

**TRAVIS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
ENVIRONMENTAL ASSESSMENT**



Prepared by:



for:



Hanscom AFB, Massachusetts

January 9, 2002

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ES-1
1.0 PURPOSE AND NEED FOR ACTION.....	1
1.1 INTRODUCTION	1
1.2 PURPOSE OF THE ACTION	2
1.3 NEED FOR THE ACTION	3
2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES	4
2.1 PROPOSED ACTION: DASR AT TRAVIS AFB.....	4
2.1.1 DASR System.....	4
2.1.2 Alternative ASR-11 Sites.....	9
2.2 NO ACTION ALTERNATIVE.....	11
3.0 AFFECTED ENVIRONMENT.....	15
3.1 LAND USE.....	15
3.1.1 Existing Conditions.....	15
3.1.2 Future Baseline Without Project.....	22
3.2 SOCIOECONOMIC CONDITIONS.....	23
3.2.1 Existing Conditions.....	23
3.2.1.1 Population.....	23
3.2.1.2 Employment.....	27
3.2.1.3 Expenditures of Travis Air Force Base.....	28
3.2.1.4 Housing.....	28
3.2.2 Future Baseline Without Project.....	30
3.3 UTILITIES AND TRANSPORTATION.....	30
3.3.1 Existing Conditions.....	30
3.3.1.1 Water Supply.....	30
3.3.1.2 Wastewater.....	31
3.3.1.3 Solid Waste.....	34
3.3.1.4 Electricity.....	35

TABLE OF CONTENTS (continued)

3.3.1.5 Telephone..... 35

3.3.1.6 Fiber Optic Cable..... 35

3.3.1.7 Natural Gas..... 37

3.3.1.8 Transportation..... 37

3.3.2 Future Baseline Without the Project..... 38

3.4 NOISE..... 39

3.4.1 Existing Conditions..... 39

3.4.2 Future Baseline Without the Project..... 40

3.5 AIR QUALITY..... 40

3.5.1 Existing Conditions..... 41

3.5.2 Future Baseline Without the Project..... 43

3.6 GEOLOGY AND SOILS 43

3.6.1 Existing Conditions..... 43

3.6.1.1 Geology..... 43

3.6.1.2 Soil Resources..... 44

3.6.2 Future Baseline Without the Project..... 45

3.7 SURFACE WATER AND GROUNDWATER 45

3.7.1 Existing Conditions..... 45

3.7.1.1 Surface Water..... 45

3.7.1.2 Groundwater..... 47

3.7.2 Future Baseline Without the Project..... 48

3.8 BIOLOGICAL RESOURCES..... 48

3.8.1 Existing Conditions..... 48

3.8.1.1 Vegetation..... 50

3.8.1.2 Wetlands and Vernal Pools..... 51

3.8.1.3 Wildlife..... 54

3.8.1.4 Threatened and Endangered Species..... 57

3.8.2 Future Baseline Without the Project..... 59

3.9 AESTHETICS 60

3.9.1 Existing Conditions..... 60

TABLE OF CONTENTS (continued)

3.9.2	Future Baseline Without the Project	65
3.10	CULTURAL RESOURCES	65
3.10.1	Existing Conditions	70
3.10.1.1	Archaeological Sites	70
3.10.1.2	Historic Structures	70
3.10.2	Future Baseline Without the Project	71
3.11	POLLUTION PREVENTION AND HAZARDOUS WASTE	72
3.11.1	Existing Conditions	72
3.11.1.1	Pollution Prevention	72
3.11.1.2	Hazardous Waste	72
3.11.2	Future Baseline Without the Project	75
3.12	ELECTROMAGNETIC ENERGY	77
3.12.1	Existing Conditions	77
3.12.2	Future Baseline Without the Project	79
4.0	ENVIRONMENTAL CONSEQUENCES	80
4.1	LAND USE	80
4.1.1	Short-term Impacts	80
4.1.2	Long-term Impacts	82
4.2	SOCIOECONOMICS	83
4.2.1	Short-term Impacts	83
4.2.2	Long-term Impacts	83
4.2.3	Environmental Justice	84
4.3	UTILITIES AND TRANSPORTATION	85
4.3.1	Short-term Impacts	85
4.3.1.1	Water Supply	89
4.3.1.2	Wastewater Treatment	89
4.3.1.3	Solid Waste	89

TABLE OF CONTENTS (continued)

4.3.1.4 Electricity.....	89
4.3.1.5 Telephone.....	90
4.3.1.6 Fiber Optic Cable.....	90
4.3.1.7 Natural Gas.....	90
4.3.1.8 Transportation.....	91
4.3.2 Long-term Impacts.....	91
4.4 NOISE.....	92
4.4.1 Short-term Impacts.....	92
4.4.2 Long-term Impacts.....	92
4.5 AIR QUALITY.....	93
4.5.1 Short-term Impacts.....	93
4.5.2 Long-term Impacts.....	94
4.6 GEOLOGY AND SOILS.....	94
4.6.1 Short-term Impacts.....	94
4.6.2 Long-term Impacts.....	95
4.7 SURFACE WATER AND GROUNDWATER.....	95
4.7.1 Short-term Impacts.....	95
4.7.2 Long-term Impacts.....	96
4.8 BIOLOGICAL RESOURCES.....	96
4.8.1 Short-term Impacts.....	96
4.8.1.1 Vegetation.....	96
4.8.1.2 Wetlands and Vernal Pools.....	97
4.8.1.3 Wildlife.....	97
4.8.1.4 Threatened and Endangered Species.....	98
4.8.2 Long-term Impacts.....	99
4.8.2.1 Vegetation.....	99
4.8.2.2 Wetlands and Vernal Pools.....	99
4.8.2.3 Wildlife.....	100
4.8.2.4 Threatened and Endangered Species.....	100

TABLE OF CONTENTS (continued)

4.9 AESTHETICS 100

 4.9.1 Short-term Impacts 100

 4.9.2 Long-term Impacts..... 101

4.10 CULTURAL RESOURCES 102

 4.10.1 Short-term Impacts 102

 4.10.2 Long-term Impacts..... 102

4.11 POLLUTION PREVENTION AND HAZARDOUS WASTE..... 103

 4.11.1 Short-term Impacts 103

 4.11.1.1 Pollution Prevention..... 103

 4.11.1.2 Hazardous Waste..... 103

 4.11.2 Long-term Impacts..... 104

 4.11.2.1 Pollution Prevention..... 104

 4.11.2.2 Hazardous Waste..... 104

4.12 ELECTROMAGNETIC ENERGY 105

 4.12.1 Short-term Impacts 105

 4.12.2 Long-term Impacts..... 105

5.0 COMPARISON OF ENVIRONMENTAL CONSEQUENCES AND SELECTION OF ENVIRONMENTALLY PREFERRED ALTERNATIVE 109

6.0 MITIGATION 112

7.0 REFERENCES 113

8.0 ACRONYMS AND ABBREVIATIONS 116

9.0 LIST OF PREPARERS 119

APPENDICES

APPENDIX A: LISTING OF AGENCIES AND INDIVIDUALS CONTACTED

APPENDIX B: PRELIMINARY SITE SCREENING CRITERIA FOR TRAVIS AFB

LIST OF FIGURES

Figure 2-1.	Travis AFB Location Map.....	5
Figure 2-2.	Location of Existing Radar Facility and Proposed ASR-11 Sites at Travis AFB.....	6
Figure 2-3.	Typical ASR-11 Facility	8
Figure 2-4.	Alternative ASR-11 Site 3, Travis AFB	12
Figure 2-5.	Alternative ASR-11 Site 7, Travis AFB	13
Figure 2-6.	Alternative ASR-11 Site 8, Travis AFB	14
Figure 3.1-1.	Land Use at Travis AFB	17
Figure 3.1-2.	City of Fairfield Land Use in the Vicinity of Travis AFB.....	20
Figure 3.2-1.	Census Block Groups in the Area of Travis AFB.....	26
Figure 3.2-2.	Employment by Industry for California and the Vallejo-Fairfield-Napa MSA as of March 2001	29
Figure 3.3-1.	Existing Drinking Water Distribution System on Travis AFB.....	32
Figure 3.3-2.	Existing Sanitary Sewer System on Travis AFB	33
Figure 3.3-3.	Existing Electrical System on Travis AFB	36
Figure 3.7-1.	Surface Water Features and Wetlands on Travis AFB	46
Figure 3.9-1.	View Angles for Photographs Taken at ASR-11 Site 3.....	61
Figure 3.9-2.	Photographs of Alternative ASR-11 Site 3.....	62
Figure 3.9-3.	View Angles for Photographs Taken at ASR-11 Site 7.....	63
Figure 3.9-4.	Photographs of Alternative ASR-11 Site 7.....	64
Figure 3.9-5.	View Angles for Photographs Taken at ASR-11 Site 8.....	66
Figure 3.9-6.	Photographs of Alternative ASR-11 Site 8.....	67
Figure 3.9-7.	View Angles for Photographs Taken of Existing AN/GPN-20 Radar	68
Figure 3.9-8.	Photographs of Existing AN/GPN-20 Radar	69
Figure 3.11-1.	Existing IRP Sites on Travis AFB	74
Figure 3.11-2.	Groundwater and Soil Contamination on Travis AFB	76
Figure 4.3-1.	Fiber Optic Cable Detail, Site 3.....	86
Figure 4.3-2.	Fiber Optic Cable Detail, Site 7.....	87
Figure 4.3-3.	Fiber Optic Cable Detail, Site 8.....	88

LIST OF TABLES

Table 2-1.	Comparative Characteristics of Existing AN/GPN-20 and Proposed ASR-11 Primary Surveillance Radar	8
Table 3.1-1.	Land Use Designations at Travis AFB	18
Table 3.2-1.	Population Trends within California, Solano County, and Fairfield	23
Table 3.2-2.	Travis Air Force Base Population.....	24
Table 3.2-3.	Income and Ethnicity Statistics for California, Solano County, Fairfield and the Census Blocks for the Areas of Travis Air Force Base.....	25
Table 3.2-4.	Labor Force, Employment, and Unemployment Data for California, Solano County, and Fairfield for Month of March 2001	28
Table 3.2-5.	Housing Units and Vacancy Status in California and Solano County in 1990.....	29
Table 3.5-1.	National and California Ambient Air Quality Standards.....	42
Table 3.8-1.	Dominant Natural Vegetation Commonly Found on Travis AFB Property	52
Table 3.8-2.	Wildlife Commonly Found on Travis AFB	55
Table 3.8-3.	List of Mammal Species Observed or Known to Occur on Travis AFB	56
Table 3.8-4.	List of Reptile and Amphibian Species Observed or Known to Occur On Travis AFB.....	56
Table 3.8-5.	Threatened and Endangered Species That Occur or Have the Potential to Occur at Travis AFB.....	58
Table 4.3-1.	Required Lengths of New Utility Connections.....	89

EXECUTIVE SUMMARY

This environmental assessment (EA) has been completed as part of the National Environmental Policy Act (NEPA) process, in compliance with U.S. Air Force (USAF) instruction AFI 32-7061. According to this instruction, the EA provides analysis sufficient to determine whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI) and to aid federal agencies in complying with NEPA when no EIS is required.

This EA describes the proposed project to install a Digital Airport Surveillance Radar (DASR) system at Travis Air Force Base (AFB) in California. This proposed action is part of the Department of Defense (DoD) National Airspace System (NAS) Program, which involves installation of new air traffic control equipment on U.S. Army, U.S. Navy, and USAF bases throughout the country. DoD NAS is a component of the aviation system capital investment plan developed by the Federal Aviation Administration (FAA) to modernize approach control systems in the United States and its territories.

The NAS program will comprehensively upgrade air traffic control systems infrastructure by systematically replacing analog systems with state-of-the-art, digital technology. The purpose of the DASR component of the NAS program is to detect and process aircraft position and weather conditions at airfields. The DASR system will use the ASR-11 radar to accurately locate aircraft, in terms of range, azimuth, and altitude; provide information regarding aircraft identification code; identify emergency conditions; and report six discrete weather precipitation levels. The ASR-11 at Travis AFB is needed to replace the older existing AN/GPN-20 Airport Surveillance Radar.

The DASR facilities at Travis AFB would consist of: primary and secondary radar electronics, rotating antenna, 47- to 87-foot tower (depending on the site selected), utility cabling, an uninterrupted power supply, an emergency generator, power conditioning, electronic equipment grounding systems, and a fuel storage system (1,000 gallon aboveground storage tank). Facility construction, including separate concrete foundations for the ASR-11 antenna tower, equipment shelter, and engine generator shelter, as well as fencing, and security systems, would generally occur within a 0.60 acre site (160 feet by 160 feet). Additional miscellaneous site improvements may include minor re-grading, installation of geotextile fabric beneath six inches of crushed stone, and an unpaved access road. Once the new DASR system is operational, the existing AN/GPN-20 will be dismantled and structures will be razed. The ground would be reclaimed by Travis AFB.

Seven areas were initially identified and evaluated as potential ASR-11 sites. An eighth site was identified by ESC personnel and the project team during a site walkover prior to the in-briefing. Four sites were eliminated from further consideration primarily due to conflicts with operational and/or environmental criteria; a fifth site was subsequently eliminated during the downselect teleconference, due to the potential for the generation of false targets. The three remaining alternative sites for Travis AFB have been identified as potential locations for the ASR-11, based on operational, construction, and environmental siting criteria contained in the *National Airspace System Digital Airport Surveillance Radar Siting Plan* and the *Travis AFB Integrated Site Survey Report*. The three remaining sites (3, 7, and 8) are evaluated in this EA.

Site 3 is located off-base on private property that is currently utilized as pasture, within an area classified as Phasing Area E by the City of Fairfield Land Use Map. As such, the site is privately owned land protected from development, reserved for Travis AFB expansion. Site 7 is located south of Perimeter Road, near the abandoned Rapid Runway Repair training area; the site contains windrows and occasional piles of concrete debris partially covered with soil and vegetation. The site is characterized as undeveloped open space by Travis AFB land use mapping. Site 8 is located in the southeastern corner of the base, behind the former WWTP and associated oxidation ponds, and is similarly characterized as undeveloped open space by Travis AFB land use mapping.

Issues that must be addressed during construction at any of the sites are elevated noise levels, increased dust, traffic and access disruption, aesthetic effects, groundwater and storm water management issues, and biological resources. Potential impacts in these areas would be reduced using standard mitigation measures as outlined below:

- ?? To minimize noise impacts during construction, mufflers would be used on construction equipment and vehicles. Noise barriers may also be used to reduce noise levels. These barriers would have the benefit of providing a visual buffer.
- ?? All equipment and vehicles used during construction would be maintained in good operating condition so that emissions are minimized, thus reducing the potential for air quality impacts.
- ?? Dust will be controlled on-site by using water to wet down disturbed areas.
- ?? All areas disturbed for the DASR system construction would be seeded with a grass mixture or covered with a geotextile fabric and crushed stone to stabilize the disturbed soils, in order to minimize the potential for erosion and sedimentation.
- ?? The proposed project should incorporate appropriate BMPs, such as vegetative swales or buffer strips, to reduce the effects of stormwater runoff from the site and along access roads.

- ?? Groundwater levels would be monitored and maintained as necessary. No discharge of groundwater from trenches during construction, if there are known contaminants in the area, shall occur without prior consultation with 60 CES/CEV.
- ?? All hazardous materials used during construction of the ASR-11 would be handled and disposed of in accordance with Travis AFB policies and protocols and all applicable state and federal regulations.
- ?? Traffic management measures will be developed to facilitate traffic flow and pedestrian access.
- ?? Wetland resources areas should be flagged, as a visual barrier to prevent construction or staging activities from directly impacting these areas.
- ?? Surveys for federal/state species of special concern (western burrowing owl) would be required, prior to breeding season in year of construction. If the owls are present and in the way of construction, they would be relocated in coordination/compliance with the California Department of Fish and Game protocols. (Should Site 3 be selected, additional survey for threatened and endangered species (such as fairy shrimp) would be required)

Potential future impacts associated with operation of the ASR-11 facility would be minimized through use of mitigation measures including the following:

- ?? All hazardous materials used during operation of the ASR-11 would be handled and disposed of in accordance with Travis AFB policies and protocols and all applicable state and federal regulations.
- ?? Due to the potential for RFR hazards during operation, warning signs, indicating the safe distance from the operating radar, would be installed at the facility perimeter.

All three sites are acceptable from an environmental perspective. Table ES-1 provides a summary of the potential environmental impacts associated with each of the alternative sites. Due to operational and other base considerations, the Air Force has selected Site 8 as the preferred ASR-11 location; however, this EA identifies potential impacts associated with placing an ASR-11 at any of the alternative sites.

