), awareness training would be incorporated into the worker health and safety protocol.

4.5.3 No-Action Alternative

Under the No-Action Alternative, the proposed security and safety upgrades would not be installed. There would be no impacts to human health and safety associated with construction or demolition activities. However, human health and safety of personnel working on VAFB may be impacted as a result of deficient protection measures established at all the ECFs, and the consequent risk and vulnerability to terrorist attacks.

4.6 Solid Waste Management

Solid waste impacts are evaluated using federal, state, and local regulatory requirements, permit conditions, contract specifications, VAFB *Solid Waste Management Plan* (30 SWP 32-7042), and operating constraints as outlined in Chapter 3, Section 3.6. Adverse impacts would occur from non-compliance with applicable substantive regulatory requirements or an increase in the amount of waste disposed beyond available base waste management capacities, which would result in disposal in other Santa Barbara County landfills. Disposal amounts in the VAFB Landfill that would cause the base to drop below its currently mandated 50 percent diversion rate would also be considered an adverse impact.

4.6.1 Proposed Action

Potential adverse impacts as a result of solid wastes generated by security and safety upgrades to ECFs would not be significant. These potential impacts are discussed in further detail in the sections below.

4.6.1.1 Construction and Demolition Debris

Solid waste generated during construction projects would include packaging from materials (cardboard and plastic), scrap rebar, wood, pipes, and wiring, and miscellaneous waste generated by onsite construction workers. Contractors would be responsible for the disposal and/or recycling of all waste generated during the scope of the project.

Soil excavated during construction activities would be used as backfill, and any excess materials would be spread throughout the site. Construction debris, along with green waste, used tires and other recyclable materials, would be segregated and diverted for reclamation. All green waste would be disposed of at the VAFB Landfill. Any wastes resulting from the implementation of the Proposed Action that are not authorized to be disposed of in the VAFB Landfill would be segregated and taken off base for recycling or disposal.

In order to meet VAFB's detailed tracking requirements for waste disposal and diversion, the party/unit responsible for diversion, recycling, or disposal must report all materials going off base for these purposes to the 30 CES/CEVV Solid Waste Manager. Additionally, any materials recycled on base by processes other than the VAFB Landfill, must be reported to the 30 CES/CEVV Solid Waste Manager at least quarterly, with copies of weight tickets and receipts provided.

Generation of concrete and asphalt debris from road demolition included under the Proposed Action has the potential of adversely affecting waste volumes at the VAFB Landfill, particularly for debris that could not be reused, recycled or placed as engineered fill. Asphalt and concrete would be recycled off base when possible or accepted at the VAFB Landfill if necessary. Access to the landfill requires a Landfill Access Ticket, which would be coordinated through 30 CES/CEVV. The contractor would meet the applicable state or local diversion requirements in effect at the time of actual disposal. Although the VAFB Landfill is permitted for a peak daily tonnage of approximately 400 tons, if required, the contractor would limit daily landfill disposal so the VAFB Landfill could continue to operate nearer its current daily average disposal tonnage of 35 tons per day. Recyclable solid wastes not managed by base processes would impact local and regional recycling facilities.

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 not to meet 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.

Solid waste from the Proposed Action would be minimized by strict compliance with applicable federal and state statutes and regulations, as well as by following requirements contained in 30 SWP 32-7042, *Solid Waste Management Plan*.

Because projects associated with the Proposed Action would generate only small amounts of solid waste and be implemented over a 24-month period, the addition of the solid waste associated with the proposed projects would result only small increases in the amount of solid waste generated by VAFB. The amount of solid waste generated would not affect the daily maximum waste that the VAFB Landfill can accept. The Proposed Action would have no adverse impacts on the environment from solid waste.

4.6.1.2 Pollution Prevention

Construction operations associated with the Proposed Action would create pollution in the air and water and would generate hazardous and solid waste. Compliance with applicable regulatory requirements, as well as the VAFB *Pollution Prevention Management Plan* (30 SWP 32-7080), and implementation of the recommended measures for air quality, hazardous waste and solid waste management (see above) would enhance pollution prevention.

Contractors on VAFB must comply with affirmative procurement requirements as specified in federal regulations, and Air Force policies and plans, including Section 6002, *Federal Procurement*, of the RCRA; EO 12873, *Federal Acquisition, Recycling, Waste Prevention*; EO 13149, *Greening the Government*; EO 13101, *Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition*; Air Force Instruction (AFI) 32-7080, *Compliance Assurance and Pollution Prevention*; 30 SWP 32-7042, *Storm Water Management Plan*; and 30 SWP 32-7080, *Pollution Prevention Management Plan*.

The contractor would use specified materials with recycled and recovered content as the minimum standard, which would be considered when evaluating recycled or reused materials as part of the contractor's affirmative procurement program. The contractor would also consider other green materials and products not listed, but commonly used in industry outside of the government as a means of further reducing hazardous materials, hazardous waste and solid waste. The contractor would make sure these materials and products meet the requirements of their contract specifications.

In addition, EO 13101 requires the use of products which have reduced toxicity and hazardous characteristics or reduced embodied energy in its manufacturing. The U.S. EPA provides comprehensive on-line pollution prevention training in the World Wide Web (www.epa.gov/).

Compliance with the regulations, guidelines, and measures described above would result in no adverse impacts to the environment.

4.6.2 Environmental Protection and Monitoring Measures

Implementation of the environmental protection and monitoring measures outlined below should avoid or minimize potential adverse effects to solid waste during implementation of the Proposed Action. These measures are considered integral elements of the project description, and would be fully implemented. Therefore, any effects to solid waste would be insignificant.

- Asphalt and concrete debris resulting from road demolition activities would be recycled when possible, or accepted at the VAFB Landfill if necessary. Access to the landfill requires a Landfill Access Ticket, which would be coordinated through 30 CES/CEVV.

- Segregating and separately managing the different types of waste during demolition processes.

- Segregating and processing the different types of demolition debris into sizes, characteristics, and specifications identified by local recyclers as acceptable to their authorized processes.

- Segregating and processing the different types of demolition debris into sizes, characteristics, and specifications for reuse within other VAFB projects.

4.6.3 No-Action Alternative

Under the No-Action Alternative, security and safety upgrades at VAFB ECFs would not occur. Solid wastes would not be generated and adverse effects would not occur under this alternative.

4.7 Transportation

For the purposes of this EA, impacts to the transportation system at VAFB would be considered significant if:

- Alternate routing for primary roadways, while they are under construction, could not service traffic demands;

- Project access to a primary or local road would cause the need for new roadways or traffic signals, or major revisions to existing roadways or traffic signals; or

- The project added traffic to roadways that had limiting design features or received use that would be incompatible with substantial increases in traffic, resulting in potential safety problems. Limiting design features include, but are not limited to, narrow width, roadside ditches, sharp curves, poor sight distance, and inadequate pavement structure. Some examples of a roadway receiving incompatible use are large numbers of heavy trucks on rural roads used by farm equipment, livestock, horseback riding, or on residential roads with heavy pedestrian or recreational use.

4.7.1 Proposed Action

Construction at ECFs would be staggered so that only one gate would be closed at a time to minimize traffic congestion. While under construction, some traffic lanes at the ECF would remain open so that traffic could continue to utilize the gate, except for a short period (approximately 5 days) during final vehicle denial barrier installation. This barrier crosses all lanes of traffic at the gate, necessitating complete closure of the ECF.

Traffic diversions during complete closure of the ECFs would generally be to the nearest gate and would occur as follows:

- Lompoc Gate – Divert to Santa Maria Gate.

- Santa Maria Gate – Divert to Utah or Lompoc Gates.

- Solvang Gate – Divert to Lompoc Gate.
- South Gate – Divert to Coast Gate.
- Utah Gate – Divert to Santa Maria Gate.

Increased truck activity from the Proposed Action, although minimal (i.e., three additional truck trips per day), has the potential to decrease the LOS on affected primary and local roads. The good LOS ratings for these roads make it unlikely that any significant impacts would occur.

Given that security and safety upgrades at ECFs would be implemented over a 24-month period and that crews of five to seven personnel would be used per gate, personnel commuting using U.S.Hwy 1 and SR 246, and their entrances onto VAFB, would be unlikely to affect existing off-base roadway conditions. Because construction at ECFs would be staggered, lanes at each gate would remain open for the majority of the construction period there, and the good LOS ratings of the base gates, it is unlikely that activities under the Proposed Action would result in any significant impacts.

4.7.2 Environmental Protection and Monitoring Measures

Although significant impacts from the Proposed Action are not anticipated given the temporary nature of the construction on any given roadway and the good LOS levels of primary roads and gates on VAFB, the following measures would reduce the potential for adverse effects on the transportation system:

- Construction on mission-critical roads would be coordinated with the 30th Launch Group to avoid mission impacts.
- Contractors would supply a traffic control plan that would cover all conditions to be encountered during construction, and which would be implemented to adequately facilitate the movement of traffic.
- Roadway users would be provided with adequate notice of when ECFs or roadways would be under construction, so that users could plan for alternate routes when possible.

The following measures would also be implemented to reduce the potential for adverse effects on transportation:

- Project employees would be encouraged to carpool and eat lunch on site.
- Truck trips would be scheduled during non-peak traffic hours when possible.

4.7.3 No-Action Alternative

Under the No-Action Alternative, security and safety upgrades to ECFs would not be implemented, thus no construction would occur. The transportation system at VAFB would not be changed.

4.8 Cumulative Impacts

Adverse cumulative impacts (hereinafter referred to as "cumulative impacts") result from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions, regardless of the agency that undertakes these other actions. Cumulative impacts can result from actions whose adverse impacts are individually minor or negligible, yet, over a period of time, are collectively significant.

In addition to the security and safety upgrades to ECFs analyzed in this EA, VAFB has an on-going operations and maintenance (O&M) program for base facilities (also known as sustainment). O&M includes activities such as corrosion control, landscaping, paving, roofing, etc. There are over 300 O&M projects planned for FY07 to FY12 (VAFB 2007). Given that these projects are spread throughout the base and the small scale of their operations, no significant cumulative impacts are anticipated with these activities.

A partial list of projects for which NEPA analysis, including cumulative impacts analysis, was completed within the past 5 years is detailed in Table 4.1. Of these, the following projects are currently in progress or will be implemented in the future at VAFB: the Demolition and Abandonment of Atlas and Titan Facilities, the Western Range

Table 4.1. Various Projects for Which NEPA Analysis was Completed in the Previous 5 Years.

Name of Project	NEPA Analysis Timeframe	Project Timeframe
13th Street Bridge Emergency Repairs	EA completed in 2003.	Project completed in 2004.
VTRS Fiber Optic Cable Installation	EA completed in 2004.	Project mostly completed in 2007. See VTRS Supplement below.
Demolition and Abandonment of Atlas and Titan Facilities	EA completed in 2005.	Project on-going.
Western Range Instrumentation Modernization Program	EA completed in 2008.	Project initiated in 2009.
Western Snowy Plover Habitat Restoration	EA completed in 2008.	Project to be implemented in Spring 2009.
San Antonio Creek Restoration	EA completed in 2008.	Project implementation began in 2008 and will continue in 2009
2007 General Plan for Main and South Base Cantonments	EA completed in 2008.	Projects to be implemented between 2009 and 2014.

Instrumentation Modernization Program, the Snowy Plover Habitat Restoration, the San Antonio Creek Restoration, and the VAFB 2007 General Plan.

Air quality impacts were considered in conjunction with ongoing and future projects planned at VAFB. The cumulative emissions from projects included under the Proposed Action and past, present, and future projects would not exceed the significance thresholds of 548 lbs per day or 100 tons per year because any project that would cause an exceedance would be postponed until the following calendar year. Therefore, no significant cumulative impacts to the region's air quality would occur.

Cumulative adverse effects to biological and cultural resources would not occur during the Proposed Action. No cumulative impacts to earth resources are anticipated from the Proposed Action, demolition and abandonment of Atlas and Titan Facilities, Western Range Instrumentation, Snowy Plover Habitat Restoration, San Antonio Creek Restoration, or VAFB's General Plan. EAs under development for future projects would identify potential adverse effects to earth resources and describe measures to avoid or minimize cumulative effects. When considered in conjunction with other past, present, and future projects on VAFB, the Proposed Action was found to have no cumulative impacts on Environmental Justice as activities covered under this EA would occur within VAFB boundaries and not affect minority communities.

Any hazardous materials/wastes encountered or generated during the Proposed Action would be managed in strict compliance with all applicable statutes and regulations, as well as local support plans and instructions including 30 SWP 32-7086, *Hazardous Materials Management Plan*, and the 30 SWP 32-7043A, *Hazardous Waste Management Plan*, to avert the potential for adverse impacts. Implementing the measures described in Section 4.4.2 of this EA, identified in EAs completed for other projects, to be incorporated in EAs currently under development for future projects, and identified and established by VAFB for O&M projects, should avoid or minimize any potential adverse effects. No significant cumulative impacts are anticipated.

Given contractors' requirement to comply with OSHA, Cal-OSHA, and all other applicable federal, state, and local regulations, no adverse impacts and therefore no cumulative impacts to human health and safety are anticipated.

No cumulative impacts are anticipated in regards to land use, as the Proposed Action

would not change land use on VAFB, result in the conversion of prime agricultural land to other uses, or result in adverse effects.

No adverse impacts to socioeconomics and therefore no cumulative impacts are expected under the Proposed Action, given that small numbers of personnel utilized for ECF upgrades and the short-term nature of the activities.

High levels of solid waste are not anticipated to occur under the implementation of the Proposed Action. Construction debris would be segregated and diverted for reclamation and solid waste would also be minimized by reuse and recycling. Contractors would also be required to dispose of all solid waste either at the VAFB Landfill as appropriate, or off base property. With these measures in place, no significant cumulative effects are anticipated.

Given the good LOS ratings for primary roadways and gates at VAFB, and with the implementation of measures described in Section 2.1.9 of this EA, identified in the EAs completed for other projects, to be incorporated in EAs currently under development for future projects, and identified and established by VAFB for O&M projects, activities covered under the Proposed Action would be unlikely to have significant impacts to the transportation system on VAFB. No cumulative impacts are anticipated.

Implementing the measures described in Chapter 1 of this EA for water resources, identified in EAs completed for other projects, to be incorporated in EAs currently under development for future projects, and identified and established by VAFB for O&M projects, should avoid or minimize any potential adverse effects. No significant cumulative impacts to water resources are anticipated.

To ensure that no significant cumulative impacts result from VAFB projects occurring concurrently or non-currently, VAFB includes environmental contract specifications and mitigation/protective measures as necessary in all projects. Actions are taken during the planning process to ensure adverse impacts are minimized or avoided all together as projects are reviewed under NEPA. Prior projects are also considered to ensure no levels of acceptable impacts are exceeded.

With these practices in place, and given that all VAFB projects are designed and implemented to be in full compliance with applicable statutes and regulations, and environmental protection measures are developed in coordination with appropriate regulatory agencies, the activities included under the Proposed Action, in conjunction with other foreseeable projects at VAFB, would not result in significant cumulative impacts.

Chapter 5. Persons and Agencies Contacted

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Chapter 7. Distribution List

California Regional Water Quality Control Board, Central Coast Region, San Luis Obispo, CA

Defense Technical Information Center (World Wide Web http://www.dtic.mil)

Lompoc Public Library, Lompoc, CA

Santa Barbara Public Library, Santa Barbara, CA

Santa Maria Public Library, Santa Maria, CA

University of California, Library, Santa Barbara, CA

VAFB Library, VAFB, CA

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Chapter 8. Bibliography

Arnold, J.E. 1992. Complex Hunter-Gatherer-Fishers of Prehistoric California: Chiefs, Specialists, and Maritime Adaptations of the Channel Islands. *American Antiquity* 57:60–84.

Berry, B.F., R.C. Payne, and A.L. Harris. 1991. Noise levels of USAF aircraft in Exercise "Luce Belle". National Physics Laboratory Report RSA (EXT) 16. 22pp.

CDFG. 1999. Special Status Plants, Animals and Natural Communities of Santa Barbara County. California Natural Diversity Data Base.

CDFG. 2001. Special Plants and Animals: Casmalia USGS Quadrangle. California Natural Diversity Database.

CDFG. 2008a. Special Animals. Department of Fish and Game Wildlife and Habitat Analysis Branch. California Natural Diversity Database. Retrieved from the World Wide Web: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf. February.

CDFG. 2008b. Special Vascular Plants, Bryophytes, and Lichens List. Department of Fish and Game Wildlife and Habitat Analysis Branch. California Natural Diversity Database. Retrieved from the World Wide Web: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/ SPPlants.pdf. January.

Christopher, S.V. 1996. Reptiles and amphibians of Vandenberg AFB, Santa Barbara County, California. Museum of Systematics and Ecology, Report No. 4, University of California, Santa Barbara, in cooperation with the National Biological Service, San Simeon.

Christopher, S.V. 2002. Sensitive amphibian inventory at Vandenberg Air Force Base, Santa Barbara County, California. Summary of preliminary results and site maps. Appendix A Field survey data January 1995 through March 2002.

Coulombe, H.N., and C.R. Mahrdt. 1976. Ecological Assessment of Vandenberg Air Force Base, California. Vol II: Biological inventory, 1974/75. Prepared for Headquarters Space and Missile Systems Org., Air Force Systems Command, Los Angeles Air Force Station, California.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Erlandson, J.M. 1994. *Early Hunter-Gatherers of the California Coast*. Plenum, New York.

Erlandson, J.M., and K. Bartoy. 1995. Cabrillo, the Chumash, and Old World Diseases. *Journal of Great Basin Anthropology* 17:153–173.

Erlandson, J.M., and K. Bartoy. 1996. Protohistoric California: Paradise or Pandemic? *Proceedings of the Society for California Archaeology* 9:304–309.

Glassow, M.A. (editor). 1990. *Archaeological Investigations on Vandenberg Air Force Base in Connection with the Development of Space Transportation System Facilities,* with contributions by J.E. Arnold, G.A. Batchelder, R.T. Fitzgerald, B.K. Glenn, D.A. Guthrie, D.L. Johnson, and P.L. Walker. Department of Anthropology, University of California, Santa Barbara. Submitted to U.S. Department of the Interior, National Park Service, Western Region Interagency Archeological Services Branch, San Francisco, Contract No. CX-8099-2-0004.

Glassow, M.A. 1996. *Purisimeño Chumash Prehistory: Maritime Adaptations along the Southern California Coast*. Case Studies in Archaeology. Jeffrey Quilter, series editor. Harcourt Brace College Publishers, San Diego.

Greenwood, R.S. 1972. *9000 Years of Prehistory at Diablo Canyon, San Luis Obispo County, California.* San Luis Obispo County Archaeological Society Occasional Paper No. 7.

Greenwood, R.S. 1978. Obispeño and Purisimeño Chumash. In *California*, edited by Robert F. Heizer, pp. 520–523. Handbook of North American Indians, vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Greenwood, R.S., and J.M. Foster. 1984. *Replacement Cable Project and Fiber Optic Cable Project, Vandenberg Air Force Base, Santa Barbara County, California.* Greenwood and Associates, Pacific Palisades, California. Submitted to the U.S. Air Force, Space and Missiles Center, Vandenberg Air Force Base, California.

Harris, C.M. 1998. Handbook of Acoustical Measurements and Noise Control, Third Edition.

Holmgren, M.A., and P.W. Collins. 1999. Final report on the distribution and habitat associations of six bird species of special concern at Vandenberg Air Force Base, Santa Barbara County, California. Prepared for Vandenberg Air Force Base, 30CES/CEVPN, Natural Resources, Vandenberg Air Force Base, California. Santa Barbara Museum of Natural History Monographs No. 1, Studies in Biodiversity No. 1. 204 pp.

Keil, D.J., and V.L. Holland. 1998. Documented Flora of Vandenberg Air Force Base Santa Barbara County, California. California Polytechnic State University, San Luis Obispo.

King, C.D. 1981. *The Evolution of Chumash Society: A Comparative Study of Artifacts Used in Social System Maintenance in the Santa Barbara Channel Region before A.D. 1804.* Ph.D. dissertation, Department of Anthropology, University of California, Davis.

King, C.D. 1984. Ethnohistoric Background. In *Archaeological Investigations on the San Antonio Terrace, Vandenberg Air Force Base, California, in Connection with MX Facilities Construction*, pp. I-1–I-54. Chambers Consultants and Planners, Stanton, California. Submitted to U.S. Army Corps of Engineers, Los Angeles District, Contract No. DAC09-81-C-0048.

King, C.D. 1990. *Evolution of Chumash Society: A Comparative Study of Artifacts Used for Social System Maintenance in the Santa Barbara Channel Region before A.D. 1804.* The Evolution of North American Indians, edited by David Hurst Thomas. Garland, New York.

Landberg, L. 1965. *The Chumash Indians of Southern California.* Southwest Museum Papers No. 19. Los Angeles.

Lebow, C.G. 2000. *Cultural Resources Condition on Vandenberg Air Force Base, Fiscal Year 2000: Zone 3*. Applied EarthWorks, Inc., Fresno, California, for Tetra Tech, Inc., Santa Barbara, California. Submitted to 30 CES/CEV, Vandenberg Air Force Base, California, USAF Contract No. F04684-95-C-0045.

Lebow, C.G., D.R. Harro, R.L. McKim, and C. Denardo. 2001. *Archaeological Excavations at CA-SBA-246, An Early Holocene Site on Vandenberg Air Force Base, Santa Barbara County, California.* Applied EarthWorks, Inc., Fresno, California, for Tetra Tech, Inc., Santa Barbara, California. Submitted to 30 CES/CEV, Vandenberg Air Force Base, California, USAF Contract No. F04684-95-C-0045.