Table ES-1. Environmental Impact Summary Matrix for the Alternative ASR-11 Sites at Travis AFB

Category	No Action Alternative	Removal of Existing AN/GPN-20 System	Installation of the ASR-11 at Site 3	Installation of the ASR-11 at Site 7	Installation of the ASR-11 at Site 8
Land Use	No Impact	Land currently occupied by the AN/GPN-20 could be reclaimed by Travis AFB.	Construction and operation of ASR-11 are anticipated to be compatible with adjacent land uses. Although site is located off-base on privately owned property used for grazing, it is within an easement maintained by Travis AFB and zoned for preserving the opportunity for future expansion of Travis AFB.	Construction and operation of ASR-11 are anticipated to be compatible with adjacent land uses. Although site is located within an undeveloped open space area (previously identified for creation of a Rapid Runway Repair facility), development of mission supporting facilities within this area is considered desirable by base comprehensive planning.	Construction and operation of ASR-11 are anticipated to be compatible with adjacent land uses. Although site is located within an undeveloped open space area (which supports seasonal pheasant hunting), development of mission supporting facilities within this area is consistent with base comprehensive planning.
Socioeconomics	No Impact	Dismantling of AN/GPN-20 expected to have short-term minor contribution to the local economy; no long-term impacts are expected.	Installation of ASR-11 expected to have short-term minor contribution to the local economy; no long-term impacts are expected.		
Utilities and Transportation	No Impact	No impacts to utilities are anticipated. Minor short-term impacts are possible to on-base traffic during dismantling.	A minimal disruption of the electrical system may be expected during ASR-11 installation. Minor short-term impacts to on-base traffic are possible during ASR-11 installation. The potential for impacts are expected to be greater as the distance from existing utilities increases.		
			Lengths of new utility connections: 3,700 feet for electric; 1,500 feet for telephone; and 3,700 feet for fiber optic.	Lengths of new utility connections: 9,300 feet for electric; 450 feet for telephone; and 14,800 feet for fiber optic.	Lengths of new utility connections: 2,800 feet for electric; 2,800 for telephone; and 7,800 feet for fiber optic.
Noise	No Impact	Dismantling of AN/GPN-20 would not create additional short-term noise impacts due to construction activities, compared to proximate flightline activities.	Construction of the ASR-11 would not create any additional short-term noise impacts due to construction activities, compared to proximate flightline activities. Operation of the ASR-11 system would not generate excessive or persistent levels of noise; therefore, no longterm impacts are anticipated.		
Air Quality	No Impact	Short-term impacts from removal of existing AN/GPN-20 are expected to consist of dust generation from construction activities and anticipated to be minimal.	Short-term impacts from installation of the ASR-11 are expected to consist of dust generation from construction activities and anticipated to be minimal. Long-term impacts consist of evaporative fuel loss from aboveground storage tanks and emissions from on-site emergency generator. Neither source is anticipated to represent a substantial impact to air quality.		
Geology and Soils	No Impact	No Impact	All three sites are located within the San Francisco Bay Area, historically known for its seismic activity.		
Surface Water & Groundwater	No Impact	No Impact	No surface water resources are located proximate to sites. Groundwater is anticipated to be encountered during excavation at all three alternative sites. Proper baseprocedures for dewatering and discharge of groundwater would be followed during construction activities. Theproposed project should incorporate appropriate BMPs, such as vegetative swales or buffer strips, to reduce the effects of stormwater runoff fromthe site and along access roads.		
Biological Resources	No Impact	No Impact	Clearing of grassland area, which may support seasonal wetland features. Survey for threatened and endangered species (such as fairy shrimp) would be required, two years prior to construction.	Clearing of grassland/ruderal vegetative community. Site is within 275 to 400 feet of several mapped, small isolated wetland areas. No anticipated impact to threatened and endangered species. Surveys for federal/state species of special concern (western burrowing owl) would be required, prior to breeding season in year of construction.	Clearing of grassland/ruderal vegetative community. Site is within 100 feet of mapped vernal swale, and 100-400 feet of other wetland features, including former oxidation ponds. No anticipated impact to threatened and endangered species. Surveys for federal/state species of special concern (western burrowing owl) would be required, prior to breeding season in year of construction.
Aesthetic Resources	No Impact	No Net Impact	All three alternative sites are located in the south/southeastern area of Travis AFB (or just beyond). Views towards a proposed radar would also include the existing functional military aesthetic provided by various structures along the flightline, such as hangars and the air traffic control tower.		
Cultural Resources	No Impact	Based on cultural resource surveys for Travis AFB, cultural resources are not likely to be present within the proposed project areas for the three alternative sites or the existing AN/GPN-20 facility.			
Pollution Prevention and Hazardous Waste	Hazardous materials used during operation and maintenance of facilities would continue being handled in compliance with all applicable regulations and base policies, therefore no impacts are expected.	Portions of the radar may contain lead paint, which has the potential to chip off during the dismantling.	An Environmental Due Diligence Audit would be required before USAF acquires or leases this property. No contaminated soils anticipated to be encountered during construction. Hazardous materials used during facility operation will be handled in compliance with base policies and regulations.	No contaminated soils anticipated to be encountered during construction, although relocation/disposal of concrete windrows potentially interspersed with asbestos containing materials may be necessary. Hazardous materials used during facility operation will be handled in compliance with base policies and regulations.	No contaminated soils anticipated to be encountered during construction. Although site is located within IRP WP017, it is outside the plume of known contamination. Some construction and landscaping debris may be found in the location of the former ponds. Hazardous materials used during facility operation will be handled in compliance with base policies and regulations.
Electromagnetic Energy	Existing radar system would continue operating in accordance with base protocol, and no impact is anticipated.	No Net Impact	No impacts expected – due to the potential for RFR hazards during operation, warning signs, indicating the safe distance from the operating radar, would be installed at the facility perimeter.		

1.0 PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

The National Environmental Policy Act (NEPA; 42 U.S.C. Sections 4321-4347) is the basic national charter for protection of the environment (CEQ, 1978). NEPA establishes policy, sets goals, and provides the process for carrying out the policy and achieving the goals. NEPA procedures were established to ensure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. To implement NEPA, the U.S. Air Force (USAF) has issued internal instruction AFI 32-7061 (USAF, 1999) that contains policies, responsibilities, and procedures dictating how NEPA should be implemented for USAF projects.

This environmental assessment (EA) has been prepared in compliance with AFI 32-7061. According to this instruction, the environmental assessment is a written analysis which serves to (1) provide analysis sufficient to determine whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI); and (2) aid federal agencies in complying with NEPA when no EIS is required. If this EA were to determine that the proposed project would significantly degrade the environment, significantly threaten public health or safety, or generate significant public controversy, then an EIS would be completed. An EIS involves a comprehensive assessment of project impacts and alternatives and a high degree of public input. Alternatively, if this EA results in a FONSI, then the action would not be the subject of an EIS. The EA is not intended to be a scientific document. The level and extent of detail and analysis in the EA is commensurate with the importance of the environmental issues involved and with the information needs of both the decision-makers and the general public.

The proposed action addressed in this EA is the construction of a Digital Airport Surveillance Radar (DASR; specifically, an ASR-11) at Travis Air Force Base (AFB) in California. This proposed action is part of the Department of Defense (DoD) National

Airspace System (NAS) Program, which involves installation of new air traffic control equipment on U.S. Army, U.S. Navy, and USAF bases throughout the country. These radars are also being installed at commercial airports under the authority of the Federal Aviation Administration (FAA). The implementation of the NAS program at DoD bases was previously evaluated in a programmatic EA and FONSI (USAF, 1995a), which fully detail the need for the program. The programmatic EA and FONSI are available on the internet at <http://www.hanscom.af.mil/ESC-BP/pollprev/products.htm>. Environmental review at FAA airfields is being conducted separately.

The programmatic EA for the NAS program committed to completing site-specific NEPA documentation tiered from the programmatic EA for individual NAS sites. This EA addresses the site-specific impacts of locating an ASR-11 on Travis AFB, and evaluates the consequences of constructing and operating this ASR-11 system on the natural and man-made environments.

1.2 PURPOSE OF THE ACTION

The NAS program was developed to modernize military air traffic control systems in the United States and its territories. DoD NAS is a component of the aviation system capital investment plan developed by the FAA. Pursuant to the Program Management Directive (USAF, 1994), the DoD must provide services within its delegated airspace which are comparable to the services which FAA provides to civil aircraft in civilian airspace. These services include: flight following, separation, expeditious handling, radar approach control, and landing.

The purpose of the DASR component of the USAF NAS program is to detect and process aircraft position and weather conditions in the vicinity of USAF airfields. The DASR will serve to accurately locate aircraft, in terms of range, azimuth, and altitude; provide information regarding aircraft identification code; identify emergency conditions; and report six discrete weather precipitation levels. The new radar facility at Travis AFB will not increase or decrease the current number of flights, change aircraft patterns, or otherwise alter existing base operations.

1.3 NEED FOR THE ACTION

The NAS program is comprehensively upgrading air traffic control systems infrastructure by systematically replacing analog systems with state-of-the-art digital technology. The ASR-11 at Travis AFB is needed to replace the existing AN/GPN-20 airport surveillance radar, which was installed in early 1984 and subsequently required replacements of the antenna and pedestal assembly following excessive wear and catastrophic failure. The ASR-11 has the capability to improve system reliability, provide additional weather data, reduce maintenance cost, improve performance, and provide digital data input to proposed new digital automation system air traffic controller displays. The proposed new ASR-11 radar systems will take advantage of the significantly increased capabilities of digital technology.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

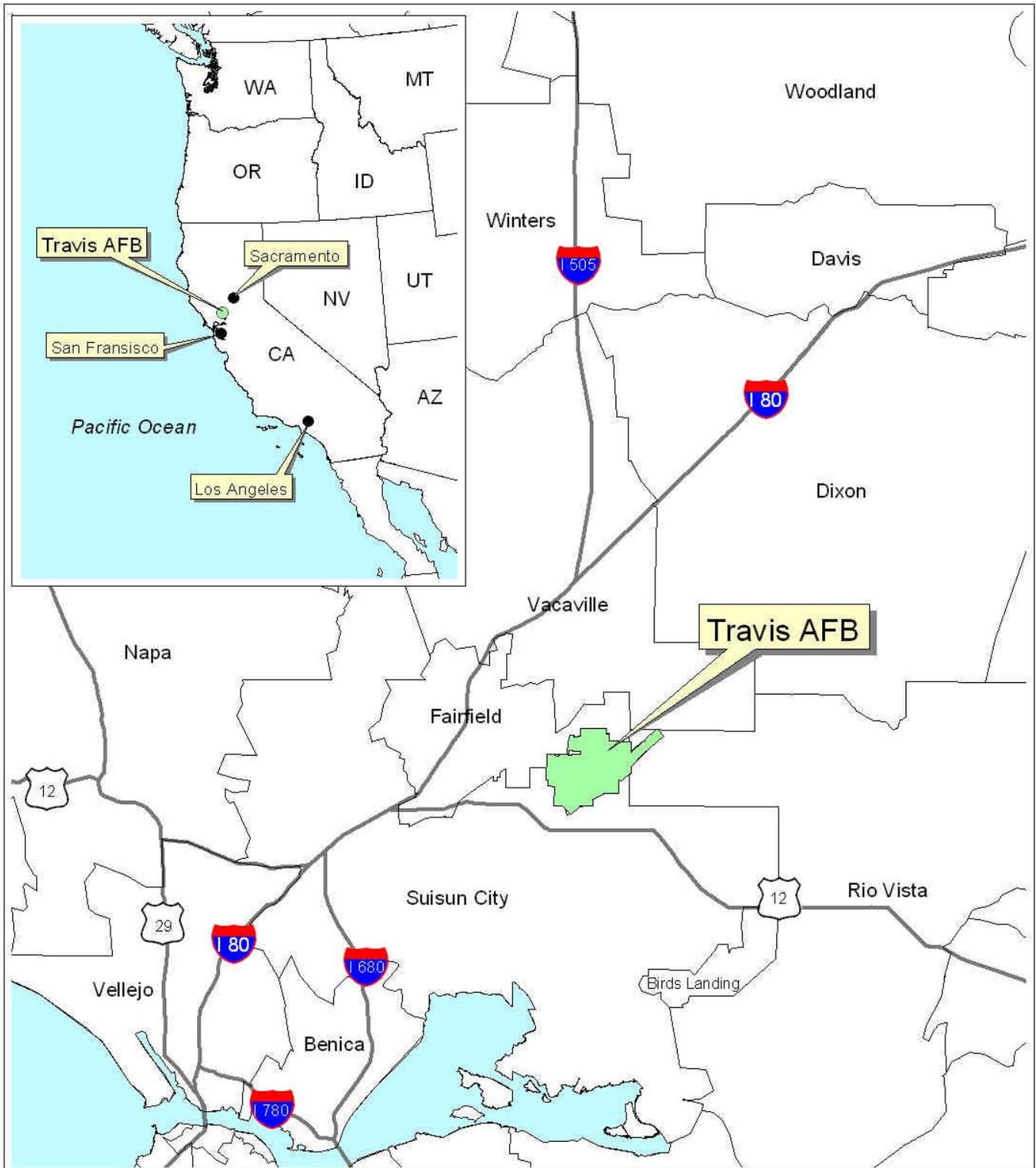
The proposed action is the installation of an ASR-11 at Travis AFB in California (Figure 2-1) to replace the existing AN/GPN-20 radar facility. The Air Force has selected a preferred site (Site 8) for the radar based on operational and base considerations. Alternatives to the proposed action include no action, or installation of the ASR-11 at one of the alternative sites. The no-action alternative consists of **not** constructing the ASR-11 facility and would involve continued use of the existing AN/GPN-20 system. Three sites were identified for Travis AFB (Figure 2-2), in accordance with the NAS Siting Plan (USAF, 1995b) and FAA Order 6310.6 *Primary and Secondary Terminal Radar Siting Handbook*, as well as site-specific criteria identified in the *Travis AFB Integrated Site Survey Report* (USAF, 2001a). This EA discusses and evaluates potential impacts associated with the placement of the ASR-11 at each one of the alternative sites and also summarizes the potential impacts associated with the no-action alternative.

2.1 PROPOSED ACTION: DASR AT TRAVIS AFB

2.1.1 DASR System

The DASR system would detect and process aircraft position and weather conditions at the airfield. The DASR system would consist of two subsystems: the Primary Surveillance Radar and the Monopulse Secondary Surveillance Radar. The purpose of the subsystems would be to accurately locate aircraft, in terms of range, azimuth, and altitude.

The Primary Surveillance Radar would transmit electromagnetic waves in the form of radio frequency pulses, which backscatter from the surface of aircraft, or other “targets of opportunity”. The radar would measure the time required for an echo to return and the direction of the signal in order to determine the target’s range and azimuth, respectively. By comparing variations in returned signal parameters, such as phase differences between



Source: ESRI, 1999

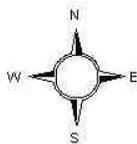


FIGURE 2-1.
TRAVIS AFB LOCATION MAP

travis01.apr : travisloc : 2-1 travisloc

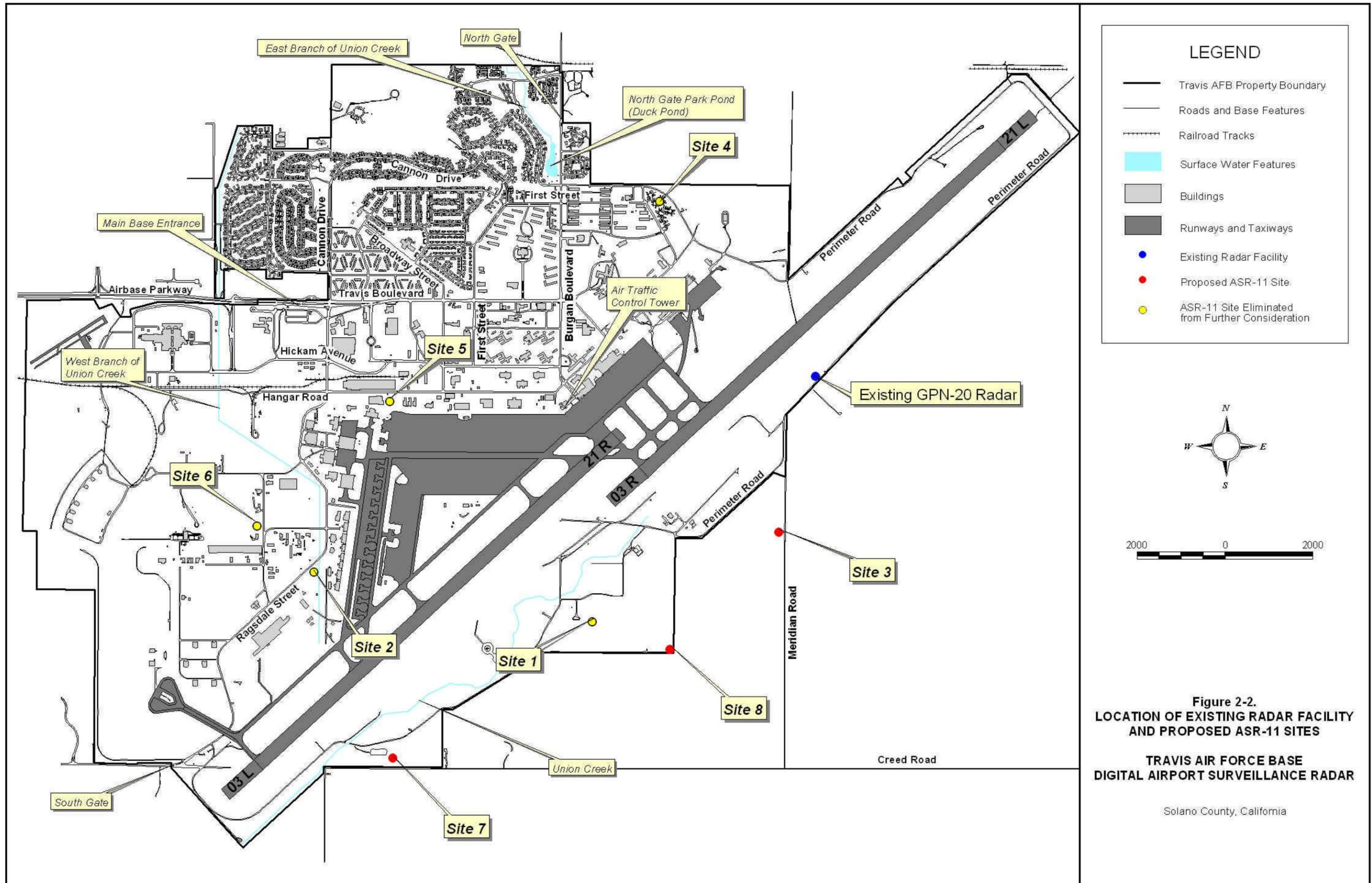


Figure 2-2.
**LOCATION OF EXISTING RADAR FACILITY
 AND PROPOSED ASR-11 SITES**
**TRAVIS AIR FORCE BASE
 DIGITAL AIRPORT SURVEILLANCE RADAR**
 Solano County, California

Source: Travis AFB

travis01.apr : siteloc : 2-2.propstes

pulses, the radar could separate moving targets from stationary clutter, such as mountains and trees. The primary radar would also report six discrete weather precipitation levels (from mild to hazardous) via a processing channel dedicated to weather detection and reporting.

The Monopulse Secondary Surveillance Radar (also called the beacon radar) would be a cooperative system consisting of ground-based beacon interrogator/receiver systems and existing aircraft based transponders. The secondary radar would obtain additional information, such as identification code, barometric altitude, and emergency conditions, from an aircraft transponder. Various processing techniques would be used to decipher both overlapping responses from multiple aircraft (synchronous garble) and aircraft responses to other beacon systems (asynchronous interference). The beacon radar would also provide rapid identification of aircraft in distress. The Monopulse Secondary Surveillance Radar transmits at a frequency of 1030 MHz and receives at a frequency of 1090 MHz. The ASR-11 would have clutter rejection, target accuracy, and probability of detection that are equal to or better than the existing AN/GPN-20 facility. Operational characteristics of the new ASR-11 as compared to the existing AN/GPN-20 are shown in Table 2-1.