Lebow, C.G., R.L. McKim, D.R. Harro, A.M. Munns, and C. Denardo. 2007. *Littoral Adaptations throughout the Holocene: Archaeological Investigations at the Honda Beach Site (CA-SBA-530), Vandenberg Air Force Base, Santa Barbara County, California*. 2 vols. Applied EarthWorks, Inc., Lompoc, California. Submitted to 30th Civil Engineer Squadron, Environmental Flight (30 CES/CEVNC), Vandenberg Air Force Base, California.

Lebow, C.G., R.L. McKim, D.R. Harro, and A.M. Munns. 2006. *Prehistoric Land Use in the Casmalia Hills throughout the Holocence: Archaeological Investigations along Combar Road, Vandenberg Air Force Base, California.* 2 vols. Applied EarthWorks, Inc., Lompoc, California. Submitted to 30th Civil Engineer Squadron, Environmental Flight (30 CES/CEVNC), Vandenberg Air Force Base, California.

Lehman, P.E. 1994. The birds of Santa Barbara County, California. Vertebrate Museum, University of California, Santa Barbara. 337 pp.

Mattoni, R.H.T. 1992. The endangered El Segundo blue butterfly. Journal of Research Lepidoptera vol. 29. 277-304pp.

Moratto, M.J. 1984. *California Archaeology*. Academic Press, New York and London.

MSRS, R. Arnold, and G. Pratt. 2007. El Segundo Blue Butterfly (*Euphilotes battoides allyni*): Flight Season Surveys and Management Recommendations (Draft). Prepared by ManTech SRS Technologies, Lompoc, CA. 127 pp.

Opler, P.A. 1999. Western Butterflies. Houghton Mifflin Company. New York, New York. 540pp.

Palmer, K. 1999. *Central Coast Continuum—From Ranchos to Rockets: A Contextual Historic Overview of Vandenberg Air Force Base, Santa Barbara County, California.* Prepared by Palmer Archaeology and Architecture Associates, Santa Barbara, California. Draft submitted to 30 CES/CEVPC, Vandenberg Air Force Base, California.

Peterson Jr., R.R., and C.G. Lebow. 2008. *Archaeological Survey Report for Security Upgrades at Seven Entry Control Gates, Vandenberg Air Force Base, Santa Barbara County, California.* Applied EarthWorks, Inc., Lompoc, California. Submitted to the 30 Civil Engineering Squadron, Environmental Flight, Vandenberg Air Force Base, California.

Pratt, G.F. 2006. Terrestrial Arthropods of Vandenberg Air Force Base, Lompoc, California 2004-2005 Draft. 106pp.

Preston, W. 1996. Serpent in Eden: Dispersal of Foreign Diseases into Pre-Mission California. *Journal of California and Great Basin Anthropology* 18:2–37.

Ryan, C. 2008. Historic Property Survey Report, Security and Safety Upgrades of Entry Control Facilities, Vandenberg Air Force Base, California. Prepared by the Cultural Resources Section, 30 CEV/CEVNC, Vandenberg AFB. Report on file at the Environmental Planning Office, Vandenberg AFB

SAIC. 1994. *Archaeological Survey Report, 8-Inch Watering Curley/Lompoc-Casmalia Roads, Vandenberg Air Force Base*. Science Applications International Corporation, Santa Barbara, California. Submitted to 30th Civil Engineering Squadron, Environmental Flight (30 CES/CEV), Vandenberg Air Force Base, Santa Barbara County, California.

Santa Barbara County. 1992. County of Santa Barbara Environmental Thresholds and Guidelines Manual. Revised January 1995, October 2001 and October 2002 with replacement pages in July 2003.

SRS. 2006. Special-status Crustacean Surveys at Vandenberg Air Force Base, Santa Barbara County, California, November 2004-April 2006. 23 October. 20 pp.

SRS. 2007. Survey Results for Three Federally Endangered Plants on Vandenberg Air Force Base, California. Prepared for 30th Space Wing Environmental Flight. 30 January. 43 pp.

Thorson, P.H. J.K. Francine, E.A. Berg, L.E. Fillmore, and D.A. Eidson. 2001. Acoustic Measurement of the 21 September 2000 Titan II G-13 Launch and Quantitative Analysis of Behavioral Responses for Selected Pinnipeds on Vandenberg Air Force Base, CA. SRS Technologies technical report submitted to the United States Air Force and the National Marine Fisheries Service. 29pp.

U.S. EPA. 2003. Final Approval of Santa Barbara Ozone Plan Revision. EPA Region 9. Retrieved on June 20, 2003 from the World Wild Web http://www.epa.gov/region09/air/santabarb/index.html.

URS Corporation. 1986. San Miguel Project and Northern Santa Maria Basin Area Study – Final Environmental Impact Statement, Environmental Impact Report. Prepared for County of San Luis Obispo, Minerals Management Service, State Lands Commission, County of Santa Barbara, California Coastal Commission, and California Office of Offshore Development. October 1986.

VAFB. 1994. Final Environmental Assessment for the Natural Gas Pipeline System Upgrade at Vandenberg Air Force Base, California. Prepared by SAIC. July 1994.

VAFB. 2005. Final Programmatic Environmental Assessment – Demolition and Abandonment of Atlas and Titan Facilities, Vandenberg Air Force Base, California. 13 September 2005.

VAFB. 2007. Vandenberg Air Force Base 2007 General Plan.

VAFB. *In Progress*. Preliminary Draft Integrated Natural Resources Management Plan, Vandenberg Air Force Base, California.

APPENDIX A

Constraints in the Cantonments

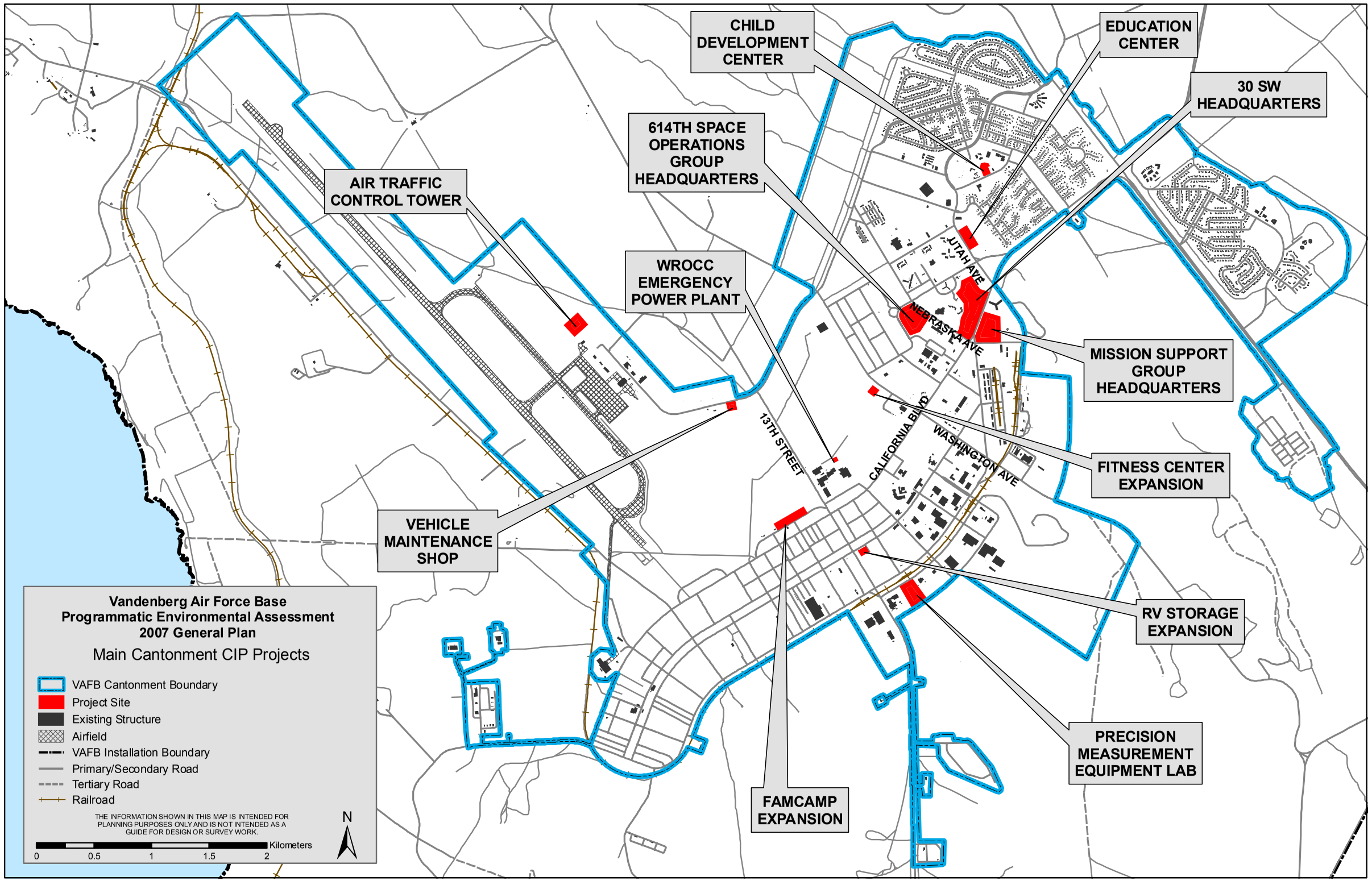

Figure A-1: Main cantonment boundaries and CIP projects under the Proposed Action.

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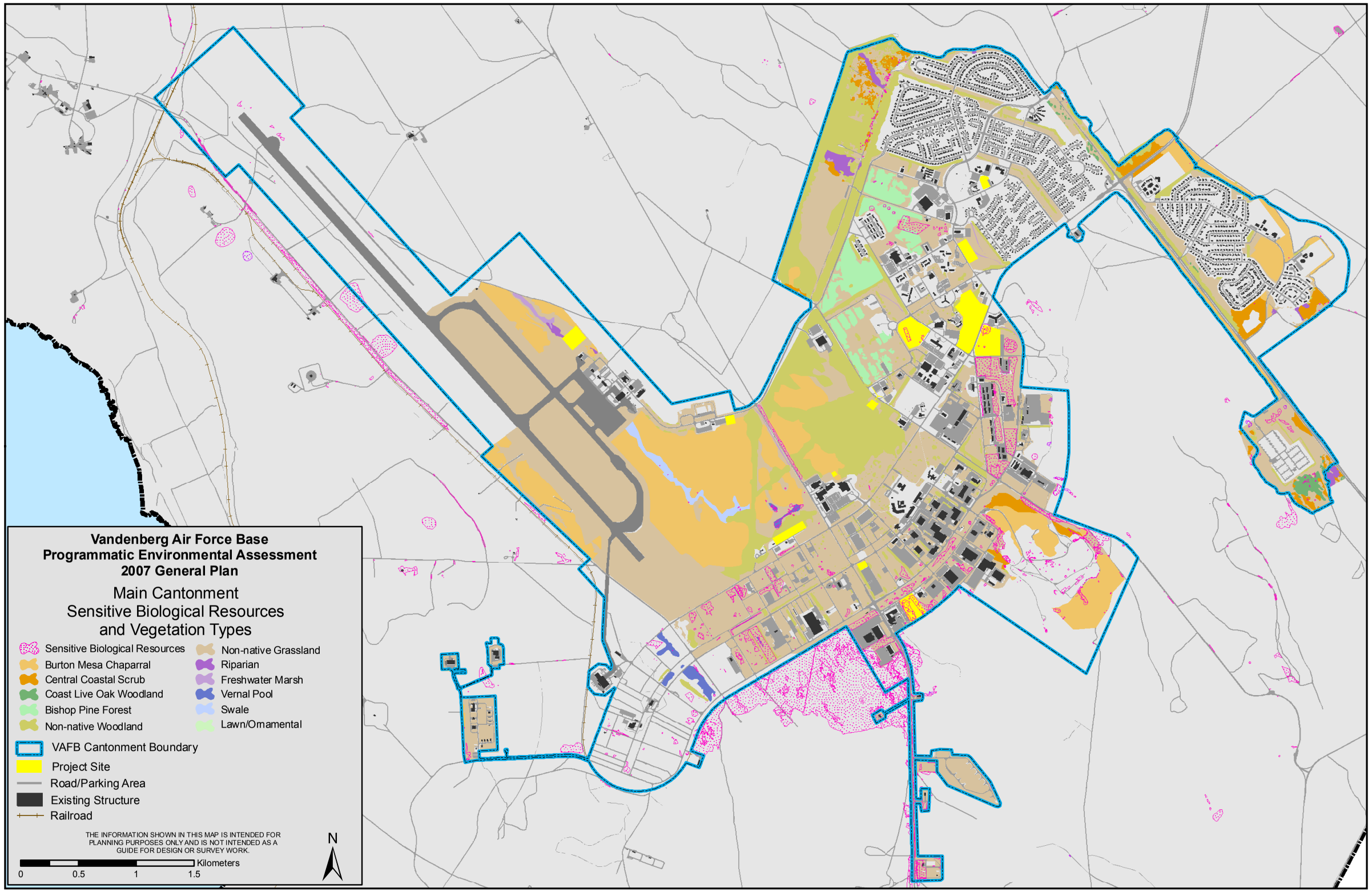

Figure A-2a: Main cantonment vegetation types.

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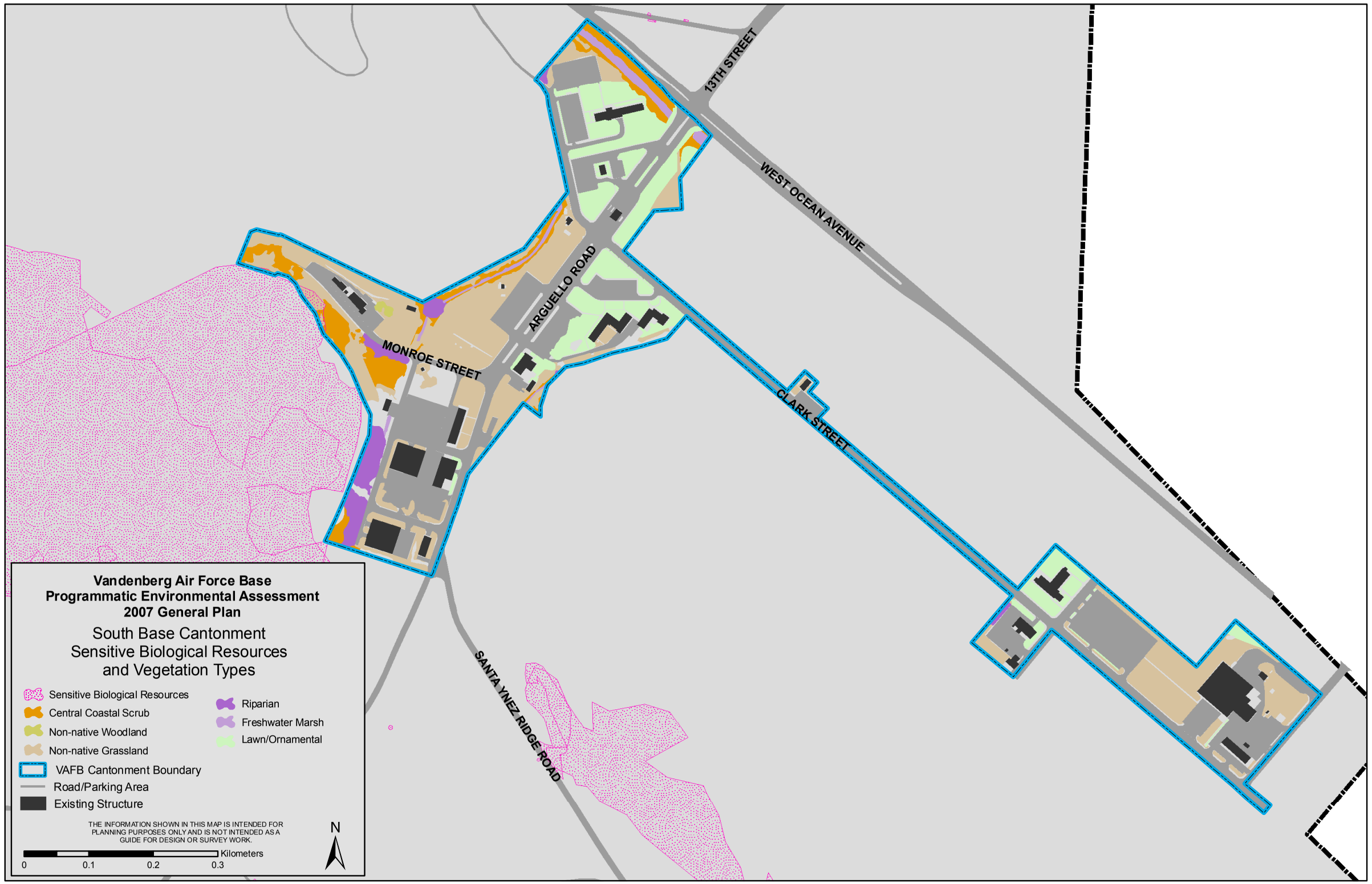

Figure A-2b: South Base cantonment vegetation types.

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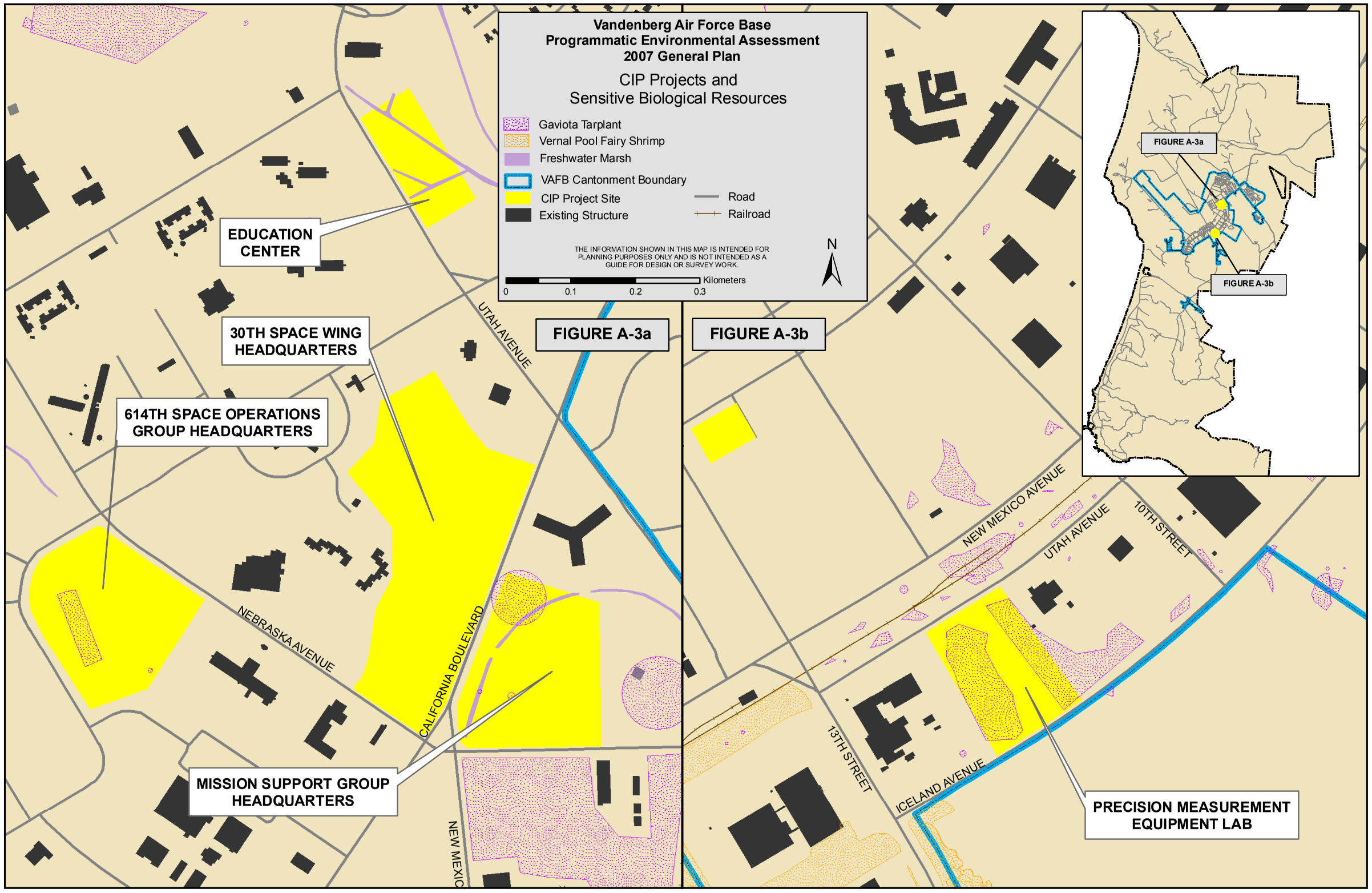

Figures A-3a and A-3b: Sensitive biological resources within project areas for identified CIP projects.