The DASR facilities at Travis AFB would consist of: a 20-foot tall rotating radar antenna mounted on a 47-foot (Site 3) or 67-foot (Site 7) or 87-foot (Site 8) tower, a concrete radar equipment shelter, an emergency engine generator in a concrete shelter, utility cabling, electronic equipment grounding systems, and a 1,000 gallon aboveground fuel storage tank. Facility construction, including separate concrete foundations for the antenna tower, the equipment shelter, and the engine generator shelter, fencing (if necessary), and security systems (see Figure 2-3 for a photograph of a typical ASR-11 facility) would be within a 0.60 acre site (160 feet x 160 feet). Additional site improvements would include an unpaved access road, minor re-grading, installation of geotextile fabric beneath six inches of crushed stone, and up to 14,800 feet of utility trenching to connect the site to existing utilities or communication links. The total structure height, include lightning rods on the antenna tower, would be 76 to 116 feet (depending on the site selected).



Figure 2-3. Typical ASR-11 Facility

Table 2-1. Comparative Characteristics of Existing AN/GPN-20 and Proposed ASR-11 Primary Surveillance Radar

	Existing AN/GPN-20	Proposed ASR-11
Frequency	2700-2900 MHz	2700-2900 MHz; 2 frequencies separated by at least 30 MHz
Power Peak	500 kW (magnetron)	19.5 kW (1 microsec) 18.0 kW (89 microsec)
Average	875 Watts	1600 Watts (Solid state)
Pulse Repetition Frequency	700-1200 pulses/second	720-1050 pulses/second

Sources: Belden, 1999; MITRE, 1997

Depending on the site chosen for the DASR facility, approximately 2800 to 9300 feet of utility trenching between the edge of the site and existing duct banks/manholes would be required to connect the ASR-11 radar systems to existing electric lines (USAF, 2001a). The telephone connections and fiber optic connections may be made in a common utility conduit; however, the new telephone cable may connect to an existing cable at a different location within the utility conduit than the fiber optic connection. Between 3700 and 14,800 feet of fiber optic cable, depending on the site chosen, would be required to connect the ASR-11 to the Radar Approach Control (RAPCON).

Once the new DASR system is operational, the existing AN/GPN-20 would be dismantled and structures would be removed to existing grade. Any subsequent below ground activities (removal of footings, etc.) would be the responsibility of Travis AFB. Upon completion, the ground would be reclaimed by the base.

2.1.2 Alternative ASR-11 Sites

Three alternative sites have been identified as potential locations for the ASR-11, based on the siting criteria contained in the *Travis AFB Integrated Site Survey Report* (USAF, 2001a)(see Appendix B). The three sites evaluated in this EA were identified based on operational, construction, and environmental criteria. The operational criteria included the following (FAA, 1992):

- ?? The site should not be located closer than 0.5 miles from the end of any existing or planned runway.
- ?? The site should not be located closer than 0.5 miles from any point of required detection coverage.
- ?? The site should not be located closer than 2,500 feet from any existing or planned electronic equipment installation or facility.
- ?? The site should not be located less than 0.5 miles from National Weather Bureau radars and radiosonde equipment.
- ?? The site should not be located closer than 1,500 feet to any aboveground object which would interfere or cause degradation in the ASR-11 operation.

Construction criteria included siting the ASR-11 in an area with a slope of less than 20 percent and away from occupied existing structures, railroads, highways, runways and taxiways, or power lines. The environmental criteria for siting included avoiding a number of sensitive resources, including: ecological/wildlife refuges, preserves, conservation areas and sanctuaries; wild and scenic rivers; prime and unique farmlands; historical, archaeological, and cultural sensitive sites; wetlands; threatened and endangered species habitat; designated hazardous waste sites; and floodplains. The details of the siting process are described in the *Integrated Site Survey Report* prepared by Raytheon Systems Company (USAF, 2001a).

Initial site selection screening criteria applied in March 2001 identified seven sites (**Sites 1** through **7**, Figure 2-2) for consideration at the in-briefing, held March 20, 2001. An eighth site (**Site 8**, Figure 2-2) was identified by ESC personnel and the project team during a site walk prior to the in-briefing. Sites 1, 4, 5, and 6 were rejected from further consideration during the in-briefing. **Site 1** is located south of Carson Road, near its intersection with Vallejo Road. Site 1 is located behind the abandoned wastewater treatment plant (WWTP), within one of the base's IRP sites (FT005). Site 1 was eliminated from further consideration due to the proximity of the former WWTP stabilization ponds/lagoons and the potential for wetland resources to exist on the site. Site 1 was essentially replaced with Site 8, approximately 2000 feet to the southeast, as described in more detail in the paragraphs below. **Site 4** is located on Vandenberg Court in an abandoned mobile home park and is also within one of the base's IRP sites (LF006). Site 4 was eliminated from further consideration because there was concern that Building #381 would cause screening of the runways from a radar at this location; additionally some of the required utility connections to Site 4 would be more than two miles long. **Site 5** is located in a grassy rectangular area south of Hangar Avenue. A series of monitoring wells is located in the northern half of the parcel, which is also within one of the base's IRP sites (SS015). Site 5 was eliminated from further consideration given its prominent location in the center of the base, as well as the associated IRP issues. **Site 6** is located west of Dixon Avenue, in an area between the roadway and a fenced pasture for horses. The site is also indicated as being within one of the base's IRP sites (DP039). Site 6 was determined to be unfavorable

from a radar coverage perspective, within predicted poor line-of-sight visibility for several approaches; thus it was eliminated from further consideration.

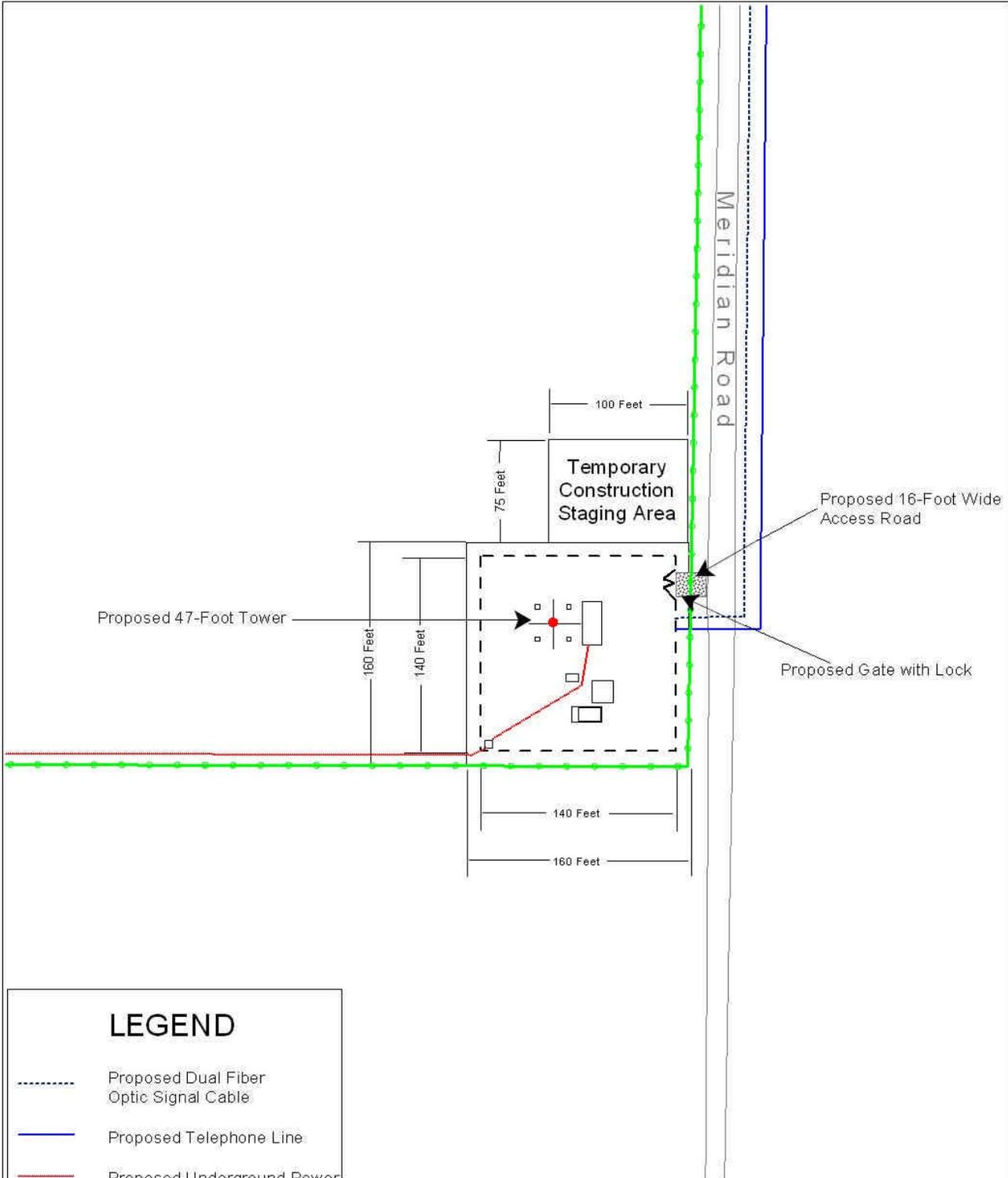
Four sites remained viable alternatives and were selected for further evaluation. **Site 2**, confined to a small triangular area to the east of Ragsdale Street, is also indicated as being within one of the base's IRP sites (SD037); a monitoring well is located near the southern side of the site, close to two large trees. Site 2 was eliminated from further consideration during a downselect teleconference on April 30, 2001. The primary reason for eliminating Site 2 was concern that nearby hangars would potentially cause reflections resulting in false targets.

Following the downselect teleconference, three sites remained. These (Sites 3, 7, and 8) are discussed in detail in this environmental assessment, as they constitute the three alternative sites for the ASR-11 (Figure 2-2). **Site 3** is located off-base on private property that is currently utilized as pasture (Figure 2-4). **Site 7** is located south of Perimeter Road, near the abandoned Rapid Runway Repair training area (Figure 2-5); the site contains windrows (3-4 feet high) and occasional piles of concrete debris, partially covered with soil and vegetation. **Site 8** is located in the southeastern corner of the base, behind the former WWTP (Figure 2-6). As noted earlier, Site 8 represents a relocation of the area previously identified as Site 1.

2.2 NO ACTION ALTERNATIVE

Implementation of the No Action Alternative would result in the continued use of the existing AN/GPN-20 radar. Continued use and reliance on the AN/GPN-20 would deny Travis AFB of the improved technology offered by the new DASR system. Travis AFB would not benefit from the improved system reliability, additional weather data, reduced maintenance costs, and improved performance provided by the ASR-11 radar.

In this EA, conditions reflecting the No Action Alternative are discussed for each of the twelve main environmental parameters evaluated in Chapter Three. For each parameter, the No Action Alternative is characterized in the section addressing Future Baseline Without the Project.



LEGEND

- Proposed Dual Fiber Optic Signal Cable
- Proposed Telephone Line
- Proposed Underground Power
- Proposed ASR-11 Tower
- ▨ Proposed Access Road
- - - Proposed ASR-11 Site Fence
- Existing Post & Wire Fence

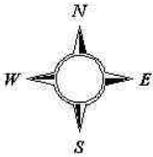
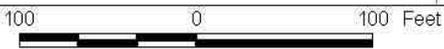


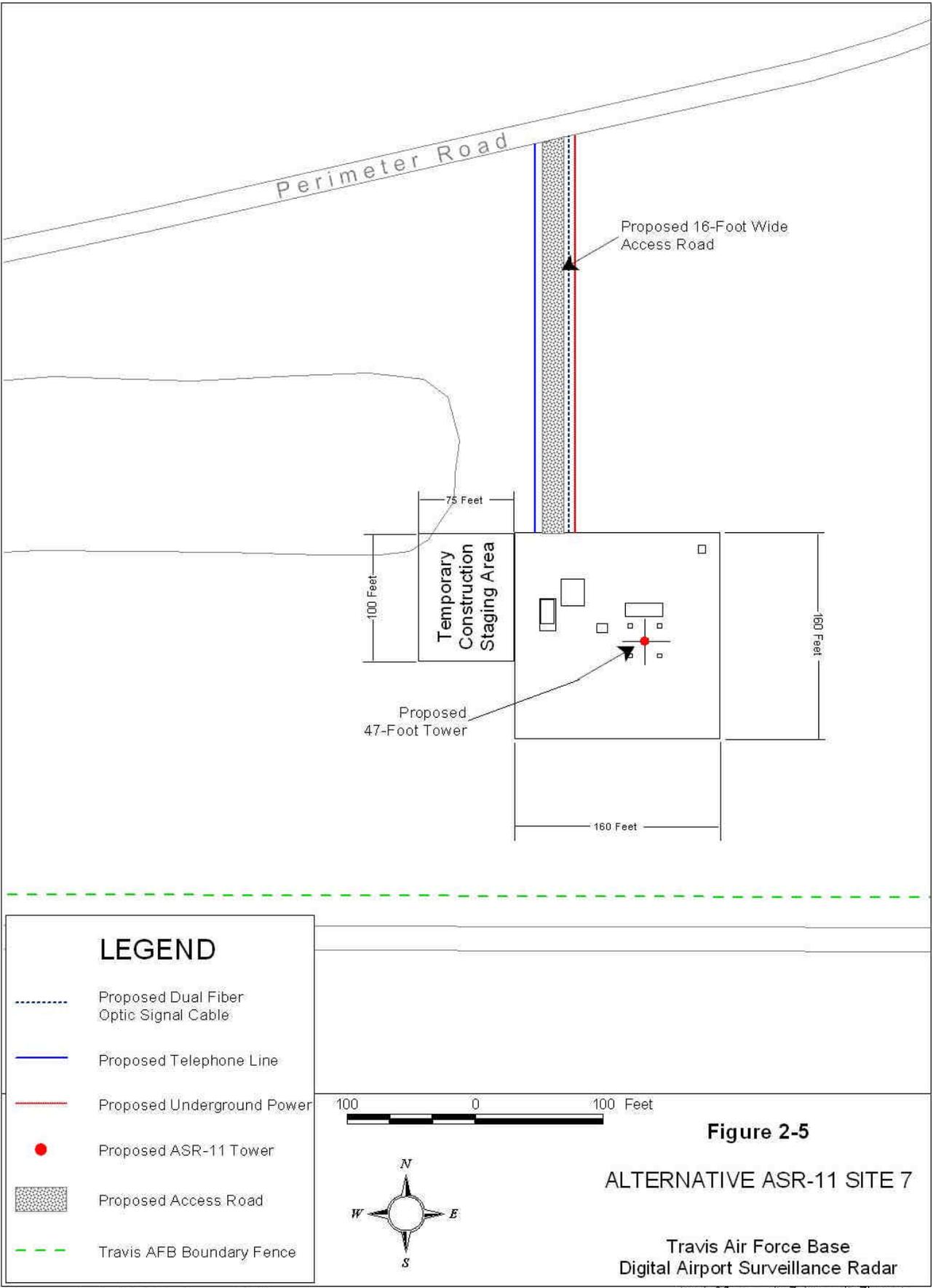
Figure 2-4

ALTERNATIVE ASR-11 SITE 3

Travis Air Force Base
Digital Airport Surveillance Radar

travis02.apr : site3view : site3layout

Source: Travis AFB; Raytheon, 2001



LEGEND

- Proposed Dual Fiber Optic Signal Cable
- Proposed Telephone Line
- Proposed Underground Power
- Proposed ASR-11 Tower
- ▒ Proposed Access Road
- - - Travis AFB Boundary Fence

100 0 100 Feet

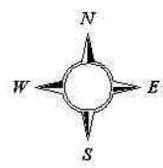


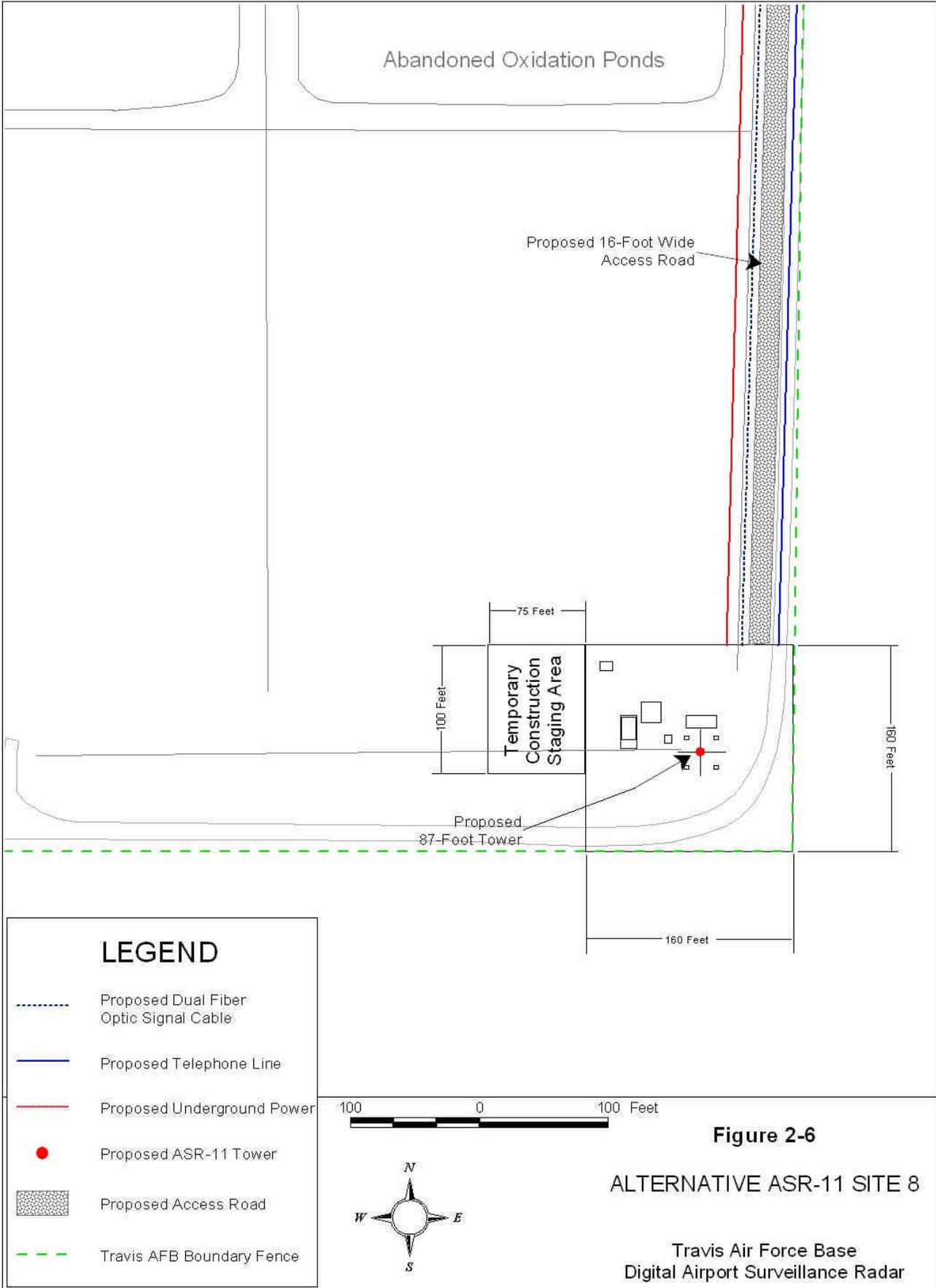
Figure 2-5

ALTERNATIVE ASR-11 SITE 7

**Travis Air Force Base
Digital Airport Surveillance Radar**

Source: Travis AFB; Raytheon, 2001

travis02.apr : site7/view : site7/layout



Source: Travis AFB; Raytheon, 2001

travis02.apr : site8view : site8layout

3.0 AFFECTED ENVIRONMENT

The existing environmental conditions and future conditions without the project are described for each site in order to provide a baseline against which potential impacts related to construction and operation of the ASR-11 can be determined. General conditions on Travis AFB are presented for each of the parameters and site specific detail is included, as available. Environmental conditions at the existing AN/GPN-20 site are also described to assess any potential issues associated with its removal. The following information was obtained from several documents/reports obtained from Travis AFB Environmental Flight staff and supplemented with data collected during site visits conducted in March 2001 and subsequent communications with base personnel, Solano County Planning Services personnel, and the City of Fairfield planning personnel.

3.1 LAND USE

The purpose of this section is to characterize land uses throughout Travis AFB and in the vicinity of the base. This section addresses land use attributes in the vicinity of the alternative ASR-11 sites (Site 3, Site 7, and Site 8) and the existing AN/GPN-20.

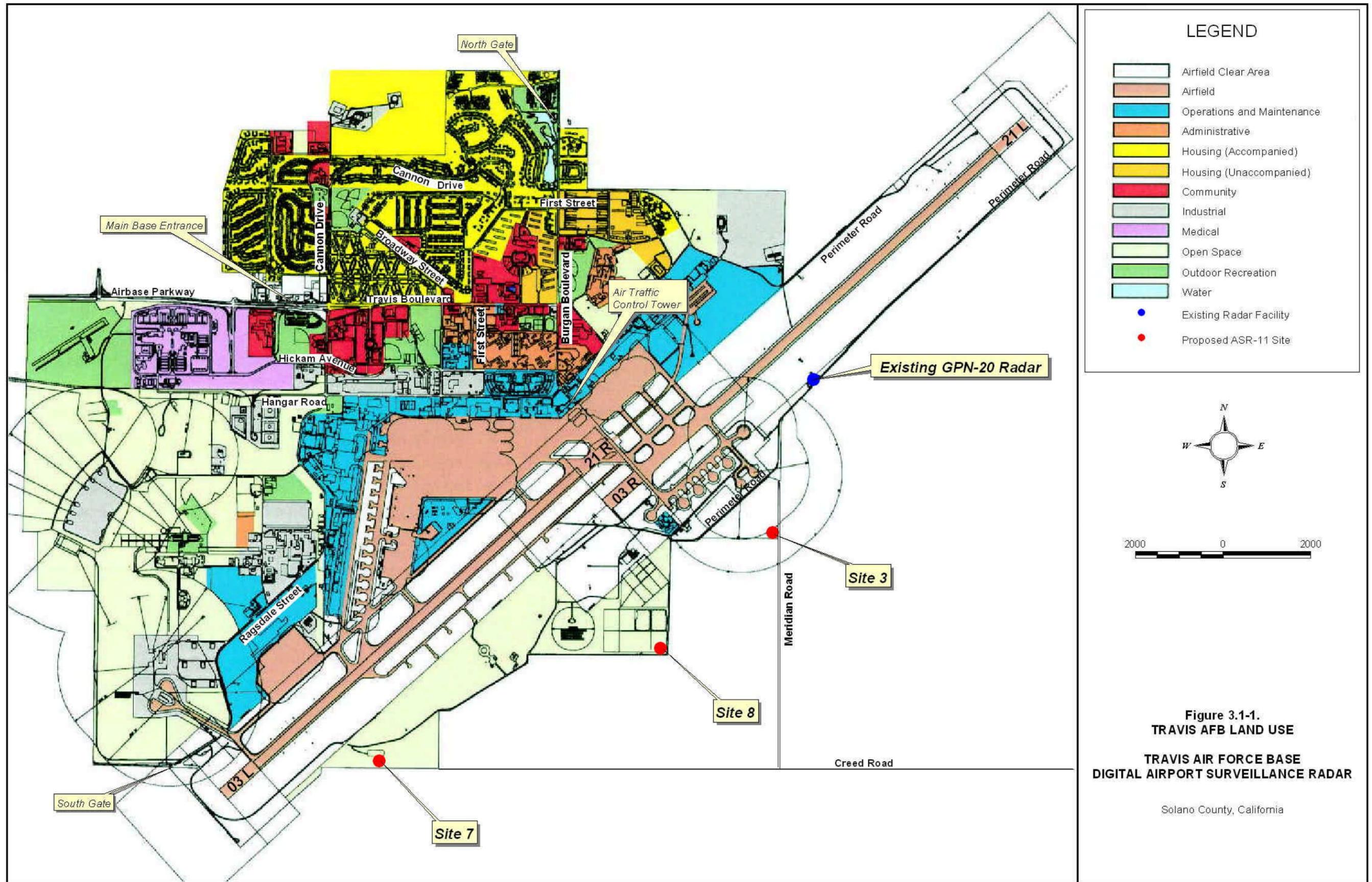
3.1.1 Existing Conditions

Travis AFB is located in northern California, within the incorporated area of the city of Fairfield, which is the county seat for Solano County. Suisun City, located to the south, and Fairfield lie at the northern end of an arm of the Suisun Bay, which is a reach of San Francisco Bay. Since the western portions of Solano County adjoin the San Francisco Bay System, it is considered part of the greater San Francisco area. The base is located approximately 50 miles northeast of San Francisco and 40 miles southwest of the state's capital, Sacramento.

Solano County covers nearly 530,000 acres. Nearly two-thirds of the county's land area is involved with agriculture. The agricultural land within Solano County is almost evenly divided between level land with intensive agricultural use and steep rolling hills used primarily for grazing sheep and cattle. North, south, and east of the base, land is predominantly agricultural with a few interspersed residences primarily associated with agriculture. The west side of the base is bordered by mixed urban uses, including commercial uses adjacent to the main entrance north of Travis Boulevard. The most heavily urbanized portions of the city of Fairfield are located approximately one mile west of the base.

Travis AFB encompasses 5,200 acres of fee-owned land. The base also has an additional 1,248 acres in easements, leases, and permits. The base has a total of 1,971 buildings, 1,485 of which are family housing buildings containing a total of 2,468 dwelling units. The northern portion of Travis AFB is predominantly residential. Immediately south of the residential area, commercial and administrative land uses span the entire width of the base from east to west. The southwest portion of the base is mostly categorized as open space, outdoor recreation, and industrial. Travis AFB runways, Runway 21R/03L and Runway 21L/03R, run northeast to southwest on the east and southeast portion of the base. The runways are 11,002 feet by 300 feet and 10,995 feet by 300 feet, respectively.

On-base land use definitions are given in Table 3.1-1. The land use pattern of Travis AFB reflects development decisions made over the past 50 years (USAF, 1996). The principal characteristics of the existing land use pattern, with core commercial and administrative areas along Travis Avenue and Hangar Avenue, the mission areas along Hangar Avenue, and the residential areas to the north reflect the history of development at Travis AFB (Figure 3.1-1). The airfield land use is the dominant category on the base, and is focused around the existing staggered runway system, which requires considerable land area. Mission land use is interdependent with airfield land use, as is arrayed in the area north of the runway system. A separate mission land use area south of the airfield supports the Naval Strategic Communications Detachment. Industrial uses are primarily located near the airfield and mission areas, generally south of Hangar Avenue or east of Ragsdale Street.



Source: Travis AFB

travis01.apr: - : 3-1-1 Induse

Table 3.1-1 Land Use Designations at Travis AFB

Land Use	Typical Facilities and Features
Administrative	Personnel, headquarters, legal, and other support activities
Airfield Operations and Maintenance	Aircraft maintenance hangars and docks, control towers, flight training facilities, flight operations buildings
Airfield	Runways, taxiways, aircraft parking aprons; associated clearance and safety zones
Community	Commissary, base exchange, service stations, clubs, chapels, library
Housing–Accompanied	Single and multi family housing for service members and their families
Housing–Unaccompanied	Airmen dormitories and unaccompanied officer quarters
Industrial	Utility systems, building maintenance facilities, base support supply warehouse
Medical	Medical centers, hospitals, and clinics
Open Space	Buffer area, out-lease areas
Outdoor Recreation	Swimming pools, tennis courts, golf course, and other active recreation facilities
Water	Rivers, lakes, and streams

Source: USAF, 1996

The installation lands are grouped into three general categories: improved, semi-improved, and unimproved. Improved grounds consist of those areas that receive regular maintenance (weekly mowing and irrigation); semi-improved grounds consist of those areas that receive maintenance only a few times per year; and unimproved grounds receive no regularly scheduled maintenance (USAF, 2001b). Elevation on Travis AFB varies from approximately 10 feet above sea level (ASL) in the southern portion of the base, to approximately 180 feet ASL in the northern portion of the base (USAF, 2001c).

The proposed ASR-11 locations and the existing AN/GPN-20 radar are located along the southern and eastern perimeter of the base. The following describes the land use activities in the immediate vicinity of the sites.

Site 3 is approximately 1000 feet southeast of the base perimeter within an easement maintained by Travis AFB. This site is privately-owned and considered off-base. The easement consists of a 2,000-foot radius around a munitions storage area near Runway 21L/03R. The actual easement required for this munitions storage area is only 1,250 feet; the proposed DASR site is located between the 1,250 and 2,000-foot extent of this radius. As observed on the March 2001 site visit, the site and the surrounding area appear to consist of open space and pasture land. The site is located within an area designated as Phasing Area E on the Fairfield Land Use Map (Figure 3.1-2). Phasing Area E consists of privately owned land protected from development and is currently maintained as open space. Phasing Area E, however, is reserved for Travis AFB expansion (Fairfield 2001a). Additionally, the site is located within an area zoned by the county as A-160 (Agriculture), which stipulates that housing densities should be no more than one residence per 160 acres (Solano, 2001).

Site 7 is located within Travis AFB in an area categorized as Open Space. The site is located approximately 1,600 feet southeast of the south end of Runway 03L/21R and slightly greater than 1,000 feet east of the Airfield Clear Area. Site 7 is located near the south perimeter of the base adjacent to the Suisun City limit. The areas beyond the base perimeter, as observed during the March 2001 site visit, consist primarily of agricultural land with a few interspersed residences, none of which appeared to be in close proximity to the site; although, there is one privately owned residence approximately 1,200 feet west of the site. Site 7 is located within the Travis AFB Natural Resources Management Unit (NRMU) E (Southeast Undeveloped Area) which identifies the current dominant uses of this area to be undeveloped open space. Site 7 is within a 45-acre parcel that had been designated for a proposed Rapid Runway Repair facility; randomly scattered piles

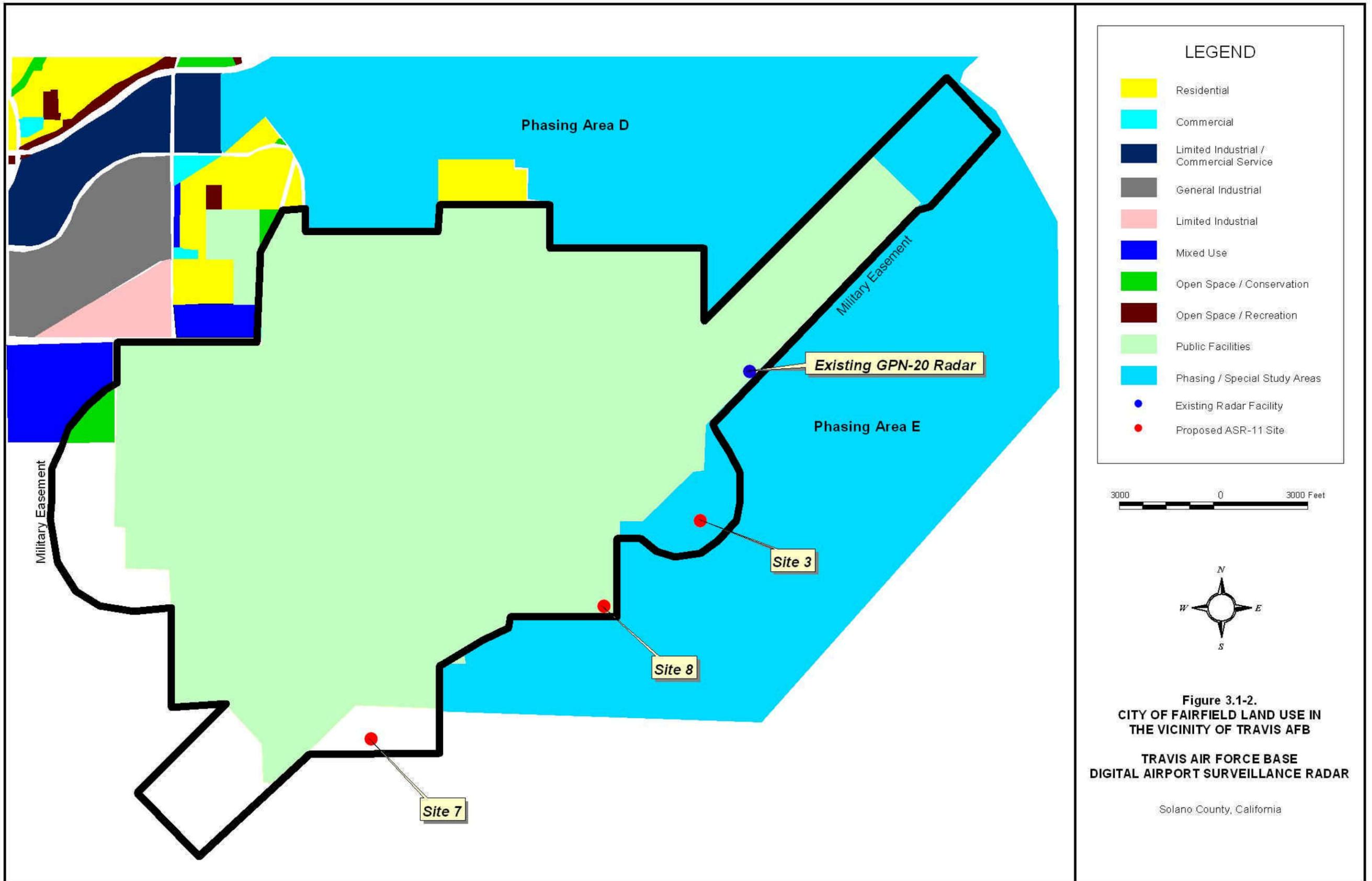


Figure 3.1-2.
CITY OF FAIRFIELD LAND USE IN
THE VICINITY OF TRAVIS AFB
TRAVIS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
 Solano County, California

Source: City of Fairfield.

travis01.apr; - 3-1-2 fairfield.u

and somewhat orderly windrows of construction debris are interspersed within the vicinity of the site. Although construction of the berms (for security and noise abatement) around the proposed RRR facility was initiated, construction was discontinued after a resident adjacent to Travis AFB complained that the construction was causing a nuisance and potential unhealthy conditions. Subsequent investigations by the USAF showed that material other than the authorized concrete fill had been deposited along with the fill material (see Section 3.11). The site has remained relatively unused since the halting of construction in 1994, and Travis AFB has put forth a proposal for the removal of the contaminated material (USAF, 2000).

Site 8 is located in the southeast corner of the base in an area designated as Open Space and used as a hunting area. The site is located near the perimeter of the base adjacent to an area formerly used for sewage treatment. The formerly used oxidation ponds still exist immediately west and northwest of the site; some of the ponds appear to have been used for burial of construction materials and landscape debris from the late 1970s to 1990. During the March 2001 site visit, the areas beyond the base perimeter were observed to consist of pastureland. The Fairfield Land Use Map designates the area beyond the base perimeter fence as Phasing Area E (see discussion of Site 3 for explanation of Phasing Area E). Site 8 is also located within the Travis AFB NRMU E (Southeast Undeveloped Area), which identifies the current dominant uses of the vicinity as undeveloped open space, abandoned oxidation ponds, and hunting area.

The existing **AN/GPN-20** radar on Travis AFB is located on the east side of the base adjacent to Perimeter Road approximately 1,000 feet east of Runway 21L/03R. The existing radar is located within an area categorized as Airfield. During the March 2001 site visit, the areas beyond the base perimeter at this location were observed to consist of pastureland. The Fairfield Land Use Map designates the area beyond the base perimeter fence as Phasing Area E (see discussion of Site 3 for explanation of Phasing Area E). The existing radar is located within the Travis AFB NRMU G (Flightline), which identifies the current dominant uses of this area to be developed and undeveloped land, including aircraft operations and maintenance and clear zone.