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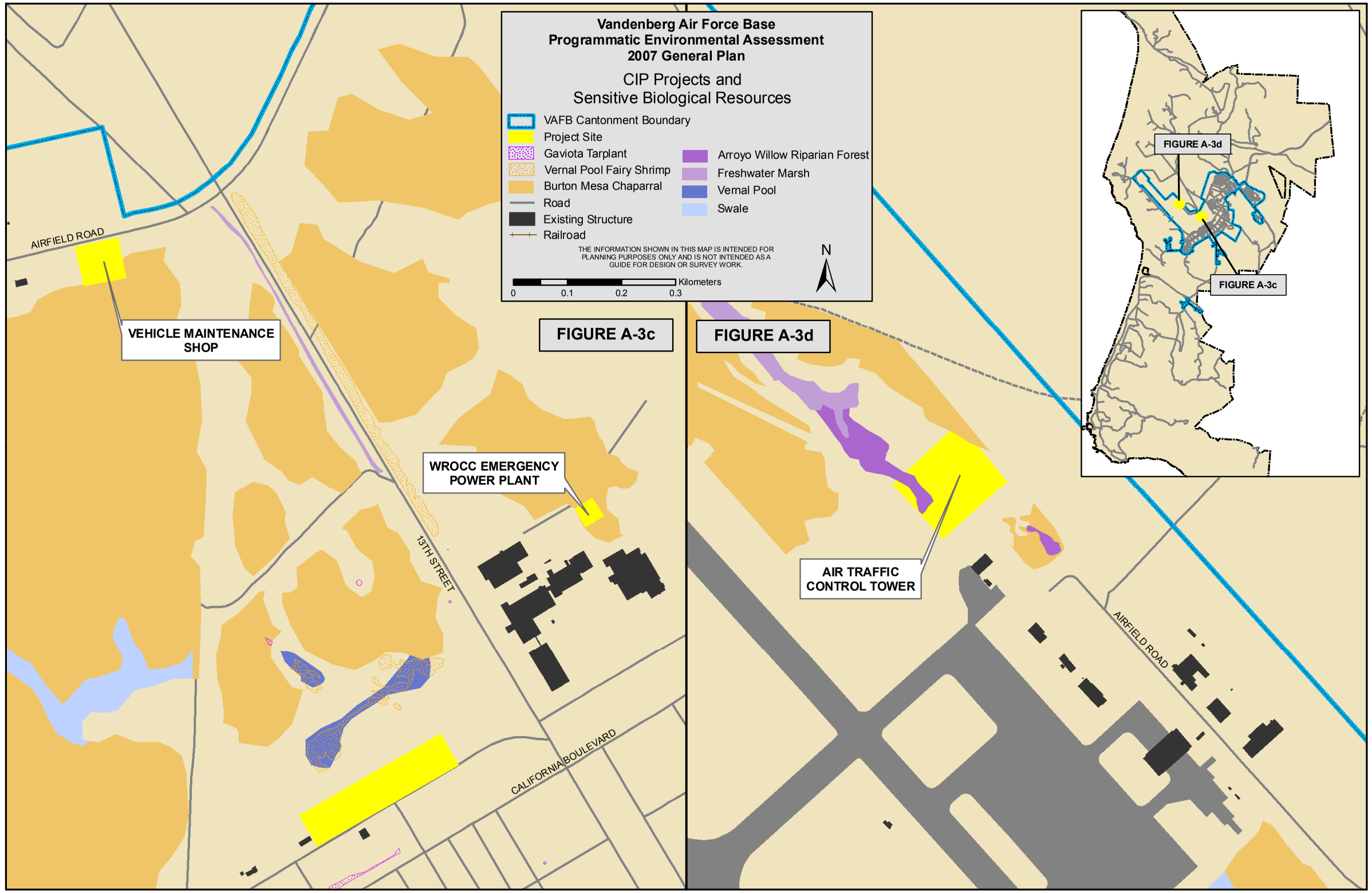

Figures A-3c and A-3d: Sensitive biological resources within project areas for identified CIP projects.

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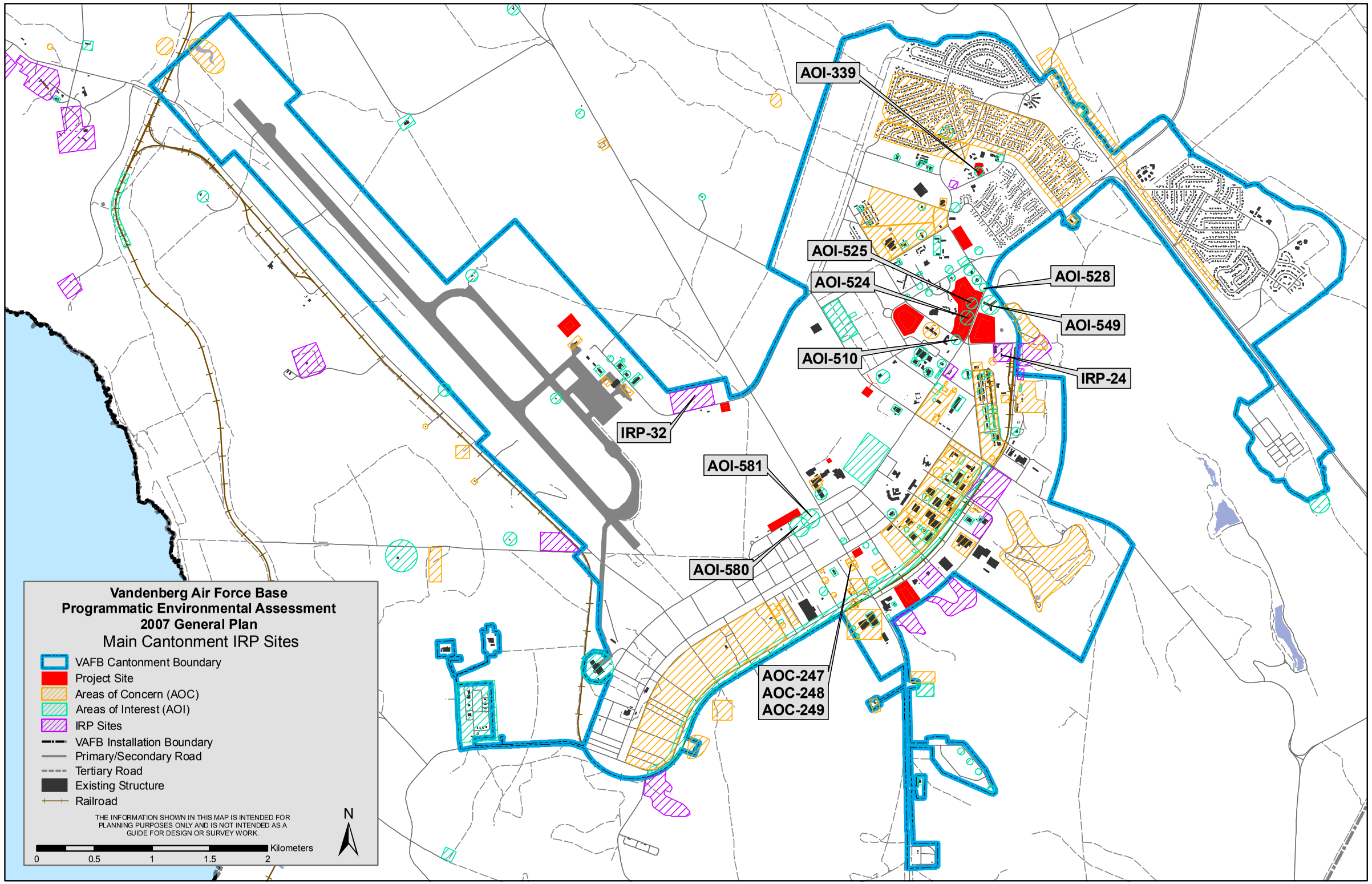

Figure A-4a: IRP sites within the main cantonment.

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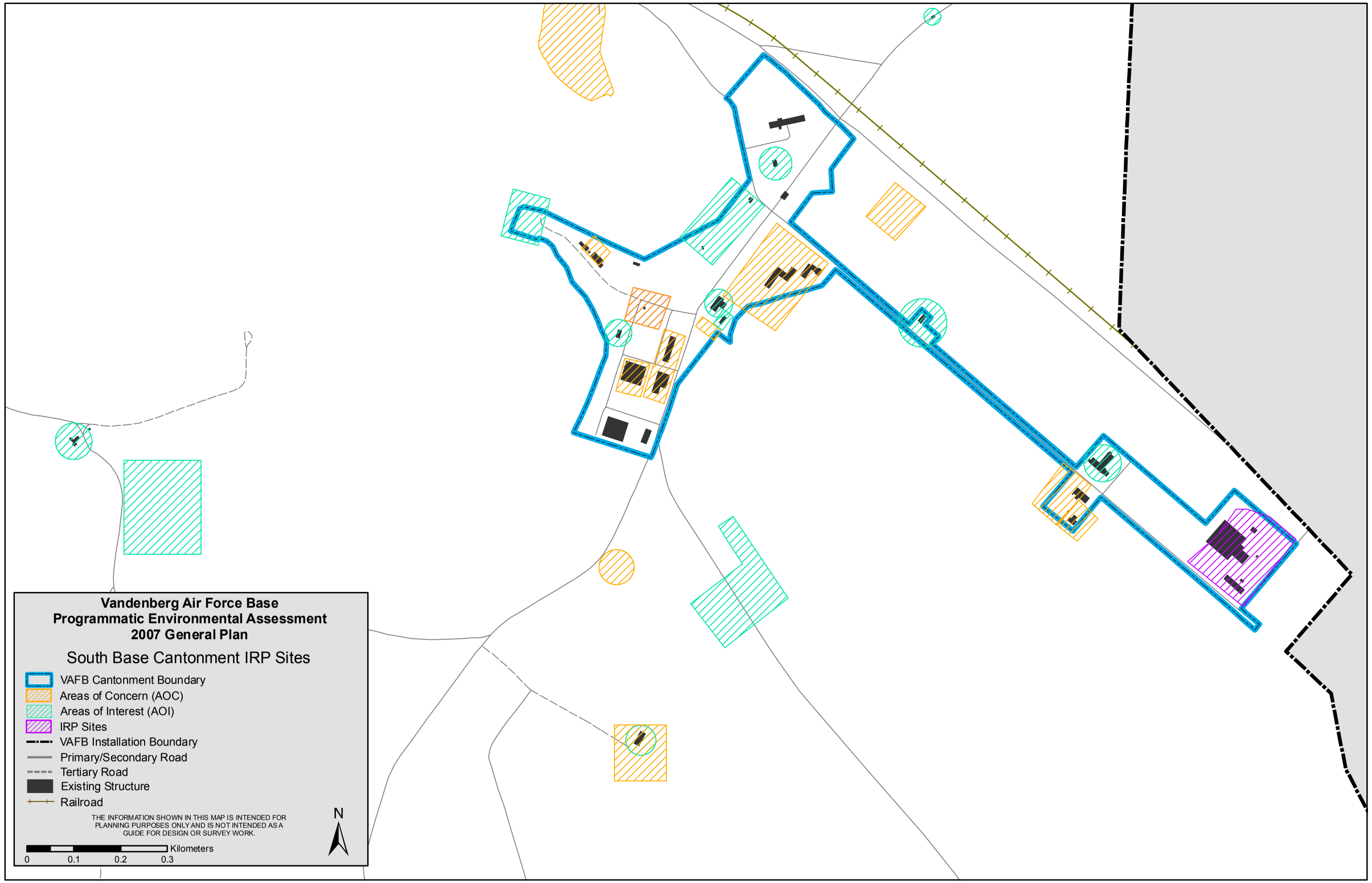

Figure A-4b: IRP sites within the South Base cantonment.

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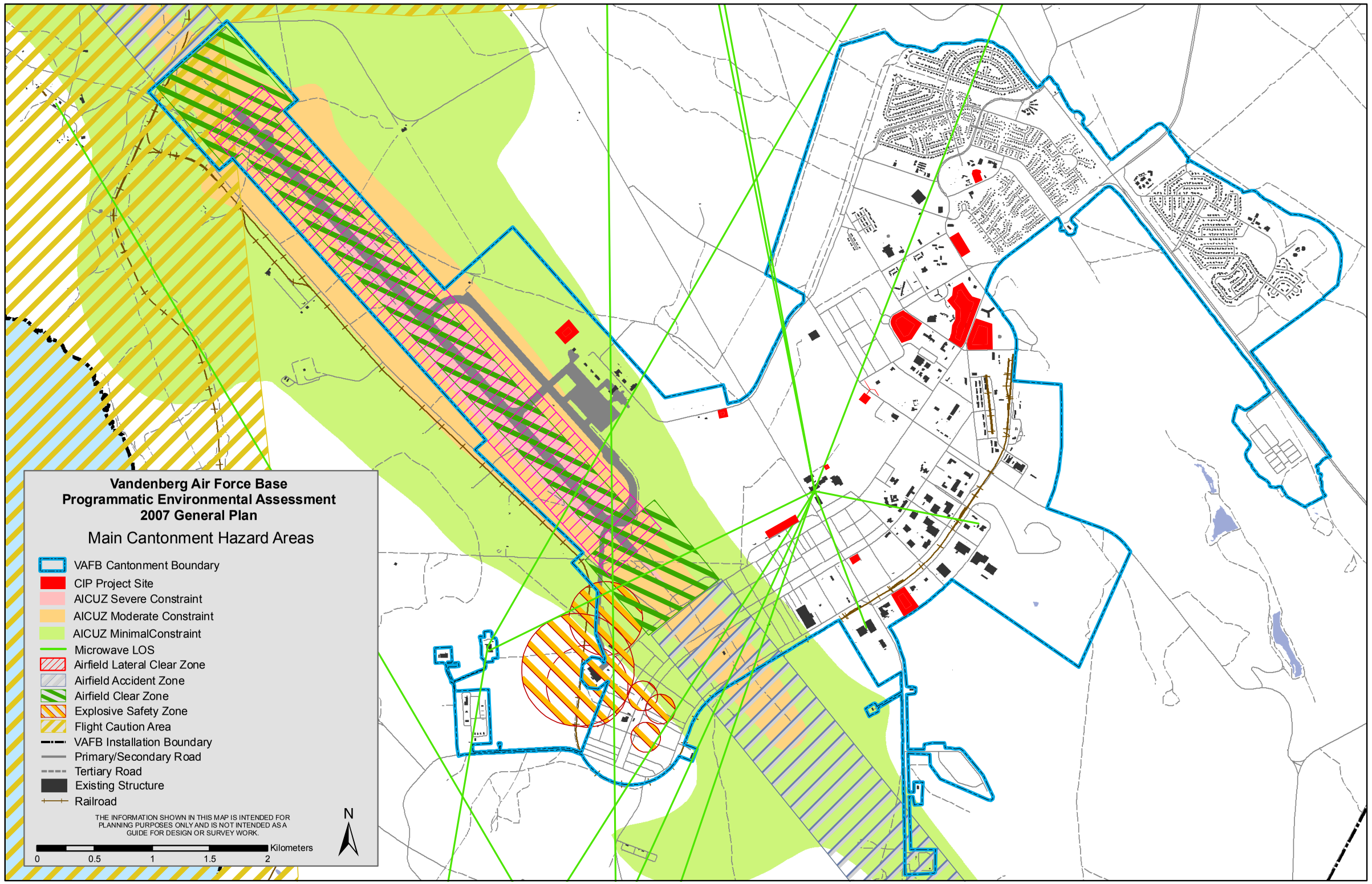

Figure A-5a: Main cantonment mission related constraints.

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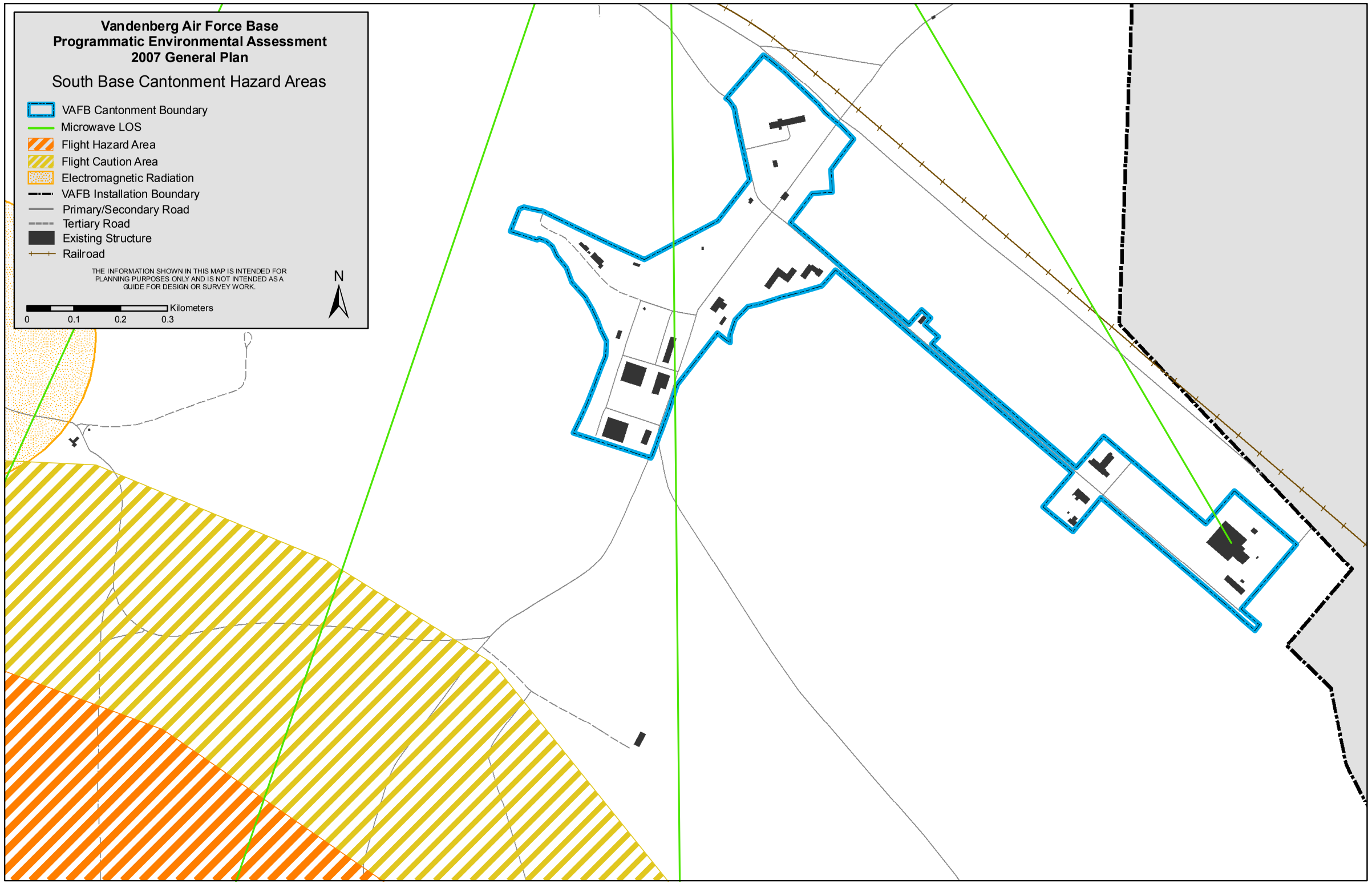

Figure A-5b: South Base cantonment mission-associated constraints.

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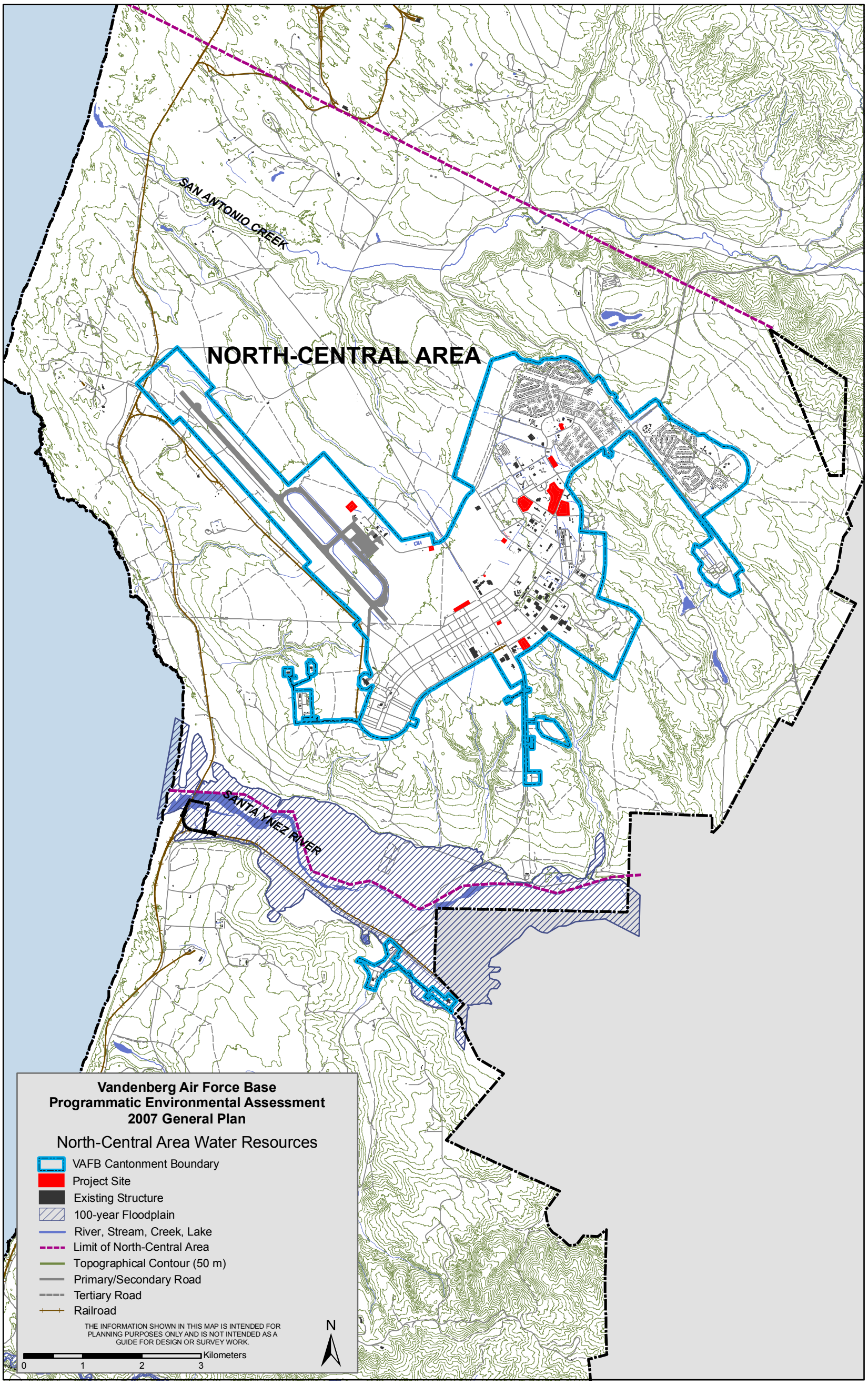

Figure A-6a: Water resources in the north-central area of VAFB.

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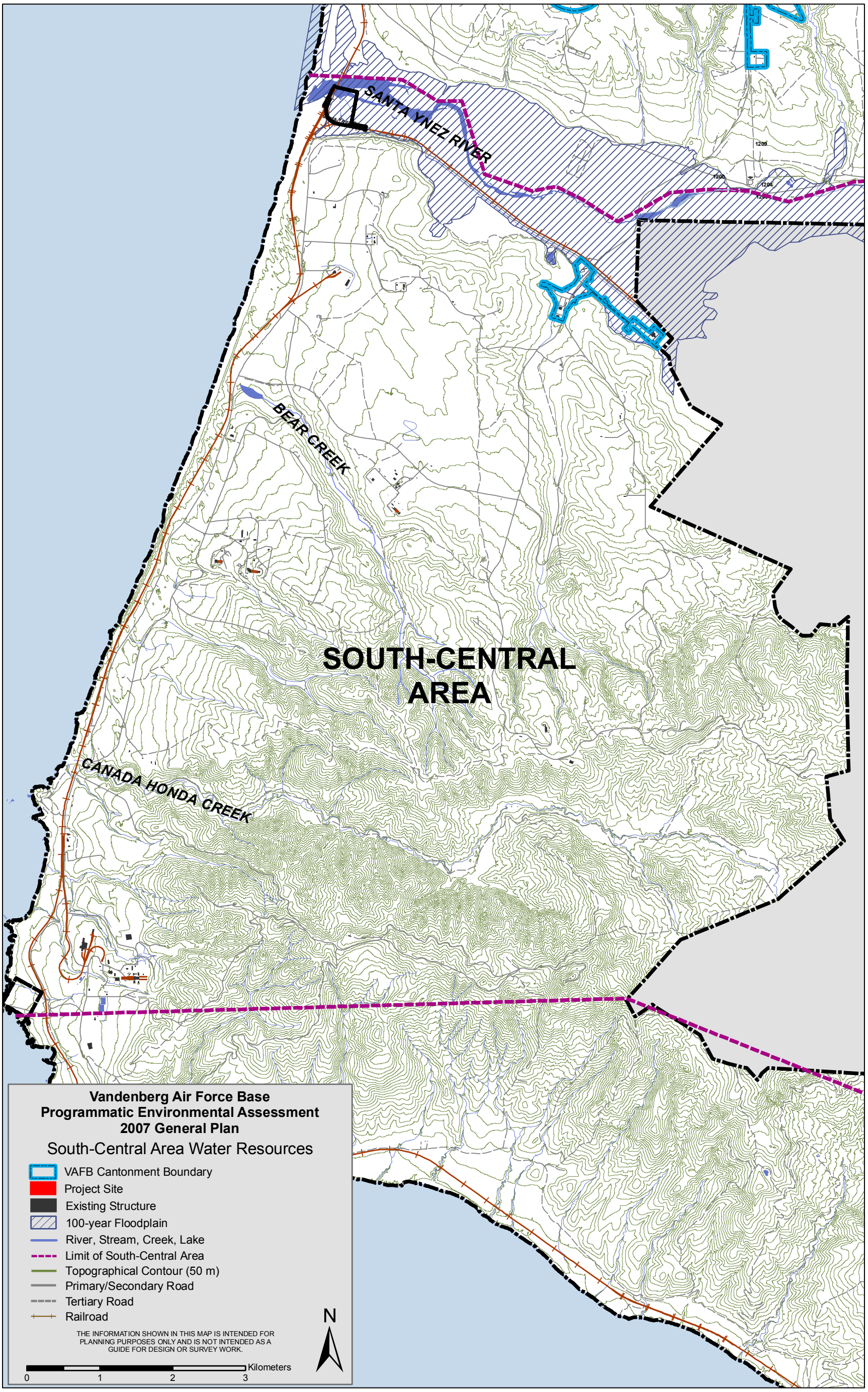

Figure A-6b: Water resources in the south-central area of VAFB.

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APPENDIX B

Cultural Resources

Appendix B – Cultural Resources

The following synthesis, modified from Lebow and Moratto (2005), provides a general overview of the prehistory and ethnohistory of the Vandenberg AFB region (i.e., Santa Barbara and San Luis Obispo counties). The historical synthesis, primarily derived from Palmer (1999), is more specific to Vandenberg AFB.

Prehistory

The prehistory of California's central coast spans the entire Holocene and may extend back to late Pleistocene times. In the Santa Barbara Channel region, a fluted Clovis point found on the surface of a coastal site suggests use of the area possibly as early as 11,000–12,000 years ago (Erlandson et al. 1987), while a site on San Miguel Island has yielded a radiocarbon date of 10,300 B.P. (Erlandson 1991). Recent calibrations suggest that terminal Pleistocene radiocarbon dates are about 2,000 years too recent (Fiedel 1999:95) and thus these early sites may be even older. In San Luis Obispo County, excavations at CA-SLO-2 in Diablo Canyon revealed an occupation older than 9,000 years (Greenwood 1972; Moratto 1984) and investigations at CA-SLO-1797 indicate initial occupations as early as 10,300 B.P. (Fitzgerald 2000). Occupations on Vandenberg AFB occurred by at least 9,000 years ago, based on radiocarbon dates from CA-SBA-931 (Glassow 1990, 1996) and CA-SBA-246 (Lebow et al. 2001) near the mouth of the Santa Ynez River, and from CA-SBA-530 at the mouth of Honda Canyon (Lebow et al. 2002).

Moratto (1984) refers to these early occupations as Paleocoastal. Population densities were probably low, judging from the limited number of sites dated to this period. Diagnostic tools associated with this time period have not been identified, although similarities with the San Dieguito Complex in southern California (Wallace 1978; Warren 1967) have been suggested (Erlandson 1994). Cultural assemblages have few of the grinding implements common to subsequent periods. These sites are characterized by a strong maritime orientation and an apparent reliance on shellfish. 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).

Site densities throughout the central coast are higher during the subsequent periods, suggesting increased population size and possibly better site preservation. Sites dating between about 8,000 and 6,500 years ago often have relatively high densities of manos and milling slabs that are typically associated with processing seeds. These milling stones are diagnostic of this period. Shellfish appear to have continued as a dietary staple throughout the central coast (Erlandson 1994; Glassow and Wilcoxon 1988), including Vandenberg AFB (Glassow 1996; Woodman et al. 1995). However, terrestrial mammals composed a larger portion of the diet on Vandenberg AFB during this period than during any other time (Glassow 1996; Rudolph 1991). Fish were a larger part of the diet than shellfish at Morro Bay in San Luis Obispo County, although shellfish were better represented during this period than during subsequent periods (Jones et al. 1994).

Early scholars associated sites of this age with inland knolls and terraces (e.g., Rogers 1929), but subsequent investigations revealed that coastal environments were also used (e.g., Glassow et al. 1988). Well-developed middens at many sites suggest a more sedentary and stable settlement

system (Breschini et al. 1983). Glassow (1990, 1996) infers that occupants of Vandenberg AFB during this time were sedentary and had begun using a collector-type (i.e., logistically mobile) land-use strategy. Burial practices suggest that society was primarily egalitarian (Glassow 1996).

Population densities appear to have decreased substantially between 6500 and 5000 B.P. throughout the region, and little is known about this period. It is possible that arid conditions associated with the Altithermal degraded the environment to the point that only low population densities were possible (Glassow 1996; Glassow and Wilcoxon 1988).

After 5000 B.P., population densities increased to pre-6500 B.P. levels as conditions became cooler and more moist. Between 5000 and 3000 B.P., mortars and pestles became increasingly common throughout the region, suggesting intensified use of acorns (Basgall 1987), although these implements may have been associated with processing pulpy roots or tubers (Glassow 1997). Along the Santa Barbara Channel coastline, use of shellfish declined as other animal foods became more important. Use of more diverse environmental settings is suggested (Erlandson 1997). On Vandenberg AFB, fish and sea mammals composed a larger part of the diet during this period. Large side-notched and stemmed projectile points became more prevalent in the archaeological record, presumably reflecting increased hunting, although Glassow (1996) suggests that proportions of terrestrial mammals do not surpass the pre-6500 B.P. levels. However, higher proportions of terrestrial mammals in archaeological assemblages are associated with this period in San Luis Obispo County. Increased logistical organization is suggested in this area (Jones et al. 1994; Jones and Waugh 1995). Proportions of obsidian (indicating exchange with other regions) increased after about 5000 B.P., particularly in San Luis Obispo County (Jones et al. 1994; Jones and Waugh 1995).

Confidence in the reconstructions of early human occupation on the Central California Coast needs to be tempered to some degree by the consideration of changes in coastline configuration over this period. Various studies (Inman 1983; Kinlan et al. 2005; Porcasi et al. 1999) suggest that sea levels were rising at a fluctuating rate during the Early Holocene from a low stand at the height of the last glaciation around 15,000–23,000 years ago. This, combined with the variations in offshore bathymetry, means that at different points in time the coastline was varying distances from where it is today. Morgan et al. (1991) note that due to the shallow sloping sea floor at the mouth of the Santa Ynez River the shoreline was probably some 5.5 kilometers west of its present position around 10,000 years ago. Off the more steeply sloping shore at the mouth of Honda Canyon, however, the distance was more like 2 kilometers around the same time (Lebow et al. 2002:3-30). This realization has significant archaeological implications. One is that a whole range of archaeological evidence dating to the Early Holocene is offshore, where it is not available for study. Another realization is that sites that are today in nearshore environments were not as close to the coastline some 4,000–10,000 years ago. The shoreline in this part of the California coast appears to have reached essentially its present configuration about 3,000–4,000 years ago.

Cultural complexity appears to have increased around 3,000–2,500 B.P. Based on mortuary data from the Santa Barbara area; King (1981, 1990) suggests a substantial change in social organization and political complexity about 3,000 years ago. According to King, high-status positions became hereditary and individuals began to accumulate wealth and control exchange systems. Arnold (1991, 1992) proposes that this evolutionary step in socioeconomic complexity occurred around 700–800 years ago. In their studies on Vandenberg AFB, Lebow et al. (2006) found changes in the archaeological data supporting King's (1981, 1990) chronology of culture change.

The period between 2,500 and 800 years ago is marked by increased cultural complexity and technological innovation. Fishing and sea mammal hunting became increasingly important, corresponding to development of the *tomol* (a plank canoe), single-piece shell fishhooks, and

harpoons (Glassow 1996; King 1990). The bow and arrow also was introduced during this period (Glenn 1990, 1991). Sites in San Luis Obispo County suggest that use of terrestrial mammals remained high. Proportions of imported obsidian continued to increase during this period (Jones et al. 1994).

Arnold (1992) proposes that the complex Chumash sociopolitical system known at historic contact evolved substantially during a brief period between A.D. 1150 and 1300, which she terms the Middle/Late Transitional Period. Arnold infers that decreased marine productivity caused by elevated sea-surface temperatures resulted in subsistence stress that allowed an elite population to control critical resources, labor, and key technologies, resulting in hierarchical social organization and a monetary system. Although the issue of elevated sea-surface temperatures has been questioned (e.g., Kennett 1998) and the inference of marine degradation and subsistence stress has been challenged (e.g., Raab et al. 1995; Raab and Larson 1997), the full emergence of Chumash cultural complexity around this time is generally accepted.

On Vandenberg AFB and in the Santa Barbara Channel region, population densities reached peak levels between 700 years ago and historic contact (Glassow 1990, 1996). Higher numbers of *Olivella* shell beads reflect increased exchange between the Channel Islands, the Santa Barbara mainland, and Vandenberg AFB. Increased subsistence diversity is apparent. Although shellfish continued to be a dietary staple in the Vandenberg area, the use of fish and birds increased, proportions of secondary species in shellfish assemblages increased (Glassow 1990), and dietary expansion is evident (Lebow and Harro 1998). Correspondingly, the range and diversity of site types increased as a greater range of habitats and resources was used (Glassow 1990; Lebow and Harro 1998; Woodman et al. 1991). In San Luis Obispo County, the settlement system appears to have changed substantially after 700 B.P. as residential bases along the coast were abandoned in favor of habitation sites farther inland. Coastal sites were used to obtain resources during short-term occupations (Breschini and Haversat 1988; Greenwood 1972; Jones et al. 1994; Jones and Waugh 1995). In addition, proportions of imported obsidian decreased substantially during this period (Jones et al. 1994).

Ethnohistory

People living in the Vandenberg AFB 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. Their social organization, traditions, cosmology, and material culture are described by Blackburn (1975), Grant (1978a, 1978b, 1978c, 1978d), Greenwood (1978), Hudson et al. (1977), Hudson and Blackburn (1982, 1985, 1986), Hudson and Underhay (1978), Johnson (1988), and Landberg (1965).

Accounts of early explorers in the Santa Barbara Channel area indicate that the Chumash people lived in large, densely populated villages with well-built structures (e.g., Bolton 1927, 1930; Engelhardt 1933; Fages 1937; Moriarity and Keistman 1968; Simpson 1939; Teggart 1911; Wagner 1929). With a total Chumash-speaking population estimated at 18,500 (Cook 1976) and employing a maritime economy, the Chumash had a culture that "was as elaborate as that of any hunter-gatherer society on earth" (Moratto 1984:118). Leadership was hereditary and chiefs exercised control over more than one village, reflecting a simple chiefdom social organization. The Chumash engaged in craft specialization and maintained exchange systems (Arnold 1992; Johnson 1988).

Relatively little is known about the Chumash in the Vandenberg region. Explorers noted that villages were smaller and lacked the formal structure found in the channel area (Greenwood 1978:520). The Purisimeño Chumash at historic contact used approximately 22 villages, with populations between 30 and 200 per village (Glassow 1996:13–14). About five ethnohistoric

villages are identified by King (1984:Figure 1) on Vandenberg AFB, along with another five villages in the general vicinity.

Unfortunately, early explorers paid scant attention to Chumash subsistence and settlements systems. Using ethnohistoric, ethnographic, and archaeological data, Landberg (1965) attempted to reconstruct those facets of Chumash lifeways. Chumash subsistence relied primarily on fishing, hunting, and gathering plants (primarily acorns). In the spring, groups left their winter villages for temporary camps where they gathered grasses, roots, tubers, and bulbs. Hunting marine mammals became important during times when seals and sea lions congregated at their rookeries. Bulbs, roots, and tubers were gathered during the summer months, and seeds became important during this season as well, especially to the people north of Point Conception. Interior groups moved to the coast during the spring and summer to collect shellfish. Coastal groups returned to their villages in late summer and early fall to harvest large schooling fish such as tuna. Pine nuts were collected in the mountains during the fall months; acorns also were gathered in the late fall. Both of these resources, as well as berries collected during the late summer and early fall, were stored for use during the winter. Hunting also was important during the fall. Winter months were spent in villages, where residents relied primarily on stored foodstuffs as well as occasional fresh fish (Landberg 1965:102–104). Regional variation in subsistence strategies is evident in the ethnohistoric record (Landberg 1965:104–118); in the interior and along the northern coast of Chumash territory, marine resources were less important than acorns, seeds, and game (particularly deer).

Contact with early Euro-American explorers, beginning with the maritime voyages of Cabrillo in A.D. 1542–1543, undoubtedly had an effect on the Chumash culture. The effect may have been profound. Erlandson and Bartoy (1995, 1996) and Preston (1996) convincingly argue that Old World diseases substantially impacted Chumash populations more than 200 years before Spanish occupation began in the 1770s.

Unquestionably, drastic changes to Chumash lifeways resulted from the Spanish occupation that began with the Portolá expedition in A.D. 1769. The first mission in Chumash territory was established in San Luis Obispo in 1772, followed in short order by San Buenaventura (1782), Santa Barbara (1786), and La Purísima Concepción, established in 1787 in the present location of Lompoc. The Santa Ynez Mission was established in 1804. Eventually, nearly the entire Chumash population was under the mission system (Grant 1978c). During the 1830s, the missions were secularized in an attempt to turn the mission centers into pueblos and make the Indians into Mexican citizens.

History

Vandenberg AFB history is divided into the Mission, Rancho, Anglo-Mexican, Americanization, Regional Culture, and Suburban periods (Palmer 1999). The Mission Period began with the early Spanish explorers and continued until 1820. Established in 1787, Mission La Purísima encompassed the area between Gaviota and Guadalupe. Farming and ranching were the primary economic activities at the mission, which was responsible for supplying the Santa Barbara Presidio with food supplies. The mission had 4,000 head of sheep by 1800; by 1812 they numbered 12,000 and by 1821 the count peaked at 23,546. Missionaries had the Chumash weave wool blankets for the Santa Barbara Presidio. Approximately 14,000 sheep remained when the mission closed in 1835. In addition to sheep, wheat, barley, corn, peas, and beans were grown at Mission La Purísima. Agricultural activities primarily occurred along the major streams such as San Antonio Creek and the Santa Ynez River (Palmer 1999:2).

The Rancho Period of Vandenberg AFB history began in 1820 and continued until 1845 (Palmer 1999). Following secularization in 1834, the Alta California government granted former mission

lands to Mexican citizens as ranchos. The Vandenberg AFB cantonment area lies within Rancho Jesus Maria, which originally encompassed 42,184 acres and was granted to Lucas, Antonio, and Jose Olivera in 1837. Rancho Jesus Maria included lands from just south of Shuman Canyon (northern boundary) to the Santa Ynez River (southern boundary), and from the Pacific Ocean to a few kilometers east of San Antonio Terrace and Burton Mesa on the east (Tetra Tech 1988). Lucas Olivera is thought to have constructed an adobe at the site of the Marshallia Ranch in 1837. By 1839, Antonio and Jose Olivera had sold their part of the land grant to José Valenzuela, who, in 1847, sold a one-third share to Don Pedro Carrillo and a one-third share to Lewis T. Burton. Cattle ranching was the primary economic activity during the Rancho Period; in the 1840s cattle were so abundant that only the hides had any value (Palmer 1999).

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, with as many as 500,000 cattle in Santa Barbara County during the 1850s. However, severe droughts during the 1860s decimated cattle herds, and less than 5,000 cattle remained in the entire county. The combination of drought and change in government from Mexico to the United States caused substantial changes in land ownership. By 1851 non-Mexicans owned approximately 42 percent of the land grants; by 1864, after a few years of drought, 90 percent of the southern California ranchos were mortgaged. The various shares in Rancho Jesus Maria changed hands, with Lewis Burton increasing his holdings. His son, Ben Burton, inherited all of Rancho Jesus Maria upon his father's death in 1879. Sheep ranching and grain farming replaced the old rancho system during this period. Dairy farming became an important economic activity during this time, particularly as Swiss-Italians immigrated into the area. Early roads were established during the 1860s and 1870s to obtain supplies that were surfed in at Point Sal. Farming remained a limited activity, due in part to the difficulty of shipping to markets. The Lompoc Temperance Colony established Lompoc during this period (Palmer 1999).

Increased population densities characterize the Americanization Period (1880–1915). The railroad reached the area in the late 1890s and provided a more efficient means of shipping and receiving goods and supplies, which in turn increased economic activity. Ranching continued and agriculture increased, particularly with development of steam-powered threshers. Row crops became increasingly common, and sugar beets were one of the most economically important commodities. Union Sugar Company had a substantial influence on economic growth in the region. Oil exploration began in earnest during this period. Union Oil began to purchase Rancho Jesus Maria property in 1903; they ultimately obtained subsurface rights to 120,000 acres in the area. Ben Burton leased the former Rancho Jesus Maria for grazing and farming during the early part of the Americanization Period. However, by 1900 the rancho was divided into four parcels and sold. These four parcels were further subdivided by 1906. Edwin Marshall formed the Jesus Maria Rancho Corporation in December of 1906; by the 1920s the Marshall Ranch encompassed 52,000 acres and prospered by raising cattle and beets. Its headquarters were constructed between 1906 and 1933 at the location of the Olivera adobe. An elaborate system of line camps and other facilities supported the ranch operations. Marshall also introduced eucalyptus trees as a potential source of commercial firewood.

Ranching and farming continued on the Marshall Ranch during the early part of The Period of Regional Culture (1915–1945). At various times, the Marshall Ranch experimented with game birds, chickens, turkeys, and purebred bulls. Grain was raised on coastal terraces, and Union Sugar purchased farm land in the San Antonio Valley from Marshall for agricultural purposes. In 1933, the Marshall family moved to the Olivera adobe and expanded and modernized the building. A wood-framed guest house was added in 1935, and a dude ranch operation began. The facility became known as the Marshallia Ranch and catered to Hollywood personalities. Visitors could arrive by airplane at an air strip in front of the house, and they could enjoy ranching activities,

horseback riding, or tennis. The ranch was sold to Frank Long upon the death of Edwin Marshall in 1937. Cattle ranching and guest operations continued until the start of World War II, when the property was condemned for Camp Cooke. However, the Army allowed the Marshallia Ranch to stay open to serve Army officers. All ranching, farming, and dairy farming in the Vandenberg AFB area was substantially reduced when Camp Cooke was established in 1941. This Army training facility was built on approximately 90,000 acres along the coast, and included the area of Rancho Jesus Maria. Camp Cooke was deactivated at the end of World War II (Palmer 1999).