3.1.2 Future Baseline Without Project

The future land use on Travis AFB will continue to reflect an emphasis on airfield and aircraft operations. Future additions will involve facilities such as maintenance hangars and docks, avionics facilities, flight simulators, and other instruction facilities. Existing plans include construction of a 43,000-square-foot Aircraft Support Equipment Shop/Storage Facility. Future land use will also involve both commercial and service facilities such as dining halls, a service station, clubs, schools, a chapel, a library, and the family support center. Existing plans also include construction of a 21,200-square-foot addition to the child development center including childcare rooms, rest rooms, and a playground. A major park area is planned to the east of the community center. In response to a joint venture between the Air Force and the Department of Veteran Affairs (DVA) to share the facilities at the David Grant Medical Center (DGMC), the DVA will construct a 420,000-square-foot addition to the DGMC to increase the bed capacity by 203 beds. Additionally 1,000 parking spaces will be added to the existing 1,700 spaces (USAF, 2001b; USAF, 2001d).

In the future without the project, land use characteristics at **Site 7**, **Site 8**, and the existing **AN/GPN-20** site are not expected to change. None of the development indicated above is expected to occur in the areas of the proposed ASR-11 sites. The Travis AFB Integrated Natural Resources Management Plan (INRMP) indicates that the projected dominant uses will not change from the current dominant uses within NRMUs E and G. Although **Site 3** is not located within the base, it is located within a base easement that precludes development of structures and there are no anticipated changes in the use of this parcel. Furthermore, not only is this parcel located within an area zoned for agricultural use, but it is also located in an area that is protected from encroachment originating in the surrounding area (Fairfield, 2001b). The Phasing Area E land use in which Site 3 is located is anticipated to undergo a reclassification in the City of Fairfield's revised General Plan in January 2002. Phasing Area E and Phasing Area D are expected to be categorized as Travis Reserve, which will set aside the entire area solely

for the expansion of Travis AFB or, in the case that the base is closed, airport expansion (Fairfield, 2001b).

3.2 SOCIOECONOMIC CONDITIONS

3.2.1 Existing Conditions

This section addresses the population, employment, general economic condition, and housing of the study area. Socioeconomic data specific to the alternative ASR-11 site locations do not exist. However, there are data for the general area of Travis AFB, Solano County, and the City of Fairfield.

3.2.1.1 Population. The populations of the State of California and Solano County have increased by 13.8 percent and 15.9 percent, respectively, since 1990 (Table 3.2-1). The city of Fairfield has experienced a population growth of nearly 25 percent since 1990.

Table 3.2-1. Population Trends within California, Solano County, and Fairfield

Area	1990 Census	2000 Census	% Change	2010 Estimate	Predicted % Change ¹
California	29,760,021	33,871,648	13.8	39,957,616	18.0
Solano County	340,421	394,542	15.9	481,700	22.1
Fairfield	77,211	96,178	24.6	112,200	16.7

Source: CA Dept of Finance

¹ Predicted percent change from 2000 to 2010

The population of Travis AFB averages 22,363 persons (Table 3.2-2). Approximately 45 percent of the Travis AFB population consists of military personnel (officer and enlisted) and another 45 percent consists of active duty family members. The remainder of the population consists of either appropriated or non-appropriated funded civilians. In addition, Travis AFB serves approximately 30,000 military retirees and their families who are located in the surrounding area (USAF, 2001d).

Table 3.2-2. Travis Air Force Base Population

Category	Number	Percent of Total
Military – Officer	1,711 ^a	7.7
Military – Enlisted	8,496 ^b	38.0
Appropriated Funded Civilians	1,681	7.5
Non-appropriated Funded Civilians	419	1.9
Active Duty Family Members	10,056	45.0
TOTAL	22,363	

Source: USAF, 2001e

^a 1,219 Active / 492 Reserve

^b 5,634 Active / 2,862 Reserve

The percentage of persons below the poverty level for Fairfield is representative of Solano County as a whole, but lower than the overall percentage of persons below the poverty level within California (Table 3.2-3). The general ethnicity proportions throughout the state of California, Solano County, and the city of Fairfield are comparable; however, the state has a lower overall black population and a higher percentage of individuals categorized as Other. In addition, Solano County has a slightly higher Asian/Pacific Islander population than the state or Fairfield.

The main portion of Travis AFB is located within Census Block Group 06095-252800-8 while six other census blocks surround the main base area (Figure 3.2-1). For the purposes of this assessment, only the main base area and surrounding Census Block Groups are identified. A variety of conditions exist throughout the census block groups of the Travis AFB area. Among the seven block groups, populations range from 96 through 9,874. The largest population belongs to the block group of Travis AFB, while the smallest belongs to block group 06095-252398-1, located to the southeast of the base. The percentage of persons below the poverty level also varies substantially. The highest

Table 3.2-3. Income and Ethnicity Statistics for California, Solano County, Fairfield and Census Blocks for the Areas of Travis Air Force Base¹.

	California	Solano County	Fairfield	Census Block Groups						
				06095-252309-8	06095-252309-1	06095-252398-1	06095-252702-2	06095-252706-1	06095-252800-8 ²	06095-253500-1
Total Persons	29,760,021	340,421	77,211	3,940	3,306	96	873	1,600	9,874	880
Number of Households	10,381,206	113,429	25,425	1,188	1,055	42	268	452	2,152	281
Percent Below Poverty Level	12.5	7.5	7.4	1.9	3.3	29.5	1.1	3.9	5.6	9.6
Persons Below Poverty Level	3,720,003	25,532	5,714	74	109	28	10	62	553	84
Land Area (sq. mi.)	158,097	850	38	12.0	1.8	98.0	4.3	1.7	7.7	149.4
ETHNICITY PERCENTAGES										
White	69	66.8	68.2	67.1	58.4	95.8	39.7	67.8	69.5	69.8
Black	7.4	13.5	13.8	11.9	13.1	1.0	14.2	10.3	16.9	5.6
American Indian	0.8	0.9	1.0	0.6	1.4	1.0	0.6	0.9	1.0	0.3
Asia/Pacific Islander	9.6	12.8	10.7	17.6	20.6	1.0	39.4	13.4	8.2	1.3
Other	13.2	6.1	6.3	2.7	6.5	1.0	6.1	7.6	4.4	23.1

Source: U.S. Bureau of the Census, 1990

¹ Statistics based on the 1990 Census data. 2000 Census data for block groups not currently available.

² The main portion of Travis AFB is contained entirely within this Census Block Group (06095-252800-8). A small section of Travis AFB accompanied housing area lies to the north of Travis AFB in Block Group 06095-252309. Travis AFB also has easements, leases, and permits outside of the main base area.

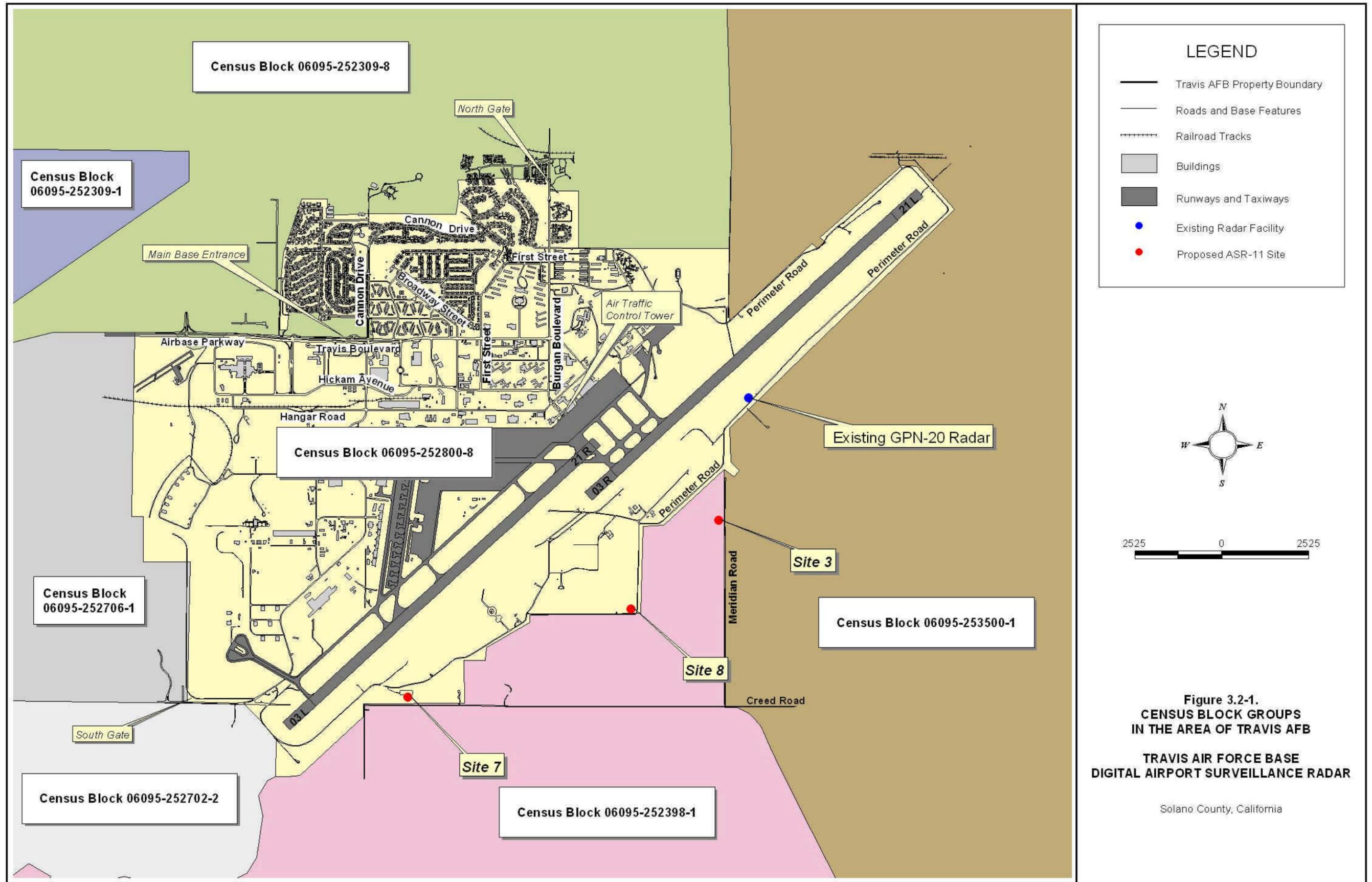


Figure 3.2-1.
CENSUS BLOCK GROUPS
IN THE AREA OF TRAVIS AFB
TRAVIS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
 Solano County, California

Source: Travis AFB; ESRI, 1999

travis01.apr : census : 3-2-1 cnsblk

percentage of persons living below the poverty level is found in block group 06095-252398-1 at 29.5 percent; whereas the remaining six block groups range between 1.1 and 9.6 percent. Block group 06095-252398-1, though possessing the highest percentage of persons below the poverty level, is the most sparsely populated of the seven block groups and has the second largest land area, substantially larger than the other five. The block group with the largest number of persons below the poverty level is the block group of Travis AFB (06095-252800-8).

Ethnicity percentages also vary between the block groups. In general, the White population comprises the majority of all census block groups except block group 06095-252702-2; this block group has almost equal percentages of White and Asian/Pacific Islander populations. Block group 06095-252398-1 has the largest percentage of Whites at 95.8 percent, while block group 06095-253500-1 has the largest percentage of the Other population. The block group of Travis AFB (06095-252800-8) contains the largest Black population of all seven block groups.

Site 7 and **Site 8** are located within the block group of Travis AFB; however, both sites are located along the perimeter of the base adjacent to block group 06095-252398-1. **Site 3** is located beyond the base perimeter within block group 06095-252398-1 and bordering block group 06095-253500-1. The existing **AN/GPN-20** is located within the block group of Travis AFB, along the perimeter of the base adjacent to block group 06095-253500-1. The closest off-base residences to each of the three alternative sites and the existing radar are as follows: within 3,750 feet of Site 3; 1,200 feet of Site 7; and 2,000 feet of Site 8.

3.2.1.2 Employment. As of March 2001, the civilian labor force totaled 17,267,700 in the state of California, 198,800 in Solano County, and 43,530 in the city of Fairfield (Table 3.2-4). Unemployment rates for Solano County and Fairfield are slightly lower than the rate for California. Over the previous year, the combined Napa and Solano counties' employment levels grew by 8,100 jobs, representing a 4.6 percent growth rate. The largest growing sectors have been services, construction, and retail trade. Wholesale trade, farm industry, government, finance, insurance, and real estate also have reported gains over the previous year. Mining, manufacturing, transportation, and public utilities have reported no changes over the previous year.

Table 3.2-4. Labor Force, Employment, and Unemployment Data for California, Solano County, and Fairfield for the Month of March 2001¹

Area	Labor Force	Employed	Unemployed	Unemployment Rate (percent)
California	17,267,700	16,432,900	834,800	4.8
Solano County	198,800	191,100	7,700	3.9
Fairfield	43,530	41,690	1,840	4.2

Source: California Employment Development Department, 2001

¹ Data not seasonally adjusted

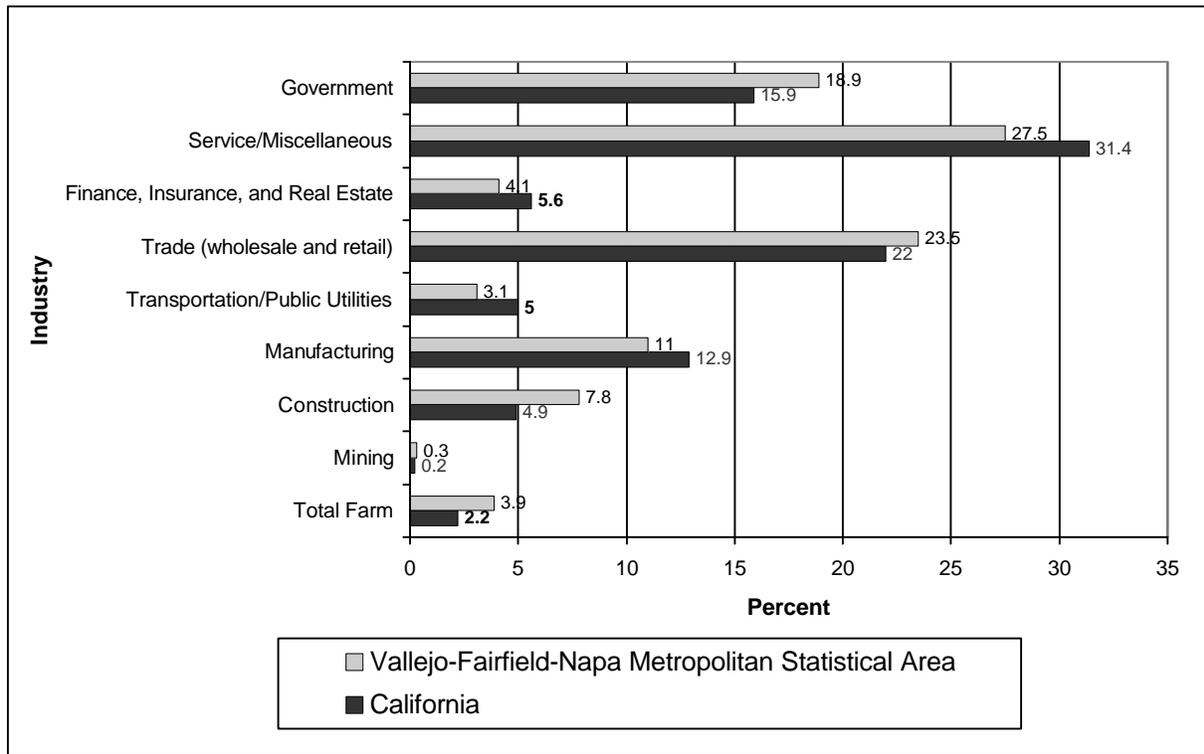
As of March 2001, employment by industry for California and the Vallejo-Fairfield-Napa Metropolitan Statistical Area (VFN MSA) are proportionally comparable to each other (Figure 3.2-2). The service/miscellaneous industry accounts for the largest percentage of employment for both the state and the VFN MSA, followed by trade (wholesale and retail), and government. Travis AFB is the largest employer in Solano County, employing nearly 16,000 people (Fairfield, 2001c).

3.2.1.3 Expenditures of Travis Air Force Base. The Travis AFB work force contributes more than one billion dollars to the local economy annually (USAF, 2001d). The annual payroll for Travis AFB is approximately \$400 million (USAF, 1996).

3.2.1.4 Housing. In 1990 (the last year for which these data are available) the number of housing units in Solano County was 119,533, representing only one percent of the total housing units in the state of California (USBC, 1990) (Table 3.2-5). Solano County had a housing occupancy rate of 94.9 percent and the state of California had an occupancy rate of 92.8 percent.

Housing areas on Travis AFB are located on the northern portion of the base. Travis AFB housing includes 2,468 active duty family housing units. Of these 2,468 housing units, 267 are officer quarters while the remaining 2,201 quarters are for enlisted personnel. The active duty housing units consist of 1,104 two-bedroom, 1,000 three-bedroom, and 364 four-bedroom housing units. In addition, Travis AFB has 121 visiting airman quarters, 138 visiting officer quarters, and 84 temporary living facilities (USAF, 2001e).

Figure 3.2-2 Employment by Industry for California and the Vallejo-Fairfield-Napa MSA as of March 2001



Source: CA Employment Development Department, 2001

Table 3.2-5. Housing Units and Vacancy Status in California and Solano County in 1990¹

Area	Total Housing Units	Occupied			Vacant
		By Owner	By Renter	Percent Occupied	
California	11,182,882	5,773,943	4,607,263	92.8	801,676
Solano County	119,533	71,309	42,120	94.9	6,104

Source: U.S. Bureau of the Census, 1990

¹ Census 2000 housing units and vacancy data not yet available; 1990 Census data used

3.2.2 Future Baseline Without Project

The projected population growth over the next decade for California and Solano County indicates that the rate of growth is expected to increase from that of the previous ten years, whereas the rate of growth for the city of Fairfield is expected to gradually slow. As shown in Table 3.2-1, the population of the State of California, Solano County, and the city of Fairfield is expected to increase by 18 percent, 22.1 percent, and 16.7 percent, respectively. Within the next ten years, the regional industries that are expected to realize the most significant growth are wholesale trade, transportation/public utilities, and services. All other industries are expected to grow, with the least growth expected in agriculture and mining (ABAG, 2001).