The Suburban Period (1945–1965) began with the end of World War II. After Camp Cooke was deactivated, the Army continued the historic tradition and leased much of the area for ranching and farming. Oil drilling reached its peak during this period. Union Oil drilled a number of wells on the San Antonio Terrace, and the Jesus Maria No. 4 produced commercial quantities of oil. Most of the Suburban Period is characterized by military use of the area. Camp Cooke was reactivated in 1950 for training during the Korean War. It was put into caretaker status from 1953 to 1956. The cantonment area became so overgrown that sheep were used to manage the vegetation and reduce the fire hazard. In November of 1956, the Army transferred 64,000 acres of North Camp Cooke to the Air Force, and it was renamed the Cooke Air Force Base (Palmer 1999). In 1958 the base had its first missile launch, the Thor, and was renamed Vandenberg AFB. The southern section of the current base was transferred to the Air Force from Army and Navy control in 1964 (Vandenberg AFB 1992). Post-transfer use of both North and South Base has related primarily to the construction and operation of missile launch and support facilities. Specific activities include management of the launch, testing, and evaluation of ballistic missile and space systems for the DOD, and operation of the Western Range (Science Applications International Corporation [SAIC] 1995; Vandenberg AFB 1992).

Bibliography

Arnold, Jeanne E.
1991 Transformation of a Regional Economy: Sociopolitical Evolution and the Production of Valuables in Southern California. American Antiquity 56:953–962.

1992 Complex Hunter-Gatherer-Fishers of Prehistoric California: Chiefs, Specialists, and Maritime Adaptations of the Channel Islands. American Antiquity 57:60–84.

Basgall, Mark E.
1987 Resource Intensification among Hunter-Gatherers: Acorn Economies in Prehistoric California. Research in Economic Anthropology 9:21–52.

Blackburn, Thomas C.
1975 December's Child: A Book of Chumash Oral Narratives. University of California Press, Berkeley.

Bolton, Herbert E.
1927 Fray Juan Crespi, Missionary Explorer on the Pacific Coast, 1769–1774. University of California Press, Berkeley.

1930 Anza's California Expeditions. 5 vols. University of California Press, Berkeley.

Breschini, Gary S., and Trudy Haversat
1988 Archaeological Excavations at CA-SLO-7 and CA-SLO-8, Diablo Canyon, San Luis Obispo County, California. Coyote Press Archives of California Prehistory 28. Coyote Press, Salinas, California.

Breschini, Gary S., Trudy Haversat, and R. Paul Hampson
1983 A Cultural Resources Overview of the Coast and Coast-Valley Study Areas. Coyote Press, Salinas, California.

Cook, Sherburne F.
1976 The Population of California Indians, 1769–1770. University of California Press, Berkeley.

Engelhardt, (Father) Zephyrin
1933 Mission San Luis Obispo in the Valley of the Bears. Mission Santa Barbara, Santa Barbara, California.

Erlandson, Jon M.
1991 Early Maritime Adaptations on the Northern Channel Islands. In Hunters and Gatherers of Early Holocene Coastal California, edited by Jon M. Erlandson and Roger H. Colten, pp. 101–111. Perspectives in California Archaeology, vol. 1. Institute of Archaeology, University of California, Los Angeles.

1994 Early Hunter-Gatherers of the California Coast. Plenum, New York.

1997 The Middle Holocene along the California Coast. In Archaeology of the California Coast during the Middle Holocene, edited by Jon M. Erlandson and Michael A. Glassow, pp. 1–10. Perspectives in California Archaeology, vol. 4. Institute of Archaeology, University of California, Los Angeles.

Erlandson, Jon M., and Kevin Bartoy
1995 Cabrillo, the Chumash, and Old World Diseases. Journal of California and Great Basin Anthropology 17:153–173.

1996 Protohistoric California: Paradise or Pandemic? Proceedings of the Society for California Archaeology 9:304–309.

Erlandson, Jon M., Theodore G. Cooley, and Richard Carrico
1987 A Fluted Projectile Point Fragment from the Southern California Coast: Chronology and Context at CA-SBA-1951. Journal of California and Great Basin Anthropology 9:120–128.

Fages, Pedro
1937 A Historical, Political, and Natural Description of California, translated by Herbert I. Priestly. University of California Press, Berkeley.

Fiedel, Stuart J.
1999 Older Than We Thought: Implications of Corrected Dates for Paleoindians. American Antiquity 64:95–115.

Fitzgerald, Richard T.
2000 Cross Creek: An Early Holocene/Millingstone Site. California State Water Project, Coast Branch Series, Paper Number 12. San Luis Obispo County Archaeological Society, San Luis Obispo, California.

Glassow, Michael A.
1996 Purisimeño Chumash Prehistory: Maritime Adaptations along the Southern California Coast. Case Studies in Archaeology. Jeffrey Quilter, series editor. Harcourt Brace College Publishers, San Diego.

1997 Middle Holocene Cultural Development in the Central Santa Barbara Channel Region. In Archaeology of the California Coast during the Middle Holocene, edited by Jon M. Erlandson and Michael A. Glassow, pp. 73–90. Perspectives in California Archaeology, vol. 4. Institute of Archaeology, University of California, Los Angeles.

Glassow, Michael A. (editor)
1990 Archaeological Investigations on Vandenberg Air Force Base in Connection with the Development of Space Transportation System Facilities, with contributions by Jeanne E. Arnold, G. A. Batchelder, Richard T. Fitzgerald, Brian K. Glenn, D. A. Guthrie, Donald L. Johnson, and Phillip L. Walker. Department of Anthropology, University of California, Santa Barbara. Submitted to U.S. Department of the Interior, National Park Service, Western Region Interagency Archeological Services Branch, San Francisco, Contract No. CX-8099-2-0004.

Glassow, Michael A., and Larry R. Wilcoxon
1988 Coastal Adaptations near Point Conception, California, with Particular Regard to Shellfish Exploitation. American Antiquity 53:36–51.

Glassow, Michael A., Larry R. Wilcoxon, and Jon M. Erlandson
1988 Cultural and Environmental Change during the Early Period of Santa Barbara Channel Prehistory. In The Archaeology of Prehistoric Coastlines, edited by Geoff N. Bailey and John E. Parkington, pp. 64–77. Cambridge University Press, Cambridge.

Glenn, Brian K.
1990 Typological Analysis of Projectile Points. In Archaeological Investigations on Vandenberg Air Force Base in Connection with the Development of Space Transportation System Facilities, vol. 2, edited by Michael A. Glassow, pp. A4-1–A4-45. Department of Anthropology, University of California, Santa Barbara. Submitted to U.S. Department of the Interior, National Park Service, Western Region Interagency Archeological Services Branch, San Francisco, Contract No. CX 8099-2-0004.

1991 Typological Analysis of Projectile Points Recovered from Excavation on Vandenberg Air Force Base, Santa Barbara County, California. Master's thesis, University of California, Santa Barbara.

Grant, Campbell

1978a Chumash: Introduction. In California, edited by Robert F. Heizer, pp. 505–508. Handbook of North American Indians, vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

1978b Eastern Coastal Chumash. In California, edited by Robert F. Heizer, pp. 509–519. Handbook of North American Indians, vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

1978c Interior Chumash. In California, edited by Robert F. Heizer, pp. 530–534. Handbook of North American Indians, vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

1978d Island Chumash. In California, edited by Robert F. Heizer, pp. 524–529. Handbook of North American Indians, vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Greenwood, Roberta S.

1972 9000 Years of Prehistory at Diablo Canyon, San Luis Obispo County, California. San Luis Obispo County Archaeological Society Occasional Paper No. 7.

1978 Obispeño and Purisimeño Chumash. In California, edited by Robert F. Heizer, pp. 520–523. Handbook of North American Indians, vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Hudson, Travis, and Thomas C. Blackburn

1982 Food Procurement and Transportation. The Material Culture of the Chumash Interaction Sphere, vol. 1. Ballena Press Anthropological Papers No. 25. Ballena Press/Santa Barbara Museum of Natural History Cooperative Publication, Los Altos and Santa Barbara, California.

1985 Clothing, Ornamentation, and Grooming. The Material Culture of the Chumash Interaction Sphere, vol. 3. Ballena Press Anthropological Papers No. 28. Menlo Park, California.

1986 Ceremonial Paraphernalia, Games, and Amusement. The Material Culture of the Chumash Interaction Sphere, vol. 4. Ballena Press Anthropological Papers No. 30. Menlo Park, California.

Hudson, Travis, Thomas C. Blackburn, Rosario Curletti, and Janice Timbrook (editors)

1977 The Eye of the Flute: Chumash Traditional History and Ritual, as told by Fernando Librado Kitsepawit to John P. Harrington. Santa Barbara Museum of Natural History, Santa Barbara, California.

Hudson, Travis, and Ernest Underhay

1978 Crystals in the Sky: An Intellectual Odyssey Involving Chumash Astronomy, Cosmology, and Rock Art. Ballena Press Anthropological Papers 10. Socorro, New Mexico.

Inman, D.L.

1983. Application of Coastal Dynamics to the Reconstruction of Paleocoastlines in the Vicinity of La Jolla, California. *Quaternary Coastlines and Marine Archaeology*, ed. P. Masters and N. Flemming. Academic Press, New York. pp1-49.

Johnson, John R.
1988 Chumash Social Organization: An Ethnohistoric Perspective. Ph.D. dissertation, Department of Anthropology, University of California, Santa Barbara.

Jones, Terry L., M. Kathleen Davis, Glenn Farris, Steven D. Grantham, Teresa W. Fung, and Betty Rivers
1994 Towards a Prehistory of Morro Bay: Phase II Archaeological Investigations for the Highway 41 Widening Project, San Luis Obispo County, California. Submitted to the California Department of Transportation, Environmental Branch, San Luis Obispo.

Jones, Terry L., and Georgie Waugh
1995 Central California Coastal Prehistory: A View from Little Pico Creek. Perspectives in California Archaeology, vol. 3, Jeanne M. Arnold, senior series editor. Institute of Archaeology, University of California, Los Angeles.

Kennett, Douglas J.
1998 Behavioral Ecology and the Evolution of Hunter-Gatherer Societies on the Northern Channel Islands, California. Ph.D. dissertation, Department of Anthropology, University of California, Santa Barbara.

King, Chester D.
1981 The Evolution of Chumash Society: A Comparative Study of Artifacts Used in Social System Maintenance in the Santa Barbara Channel Region before A.D. 1804. Ph.D. dissertation, Department of Anthropology, University of California, Davis.

1984 Ethnohistoric Background. In Archaeological Investigations on the San Antonio Terrace, Vandenberg Air Force Base, California, in Connection with MX Facilities Construction, pp. I-1–I-54. Chambers Consultants and Planners, Stanton, California. Submitted to U.S. Army Corps of Engineers, Los Angeles District, Contract No. DAC09-81-C-0048.

1990 Evolution of Chumash Society: A Comparative Study of Artifacts Used for Social System Maintenance in the Santa Barbara Channel Region before A.D. 1804. The Evolution of North American Indians, edited by David Hurst Thomas. Garland, New York.

Kinlan, Brian P., Michael H. Graham, and Jon M. Earlandson
2005. Late Quaternary Changes in the Size and Shape of the California Channel Islands: Implications for marine Subsidies to Terrestrial Communities. Retrieved on 18 June 2007 from the World Wide Web: http://phycology.mlml.calstate.edu/PDFs/Kinlan05.pdf.

Landberg, Leif
1965 The Chumash Indians of Southern California. Southwest Museum Papers No. 19. Los Angeles.

Lebow, Clayton G., and Douglas R. Harro
1998 Plant Processing on the San Antonio Terrace: Archaeological Investigations at CA-SBA-2767. Applied EarthWorks, Inc., Fresno, California. Submitted to Central Coast Water Authority, Buellton, California.

Lebow, Clayton G., Douglas R. Harro, Rebecca L. McKim, and Carole Denardo
2001 Archaeological Excavations at CA-SBA-246, An Early Holocene Site on Vandenberg Air Force Base, Santa Barbara County, California. Applied EarthWorks, Inc., Fresno, California, for Tetra Tech, Inc., Santa Barbara, California. Submitted to 30 CES/CEV, Vandenberg Air Force Base, California, USAF Contract No. F04684-95-C-0045.

2002 Archaeological Excavations at the Honda Beach Site (CA-SBA-530), Vandenberg Air Force Base, Santa Barbara County, California. Applied EarthWorks, Inc., Fresno, California, for Tetra Tech, Inc., Santa Barbara, California. Submitted to Headquarters 311th Human Systems Wing (AFMC), Brooks Air Force Base, Texas, Contract No. F41684-00-D-8029.

Lebow, Clayton G., and Michael J. Moratto
2005 Management of Prehistoric Archaeological Resources. Vandenberg Air Force Base Integrated Cultural Resources Management Plan, vol. 5, edited by Michael J. Moratto and Barry A. Price. Applied EarthWorks, Inc., Fresno, California. Submitted to U.S. Air Force, 30 CES/CEVPC, Vandenberg Air Force Base, California.

Lebow, Clayton G. and Robert R. Peterson, Jr.
2007 Archaeological Survey of the Vandenberg Air Force Base Cantonment Area, Santa Barbara County, California. Applied EarthWorks, Inc., Lompoc, California. Submitted to the 30 CES/CEVNC, Vandenberg Air Force Base, California.

Lebow, Clayton G., Nathan E. Stevens, Barry A. Price, Rebecca L. McKim, Wendy M. Nettles, Leeann G. Haslouer, Michael H. Imwalle, and Jason M. Fancher
2006 Archaeological Investigations Supporting Consultation with the State Historic Preservation Officer for the Privatization of Military Family Housing on Vandenberg Air Force Base, Santa Barbara County, California. Applied EarthWorks, Inc., Lompoc, California. Submitted to 30 CES/CEVPC, Vandenberg Air Force Base, California.

Moratto, Michael J.
1984 California Archaeology. Academic Press, New York and London.

Morgan, Anthony, Thomas Mulroy, Rosemary Thompson, Michael Dungan, Melissa Mooney, Elizabeth Dunlap, John Storrer, and James L. Rudolph
1991 Environmental Setting. In Western Chumash Prehistory: Resource Use and Settlement in the Santa Ynez River Valley, edited by Craig F. Woodman, James L. Rudolph, and Teresa P. Rudolph, pp. 35–64. Science Applications International Corporation, Santa Barbara, California. Prepared for Unocal Corporation. Submitted to U.S. Army Corps of Engineers, Los Angeles District.

Moriarity, James R., and M. Keistman (translators)
1968 Cabrillo's Log 1542–1543: A Voyage of Discovery (a Summary by Juan Paez). Western Explorer 5(2–3):1–20. Cabrillo Historical Association, San Diego, California.

Palmer, Kevin (Lex)
1999 Central Coast Continuum—From Ranchos to Rockets: A Contextual Historic Overview of Vandenberg Air Force Base, Santa Barbara County, California. Prepared by Palmer Archaeology and Architecture Associates, Santa Barbara, California. Submitted to 30 CES/CEVPC, Vandenberg Air Force Base, California.

Porcasi, Paul, Judith F. Porcasi, and Collin O'Neill
1999. Early Holocene Coastlines of the California Bight: The Channel Islands as First Visited by Humans. *Pacific Coast Archaeological quarterly*. (35)2&3.

Preston, William
1996 Serpent in Eden: Dispersal of Foreign Diseases into Pre-Mission California. Journal of California and Great Basin Anthropology 18:2–37.

Raab, L. Mark, Katherine Bradford, Judith F. Porcasi, and William J. Howard
1995 Return to Little Harbor, Santa Catalina Island, California: A Critique of the Marine Paleotemperature Model. American Antiquity 60:287–308.

Raab, L. Mark, and Daniel O. Larson
1997 Medieval Climatic Anomaly and Punctuated Cultural Evolution in Coastal Southern California. American Antiquity 62:319–336.

Rogers, David Banks
1929 Prehistoric Man of the Santa Barbara Coast, California. Santa Barbara Museum of Natural History Special Publications No. 1. Santa Barbara, California.

Rudolph, Teresa P.
1991 Settlement Organization in the Lower Santa Ynez River Valley: 9000 B.P. to Contact. In Western Chumash Prehistory: Resource Use and Settlement in the Santa Ynez River Valley, edited by Craig F. Woodman, James L. Rudolph, and Teresa P. Rudolph, pp. 307–338. Science Applications International Corporation, Santa Barbara, California. Prepared for Unocal Corporation. Submitted to U.S. Army Corps of Engineers, Los Angeles District.

Science Applications International Corporation (SAIC)
1995 Historical Eligibility Evaluation of the Vandenberg Tracking Station, Vandenberg Air Force Base. Science Applications International Corporation, Santa Barbara, California. Prepared for ITT Federal Services Corporation, Vandenberg Air Force Base, California.

Simpson, Lesley B.
1939 California in 1792: The Expedition of Longinos Martinez. Huntington Library, San Marino, California.

Teggart, Frederick J. (editor)
1911 The Portolá Expedition of 1769–1770: Diary of Miguel Costansó. Publications of the Academy of Pacific Coast History 2(4):164–327. Berkeley, California.

Tetra Tech, Inc.
1988 Historic Preservation Plan, San Antonio Terrace National Register District, Vandenberg Air Force Base, California. Tetra Tech, Inc., San Bernardino, California. Prepared for United States Air Force AFRCE-BMS, Norton Air Force Base, California.

Vandenberg Air Force Base
1992 Land Management Plan for Vandenberg Air Force Base, California, for Plan Period 1992 to 1997. Natural Resources and Comprehensive Planning Division, Vandenberg Air Force Base, California.

Wagner, Henry R.
1929 Spanish Voyages to the Northwest Coast in the Sixteenth Century. California Historical Society, San Francisco.

Wallace, William J.
1978 Post-Pleistocene Archeology, 9000 to 2000 B.C. In California, edited by Robert F. Heizer, pp. 25–36. Handbook of North American Indians, vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Warren, Claude N.
1967 The San Dieguito Complex: A Review and Hypothesis. American Antiquity 32:168–185.

Woodman, Craig F., Chantal Cagle, Philip de Barros, and Teresa P. Rudolph
1995 Final Report, Archaeological Survey and Evaluation of the Honda Beach Site, SBA-530. Science Applications International Corporation and Chambers Group, Inc., Santa Barbara, California. Submitted to U.S. Department of the Interior, National Park Service, Western Region Interagency Archeological Services Branch, San Francisco, Contract No. 1443 CX 8000-92-010.

APPENDIX -1

PROGRAMMATIC AGREEMENT
BETWEEN

VANDENBERG AIR FORCE BASE, CALIFORNIA

AND THE

CALIFORNIA STATE HISTORIC PRESERVATION OFFICER

REGARDING THE MANAGEMENT OF

EXCEPTIONALLY IMPORTANT COLD WAR HISTORIC PROPERTIES UNDER THE JURISDICTION OF VANDENBERG AIR FORCE BASE, CALIFORNIA

WHEREAS, Vandenberg Air Force Base (VAFB) maintains properties located at VAFB and its remote installations that contributed to exceptionally important military and civilian programs during the Cold War (hereinafter, "Cold War properties"); and

WHEREAS, VAFB developed a systematic methodology for identifying and evaluating VAFB property types that could qualify as Cold War properties of exceptional significance and used this methodology to complete a three-phase Cold War Properties Inventory and Evaluation Report (hereinafter, "Report") that identifies, evaluates and documents VAFB-administered Cold War properties and concludes that certain of these properties (hereinafter collectively, "historic properties") are exceptionally significant and qualify for inclusion in the National Register of Historic Places (hereinafter, "NRHP"); and

WHEREAS, VAFB has determined that its mission, programs, and other ongoing management activities (hereinafter, “Undertakings") may have an effect on historic properties and on SLC-10, a National Historic Landmark (hereinafter, the "NHL"), and has consulted with the California State Historic Preservation Officer (hereinafter, "SHPO") pursuant to § 800.6(a) of 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f) (hereinafter, "NHPA”) and Section 110(f) of the NHPA (16 U.S.C. 470h-2(f)), and has notified the Advisory Council on Historic Preservation (the “Council”) pursuant to 36 CFR § 800.6(a)(1)(i)(C), and intends to execute this Programmatic Agreement (hereinafter, "PA") pursuant to 36 CFR § 800.6(b)(1) because the Council has declined to participate in the consultation pursuant to 36 CFR § 800.6(a)(1)(iii-iv); and

WHEREAS, pursuant to 36 CFR § 800.10(c), VAFB has notified the Secretary of the Interior (hereinafter, "Secretary") through the National Park Service (hereinafter, "NPS") that Undertakings covered by this PA may have an adverse effect on the NHL, has invited the Secretary to participate in the consultation, has requested the NPS to execute this PA on behalf of the Secretary, and herewith acknowledges that, following the consultation cited herein, the NPS has declined VAFB's request to execute this PA; and

WHEREAS, VAFB has developed a *Historic Preservation Plan for the Management and Treatment of Cold War Properties at Vandenberg Air Force Base, California* (Attachment 1) (hereinafter, "HPP") that includes in Appendix A a list of historic properties covered by this PA at the time of its execution; upon execution of this PA, the HPP will be used by VAFB to manage historic properties, to take into account the effects of Undertakings on historic properties, and to re-evaluate Cold War properties previously determined NRHP eligible or ineligible as the passage of time, changing perceptions of significance, or incomplete prior evaluations may require;

NOW, THEREFORE, VAFB and the SHPO agree that the Undertakings covered by this PA shall be administered in accordance with the following stipulations to take into account the effect of the Undertakings on historic properties and to satisfy VAFB's Section 106 responsibilities for these Undertakings during the term of this PA.

STIPULATIONS

VAFB will ensure that the following stipulations are carried out:

I. Applicability

This PA applies exclusively to the Undertakings defined and described herein.

II. Implementing the HPP

Upon execution of this PA, VAFB will implement the HPP, Attachment 1, in lieu of compliance with 36 CFR §§ 800.3 through 800.6.

III. Reviewing Implementation of the HPP

1. No later than one year after execution of this PA, and by the anniversary date of such execution each year thereafter, until the signatories to this PA agree in writing that its terms have been fulfilled, VAFB will prepare and provide the SHPO with a written report that includes, but is not necessarily limited to, the following items:

a. A narrative that indicates how many actions were undertaken and that describes and discusses how and with what results, the HPP was applied to such actions;

b. An assessment of the effectiveness of this PA and of the HPP in assisting VAFB to advance with greater efficiency both its mission and its obligation under applicable law to preserve and protect historic properties;

c. A discussion of any problems or unexpected issues encountered during the year;

d. Any changes that VAFB believes should be made to this PA, to its manner of implementation, or to the HPP.

2. The SHPO shall have 45 days from the date of receipt to provide VAFB with comments on the annual report. VAFB shall take any comments received into account when considering possible modifications to this PA or to the HPP. Absent SHPO comments within the time frame stipulated herein, VAFB may assume that no comments will be forthcoming, except that VAFB will honor any SHPO request for a reasonable extension of the review period provided that such request is received by VAFB within the review period.

3. At the request of the SHPO, VAFB shall hold a consultation meeting to facilitate review and comment on the annual report, or to resolve questions, issues or adverse comments that have been raised by the SHPO or by a member of the public.

IV. Professional Standards

1. All work required by this PA and the HPP that addresses the identification, evaluation, treatment and documentation of historic properties shall be carried out by or under the direct supervision of a person or persons meeting at a minimum the Secretary of Interior's Professional Qualifications Standards (48 FR 44738-39) (PQS) in the appropriate disciplines. However, nothing in this stipulation may be interpreted to preclude VAFB or any agent or contractor thereof from using the properly supervised services of persons who do not meet the PQS.

2. All documentation required by this PA and the HPP that addresses the identification, evaluation, and treatment of historic or potentially historic properties shall be responsive to contemporary professional standards, to the Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716-40), National Park Service Bulletin 38, as well as to standards and guidelines established by the SHPO.

V. Resolving Objections

1. Should the SHPO object in writing to VAFB regarding the manner in which the terms of this PA or the provisions of the HPP are carried out, or to any documentation prepared in accordance with and subject to the terms of this PA, the signatories shall consult to address the objection. VAFB shall determine a reasonable time frame for this

consultation. If resolution is reached within this time frame, VAFB may proceed with its action in accordance with the terms of the resolution. If after initiating such consultation, VAFB determines that the objection cannot be resolved through consultation, VAFB shall forward all documentation relevant to the objection to the Council, including VAFB's proposed response to the objection, with the expectation that the Council will within thirty (30) days after receipt of such documentation:

(a) Advise VAFB that the Council concurs in its proposed response to the objection, whereupon VAFB will respond to the objection accordingly. Thereafter, VAFB may proceed with its action in a manner consistent with its proposed response; or

(b) Provide VAFB with recommendations, which VAFB will take into account in reaching a final decision regarding its response to the objection. Upon reaching its final decision, VAFB will notify the SHPO and the Council of its final decision, and may thereafter proceed with its action; or

(c) Notify VAFB that the objection will be referred for comment pursuant to 36 CFR 800.7(a)(4), and proceed to refer the objection and comment. In this event, VAFB shall ensure that its agency head is prepared to take the resulting comment into account in accordance with 36 CFR 800.7(c)(4) and Section 110(l) of the NHPA. Thereafter, VAFB shall notify the objecting party and the Council of its final decision regarding the objection, and may thereafter proceed with its action.

2. Should the Council not exercise one of the above options within 30 days after receipt of all pertinent documentation, VAFB may assume the Council's concurrence in its proposed response to the objection, advise the SHPO of that response and proceed with its action in a manner consistent with that response.

3. VAFB shall take into account any Council recommendation or comment provided in accordance with this stipulation with reference only to the subject of the objection; VAFB's responsibility to carry out all actions under this PA that are not the subjects of the objection shall remain unchanged.

4. At any time during implementation of the stipulations in this PA should an objection pertaining to such implementation be raised by a member of the public, VAFB shall notify the SHPO about the objection and take the objection into account, consulting with the objector and, should the objector so request, with the SHPO to resolve the objection.

5. Disputes pertaining to the NRHP eligibility of properties covered by this PA shall be addressed through consultation between VAFB and the SHPO. If such consultation fails to resolve the dispute within a time frame deemed reasonable by VAFB, the dispute will be addressed by VAFB in accordance with 36 CFR § 800.4(c)(2).

VI. Amending the PA and the HPP

1. If either signatory believes that this PA should be amended, that signatory may at any time propose amendments, whereupon the signatories will consult to consider the amendment pursuant to 36 CFR § 800.6(c)(7) and 800.6(c)(8). This PA may be amended only upon the written concurrence of VAFB and the SHPO.

2. If either signatory believes that the HPP should be revised, that signatory may at any time propose revisions, whereupon the signatories will consult to consider the revisions. The HPP will be promptly revised by VAFB if VAFB and the SHPO agree upon the proposed revisions. The signatories agree that any such revision shall not necessarily require either concurrent or subsequent amendment of this PA.

VII. Terminating the PA

1. This PA may be terminated by VAFB or the SHPO. If this PA is not amended as provided for in Stipulation VI.1., above, or if VAFB or the SHPO proposes termination of this PA for other reasons, the signatory proposing termination shall in writing notify the other signatory, explain the reasons for proposing termination, and consult with the other signatory for no more than 30 days to seek alternatives to termination.

2. Should such consultation fail, the signatory proposing termination may terminate this PA by promptly notifying the other signatory in writing.

3. Should this PA be terminated, then beginning with the date of termination VAFB shall do the following:

a. promptly consult with the SHPO to develop a new PA pursuant to 36 CFR Part 800.

b. ensure that until a new PA is executed for the actions covered by this PA, that each such individual action is reviewed in accordance with 36 CFR § 800.4 - 800.6.

VIII. Duration of the PA

This PA shall take effect when it has been executed by VAFB and the SHPO. It shall remain in effect for a period of 10 years from the date of last signature and will automatically become null and void at the end of this ten year period unless it is terminated prior to that time or unless it is extended by written agreement of VAFB and the SHPO. Not later than 6 months prior to the expiration date of this PA, VAFB will notify the SHPO of the PA's pending expiration and, following such expiration, VAFB will re-initiate review of the Undertakings in accordance with 36 CFR Part 800.

IX. Anti-Deficiency Act

1. All requirements set forth in this PA requiring the expenditure of VAFB funds are expressly subject to the availability of appropriations and the requirements of the Anti-Deficiency Act (31.U.S.C. Section 1341). No obligation undertaken by VAFB under the terms of this PA shall require or be interpreted to require a commitment to expend funds not appropriated for a particular purpose.

2. If VAFB cannot perform any obligation set forth in this PA because of the unavailability of funds, VAFB and the SHPO intend that the remainder of the PA be executed. Any obligation under this PA that cannot be performed because of the unavailability of funds must be renegotiated between VAFB and the SHPO.

Execution of this PA by VAFB and the SHPO, its transmittal by VAFB to the Council in accordance with 36 CFR § 800.6(b)(1)(iv), and implementation of its terms shall evidence, pursuant to 36 CFR § 800.6(c), that this PA is an agreement with the Council for purposes of Section 110(l) of the NHPA, and shall further evidence that VAFB has afforded the Council an opportunity to comment on the Undertakings and their effects on historic properties, that VAFB has taken into account the effects of the Undertakings on historic properties, and that VAFB has satisfied its responsibilities under Sections 106 and 110(f) of the NHPA and applicable implementing regulations for all aspects of the Undertakings.

30 CES/CEV, VANDENBERG AIR FORCE BASE

By: [signed] Date: [19 Jul 02]

Name: SCOTT W. WESTFALL, Lt Col, USAF

Title: Commander, Environmental Flight

CALIFORNIA STATE HISTORIC PRESERVATION OFFICER

By: [signed] Date: [6/17/02]

Name: Dr. Knox Mellon

Title: State Historic Preservation Officer

ATTACHMENT 1

Historic Preservation Plan for the Management and Treatment of Cold War Properties at Vandenberg Air Force Base, California

FOREWORD

Vandenberg Air Force Base (VAFB), California maintains numerous Cold War properties at VAFB and its remote installations (hereinafter "properties"). These properties often require modifications to meet changing mission requirements. The Tri-Services Cultural Resources Research Center (TSCRRC) at the United States Army Construction Engineering Research Laboratories (USACERL) in Champaign, Illinois has completed a three-phase inventory and evaluation of VAFB's Cold War properties to assist VAFB in complying with Section 106 of the National Historic Preservation Act (NHPA). During Phase I, TSCRRC developed a standard methodology for identifying and evaluating VAFB properties that qualify as exceptionally important Cold War properties. This standard methodology was subsequently applied during Phases II and III. The essential purpose of this Historic Preservation Plan (HPP) is to apply the findings of the three-phase TSCRRC study, and establish a process for appropriately preserving and using VAFB's Cold War properties consistent with VAFB's mission, programs, and planning processes.

INTRODUCTION

This HPP is organized into eight sections. Section One provides a brief historic context of VAFB, describing its unique role in supporting numerous Cold War ballistic missile and space programs. Section Two establishes procedures for identifying and evaluating VAFB's exceptionally important Cold War properties. Section Three lists the properties identified as being eligible for the National Register of Historic Places (NRHP) in the three-phase, three volume TSCRRC study prepared at USACERL. The studies identify 13 site areas, weapon systems, or districts (with a total of 61 Numbered facilities and 23 unnumbered elements) as eligible for the NRHP (see Appendix A). Section Four establishes procedures for managing and treating VAFB's exceptionally important Cold War properties. Section Five reiterates and summarizes the management and treatment procedures to be applied to the various types of Cold War properties at VAFB. Section Six discusses discontiguous historic districts having non-VAFB contributing elements. Section Seven discusses the determination of eligibility and the future mitigation of impacts to sites that are identical or nearly identical to scores of other sites. Section Eight briefly considers the problem of secret and classified information and the effect that the declassification of Cold War-era records will have on VAFB's Cold War properties.

1. HISTORIC CONTEXT[1]

VAFB is located on the Pacific Coast of California about 130 miles northwest of Los Angeles. Originally known as Camp Cooke, VAFB was a World War II and Korean War Army training facility. In 1956, the Air Force chose Camp Cooke as the site for a new missile base and subsequently renamed the installation Vandenberg Air Force Base. The Air Force established VAFB as an operational base for missiles and their supporting ground equipment, complementing Cape Canaveral, the Air Force's missile research and development test site. VAFB was also a training base for missile combat and maintenance crews. All of the United States' operational intercontinental ballistic missiles have been flight tested at VAFB, and thousands of personnel, including crews from the British Royal Air Force, received operational missile weapon system combat and maintenance training at the base. In addition to its ballistic missile programs, VAFB also played an important role in America's Cold War military and civilian space programs. VAFB is the only safe polar orbit launch site in the United States. Since most surveillance and reconnaissance spy satellites require a polar orbit, VAFB has launched many of America's critically important military satellites. Also, many important scientific and application satellites have been launched from VAFB launch complexes. Today, VAFB continues to serve as a critically important ballistic missile testing installation and satellite launch site.

2. IDENTIFICATION SYSTEM

Under 36 CFR Section 60.4(g) and National Register Bulletin (NRB) 22: Guidelines for Evaluating and Nominating Properties that Have Achieved Significance within the Last Fifty Years, properties that have achieved significance within the last fifty years may be listed on the NRHP only if they are of exceptional importance or if they are integral parts of districts that are eligible for listing in the NRHP, according to the National Register Criteria for Evaluation. Such properties must also retain sufficient integrity to convey their significance.

2.1 Identifying and Evaluating Exceptionally Important Cold War Properties at VAFB

All VAFB's Cold War properties are less than fifty years of age; therefore, they must possess exceptional importance to be eligible for NRHP listing. The first step to identify exceptionally important Cold War properties is to identify an installation's Cold War programs that are considered exceptionally important. Then, per Air Force

[1] Each volume of the three-phase TSCRRC study includes an extensive discussion of VAFB's historic context. See for example, *Cold War Properties Evaluation - Phase 1: Inventory and Evaluation of Launch Complexes and Related Facilities at Vandenberg Air Force Base, California* (February 1996).

guidelines,[2] identify those properties that are specifically associated with operational missions. Air Force guidelines exclude properties such as base exchanges, general administrative buildings, family housing, maintenance shops, and sewage treatment plants. VAFB's exceptionally important Cold War programs are the various ballistic missile testing and training programs (e.g. Thor, Atlas, Titan, Minuteman, and Peacekeeper) that provided the United States with an operational nuclear missile force and the necessary support personnel. VAFB has supported other exceptionally important programs including American military and civilian space programs. The military space program provided critical information to military and political leaders during the Cold War. Since the National Aeronautics and Space Administration (NASA) was established in 1958, the civilian space program has supported the military space program by sharing critical scientific information and technology. The civilian space program has also greatly expanded our knowledge of science and the universe. This knowledge is of significant value to the military.

After identifying VAFB's exceptionally important Cold War programs and their associated properties, a distinction must be made between direct and indirect association or contribution of these properties to the operational missions. Some properties *directly* supported operational missions, while other properties supported operational missions in a secondary or complementary capacity. An example is the distinction between a VAFB Minuteman launch silo and a Minuteman maintenance facility. The Minuteman maintenance facility was used primarily for mating missile components. Although this function was certainly important, it is considered secondary or complementary. The silo, on the other hand, directly supported Minuteman missions as the primary staging ground for various Minuteman weapon systems testing programs. A Minuteman silo, because of its direct contribution to operational missions, better illustrates and offers a better understanding of the Minuteman program than does a maintenance facility. Properties directly supporting VAFB's operational missions of exceptionally important Cold War programs are themselves exceptionally important, and therefore qualify for listing in the NRHP.

2.2. Evaluating Integrity of Cold War Properties

Integrity is defined by NRB 15 as:

> "[T]he authenticity of a property's historic identity, evidenced by the survival of physical characteristics that existed during the property's historic...period. If a property retains the physical characteristics it possessed in the past then it has the capacity to convey association with historical patterns or persons, architectural or engineering design and technology, or information about a culture or people."

[2] See *Interim Guidance Treatment of Cold War Historic Properties for U.S. Air Force Installations* (June 1993) written by Dr. Paul Green.

NRB 15 states that integrity, as applied to historic properties, has seven aspects: location, design, setting, materials, workmanship, feeling, and association. To be regarded as retaining sufficient integrity to be considered eligible for listing on the NRHP a historic structure must normally demonstrate integrity in at least two of these qualities. Retention of integrity does not necessarily mean that a property must be in an unchanged state. This is particularly true when the significance of a property derives from its function rather than its physical design, as is often the case with historic Cold War properties. Most Cold War military programs, and certainly the ballistic missile and space programs, were characterized by constantly changing and advancing technology. Consequently, the properties that supported these programs often underwent numerous modifications reflecting those technological advances. Many of the exceptionally important Cold War properties at VAFB have experienced numerous physical changes and modifications. However, a significant percentage of these properties qualify for NRHP listing based on their historic function rather than their architectural or engineering design. In these cases, integrity of function becomes more important than integrity of the original design. As long as such properties retain an ability to convey a sense of their historic function, then the properties retain their integrity, regardless of modifications or changes. A classic example would be the launch complex that has been constantly modified over the years to accommodate new generations of space vehicles. It obviously would not retain integrity of original design, but if it retained an ability to convey a sense of its historic function as a launch site, it would continue to retain its integrity of function and would meet the NRHP integrity requirement.[3]

Integrity of function would not apply to facilities that are found eligible for the NRHP based on their exceptionally important architectural or engineering design. In such cases, integrity of design would take precedence.

3. INVENTORY

TSCRRC conducted the inventory and evaluation of Cold War resources at VAFB in three phases. This multi-phase study resulted in three volumes, prepared by USACERL. The first volume, *Cold War Properties Evaluation - Phase I: Inventory and Evaluation of Launch Complexes and Related Facilities at Vandenberg Air Force Base, California*, was completed in February 1996. The second volume, *Cold War Properties Evaluation - Phase II: Inventory and Evaluation of Minuteman, MX Peacekeeper, and Space Tracking Facilities at Vandenberg Air Force Base, California*, was completed in June 1997. The third and final volume, *Cold War Properties Evaluation - Phase III: Inventory and Evaluation of Atlas, Titan, Bomarc, and Blue Scout Junior Launch Facilities at Vandenberg Air Force Base, California*, was completed in October 1997.

[3] In presenting this argument, the Advisory Council on Historic Preservation (ACHP), in its 1991 publication Balancing Historic Preservation Needs with the Operation of Highly Technical or Scientific Facilities, specifically refers to the many active NASA and U.S. Air Force launch complexes that have been continually modified over time to support new generations of rockets. See also the discussion of "integrity of function" found in the Center for Air Force History report, Coming in from the Cold. Military Heritage in the Cold War. Report on the Department of Defense Legacy Cold War Project (Washington, DC: Department of Defense Legacy Resource Management Program, June 1994), 18-19.

Appendix A is a complete listing of properties deemed eligible for the NRHP in all three phases of TSCRRC's inventory and evaluation.

3.1 Phase I

In Phase One, facilities deemed eligible for the NRHP qualified in one of two ways: as sites with contributing elements, or as a district with contributing elements.

3.1.1 Sites: Space Launch Complexes and GERTS

Several VAFB sites possess exceptional importance for their *direct* contribution to operational missions of exceptionally important military or civilian Cold War programs. These sites are Space Launch Complexes (SLCs) 2, 3, 5 and 10 (the latter is an already existing National Historic Landmark) and the General Electric Radio Tracking Station (GERTS). Each of these sites contains individual structures and facilities, not all of which are considered contributing elements of those sites. The contributing elements are limited to the primary launching facilities and support systems.

3.1.2 District: Western Range Landbased Instrumentation Support Systems Historic District

The proposed discontiguous Western Range Landbased Instrumentation Support Systems Historic District (WRLISSHD) encompasses the historic Air Force Western Range landbased instrumentation support facilities located at VAFB, and VAFB remote (or "satellite") installations that *directly* supported operational missions of exceptionally important Cold War space programs and exceptionally important Cold War ballistic missile programs *during their critical design, development, and testing phases*. The contributing elements of the proposed WRLISSHD located at VAFB are: the Western Range Control Center (Facility 7000) on North Vandenberg; and the control center (Facility 75) and two telemetry structures (Facilities 81 and 86) of the Vandenberg Telemetry Receiving Site, the LA-24 Tracking Telescope (Facility 181), the AN/TPQ-18 Radar Facility (Facility 907), and the AN/FPS-16 Radar Facility (Facility 178), on South VAFB. Contributing elements of the WRLISSHD located at VAFB remote installations are: the AN/FPQ-6 Radar Facility (Facility 18) and two telemetry structures (Facilities 22 and 40) at Pillar Point Air Force Station, California; the Deployment Mapping Instrument (DMI) telescope (Facility 3) at the Anderson Peak Optical Site, Big Sur, California; and the Recording Optical Tracking Instrument (ROTI, Facility 21) at the Santa Ynez Peak Optical Tracking Site, California.

3.2 Phase II

In Phase Two, properties deemed eligible for NRHP listing qualified in one of three ways: as individual buildings, as sites with contributing elements, or as a district with contributing elements.

3.2.1 Individual Buildings: Minuteman and Peacekeeper Missile Alert Facilities and Missile Procedure Trainers

Four Minuteman Missile Alert Facilities (MAF-DO, -EO, -01A, -01B), a Minuteman Launch Support Center (LSC), a Peacekeeper Missile Alert Facility (MAF-01E), and two buildings housing Missile Procedure Trainers (Facilities 8195 and 7403) qualify for NRHP listing as individual buildings that directly supported operational missions of the exceptionally important Minuteman and Peacekeeper ICBM programs.

3.2.2 Sites: Minuteman and Peacekeeper Launch Facilities and the Vandenberg Tracking Station

Seven Minuteman Launch Facilities (LF-03, -06, -04, -07, -09, -10, -26) and three Peacekeeper Launch Facilities (LF-02, -05, -08) qualify for NRHP listing as sites based on their *direct* contributions to operational missions of the exceptionally important Minuteman and Peacekeeper ICBM programs. The Vandenberg Tracking Station (VTS) qualifies for NRHP listing based on its historic function as a satellite tracking and control site that directly supported operational missions of exceptionally important U.S. military space programs. Each of these sites is comprised of a number of individual structures and facilities, not all of which are considered contributing elements of those sites. The contributing elements of the LFs are the launch silos, the Launcher Equipment Rooms (LERs), and the Launch Support Buildings (LSBs). The contributing elements of the VTS are the UHF Building and 60' Telemetry Tracking and Control Antenna (Facility 23201) and the VHF Antenna Building and Antenna Support Structure (Facility 23235).

3.2.3 District: Rail Garrison Historic District

In an evaluation completed in 1994, Dames & Moore, Inc.[4] found fourteen rail garrison facilities eligible for the NRHP as contributing elements of a Rail Garrison Historic District. TSCRRC agreed with the designation of a Rail Garrison Historic District (RGHD), but found only seven facilities eligible for NRHP listing as contributing elements of this district. The seven contributing elements are Facilities 1819, 1886, 1862, 1894, 1900, the Test Loop, and the Rail Spur.

3.3 Phase III

In the Phase Three report of the evaluation of Cold War properties at VAFB, one property qualified for NRHP listing as a site with contributing elements.