It is not expected that any substantial impacts to socioeconomic conditions of the area would result from changes at Travis AFB unless there is a major expansion or reduction in base operation. Plans of rebuilding and reconfiguring areas of Travis AFB, including housing, community, recreation, and administrative areas, may have minor effects on socioeconomic conditions during construction due to increased employment and local materials contracts. The planned 420,000-square-foot addition to the DGMC, which will increase the bed capacity by 203 beds, is anticipated to have a small positive economic impact through construction and increased employment during operation of the expanded facility.

3.3 UTILITIES AND TRANSPORTATION

3.3.1 Existing Conditions

The utility service at Travis AFB, including availability in the vicinity of the alternative ASR-11 sites, is discussed in this section. The utilities include water, wastewater, solid waste, electricity, telephone, fiber optic, and natural gas. Transportation is described in section 3.3.1.8.

3.3.1.1 Water Supply. Raw water from the North Bay Aqueduct supplies the Travis AFB Water Treatment Plant (WTP) which chlorinates, fluoridates, and distributes drinking water to the base. The 7.5 million gallon per day (mgd) capacity WTP is owned and operated by the City of Vallejo. Water for the North Bay Aqueduct originates from the Sacramento River Delta, just east of San Francisco. The amount of water drawn from this source may be limited in dry years

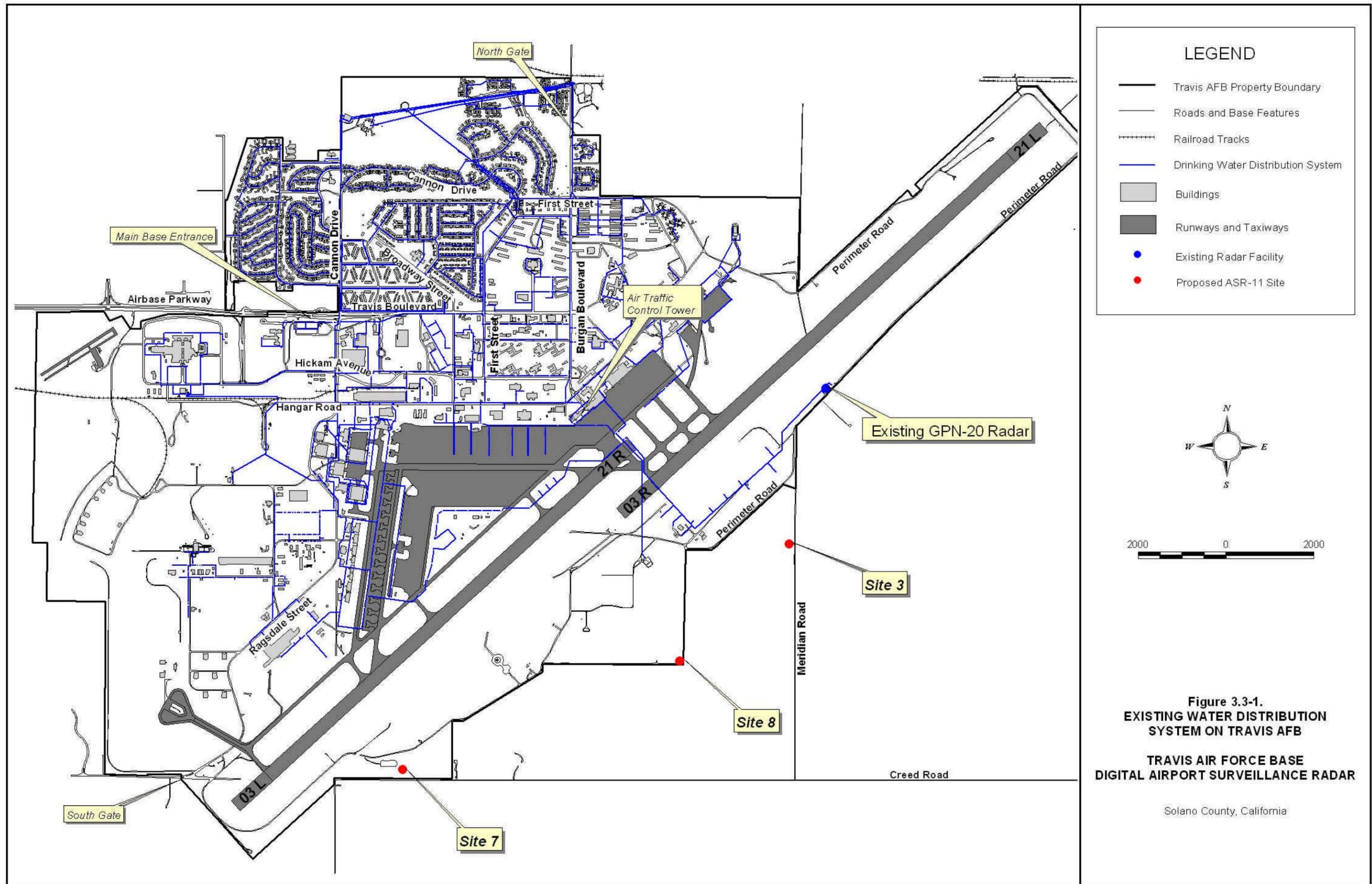
to protect the spawning habitat of the delta smelt, a state and federally protected endangered species (USAF, 1996). In addition to the contracted water supply, the base has two active wells with a combined capacity of 2.5 mgd. Both wells are located on Water Annex #2, a separate land holding approximately four miles north of the base.

Three surface reservoirs provide a potable water storage capacity of 3.7 million gallons. An additional 600,000-gallon storage tank is located at the base medical center. Two storage tanks provide a combined capacity of 950,000 gallons of non-potable water, tied into a fire protection deluge system (USAF, 1996). The existing water distribution system on Travis AFB is depicted in Figure 3.3-1.

Site 3 is located approximately 1,500 feet from the nearest water distribution line. The water distribution line nearest to **Site 7** is approximately 3,000 feet away on the opposite side of Runway 03L/21R. **Site 8** is approximately 2,400 feet from the nearest water distribution line. The existing **AN/GPN-20** is serviced by a water distribution line.

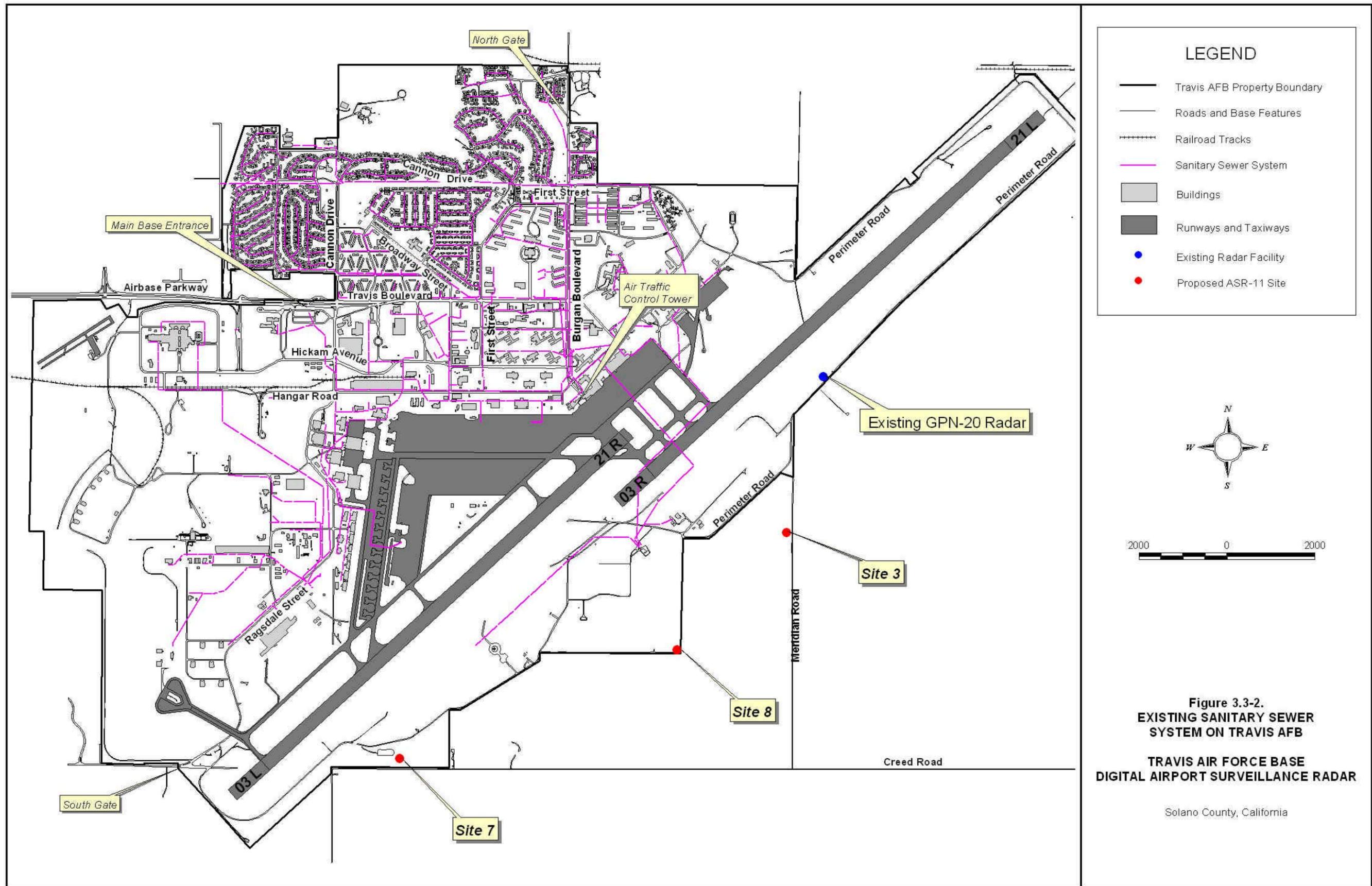
3.3.1.2 Wastewater. The Travis AFB wastewater collection system consists of industrial wastewater pipes, sanitary sewers from lavatories, showers, janitorial sinks, buildings, and family housing units. Sanitary and *de minimus* industrial wastes are discharged directly to the Fairfield-Suisun Sanitary District (FSSD) treatment facility via a main adjacent to the south gate (USAF, 2001b).

The domestic sanitary sewer system consists of over 40 miles of gravity and force mains ranging from 4 to 21 inches in diameter, depicted on Figure 3.3-2 (USAF, 1996). The collection system includes eight lift stations. A sewage storage facility at the former wastewater treatment plant in the southwest corner of the base consists of five basins with a combined capacity of 18 million gallons. A pump station located in Building 1150, diverts excess flows to the storage basin until peak influent recedes. Stored wastewater is then returned to the pump station for discharge to the treatment plant. An additional 90,000 gallon sewage holding tank is located at the medical center, and also serves to store sewage during times of peak discharge (USAF, 1996). The sewage treatment facility and oxidation ponds, now deactivated, were once located in the southeastern portion of the base, in what is now IRP Site WP017 (Section 3.11) (USAF, 2001b).



Source: Travis AFB

travis02.apr : drnkgwtr : 3-3-1 : wtrsys



Source: Travis AFB

travis02.apr : sanitary : 3-3-2 swrsys

The wastewater system experiences significant wet weather flow. Many of the sewer pipes are aging and have become permeable to seeping groundwater, especially in the winter months when portions of the collection system may be as much as eight feet below water table (USAF, 1996). A 1988 study indicated an annual peak wet weather flow of 4.8 mgd, compared to an annual average base flow of 3.16 mgd and an average domestic sanitary flow of 1.69 mgd (USAF, 1996).

The Central Groundwater Treatment Plant (CGWTP) processes contaminated groundwater derived from base-wide remedial activities. The CGWTP is administered through IRP and is independent from the FSSD facility.

The sanitary sewer line closest to **Site 3** is approximately 2,500 feet away, adjacent to Runway 03R/21L. The sanitary sewer line closest to **Site 7** is located approximately 3,000 feet away off Perimeter Road. **Site 8** is near the deactivated oxidation ponds and WWTP. The nearest sanitary sewer line to Site 8 is approximately 2,100 feet north of the site. The existing **AN/GPN-20** is 2,700 feet from the nearest sanitary sewer line.

3.3.1.3 Solid Waste. Travis AFB maintains a Utility Service Contract with the Solano County Garbage Company for refuse collection, recycling, and off-base disposal services (USAF, 2001b). The Solano County Garbage Company disposes of all refuse, including household and industrial waste generated on the base, in the Potrero Hills Landfill or in other licensed or permitted landfills. Refuse from the medical facility is also handled by the Solano County Garbage Company under a separate agreement. The Potrero Hills Landfill is scheduled for closure in 2010.

Eight inactive solid waste disposal sites on base are currently listed as IRP sites. Four of these are abandoned landfills, two are radioactive burial pits, one is a cyanide disposal pit, and one was used for the disposal of sludge from the sewage treatment plant. Another site, LF044, is not actually landfill, but rather is a site used for stockpiling construction material such as asphalt and concrete. It currently is used for heavy equipment training (USAF, 2001b). On-base solid waste incinerators at the aerial port, the medical center, and the mortuary incinerate organic matter.

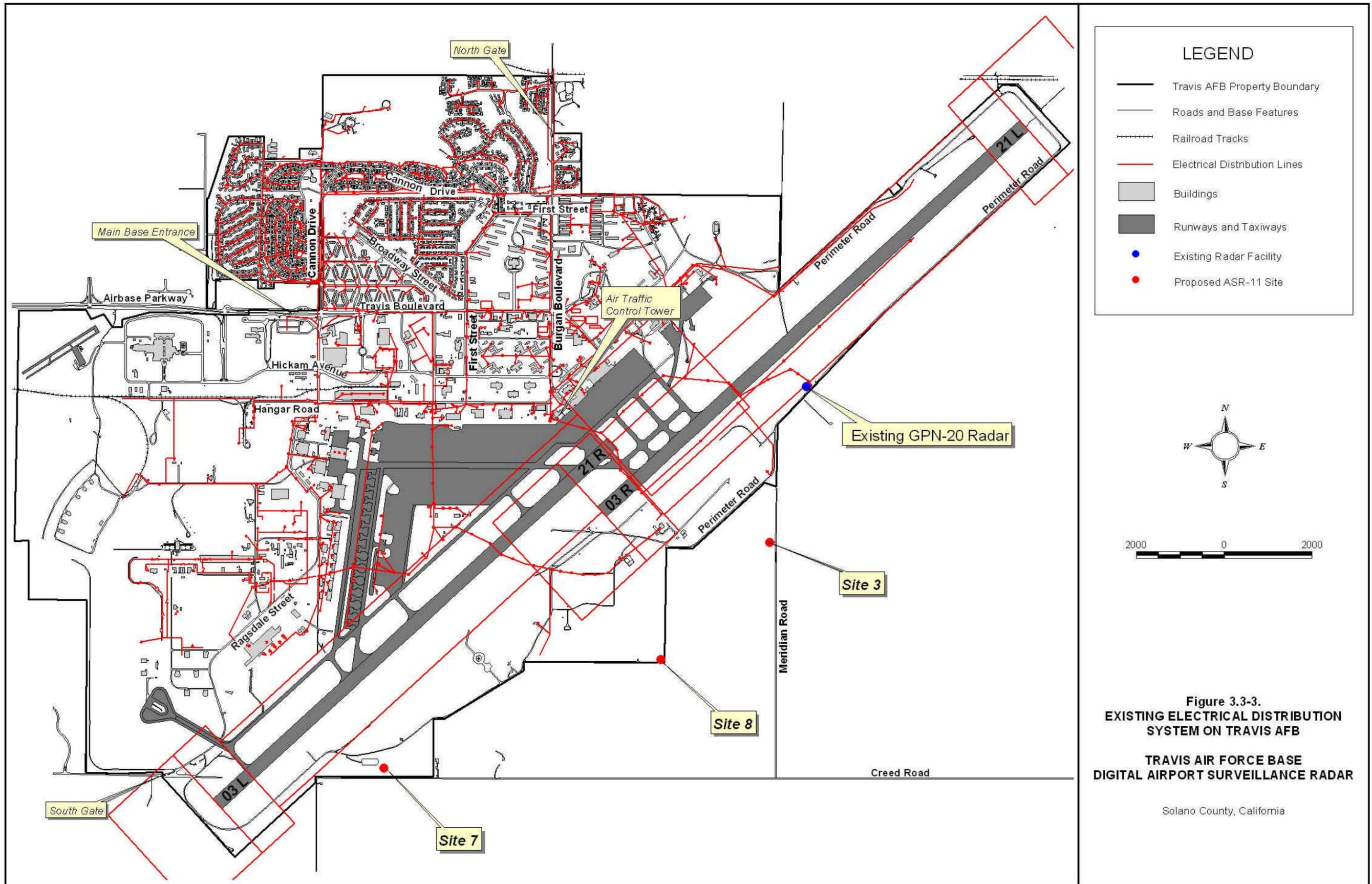
None of the ASR-11 alternative sites nor existing AN/GPN-20 facilities is near designated solid waste handling or disposal areas. However, construction-related debris has been deposited in the vicinity of Sites 7 and 8; the debris near Site 7 is known to include asbestos containing materials (see Section 3.11).

3.3.1.4 Electricity. Travis AFB utilizes Bureau of Reclamation electrical power delivered to the base by Pacific Gas & Electric Company (PG&E) transmission lines. A feeder from the North Gate carries power to the main substation (substation A). Aboveground primary transmission lines carry power to substations B and C (USAF, 1996). Substation B serves primarily the airfield area. Substation C serves the Capehart housing area. Substation A supplies the remainder of the base (USAF, 1996). The electrical distribution lines on Travis AFB are depicted on Figure 3.3-3. Most of the base has underground distribution lines, except the family housing areas and the portion of the base west of Ragsdale Street, which have overhead distribution lines.

An existing electrical line spur terminates at Perimeter Road approximately 1500 feet north of **Site 3**. An existing electrical line parallel and southeast of Runway 03L/21R is within approximately 1000 feet of **Site 7**. The nearest existing electrical lines to **Site 8** are located approximately 2000 feet north, near Perimeter Road. Electrical service is currently provided at the existing **AN/GPN-20** site.

3.3.1.5 Telephone. **Site 3** is 1,500 feet from existing telephone lines on Perimeter Road. **Site 7** is 450 feet from the nearest telephone connection, also along Perimeter Road. **Site 8** is 2,800 feet from existing lines at Building 1150. Telephone service is available at the existing **AN/GPN-20** site (USAF, 2001a).