3.3.1 Site: Titan II Launch Complex 395-C

The Titan II Launch Complex qualified for listing in the NRHP as a site based upon its *direct* contribution to operational missions of the exceptionally important Titan II ICBM program. This site is composed of a number of contributing elements consisting of: the access portal, launch control center, blast lock structure, cableway, silo, oxidizer hardstand, fuel hardstand, cooling tower pit, and the air intake and air exhaust vents.

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[4] Dames & Moore, Inc. (Weitze, Karen J.), National Register of Historic Places Evaluation: Peacekeeper Rail Garrison Complex, Vandenberg Air Force Base, Austin, TX, April 1994.

4. MANAGEMENT AND TREATMENT OF HISTORIC COLD WAR PROPERTIES AT VAFB IDENTIFIED IN TSCRRC'S THREE-PHASE INVENTORY AND EVALUATION

This section provides guidance for managing and treating VAFB's historic Cold War properties. Management procedures specified in this PA will be followed until they are superseded by Air Force Guidance that specifically addresses the management of Cold War Historic Resources located on active highly technical and scientific facilities.

The appropriate management and treatment measures for VAFB's historic Cold War properties are dictated by the nature of their significance. In all cases, for all eligible properties, preventative maintenance (e.g., painting, caulking, roof repair), repairs or upgrades to utilities or service infrastructure (e.g., phone, power, plumbing, HVAC, parking areas, fencing), and the upgrade of control components that do not affect the historic character or appearance of a facility, site, or weapon system (e.g., communication panel upgrades, power management system upgrades) are considered normal, necessary evolutionary changes and will not require SHPO consultation.

Below, the specific management and treatment measures for historic Cold War properties are discussed. The properties are categorized as Individual Facilities, Sites, or Historic Districts. They are also divided into specific categories corresponding to the nature of their significance.

4.1 Individual Facilities

4.1.1 Individual Facilities Significant for their Historic Function

The individual facilities significant for their historic function are MAF-DO, MAF-EO, MAF-01A, MAF-01B[5], MAF-01E, the LSC, and facilities 8195 and 7403. The LSC and the MAFs are significant for their historic function as Minuteman or Peacekeeper launch control facilities. Facilities 8195 and 7403 are significant because of their function as missile combat training facilities. Undertakings that do not alter the ability of these facilities to convey a sense of their historic function will have no adverse effect and will not require VAFB to conduct Section 106 consultations or to take any other actions.

4.1.2 Individual Facilities Significant for their Distinctive Physical Characteristics

There are no individual facilities in this category.

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[5] Late in 1996 and early in 1997, VAFB decommissioned Minuteman II Alert Facility MAF-01B and Minuteman II Launch Facility LF-07. This was done according to Section 106 guidelines, in consultation with the SHPO. Mitigation for the action of decommissioning was identified and agreed upon by SHPO and VAFB.

4.2 Sites

4.2.1 Sites Significant for their Historic Function

Sites significant for their historic function are SLC-2, LF-03, LF-04, LF-06, LF-07[6], LF-09, LF-10, LF-26, 395-C, and the VTS (SLC-3 is also significant based on its historic function, but it is a special case which is discussed separately below). The significance of the SLCs lies in their historic function as launch complexes that supported the United States space program. The significance of the LFs lies in their historic function as launch complexes that supported the Minuteman program during the critical design, development, and testing phases. The significance of 395-C lies in its historic function as a launch complex for the Titan II ICBM. The significance of the VTS lies in its historic function as a satellite tracking and control facility.

Each site is comprised of a number of contributing elements that together convey a sense of that site's historic function. Undertakings that do not alter the ability of these contributing elements to convey a sense of the site's historic function, including preventive maintenance, will have no adverse effect on the site and will not require VAFB to conduct Section 106 consultations or to take any other actions.

Undertakings that modify contributing elements of these historic sites are sometimes necessary to accommodate new missiles or space launch vehicles or mission requirements. Normally, such modifications do not compromise the functional integrity of these sites as launch complexes (or, in the case of the VTS, as a satellite tracking and control facility). Since the sites are eligible for NRHP listing based on their historic function, normal evolutionary modifications that do not affect the ability of the contributing elements to convey a sense of the site's historic function will not require VAFB to complete the statutory Section 106 process.

All upgrades and modifications of the launch complexes and the VTS are routinely recorded by Air Force launch personnel, and personnel of the cultural resources section. Descriptive project plans, engineering documents, and photographs of these modifications are filed at the launch facility in question. These historical documents record the physical evolution of the launch complex and are invaluable when maintenance problems are encountered or when a facility is upgraded further.

When substantial upgrades or modifications are made to a site that is significant for its historic function, a packet of descriptive information will be archived at 30 CES/CEVPC at VAFB. The documentation packet will normally contain photographic prints, design plans, and narrative documents describing the project. The prints will be color, 5" x 7", from 35 mm negatives. Digital camera images, and video film (magnetic tape media) may also be used to record "before and after" images of the affected facility.

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[6] See footnote 5, above.

Undertakings that adversely affect the ability of the contributing elements to convey a sense of a site's historic function will require VAFB to complete the statutory Section 106 process. This would be required if, for example, an eligible launch complex is demolished, or one or more contributing elements of the site are removed or completely replaced. Section 106 consultation would also be necessary if the launch complex is altered to accommodate entirely new space vehicles or weapon systems or, in the case of the VTS, if the site is altered to perform a function wholly unrelated to its present satellite tracking and control function.

At SLC-3, the entire launch complex was thoroughly documented in 1993. This study, Historic American Engineering Record (HAER) recordation No. CA-133-1 was mitigation for the adverse effects of the Atlas II program at SLC-3 East and was required by a three-party Programmatic Agreement (PA). In 1999, development of the Evolved Expendable Launch Vehicle (EELV) program at SLC-3 West required a follow-on PA between VAFB and SHPO. The new PA clarifies the scope of the original 1993 HAER effort, and qualifies that study as mitigation for the adverse effects of the 1999 EELV program. Since the entire site has been recorded to HAER standards, only the complete demolition of SLC-3 will require a statutory Section 106 consultation in the future.

4.2.2 Sites Significant for their Distinctive Physical Characteristics and their Historic Function

Sites in this category qualify for listing in the NRHP based on their historic function and their exceptionally important architectural or engineering design. For the purposes of Section 106 consultation concerning the mitigation of impacts, engineering design and architecture take precedence over historic function. Sites in this category are: SLC-5, GERTS, Peacekeeper Launch Facilities LF-02, LF-05, and LF-08, and SLC-10.

Undertakings compromising the physical integrity of contributing elements of these sites have an adverse effect on the sites, and will require VAFB to complete the statutory Section 106 process. Preventive maintenance, normal repairs and upgrades, as defined above, do not require Section 106 consultation.

SLC-10 is significant for both its distinctive physical characteristics and its historic function. In addition, SLC-10 was designated a National Historic Landmark as part of the 1986 "Man In Space" thematic study conducted by the National Park Service (NPS). All undertakings affecting SLC-10 will follow the guidelines and procedures outlined in the NHPA and in 36 CFR 800, or in a PA that specifically addresses SLC-10.

4.3 Historic Districts

4.3.1 Western Range Landbased Instrumentation Support Systems Historic District

The WRLISSHD is composed of a number of sites (both on VAFB, and also at three remote locations in other parts of California) that are significant based on their historic function. Each site is comprised of a number of contributing elements that together convey a sense of that site's historic function. Preventative maintenance,

repairs, and normal upgrades that do not modify a site's contributing elements will not require VAFB to complete the standard Section 106 process.

Undertakings that modify contributing elements of the historic sites in the WRLISSHD, but do not compromise the functional integrity of these sites (e.g., as a telemetry site or as an optical site), still constitute incremental and cumulative changes. While these evolutionary upgrades are common at highly technical and scientific installations, some documentation to preserve a record of these changes is necessary. In such cases, VAFB will prepare a documentation packet consisting of photographic prints, design plans, and a description of the undertaking. Normally, color, 5" x 7" photographic prints from 35-mm film negatives will be produced. Digital camera images, and video film (magnetic tape media) may also be used to record "before and after" images of the affected facility. This packet will be archived at 30 CES/CEVPC at VAFB.

Undertakings that adversely affect the ability of a site's contributing elements to convey a sense of the site's historic function will require VAFB to complete the statutory Section 106 process. This would occur, for example, when contributing elements are completely removed or replaced, when an entire site is demolished, or when a site is altered to perform a function wholly unrelated to its historic function.

4.3.2 Rail Garrison Historic District

The Rail Garrison Historic District is composed of a number of facilities that are significant based on their historic function and their exceptionally important architectural or engineering design. For the purposes of Section 106 consultation concerning the mitigation of impacts, significance of the engineering and architecture takes precedence over significance based on historic function.

Undertakings compromising the physical integrity of any of these facilities will require VAFB to complete the statutory Section 106 process. Preventive maintenance, normal repairs, and upgrades to these facilities will have no adverse effect and will not require VAFB to conduct Section 106 consultations or to take any other actions.

5. SUMMARY OF MANAGEMENT AND TREATMENT PROCEDURES

Section 106 consultations will be initiated by VAFB when undertakings are proposed that will change the physical layout and/or design of the contributing elements of the GERTS, LF-02, LF-05, LF-08, SLC-5, and the contributing elements of the Rail Garrison Historic District. For these properties, undertakings that do not change the physical layout or design of the contributing elements have no adverse effect and will not require VAFB to complete a Section 106 consultation.

The remaining historically significant Cold War resources at VAFB are eligible for the NRHP because of their direct support of exceptionally important Cold War programs. The majority of these properties are dynamic, active technical facilities that are significant for their function, not for their physical design. Only undertakings that compromise the ability of these properties to convey a sense of their historic function have an adverse effect and will require VAFB to complete the standard Section 106 process. Upgrades

and other necessary modifications to these properties that do not compromise their ability to convey a sense of their historic function will be considered to have no adverse effect. Unless contributing elements are removed or completely replaced, such modifications will not require formal Section 106 consultations, although VAFB will record and document these modifications as outlined in Sections 4.2.1 and 4.3.1.

In all cases, for all the eligible VAFB Cold War properties, decommissioning or abandonment will require formal Section 106 consultation. Demolition of an entire site or of one or more contributing elements will require Section 106 consultation, as will new construction within a site that is not compatible with the original structure or existing site elements. Also, a change in the function, purpose, or use of an eligible site will require formal Section 106 consultation.

SLC-10 is listed in the National Register as a National Historic Landmark. VAFB will initiate consultations with the SHPO, the Council, and the NPS for any proposed undertakings that would affect the contributing elements of SLC-10.

6. VAFB INTENTIONS CONCERNING PROPOSED AND POTENTIAL DISCONTIGUOUS HISTORIC DISTRICTS CONTAINING NON-VAFB CONTRIBUTING ELEMENTS

The TSCRRC study of VAFB Cold War properties proposes the establishment of one NRHP eligible discontiguous historic district, and mentions the potential eligibility of a second discontiguous historic district. The proposed eligible district is the Western Range Landbased Instrumentation Support Systems Historic District, or WRLISSHD. It is discussed in summary fashion in volume 1 of TSCRRC's evaluation of VAFB Cold War properties.[7] The potential district is the Satellite Control Historic District (SCHD). If proposed and found eligible, the SCHD would include the two eligible VTS facilities (23201 and 23235), the Satellite Control Center at Onizuka Air Force Base (OAFB), and the network of remote satellite tracking stations located in the Pacific and elsewhere. Details of the potential SCHD are summarized in volume 2 of the TSCRRC study.[8]

The scope of the TSCRRC study of VAFB Cold War properties did not include the remote landbased tracking and control stations. Consequently, the study volumes offer little detail about the proposed and potential discontiguous districts. Although other cultural resource studies have previously evaluated the five non-VAFB contributing elements of the WRLISSHD (located at Pillar Point, Santa Ynez Peak, and Anderson Peak), presently VAFB does not have the resources to reevaluate these WRLISSHD sites or to inventory and evaluate NRHP eligible elements of the potential SCHD.

In sum, VAFB will assume that the contributing elements of the discontiguous WRLISSHD are eligible for the National Register, and will manage them in accord with

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[7] *Cold War Properties Evaluation - Phase I: Inventory and Evaluation of Launch Complexes and Related Facilities at Vandenberg Air Force Base, California* (February 1996), pages 59-61.

[8] *Cold War Properties Evaluation - Phase II: Inventory and Evaluation of Minuteman, MX Peacekeeper, and Space Tracking Facilities at Vandenberg Air Force Base, California* (June 1997), pages 267-281. Note that VAFB does not directly control the remote sites that have satellite tracking stations.

this PA and HPP. Significant historical documentation, construction plans, and other data related to potential contributing elements of the discontiguous SCHD will be collected and retained for possible evaluation and use in the future.

7. FINDING OF NRHP ELIGIBILITY vs. FUTURE MITIGATION: VAFB INTENTIONS CONCERNING MITIGATION OF SIMILAR COLD WAR-ERA MILITARY FACILITIES

The determination of eligibility (or *potential* eligibility) is a critical step in the process of Cultural Resource Management (CRM). Significance (and therefore NRHP eligibility) is normally determined separately from issues of preservation. However, in the case of the Air Force and its legacy of Cold War weapons systems, great numbers of similar missile silos, launch facilities, and control centers remain throughout the western and Midwestern United States. Both logic, and the continuing decline in CRM funding argue that new methods are needed to manage these similar "cookie-cutter" sites.

Regardless of how scores (or hundreds) of similar Cold War sites should be managed, the formal determination of eligibility is important for two reasons. First, definitive national guidance (from the Air Force or the Department of Defense) relevant to the management of Cold War resources is still wanting. Second, no easily accessible nationwide database is yet available listing all known Cold War resources. Lacking such a nationwide database, the determination of potential NRHP eligibility is currently the only way available to acknowledge the existence of historic Cold War properties.

A number of similar Minuteman and Peacekeeper facilities at VAFB are deemed eligible for NRHP listing. While this determination of eligibility is important for future management of these resources, it should not be construed as giving equal mitigatory protection to all the historic properties in question. Current resources in the Cold War CRM program at VAFB will not allow identical, repetitive mitigation to be applied to similar NRHP eligible sites. In sum, when a future Air Force undertaking affects one of a block of similar "cookie-cutter" historic properties (e.g., Minuteman silos or launch facilities), the entire suite of sites will be considered in the mitigation effort. Further, if it is determined that similar silos or launch facilities have been documented and/or preserved elsewhere, then it is possible the undertaking at VAFB may be allowed to proceed with no local mitigation or documentation (although the normal statutory Section 106 consultation with the SHPO would be necessary).

8. DECLASSIFICATION OF COLD WAR-ERA MILITARY RECORDS AND INTELLIGENCE, AND ITS EFFECT ON NATIONAL REGISTER-ELIGIBLE PROPERTIES AT VAFB

While the system to declassify national security records was cited as "hopelessly clogged" in 1994,[9] the declassification of important Cold War documents continues, and a

[9]Center for Air Force History, Coming in from the Cold. Military Heritage in the Cold War. Report on the Department of Defense Legacy Cold War Project (Washington, DC: Department of Defense Legacy Resource Management Program, June 1994), 29.

reconsideration of the methods normally used may succeed in speeding up the process. Still, it is expected that important military, national security, and intelligence documents from the Cold War will remain to be examined and declassified until well into the next millennium. One must assume that the data contained in at least a tiny percentage of these millions of pages will have some relevance to Vandenberg AFB.

When previously classified intelligence, covert histories, or other data concerning sites or properties at VAFB become known, they will be considered for their content and their bearing on the existing list of NRHP-eligible properties. If important data become available concerning a site or facility not previously considered to be eligible, then the cultural resources staff at 30 CES/CEVPC will reevaluate the property, using the same methods and criteria originally developed and applied by TSCRRC. When new information indicates that a property previously thought ineligible may be eligible, VAFB will notify the SHPO. The normal Section 106 consultation process, between VAFB and the SHPO, will determine if the property will be added to the list of NRHP eligible properties protected under this Programmatic Agreement.

Although it is possible that newly declassified information will precipitate the removal of a property from the list of NRHP-eligibles, this situation is thought to be highly unlikely. If, however, information is received which causes VAFB to reevaluate a property, and if the property appears to be ineligible given the new information, and if the property in question is in the Area of Potential Effect of an Air Force undertaking, then VAFB will initiate formal Section 106 consultation proceedings with the SHPO.

APPENDIX A

SUMMARY LIST OF PROPERTIES DEEMED ELIGIBLE FOR THE NRHP
AT
VANDENBERG AIR FORCE BASE, CALIFORNIA

PHASE I PROPERTIES IDENTIFIED BY USACERL

Contributing Elements of Space Launch Complex 2

The following facilities are eligible for the NRHP under **Cold War Criterion A** as a result of SLC-2's historic function as a launch complex that directly supported operational missions of exceptionally important Cold War programs.

SLC-2 West

Facility 1622	Blockhouse
Facility 1623	Mobile Service Tower
Facility 1662	Tank Farm
Facility 1623A	Trailer Shelter
Facility 1623B	Trailer Shelter
	Electric Cableway
	Fixed Umbilical Tower
	Flame Bucket / Flame Trench
	Fuel Propellant Transfer Unit
	Fuel Propellant Transfer Unit Pond
	Fuel Tank Revetment
	LOX Tank Revetment
	Oxidizer Propellant Transfer Unit
	Water Valve Pit

Contributing Elements of Space Launch Complex 3

The following facilities are eligible for the NRHP under **Cold War Criterion A** as a result of SLC-3's historic function as a launch complex that directly supported operational missions of exceptionally important Cold War programs. Note: In 1993, SLC-3 was documented according to HABS/HAER standards.

SLC-3 East

Facility 751	Launch and Service Facility
	Retention Basin and Deluge Channel
	Mobile Service Tower and Umbilical Mast

SLC-3 West

Facility 770	Launch and Service Facility
	Mobile Service Tower and Umbilical Mast
	Retention Basin and Deluge Channel

SLC 3 (Shared Facilities)

Facility 763 Launch Operations Facility
Facility 766 Launch Vehicle Support Facility

Contributing Elements of Space Launch Complex 5

The following facilities are eligible for the NRHP under **Cold War Criterion A** as a result of SLC-5's historic function as a launch complex that directly supported operational missions of exceptionally important Cold War programs. These facilities are also eligible under **Cold War Criterion D** as a result of SLC-5's distinctive launch technology that, along with these facilities, has remained relatively unchanged since the early 1960s.

Facility 578 Cosmodyne Shelter
Facility 579 Motor Building
Facility 580 Terminal Building / Launch Shelter
Facility 582 Launcher Support Building
Facility 589 Blockhouse

Contributing Elements of Space Launch Complex 10

The following facilities at SLC-10 are eligible for listing as contributing elements to a National Historic Landmark (NHL) under **NHL Criterion 1** due to their direct contribution to operational missions of the Air Force's Thor training program, the nation's military space program, and the Air Force Program 437. SLC-10 also qualifies as a NHL under **NHL Criterion 4** as the best surviving example of a launch complex built in the 1950s at the beginning of the American effort to explore space.

SLC-10 East

Facility 1651 East Pad Shelter
Facility 1664 Storage and Maintenance Facility

SLC-10 West

Facility 1657 Office and Administration Facility
Facility 1658 Shelter/ Electrical Equipment Building
Facility 1659 Storage and Maintenance Facility
Facility 1663 Storage and Maintenance Facility

SLC-10 (Shared Facilities)

Facility 1654 Blockhouse

Contributing Elements of the GERTS

The following facilities are eligible for the NRHP under **Cold War Criterion A** resulting from the GERTS historic function as a missile command guidance system that directly supported operational missions of exceptionally important Atlas space programs and Atlas and Titan ICBM programs during their critical design, development, and testing phases. The GERTS facility is also eligible for the NRHP under **Cold War Criterion D** for its distinctive technological characteristics as the only surviving example of the MOD-3 command guidance system.

Facility 470 Rate Receiver Station
Facility 480 Rate Receiver Station
Facility 488 Range Operations Building

Contributing Elements of the Proposed Western Range Landbased Instrumentation Support Systems Historic District (WRLISSHD)

The following facilities are eligible for the NRHP under **Cold War Criterion A** and the last part **Cold War Criterion D** as contributing elements of a district that provided direct support to the numerous ballistic missile and space missions originating at VAFB throughout the Cold War era.

Contributing Elements of the Proposed WRLISSHD Located at VAFB:

Facility 7000 Western Range Control Center, North VAFB

Vandenberg Telemetry Receiving Site, South VAFB

Facility 81 Ten Meter Antenna
Facility 86 GKR-7 Autotrack Antenna
Facility 75 Vandenberg Telemetry Receiving Site Control Center

Optical Systems

Facility 181 LA-24 Optical Tracking Radar, South VAFB

Radar Systems

Facility 907 TPQ-18 Radar Facility, South VAFB
Facility 178 FPS 16-1 Radar Facility, South VAFB

Contributing Elements of the Proposed WRLISSHD at Satellite Installations:

Pillar Point Air Force Station, California

Facility 18 AN/FPQ-6 Radar Facility
Facility 22 Telemetry Antenna
Facility 40 Telemetry Antenna

Santa Ynez Peak, California

Facility 21 Recording Optical Tracking Instrument (ROTI)

Anderson Peak Optical Site at Big Sur, California

Facility 3 Deployment Mapping Instrument Telescope (DMI)

PHASE II PROPERTIES IDENTIFIED BY USACERL

Minuteman Facilities

The following facilities are eligible for the NRHP under **Cold War Criterion A** for their function as facilities providing direct support to the exceptionally important ICBM program. *Note: LF-07 and MAF 01B were decommissioned in March 1997, with mitigation, per Section 106 consultation with SHPO.

Launch Facilities

Facility 1972 LF-03
Facility 1980 LF-06
Facility 1976 LF-04
Facility 1981 LF-07*
Facility 1993 LF-09
Facility 1963 LF-10
Facility 1967 LF-26

Missile Alert Facilities

Facility 1450 MAF-DO
Facility 1565 MAF-EO
Facility 1974 MAF-O1A
Facility 1978 MAF-O1B*
Launch Support Center (LSC) for LF-03 and LF-06

Missile Procedures Trainers

Facility 8195
Facility 7403

Peacekeeper Facilities

The following facilities are eligible for the NRHP under **Cold War Criterion A** for their function as facilities providing direct support to the exceptionally important MX and Peacekeeper ICBM program, and **Cold War Criterion D** for the unique architectural and engineering characteristics associated with the 'cold launch' concept.

Launch Facilities

Facility 1971: LF-02
Facility 1977: LF-05
Facility 1986: LF-08

The following facility is eligible for the NRHP under **Cold War Criterion A** for is function as a facility that provided direct support to the exceptionally important MX Peacekeeper ICBM program.

Missile Alert Facilities

Facility 1987: MAF-O1E

Peacekeeper Rail Garrison Complex

The following facilities are eligible for the NRHP as contributing elements to a proposed Rail Garrison Historic District under **Cold War Criterion A** for their association with critical Cold War nuclear strategic planning, and under **Cold War Criterion D** as facilities that together represent a unique ICBM basing concept.

Facility 1819	Missile Assembly Building
Facility 1886	Rail Transfer Facility
Facility 1862	Rail Garrison Launch Site
Facility 1894	Test Igloo
Facility 1900	Integration Refurbishment Facility
	Test Loop
	Rail Spur

Vandenberg Tracking Station

The following facilities are eligible for the NRHP under **Cold War Criterion A** for their function as facilities providing direct support to the numerous ballistic missile and space missions originating at VAFB throughout the Cold War era, and **Cold War Criterion D** as contributing elements to a potential satellite control historic district that would include the network of remote tracking stations and the Satellite Control Center at Onizuka AFB.

Facility 23201	UHF Building and 60' Telemetry Tracking and Control Antenna
Facility 23235	VHF Antenna Building and Antenna Support Structure.

PHASE III PROPERTIES IDENTIFIED BY USACERL

Titan II Facilities

The following facilities are eligible for the NRHP under **Cold War Criterion A** for their function as facilities providing direct support to the exceptionally important Titan II ICBM
program.

Complex 395-C

1 FACILITY 1050:

Access Portal
Launch Control Center
Blast Lock Structure
Cableway
Silo
Oxidizer Hardstand
Fuel Hardstand
Cooling Tower Pit
Air Intake and Air Exhaust Vents

APPENDIX C

Air Quality Analysis

Appendix C Air Quality Analysis

Detailed engineering analyses for identified Capital Improvement Program (CIP) projects described in the 2007 Vandenberg Air Force Base (VAFB) General Plan (2007 General Plan – VAFB 2007 *In progress*) have not been completed; thus equipment usages have not been generated for any of these projects. Documentation from previously planned and/or executed VAFB construction projects was reviewed to develop a generic equipment list and usages for a worst-case scenario project, representative of identified CIP projects addressed in this Programmatic Environmental Assessment. This worst-case scenario representative project combined the CIP project with the construction of the largest facility with the project with the largest area of disturbed acreage. Procedures and equations used to calculate air emissions for this worst-case scenario are detailed below.

Technical Assumptions and Emission Calculation

Proposed Action

Under the CIP, the 2007 General Plan proposes the construction of a number of new facilities over a 10-year period starting in fiscal year 2007. For the purposes of this air quality analysis, a worst-case scenario representative project, hereafter representative project, was developed that combines the CIP project with the construction of the largest facility with the project with largest area of disturbance to estimate air emissions that would represent the annual worst-case scenario throughout the 10-year period. The construction of the Mission Support Group Headquarters is the CIP project with the construction of the largest facility at 9,290 square meters while the 30th Space Wing Headquarters is the CIP project with the largest area of disturbance at 13.6 acres.

Equipment usages from prior construction projects were reviewed to estimate equipment usages for this representative project. Table C-1 presents equipment usages for the estimated reasonable daily worst-case scenario, including equipment size and load factors. Table C-2 shows the emissions factors used in this analysis, and Tables C-3 and C-4 show the reasonable estimated worst-case daily and total project emissions. Because implementation of selected construction projects in the representative project would start in 2010, emissions were estimated using 2010 emission factors.

Projects proposed under the Proposed Action would be similar in nature, i.e. involve similar construction activities. After a detailed engineering study is prepared for the construction of each facility, the 30th Civil Engineer Contracts (30 CES/CEC) would submit an Air Force Form 813, *Request for Environmental Impact Analysis* (AF Form 813) to the 30th Space Wing Environmental Flight (30 CES/CEV) at the time of each project's implementation. The AF Form 813 would include the project design, specific construction requirements, a detailed equipment list, and an estimate of air emissions based upon the methodology detailed in this appendix. The 30 CES/CEV would maintain a calendar year and 12-month rolling air inventory. When the cumulative calendar year emissions of nitrogen oxide (NO_x), or reactive organic compound (ROC) reach but not exceed 548 pounds per day (lbs/day) or 100 tons/year, that request would receive clearance, but no further

environmental clearances for projects would be given until the following calendar year. At no time will environmental clearances be given if specific project emissions plus cumulative calendar year emissions of NO_x, or ROC exceed 548 lbs/day or 100 tons/year.

Sources of air emissions from projects included under the Proposed Action would include combustive and fugitive emissions. Combustive emission would come from construction equipment, employee commuting, and trucks. Fugitive emissions would come from construction equipment disturbing the sites.

Combustive Emissions

Actual daily combustive and vehicular emissions for each project under the Proposed Action would be calculated at the time of implementation based on the information submitted in the AF Form 813.

For combustive emissions from construction equipment, the daily emissions for the representative project were calculated by multiplying the equipment horsepower, the load factor, the emission factor, the number of equipment and the hours of operation for a day. Project emissions were calculated by multiplying the equipment horsepower, the load factor, the emission factor, the number of equipment, and the hours of operation during the project. As shown in Table C-1, the default horsepower and load factors from URBEMIS 2007 (Jones & Stokes Associates 2007) were used. Emission factors for the construction equipment, also from URBEMIS 2007 (Jones & Stokes Associates 2007), are shown in Table C-2. In the future, if better emission factors and load factors become available, new data would be used to provide more accurate emissions calculations.

Vehicular emissions from employees commuting and truck trips for the representative project were estimated by multiplying the total number of trips per day, the distance traveled, and the emission factor. Project emissions were calculated by multiplying number of trips per day by the distance traveled by the numbers of days in the project by the emission factor. It was assumed the average, one-way employee commute is 25 miles, while for the trucks delivering materials, an average one-way trip of 45 miles was assumed. Emission factors for commuting employees and trucks hauling materials were obtained from California Air Resources Board's EMFAC 2007 (v2.3) BURDEN model run by the South Coast Air Quality Management District. The emission factors for employee commuting and construction trucks are shown in Table C-2.

Fugitive Dust

Equipment operating on construction sites would disturb soil and create fugitive dust. Maps included with the AF Form 813 would be used to estimate the area disturbed by construction equipment. This area would be multiplied by the hours of operation by the emission factor of 3.49 pounds of particulate matter 10 microns or less in diameter (PM_{10}) per acre per hour to estimate the daily emissions (Santa Barbara County Air Pollution Control District [SBCAPCD]). The 3.49 pounds per acre per hour includes site watering to achieve a 50% reduction in PM_{10}. The project PM_{10} emissions would be estimated by multiplying daily emissions by the number of days the site would be disturbed.

Table C-1. Estimated daily equipment usage for representative project.

Equipment Category	Horse Power	Load Factor	# of Pieces of Equipment	Hrs/Day	Total Hrs
Site Grading					
Bulldozer	240	0.59	1	8.00	80
Scraper	265	0.66	2	8.00	80
Track Loader	121	0.59	1	8.00	80
Backhoe	77	0.47	1	8.00	80
Water Truck	250	0.47	1	5.00	50
Dump Truck [(a)]	25	2.00	4	NA	40
Foreman's Truck [(a)]	25	2.00	2	NA	20
Crew Trucks [(a)]	25	2.00	16	NA	160
Road, Parking Lot and Utility Construction					
Compactor (70 Hp)	70	0.53	1	6.00	120
Compactor (32 Hp)	32	0.53	1	6.00	120
Paver	153	0.59	1	6.00	120
Road Grader	137	0.58	1	6.00	120
Skid Steer Loader	78	0.52	1	6.00	120
Water Truck	250	0.47	1	4.00	80
50 Kw Generator	65	0.74	1	4.00	80
Asphalt Truck [(a)]	45	2.00	6	NA	180
Foreman's Truck [(a)]	25	2.00	2	NA	40
Crew Trucks [(a)]	25	2.00	16	NA	320
Facility Construction					
100-ton Crane	270	0.43	1	3.00	660
Backhoe	77	0.47	4	5.00	1,100
Forklift	125	0.48	4	8.00	1,760
Scraper	265	0.66	1	7.00	1,540
Skid Steer Loader	78	0.52	1	6.00	1,320
Trencher (13 Hp)	13	0.70	1	7.00	1,540
Trencher (45 Hp)	45	0.70	1	7.00	1,540
Cement Truck [(a)]	45	2.00	6	NA	1,980
Delivery Truck [(a)]	45	2.00	4	NA	1,320
Dump Truck [(a)]	25	2.00	2	NA	440
Foreman's Truck [(a)]	25	2.00	2	NA	440
Crew Trucks [(a)]	25	2.00	32	NA	7,040
Fugitive Dust[(b)]					
Average Day					
Site Grading	1.36				72
Road & Parking Lot Construction	0.34				152
Facility Construction	0.03				1,752
Worst-Case Day					
Site Grading	4.08				8
Road & Parking Lot Construction	1.02				8
Facility Construction	0.09				8

NOTES:
(a) For this source, Horsepower indicates number of miles for a one-way trip, # of Pieces of Equipment indicates the number of one-way trips per day, and Total Hours indicates the total number of one-way trips.
(b) For this source, Horsepower indicates number of acres disturbed in one day and Total Hours indicates the number of hours of disturbance.

Table C-2. Construction equipment emission factors for representative project.

Equipment Category	Emission Factor (gm/hp-hr)					Ref.	Category
	CO	NO_x	PM_{10}	ROG	SO_x		
Site Grading							
Bulldozer Cat D7R	0.735	2.822	0.095	0.258	0.004	(1)	Tractors/Loaders/Backhoe
Scraper Cat 611	1.440	4.852	0.197	0.512	0.005	(1)	Scrapers
Track Loader Cat 953C	2.191	3.426	0.312	0.550	0.004	(1)	Tractors/Loaders/Backhoe
Backhoe Cat 416D	3.658	3.211	0.322	1.296	0.004	(1)	Tractors/Loaders/Backhoe
Water Truck Ford F750	0.837	3.144	0.112	0.319	0.004	(1)	Off-Highway Truck
Dump Truck 10 yd^3 [(a)]	0.011955	0.038221	0.001831	0.003042	0.000041	(2)	Heavy Heavy Duty Diesel Truck[(a)]
Foreman's Truck [(a)]	0.008263	0.000918	0.000087	0.000914	0.000011	(2)	Passenger Vehicles[(a)]
Crew Trucks [(a)]	0.008263	0.000918	0.000087	0.000914	0.000011	(2)	Passenger Vehicles[(a)]
Road, Parking Lot and Utility Construction							
Asphalt Truck	0.011955	0.038221	0.001831	0.003042	0.000041	-2	Heavy Heavy Duty Diesel Truck[(a)]
Compactor Cat CB-214D	1.314	2.504	0.129	0.391	0.004	(1)	Rollers
Compactor Cat CB-434C	3.885	3.375	0.358	1.557	0.004	(1)	Rollers
Paver Cat BG-240C	2.188	4.406	0.248	0.563	0.004	(1)	Pavers
Road Grader Cat 120H	2.527	4.290	0.393	0.719	0.004	(1)	Graders
Skid Steer Loader 262B	3.658	3.211	0.322	1.296	0.004	(1)	Tractors/Loaders/Backhoes
Water Truck Ford F750	0.837	3.144	0.112	0.319	0.004	(1)	Off-Highway Truck
50 Kw Generator	3.965	4.207	0.387	1.515	0.005	(1)	Generator Sets
Foreman's Truck [(a)]	0.008263	0.000918	0.000087	0.000914	0.000011	(2)	Passenger Vehicles[(a)]
Crew Trucks [(a)]	0.008263	0.000918	0.000087	0.000914	0.000011	(2)	Passenger Vehicles[(a)]
Facility Construction							
100-ton Crane	0.755	2.698	0.102	0.271	0.003	(1)	Cranes
Backhoe Cat 416D	3.658	3.211	0.322	1.296	0.004	(1)	Tractors/Loaders/Backhoe
Cement Truck [(a)]	0.011955	0.038221	0.001831	0.003042	0.000041	(2)	Heavy Heavy Duty Diesel Truck[(a)]
Delivery Truck [(a)]	0.011955	0.038221	0.001831	0.003042	0.000041	(2)	Heavy Heavy Duty Diesel Truck[(a)]
Forklift Grandsal 544D	2.342	3.700	0.344	0.616	0.004	(1)	Forklifts
Scraper Cat 611	1.440	4.852	0.197	0.512	0.005	(1)	Scrapers
Skid Steer Loader 262B	3.658	3.211	0.322	1.296	0.004	(1)	Tractors/Loaders/Backhoes
Trencher Ditchwitch 1230	2.605	3.110	0.117	0.497	0.007	(1)	Trenchers
Trencher Ditchwitch 3700	5.657	4.692	0.525	2.381	0.006	(1)	Trenchers
Dump Truck 10 yd^3	0.011955	0.038221	0.001831	0.003042	0.000041	(2)	Heavy Heavy Duty Diesel Truck[(a)]
Foreman's Truck [(a)]	0.008263	0.000918	0.000087	0.000914	0.000011	(2)	Passenger Vehicles[(a)]
Crew Trucks [(a)]	0.008263	0.000918	0.000087	0.000914	0.000011	(2)	Passenger Vehicles[(a)]
Fugitive Dust			3.490			(3)	SBCAPCD Form 24[(b)]

REFERENCES:
(1) URBEMIS 2007 Version 9.2, Appendix I - Construction Equipment Emission Factors, Year 2010
(2) EMFAC 2007 Version 2.3 On-Road Emission Factors, Year 2010
(3) SBCAPCD Form 24 Construction Equipment Emission Factors
NOTES:
(a) Emission factor from SCAQMD CEQA On-Road Vehicles are in lbs/mile
(b) Emission factor is controlled in units of lbs/acre-hr with PM_{10} fraction 0.64 and Control Efficiency of 50%.

Table C-3. Estimated daily emissions for representative project.

Emission Source	Daily Emissions (Lbs)				
	CO	NO_x	PM_{10}	ROC	SO_x
Site Grading					
Bulldozer Cat D7R	1.836	7.048	0.237	0.644	0.010
Scraper Cat 611	8.884	29.934	1.215	3.159	0.031
Track Loader Cat 953C	2.759	4.314	0.393	0.692	0.005
Backhoe Cat 416D	2.310	2.028	0.203	0.137	0.003
Water Truck Ford F750	1.084	4.072	0.145	0.069	0.005
Dump Truck 10 yd^3 [(a)]	2.391	7.644	0.366	0.608	0.008
Foreman's Truck [(a)]	0.826	0.092	0.009	0.091	0.001
Crew Trucks [(a)]	6.610	0.735	0.070	0.731	0.009
Fugitive Dust Worst-Case Day			56.957		
Total	***26.699***	***55.865***	***59.595***	***6.132***	***0.072***
Road, Parking Lot and Utility Construction					
Asphalt Truck [(a)]	6.455	20.639	0.989	1.642	0.022
Compactor Cat CB-214D	0.295	0.562	0.029	0.015	0.001
Compactor Cat CB-434C	1.907	1.656	0.176	0.128	0.002
Paver Cat BG-240C	2.613	5.261	0.296	0.112	0.005
Road Grader Cat 120H	2.633	4.470	0.410	0.125	0.004
Skid Steer Loader 262B	1.944	1.706	0.171	0.115	0.002
Water Truck Ford F750	0.867	3.258	0.116	0.055	0.004
50 Kw Generator	1.682	1.784	0.164	0.643	0.002
Foreman's Truck [(a)]	0.826	0.092	0.009	0.091	0.001
Crew Trucks [(a)]	6.610	0.735	0.070	0.731	0.009
Fugitive Dust Worst-Case Day			14.239		
Total	***25.832***	***40.163***	***16.668***	***3.657***	***0.052***
Facility Construction					
100-ton Crane	0.580	2.072	0.078	0.035	0.002
Backhoe Cat 416D	5.775	5.069	0.508	0.341	0.006
Cement Truck [(a)]	6.455	20.639	0.989	1.642	0.022
Delivery Truck [(a)]	4.304	13.760	0.659	1.095	0.015
Forklift Grandsal 544D	9.913	15.661	1.456	0.435	0.017
Scraper Cat 611	3.887	13.096	0.532	0.231	0.013
Skid Steer Loader 262B	1.944	1.706	0.171	0.115	0.002
Trencher Ditchwitch 1230	0.363	0.434	0.016	0.012	0.001
Trencher Ditchwitch 3700	2.730	2.265	0.253	0.192	0.003
Dump Truck 10 yd^3 [(a)]	1.195	3.822	0.183	0.304	0.004
Foreman's Truck [(a)]	0.826	0.092	0.009	0.091	0.001
Crew Trucks [(a)]	13.220	1.469	0.139	1.462	0.017
Fugitive Dust Worst-Case Day			2.589		
Total	***51.193***	***80.084***	***7.583***	***5.956***	***0.105***
Daily Project Total	**103.724**	**176.112**	**83.845**	**15.745**	**0.228**

Table C-4. Estimated project emissions for representative project.

Emission Source	Project Emissions (Lbs)				
	CO	**NO_x**	**PM_{10}**	**ROC**	**SO_x**
Site Grading					
Bulldozer Cat D7R	18.356	70.475	2.372	6.443	0.100
Scraper Cat 611	88.838	299.335	12.154	31.587	0.308
Track Loader Cat 953C	27.587	43.136	3.928	6.925	0.050
Backhoe Cat 416D	23.100	3.384	2.033	8.184	11.458
Water Truck Ford F750	10.841	6.796	1.451	4.132	23.500
Dump Truck 10 yd^3 [(a)]	95.636	305.768	14.645	24.333	0.330
Foreman's Truck [(a)]	16.526	1.836	0.174	1.828	0.022
Crew Trucks [(a)]	1,057.633	117.522	11.133	116.991	1.379
Fugitive Dust			341.741		
Total (Lbs)	***1,338.516***	***848.253***	***389.632***	***200.422***	***37.147***
Total (Tons)	***0.669***	***0.424***	***0.195***	***0.100***	***0.019***
Road, Parking Lot and Utility Construction					
Asphalt Truck [(a)]	774.655	2,476.722	118.624	197.094	2.677
Compactor Cat CB-214D	5.896	1.875	0.579	1.754	8.141
Compactor Cat CB-434C	38.131	5.528	3.514	15.282	17.808
Paver Cat BG-240C	52.252	17.560	5.922	13.445	43.330
Road Grader Cat 120H	52.663	14.920	8.190	14.984	37.812
Skid Steer Loader 262B	38.874	5.695	3.422	13.773	19.282
Water Truck Ford F750	17.345	10.873	2.321	6.611	37.600
50 Kw Generator	33.636	35.689	3.283	12.852	0.042
Foreman's Truck [(a)]	33.051	3.673	0.348	3.656	0.043
Crew Trucks [(a)]	2,115.267	235.044	22.267	233.981	2.757
Fugitive Dust			180.363		
Total (Lbs)	***3,161.768***	***2,807.579***	***348.833***	***513.431***	***169.492***
Total (Tons)	***1.581***	***1.404***	***0.174***	***0.257***	***0.085***
Facility Construction					
100-ton Crane	127.541	76.062	17.231	45.780	229.878
Backhoe Cat 416D	1,270.478	186.117	111.835	450.120	630.168
Cement Truck [(a)]	8,521.210	27,243.943	1,304.866	2,168.031	29.446
Delivery Truck [(a)]	3,787.205	12,108.419	579.940	963.569	13.087
Forklift Grandsal 544D	2,180.910	575.011	320.339	573.630	1,689.600
Scraper Cat 611	855.067	480.819	116.978	304.024	1,346.730
Skid Steer Loader 262B	427.609	62.642	37.641	151.498	212.098
Trencher Ditchwitch 1230	79.907	15.921	3.589	15.245	97.397
Trencher Ditchwitch 3700	600.663	83.143	55.745	252.816	288.981
Dump Truck 10 yd^3 [(a)]	526.001	1,681.725	80.547	133.829	1.818
Foreman's Truck [(a)]	363.561	40.398	3.827	40.216	0.474
Crew Trucks [(a)]	93,071.729	10,341.929	979.743	10,295.183	121.313
Fugitive Dust			188.993		
Total (Lbs)	111,811.880	52,896.130	3,801.274	15,393.941	4,660.989
Total (Tons)	55.906	26.448	1.901	7.697	2.330
Project Total (Lbs)	**116,312.164**	**56,551.962**	**4,539.738**	**16,107.794**	**4,867.628**
Project Total (Tons)	**58.156**	**28.276**	**2.270**	**8.054**	**2.434**

References

Jones & Stokes Associates. 2007. Software User's Guide: URBEMIS2007 for Windows Version 9.2. Emissions Estimation for Land Use Development Projects. November.

Santa Barbara County Air Pollution Control District. 2004. Clear Air Plan. Santa Barbara.

Vandenberg Air Force Base. 2007 *In progress*. Vandenberg Air Force Base 2007 General Plan. 65% Submission.