3.3.1.6 Fiber Optic Cable. Direct-buried fiber optic lines are located along Perimeter Road. However, the proposed project requires redundant fiber optic cable within a duct bank, between the alternative ASR-11 sites and the RAPCON. This alignment would be approximately 3,700 feet long for **Site 3**; 14,800 feet long for **Site 7**; and 7,800 feet long for **Site 8**.



Source: Travis AFB

travis02.apr : electric : 3-3-3 elect

3.3.1.7 Natural Gas. The base uses natural gas as the primary heating fuel. Gas is furnished by PG&E on a firm, as well as on an interruptible, basis. Gas is supplied to the base by a 6-inch line at the South Gate, a 12-inch line at the main gate, and a separate 4-inch line also at the main gate. Only a few facilities on-base have a fuel oil standby system (USAF, 1996).

No natural gas lines are known to run near any of the alternative ASR-11 sites nor the existing AN/GPN-20.

3.3.1.8 Transportation. Interstate Highway 80, five miles west of Travis AFB, is the major regional highway serving the area, and connects Fairfield with San Francisco and Sacramento. Interstate Highway 505, which intersects Interstate 80 in Vacaville, provides a regional connection to Interstate Highway 5, which runs from Seattle to San Diego. Interstate Highway 680 intersects Interstate 80 at Cordelia eight miles southwest of the base, providing a regional bypass route around the east side of the San Francisco Bay Area (USAF, 1996). Air Base Parkway and U.S. Route 12 both connect with Interstate 80 to provide local base access. U.S. 12 runs along the southern base perimeter.

Typically, 7,000 vehicles enter Travis AFB per day during the hours of 6:30 am to 7:45 am on a workday (USAF, 2000). The primary entrance to the base is through the Main Gate at Air Base Parkway. Beyond the Main Gate, the road becomes Travis Boulevard, a paved four-lane road. A secondary gate is also located off Air Base Parkway at Parker Road. The secondary gate provides direct access to the base medical center. Other gates include the North Gate on Burgan Boulevard and the South Gate at Ragsdale Street. The North Gate provides access to family and unaccompanied housing areas, while the South Gate provides access to the aerial port area.

Travis Boulevard and Hickam Avenue serve as the base's principal east-west thoroughfares. Travis Boulevard extends from the Main Gate to Burgan Boulevard. Hickam Avenue extends from the medical center to Burgan Boulevard parallel to Travis Boulevard. A third east-west roadway by the name of Hanger Road serves flightline maintenance and operations functions (USAF, 1996).

The base's two principal north-south streets, Ragsdale Street and Burgan Boulevard, act as collector streets that distribute traffic from the base's arterial roadways and from the North and South Gates. Cannon Drive, Broadway Street, and First Street are collector roadways serving the family housing areas on the north side of the base. Perimeter Road runs along the base perimeter.

The Southern-Pacific Railroad operates a line that runs northwest of the base. The tracks provide train access to the base via a spur which enters the base parallel to and between Air Base Parkway and East Tabor Avenue. Once inside the base perimeter, the spur splits into an east-west track and a short north-south track.

Site 3, located on what is currently private property, is approximately 225 feet from the nearest vehicular access point along Perimeter Road (USAF, 2001a). **Site 7** is 450 feet from Perimeter Road. **Site 8** is approximately 2,600 feet from the nearest access point, also along Perimeter Road (USAF, 2001a). The existing **AN/GPN-20** is located adjacent to Perimeter Road.

3.3.2 Future Baseline Without the Project.

No substantial changes to railways or natural gas are anticipated at Travis AFB in the near future. Some improvements are planned for the water, wastewater, and electrical systems (USAF, 1996). As part of the base realignment and closure (BRAC) program, Travis AFB is in the process of relocating all transmission and distribution cables underground. Other upgrades are planned, including boosting 60 kV primary transformers to 115 kV (USAF, 1996). Also, there is a general base-wide plan to upgrade all telephone and fiber optic infrastructure; these upgrades occur as money becomes available or as new projects, such as the new radar system, require upgrades (USAF, 2001f). New buildings, such as the planned 420,000 sq ft addition to the medical center along with 1,000 new parking spaces, dining halls, day care centers, shopping facility, and a library will likely increase demand for existing utilities and roadways (USAF, 2001b).

3.4 NOISE

The existing general noise environment of Travis AFB is discussed in this section, as well as the noise environments of the three alternative ASR-11 sites and the existing AN/GPN-20 location. Many federal agencies use the day-night average sound level to describe noise and to predict community effects from long-term exposure to noise. In addition, this noise level classification system is used to determine the appropriateness of a given use of specific land (land use compatibility) relative to the average level of environmental noise experienced at the location. These guidelines are described in the *Air Installation Compatible Use Zone (AICUZ) Program Handbook* (USAF, 1991). Noise levels below 65 decibels are considered to be compatible with residential land use. Residential land use is discouraged in areas with a noise level between 65-70 decibels, strongly discouraged in areas with sound levels between 70 and 75 decibels, and considered generally unacceptable for areas with noise levels exceeding 75 decibels.

3.4.1 Existing Conditions

The primary source of noise in the vicinity of Travis AFB results from normal base operation and aircraft usage and maintenance. Noise generated independent of aircraft flight noise on Travis AFB, such as maintenance and shop operations, ground traffic, and construction, is comparable to the noise generated in the surrounding community; therefore, noise generated during aircraft flight operations represents the most substantial noise source on the base.

The associated noise contours generally reflect proximity to the runways. The area of highest decibel readings (75 dB and higher) is in the immediate vicinity of the runways. Extended areas of higher level noise occur along the aircraft approach and departure corridors. In general, the extended areas of higher noise surrounding the base extend further on the southeast side of the base than they do on the northwest side of the base. This appears to be a result of two factors: 1) topography and 2) occurrence of structures. Though the topographic relief on Travis AFB is generally flat, the northwest portion of the base is at a higher elevation than the runways. This difference in elevation, combined with the development on this side of the base, provides a barrier that prevents much of the noise originating at the runways and taxi areas from traveling a great distance off-base.

The southeast portion of the base, and areas beyond the base perimeter, are at a lower elevation (though not significant) than the runways. In addition, not only are the runways close to the base perimeter, but there are very few structures on the base and throughout adjacent lands to deflect the sound as it travels southeast from the runways.

All three proposed alternative sites are located on (or just beyond) the south/southeast portion of the base. **Site 3** and **Site 8** are located within the 70 to 75 dB contour; **Site 7** and the existing **AN/GPN-20** are located within the 80 dB and higher contour.

3.4.2 Future Baseline Without the Project

In the future without the project, it is not anticipated that there would be any changes in the current noise conditions in the areas of the three alternative sites. No major changes in land use activities are expected to occur in the vicinity of the alternative sites, and thus future noise levels are anticipated to be similar to those which currently characterize the area.

3.5 AIR QUALITY

Air quality data specific to the alternative ASR-11 site locations and the existing AN/GPN-20 do not exist. However, information compiled from regional data is expected to describe site specific characteristics.

The U. S. Environmental Protection Agency (EPA) defines ambient air in 40 CFR Part 50 as “that portion of the atmosphere, external to buildings, to which the general public has access.” In compliance with the 1970 Clean Air Act and the 1977 and 1990 Clean Air Act Amendments, EPA has developed ambient air quality standards and regulations. The National Ambient Air Quality Standards (NAAQS) were enacted for the protection of the public health and welfare, allowing for an adequate margin of safety. To date, EPA has issued NAAQS for six criteria pollutants (Table 3.5-1): carbon monoxide, sulfur dioxide (SO₂), ozone (O₃), nitrogen dioxide (NO₂), lead (Pb), and particulates (e.g., PM-10, particles with a diameter less than or equal to 10 μm). National primary standards are set to protect human health with an adequate margin of

safety for even the most sensitive portion of the human population. Secondary standards are set for some pollutants to protect against damage to plants, animals, and materials.

According to guidelines, an area with air quality better than NAAQS for a specific pollutant is designated as being “in attainment” for that pollutant. A “non-attainment” designation means that a NAAQS has been exceeded more than three discontinuous times in 3 years. In 1995, EPA upgraded the San Francisco Bay Area Air Basin (SFBAAB) to attainment of the national ozone standard, after data showed the region had not violated the standard for 3 years. Soon after, the region experienced several violations of the ozone standard, requiring EPA to downgrade the SFBAAB as an ozone non-attainment area in 1997. In 1998, EPA designated SFBAAB as attaining the CO standard. Currently, the SFBAAB is designated as non-attainment only with regard to the ozone NAAQS.

State standards established by the California Ambient Air Resources Board (ARB) are termed the California Ambient Air Quality Standards (CAAQS). The CAAQS are at least as protective as the NAAQS, and include standards for pollutants for which there are no national standards (visibility reducing particles, sulfates, hydrogen sulfide). NAAQS and CAAQS are compared in Table 3.5-1 (ARB, 1999). The ARB has designated the SFBAAB as non-attainment for ozone and PM-10.

3.5.1 Existing Conditions

Travis AFB is located in the southwestern portion of Solano County, which is part of the SFBAAB. Air quality regulations and standards are administered by the Bay Area Air Quality Management District (BAAQMD) (USAF, 2001b). The SFBAAB also includes the counties of Santa Clara, San Mateo, San Francisco, Marin, Napa, Contra Costa, Alameda, and the southeast portion of Sonoma (USAF, 1999). Portions of the SFBAAB are in an area subject to temperature inversions, which prevent pollutants from rising and becoming diluted vertically. Inversions during the summer months foster the development of ground-level ozone due to the warm sunny weather. Carbon monoxide levels typically reach their peak in late fall and winter (USAF, 1996).

Table 3.5-1. National and California Ambient Air Quality Standards

Air Pollutant	Time Averaging	Primary NAAQS ($\mu\text{g}/\text{m}^3$)	CAAQS ($\mu\text{g}/\text{m}^3$)
Ozone (O ₃)	1-hour	235	180
	8-hour	157	N/A
Respirable particulate matter of diameter less than 10 microns (PM ₁₀)	24-hour	150	50
	Annual	50 (arithmetic mean)	30 (geometric mean)
Fine Particulate matter of diameter less than 2.5 microns (PM _{2.5})	24-hour	65	N/A
	Annual	15	N/A
Carbon Monoxide (CO)	1-hour	40,000	23,000
	8-hour	10,000	10,000
Nitrogen Dioxide (NO ₂)	1-hour	N/A	470
	Annual	100	N/A
Lead (Pb)	Quarterly	1.5	1.5
Sulfur Dioxide (SO ₂)	1-hour	N/A	655
	3-hour	N/A ¹	N/A
	24-hour	365	105
	Annual	80	N/A
Visibility Reducing Particles	8-hour	No Federal Standard	In sufficient amount to produce an extinction coefficient of 0.23/km
Sulfates	24-hour	No Federal Standard	25
Hydrogen Sulfide (H ₂ S)	1-hour	No Federal Standard	42

CAAQS = California Air Quality Standards

NAAQS = National Ambient Air Quality Standards

N/A = Not applicable

¹ although there is no primary federal 3-hour standard for SO₂, the secondary standard is 1,300 $\mu\text{g}/\text{m}^3$

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter

Source: California Air Resources Board, 1999

Air pollutant emissions are generated at Travis AFB from various sources including military aircraft, field activities, boilers, surface coating and painting operations, commuter traffic, and maintenance and repair operations. The BAAQMD regulates stationary air emission sources and regularly inspects these sources. Travis AFB currently has 126 (exempt and non-exempt) sources permitted by the BAAQMD (USAF, 2001g). Fire training areas no longer operate on the

base. No sources of air pollution on Travis AFB are known to negatively affect the natural resources on the base or surrounding area (USAF, 2001b).

3.5.2 Future Baseline Without the Project

Without the project, air quality in SFBAAB will continue as being in “non-attainment” of ozone and PM-10 unless efforts implemented by the state of California to reduce source emissions from industry and automobiles succeed. Incremental improvements, however, may be off-set by a growing population and subsequent increase in traffic. Construction of new base facilities, such as the proposed medical center expansion, could also contribute to higher localized pollutant levels through increased traffic and incineration.

3.6 GEOLOGY AND SOILS

3.6.1 Existing Conditions

General characteristics of soils and geology on the base are discussed in this section. Site-specific data relevant to the three alternative ASR-11 sites and the existing AN/GPN-20 are provided, as available.

3.6.1.1 Geology. Travis AFB is situated on Quaternary bay sediments. Generally, the base has unconsolidated silty clays at the surface and silts and fine sands at depths of 15 to 20 feet. Rocks and sediments found in the area date to the Cretaceous period. Alluvium, consisting of sand, gravel, silt, and clays, underlays parts of the northern portion of Travis AFB. These deposits are found in irregular patterns with a thickness varying from 5 to 60 feet. The majority of the base is underlain by older alluvium of Pleistocene age, consisting of interfingering lenses of sands, gravels, silts, and clays. Southwest of Fairfield, these deposits can reach up to 200 feet thick; however, the deposits on base are much shallower overlying the basement rocks that are part of the outcropping evident at Potero Hill to the south. Tertiary consolidated sediments with some interbedded volca-debris, the Tehama Formation, Pleistocene-Pliocene nonmarine sediments, the Markley Formation, and Eocene marine sediments typically underlie the alluvium, but in places crop out of the surface (USAF, 2001b).

The San Francisco Bay Area has historically been an area of seismic activity. This is primarily due to the occurrence of the San Andreas, the Hayward, and the Calaveras faults. All three of these major faults lie more than 20 miles from Travis AFB. A smaller potentially active fault, the Green Valley Fault, is located approximately 10 miles west of the base. The Vaca Fault System may traverse the eastern portion of the base. The location of the fault has been inferred by photographs, but no evidence has confirmed it in the field (USAF, 2001b).

3.6.1.2 Soil Resources. The soils of the Travis AFB region have weathered under a distinctive climatic cycle of the Pacific coast region. Summer temperatures frequently reach 110° F with little or no rainfall (USAF, 2001b). Winters are moderate with occasional frosts and gentle frequent rains. Vegetation withers during the summer months; fall rains promote decomposition, and the accumulated organic matter is largely oxidized and decomposed during the late spring and early summer. The light brown or reddish-brown colors of the surface soils are attributed to the oxides of iron and aluminum, rather than humus. The lower layers of soil in the vicinity of Travis AFB are dense and compact, which retard the penetration of roots and water.

Site 3 and **Site 8** are located within a zone of Antioch-San Ysidro Complex (AoA). This complex consists of approximately 50 percent Antioch loam and 35 percent San Ysidro sandy loam. The remaining 15 percent includes small areas of Solano loam and Pescadero clay loam. Permeability of these soils is very slow. Slopes are zero to two percent.

Site 7 is located within an area of San Ysidro Sandy Loam. The San Ysidro series was formed in alluvium derived from sedimentary rocks. The permeability of this complex is typically slow to very slow. Slopes range from zero to two percent.

The existing **AN/GPN-20** is located within an area of Millsap sandy loam (MkA). This soil series consists of moderately well-drained soils on uplands, underlain by sandstone at a depth of 20-30 inches. Permeability in the subsoil is very slow. Slopes range from zero to two percent.

3.6.2 Future Baseline Without the Project

Barring any significant seismic activity in the area of Travis AFB, no changes in geologic formations, or existing soil types and locations, are anticipated on Travis AFB in the future without the project.

3.7 SURFACE WATER AND GROUNDWATER

3.7.1 Existing Conditions

The characteristics for surface water and groundwater on the base are discussed in this section and are expected to generally describe the area around the three alternative ASR-11 sites and the existing AN/GPN-20 radar.

3.7.1.1 Surface Water. The major surface water feature on Travis AFB is Union Creek, a perennial water body which originates three miles north of the base. Union Creek splits about one mile north of the base to form two branches. The western branch flows south along the west perimeter of the base housing area and then proceeds along the east edge of the medical center and continues south (Figure 3.7-1). The channel then turns southeast and follows Ragsdale Street for over one mile before it eventually crosses under Ragsdale Street and runs south to the edge of Taxiway 30. This channel fills with water during heavy rains, and is the main drainage channel for a large area of the west side of the base. The western branch ranges in width from 15 to 25 feet wide, and from 4 to 15 feet in depth as it traverses the base.

The eastern branch of Union Creek enters Travis AFB at the base's northeast corner and flows directly into North Gate Park Pond, which is adjacent to the North Gate. North Gate Park Pond is a man-made water body. Outflow from North Gate Park Pond is channeled into the base's storm water sewer system, resurfaces south of the main flightline, and leaves the base along the south boundary (USAF, 2001b). After exiting Travis AFB, Union Creek flows 1.6 miles before discharging into Hill Slough, which is a seasonally and semi-permanently flooded wetland (USAF, 2000). Width and depth of the eastern branch of Union Creek vary from 10 to 15 feet and from 4 to 15 feet, respectively (USAF, 2001b).

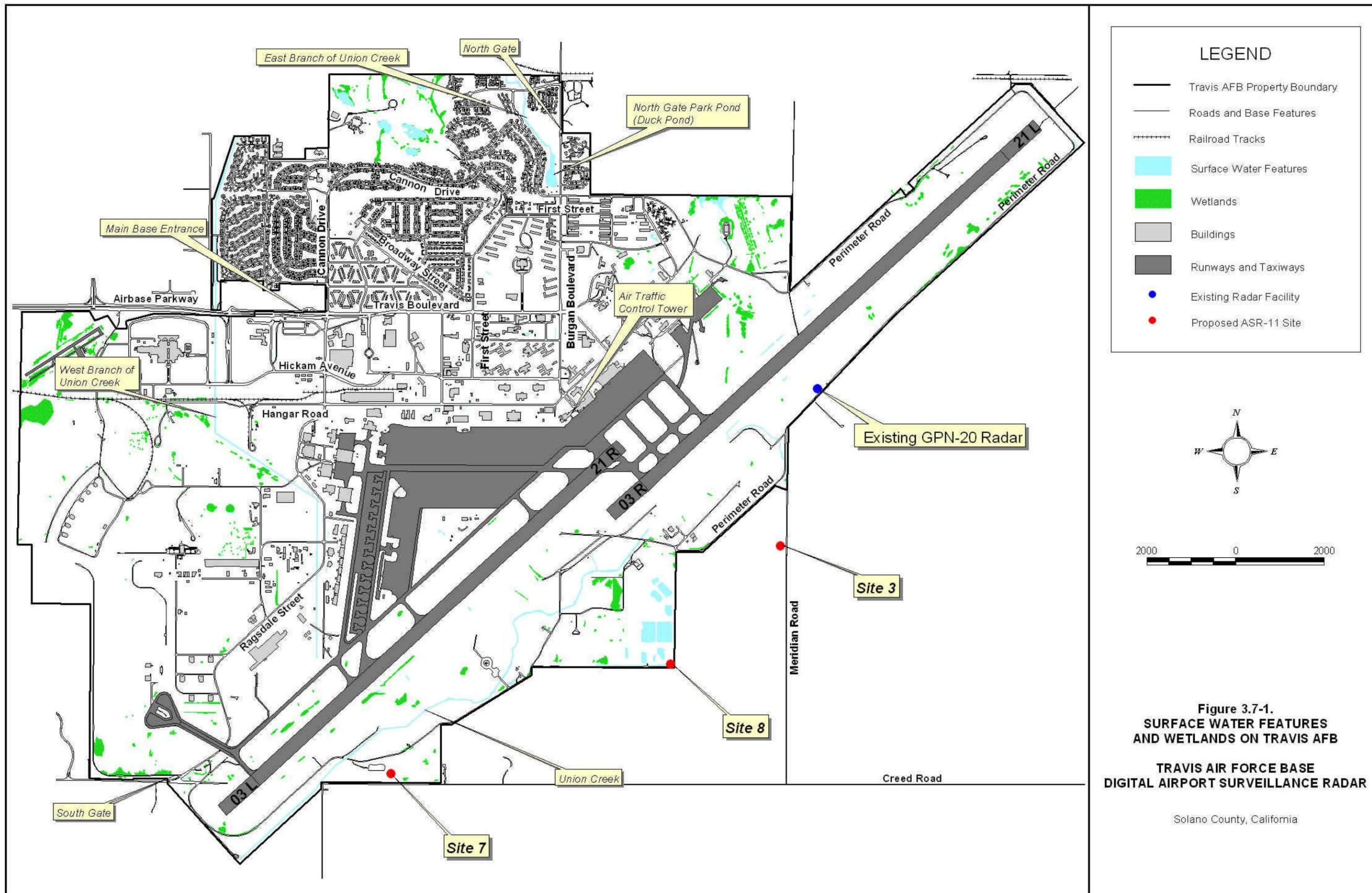


Figure 3.7-1.
SURFACE WATER FEATURES
AND WETLANDS ON TRAVIS AFB

TRAVIS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR

Solano County, California

Source: Travis AFB

travis01.apr : wtrwflnd : 3-7-1 wtrwflnd

The base's storm drain capacity is designed to handle a 10-year 24 hour storm. Storm water runoff from Travis AFB is directed to Union Creek through a series of underground pipes, culverts, and open channels (USAF, 2001b). Union Creek is the only perennial watercourse on the base. Other drainage basins and water conveyances are ephemeral (e.g. Luco Slough, Nurse Slough, Suisun Slough, Hill Slough, Union Creek, Montezuma Slough, and Denverton Slough). All drainage from these surface water channels ultimately enters Suisun Bay (USAF, 1996). There are six on-base outfall locations, all of which are located near the southern boundary of the base, in the general area of the proposed alternative ASR-11 sites (USAF, 2001b).

The State Water Resources Control Board (SWRCB) Storm Water General Permit regulates storm water runoff from the base. On the base, storm water is commingled with discharge from industrial activities. Non-point source stormwater discharge is regulated under the Air Mobility Command Statewide Industrial Activities Storm Water Discharge Permit (ID 24S000808), although the industrial portion of the permit is presently undergoing revision (USAF, 2001g). In addition to the permitted storm water discharges, there are a number of permitted non-storm water discharges (e.g. discharges from construction activities, excess water from treatment system wells) and authorized non-storm water discharges (e.g. discharges from dust control, fire fighting) at Travis AFB. The Travis AFB Storm Water Pollution Prevention Plan (SWPPP) discusses management and monitoring of stormwater discharges (USAF, 2001b).

Site 3 is approximately 3,000 feet east of the point where the eastern branch of Union Creek re-emerges from the culvert which conveys it from North Gate Park Pond south beneath the flightline. **Site 7** lies approximately 1000 feet southeast of the eastern branch of Union Creek. **Site 8** lies approximately 2,500 feet southeast of the eastern branch of Union Creek. The existing **AN/GPN-20** is 1,500 feet from an unnamed drainage swale.

3.7.1.2 Groundwater. Primary water-bearing deposits in the region surrounding Travis AFB are coarse-grained sediments (sand and gravel) within alluvium. The aquifer below the base is not considered productive for drinking water nor industrial uses (USAF, 2001b). Depth to the unconfined groundwater aquifer varies seasonally from about 5 feet below ground surface (bgs) to 30 feet bgs. The groundwater gradient beneath Travis AFB is north to the south. Horizontal

hydraulic gradients range from between 0.003 and 0.005 vertical feet per horizontal foot in the upper portion of the aquifer, to between 0.003 and 0.10 in the deeper portion of the aquifer (USAF, 2000).

Recharge to the groundwater table is from the foothills of Cement Hill to the north and in-channel infiltration from the creeks' draining area (i.e. Union Creek, Denverton Creek, and smaller unnamed creeks northwest of the base)(USAF, 2001b).

The Travis AFB IRP program is conducting extensive groundwater monitoring. The unconfined aquifer has been affected by releases of hazardous substances from historic activities at the base, as discussed in Section 3.11.

3.7.2 Future Baseline Without the Project

No substantial changes to surface water or groundwater conditions are expected to occur in the future without the proposed project. Implementation of Best Management Practices during normal activities on the base will help to reduce both point and non-point source pollution from stormwater. Withdrawal of groundwater for industrial and non-industrial uses is not likely due to the poor yield of the aquifer, except for activities related to IRP investigation and remediation of groundwater contamination.

3.8 BIOLOGICAL RESOURCES

This section contains descriptions of biological resources, including vegetation, wetlands, wildlife, and endangered species for Travis AFB and its vicinity, including the proposed ASR-11 sites and the existing AN/GPN-20 radar.

3.8.1 Existing Conditions

Travis AFB is situated in an inland area influenced by marine air influx that produces mild, wet winters and cooler summers, though hot dry air blowing from the north may cause summer temperatures to temporarily reach 110° F. Low winter temperatures may dip just below the freezing point. Annual precipitation is approximately 17.7 inches. The rainy season, during

which 83 percent of the annual rainfall occurs, begins in November and continues into March. In the dry season, less than 1/3 of an inch of rain may fall per month (USAF, 2001b).

Terrestrial habitats on Travis AFB may be broadly distinguished into annual grasslands/forbs, ruderal, and riparian categories, as well as urban landscapes:

- ?? The grassland/forbs habitat, which supports a variety of birds, reptiles, and mammals, is found predominantly in the west and southwest portions of the base, comprising approximately 1,700 acres. A significant portion of the grasslands is subject to periodic mowing and discing, and are also utilized as pasture for cattle and horse grazing.
- ?? The ruderal habitat is found in the southeast quadrant of the base adjacent to Union Creek and in association with the base's pheasant hunting area. In general, this plant community occurs in disturbed areas such as roadfills and construction sites and in areas subject to recurrent disturbances such as mowing, discing, and grazing. The ruderal habitat is widely distributed and in the aggregate constitutes only a small portion of the land area at Travis AFB. The ruderal habitat next to Union Creek, in the vicinity of Sites 7 and 8, supports numerous birds, reptiles, and small mammals (USAF, 2001b).
- ?? Riparian habitat is associated with a river or stream and supports dynamic plant communities that are adapted to drainages that are continually changing with the ebb and flow of water. Riparian habitats primarily exist along Union Creek and north of the North Gate Park Pond; this habitat type does not extend more than a few meters from the banks of the aquatic environments (USAF, 2001b).
- ?? Urban landscapes are associated with non-native landscaped vegetation, predominantly lawns, found throughout the housing and building areas in the north-central portion of Travis AFB. The base has approximately 300 acres of irrigated, improved urban landscapes. These areas are periodically subject to disturbance such as mowing (USAF, 2001b).

Aquatic habitats on Travis AFB can be broadly distinguished into riparian, wetland meadows, vernal pools, and lacustrine categories:

- ?? Riparian habitat is a component of the in-stream habitat and the exposed banks of Union Creek. The streambed is channeled, and for the most part, the flow is sluggish (USAF, 2001b).

- ?? Wetland meadows are scattered throughout the base in depressional areas, which are maintained by mowing and discing, or used as pasture for cattle and horses. Wetland meadows are usually wet throughout the rainy season (USAF, 2001b).
- ?? Vernal pools are shallow depressions or small, shallow ponds that fill with water during the rainy season and then dry out during the spring, becoming completely dry by late spring or early summer. Vernal pools are typically underlain by a duripan (claypan or hardpan) layer or by impermeable bedrock, which restricts percolation of water into the soil. Vernal swales are ecologically and floristically related to vernal pools; however vernal swales are drainageways or poorly defined depressions that are seasonally inundated, holding standing water for relatively short periods. These wetlands are generally scattered throughout Travis AFB, but are generally absent in the highly developed central portion of the base (USAF, 2001b).
- ?? Lacustrine habitat at Travis AFB refers to man-made, open water associated with the North Gate Park Pond, created by the impoundment of Union Creek. North Gate Park Pond is 2.2 surface acres and has an average depth of approximately 5 feet. A number of small ponds in the southeast portion of the base also exhibit this lacustrine, open-water environment; the edges of these ponds support vegetation dominated by grass species, but the ponds themselves do not appear to support any wildlife (USAF, 2001b).

3.8.1.1. Vegetation. Descriptions from early botanical surveys and from existing remnants of natural vegetation suggest that, before European settlement, the upland areas in the vicinity of present-day Fairfield were dominated by perennial bunch grasses. Among the arborescent taxa, valley oak was the dominant species, although other native oaks such as coast live oak and interior live oak may have been present in small numbers along perennial creeks. Common associated overstory likely consisted of Fremont cottonwood, California sycamore, boxelder, and willows. The land occupied by Travis AFB was originally public land that bordered on land grants from the Mexican government dating from about 1841. Prior to this time, the only inhabitants were small, scattered groups of Suisun/Patwin Indians who did not practice even the most primitive form of agriculture. Europeans had undoubtedly traveled through this territory in earlier years, but none remained long enough to change the character of the landscape. The destruction of the natural communities began in approximately 1890 when the land contained within present-day Travis AFB was first claimed and permanently inhabited by European

settlers. The early custom of free-range cattle grazing had a significant impact on the landscape, as did the subsequent practice of dry land wheat and barley farming. Perhaps the greatest level of vegetational displacement, however, has occurred within the twentieth century. The continued sowing of nonnative grain, forage, and turf grasses has resulted in the establishment of oligotypic stands of brome, wild oat, rye, and fescue. The native trees were removed for farming operations, and with settlement, windbreaks of eucalyptus, osage orange, Monterey cypress, and others were planted (USAF, 2001b).

Today, the vegetation on Travis AFB consists of 53 families, 159 genera, and 252 species. Woody plants constitute 13 species. Composites (*Asteraceae*) and grasses (*Poaceae*) are the most dominant families, comprising one-third of all species present. Forty-eight percent of flora (120 species) found on Travis AFB are species not native to California (USAF, 2001b). Despite the limited areal extent of vernal pools, 110 species (44 percent) of the taxa have been identified in these areas. The dominant plant species, corresponding to the various terrestrial and aquatic habitats described above, is presented in Table 3.8-1 (USAF, 2001b).

Site 3 is located in an off-base pasture that is characterized by vegetation similar to adjacent on-base grasslands. Vegetation at **Site 7** generally reflects the disturbed nature (debris dumping) that is common of the ruderal habitat on the southern boundary of the base. **Site 8** also is located within a ruderal habitat (prior sewage treatment facility), although there are a number of mapped vernal pools and/or wetland meadows in this portion of Travis AFB. Both Sites 7 and 8 are characterized by mixed grass species with clumps of fennel. The existing **AN/GPN-20**, just south of the flightline, is located within a portion of grassland subject to periodic mowing and discing, as part of the bird-aircraft strike hazard program.

3.8.1.2 Wetlands and Vernal Pools. Wetlands on-base are almost exclusively vernal pools and vernal swales associated with the bed and banks of surface drainage features, and isolated depressions in low-lying areas. Travis AFB has conducted various studies to inventory the vernal pools and to delineate the wetlands.

Table 3.8-1 Dominant Natural Vegetation Commonly Found on Travis AFB Property

Habitat Type	Scientific Name	Common Name
Grassland	<i>Bromus hordeaceus</i> <i>Lolium multiflorum</i> <i>Vulpia myuros</i> var. <i>myuros</i> <i>Erodium</i> sp. <i>Avena fatua</i> <i>Bromus diandrus</i> <i>Phalaris aquatica</i>	Soft chess Italian rye-grass Mouse-tail fescue Filaree Wild oat Ripgut grass Harding grass
Ruderal	<i>Baccharus pilularis</i> <i>Eucalyptus globulus</i> <i>Schinus molle</i> <i>Robinia pseudoacacia</i> <i>Centaurea solstitialis</i> <i>Geranium dissectum</i> <i>Avena fatua</i> <i>Bromus diandrus</i>	Covote bush Blue gum California pepper tree Black locust Yellow star thistle Cut-leaved geranium Wild oat Ripgut grass
Riparian (Terrestrial)	<i>Elymus triticoides</i> <i>Lepidium latifolium</i> <i>Phalaris aquatica</i> <i>Distichlis</i> sp. <i>Salix laevigata</i> <i>Salix lasiolepis</i> <i>Baccharus pilularis</i>	Beardless wild rye Broad-leaved pepperwort Harding grass Salt grass Red willows Arroyo willow Coyote bush
Riparian (Aquatic)	<i>Salix</i> sp. <i>Lemna minor</i> <i>Lepidium latifolium</i> <i>Myriophyllum sibiricum</i> <i>Potamogetan foliosus</i>	Willow Minor duck-weed Broad-leaved pepperwort American water milfoil Leafy pondweed
Wet Meadow	<i>Lolium multiflorum</i> <i>Eryngium vaseyi</i> <i>Plagiobothrys</i> sp. <i>Downingia</i> sp. <i>Alopecurus saccatus</i> <i>Erodium</i> sp. <i>Bromus diandrus</i> <i>Avena fatua</i>	Italian rye-grass Coyote thistle Popcorn flower Downingia Pacific meadow foxtail Filaree Ripgut grass Wild oat
Vernal Pools	<i>Deschamsia dianthonoides</i> <i>Alopecurus saccatus</i> <i>Lasthenia</i> sp. <i>Psilocarphus tenellus</i> var. <i>globiferus</i> <i>Plagiobothrys</i> sp. <i>Downingia</i> sp. <i>Hordeum brachyantherum</i> <i>Lythrum hyssopifolia</i> <i>Eryngium vaseyi</i> <i>Eleocharis</i> sp. <i>Lilaea scilloides</i> <i>Astragalus tener</i> var. <i>tener</i> <i>Atriplex joaquiina</i>	Annual hairgrass Pacific meadow foxtail Goldfields Round wooly marbles Popcorn Flower Downingia Meadow barley Hyssop loosetrife Coyote thistle Spike rush Flowering quiltwort Alkali milk vetch San Joaquin spearscale
Lacustrine	<i>Lemna</i> sp. <i>Potamogetan foliosus</i> <i>Myriophyllum sibiricum</i> <i>Typha latifolia</i>	Duckweed Leafy pondweed American water milfoil Cattail

As a general habitat type, vernal pools typically exist as a complex of upland mounds (mima mounds) interlaced by a hydrologically associated system of basins and swales. A highly distinctive flora, consisting largely of annual species, is associated with vernal pools, or other ecologically related vernal wet habitats (i.e. vernal swales, vernal wet grasslands), including about 70 plant species considered to be endemic to vernal pools in California. The highly distinctive flora of these habitat types includes many special-status plant species, as well as several special-status invertebrate and amphibian species.

In vegetative composition, vernal swales and vernal wet grasslands are intermediate between upland grassland and vernal pools, and consist of a strong cover of facultative vernal pool species and a minimal cover of obligate (indicator) species. The most striking ecological characteristic of vernal pools and related vernal wet habitats is their seasonal transition from inundated conditions in winter and early spring to desiccated conditions in summer and fall. Over 320 sites on Travis AFB have been identified and classified as vernal pools, most of which are in the base's western portion, although a number of wetlands/vernal pools have been identified in the southeastern portion of the base (Natural Resource Management Unit E) in the general area of the proposed ASR-11 sites (Figure 3.7-1).

Site 7 is approximately 275 feet south of a small wetland identified as SE052; Site 7 is also approximately 400 feet west of a cluster of small wetlands identified as SE002, SE047, SE049, SE050, and SE051. Field walkovers during the March 2001 site visit did not find these mapped wetland areas to be readily apparent in the field. **Site 8** is located approximately 100 feet north of a linear wetland (SE032W) which likely identifies a shallow depression along the existing road along the base perimeter; this area appeared to have water-stained vegetation during the field walkover in March 2001. Site 8 is also approximately 100 feet southeast of a moderately-sized wetland identified as SE036W; two larger wetlands (SE038W and SE037W) having a square shape corresponding to that of the former oxidation ponds are located approximately 400 feet north of the site. **Site 3** is located off-base in a grassy pasture, just beyond the southeast perimeter of the base; the field walkover did not reveal the presence of any readily apparent wetlands. Base personnel, however, have indicated there is an approximately 80 percent chance

that wetlands occur in the area of Site 3 (USAF, 2001h). The existing AN/GPN-20 is not located near any mapped vernal pools or wetland resource areas.

3.8.1.3 Wildlife. Wildlife present at Travis AFB has been documented through several studies and compiled in the Integrated Natural Resources Management Plan. Table 3.8-2 presents the most common wildlife species in each of the various habitat types at Travis AFB.

Six small mammal species are found on Travis AFB, listed in Table 3.8-3. The deer mouse is the most common in the grassland habitat, and the house mouse is the most common in the riparian area. Thirteen species of large mammals, listed in Table 3.8-3, have been either directly observed or identified by sign (scat, tracks, nests). California ground squirrels and black jackrabbits are abundant throughout Travis AFB. Two beaver dams and one beaver sighting have been confirmed along Union Creek. The western mastiff bat, a federally listed species of special concern, may occur on Travis AFB (see Section 3.8.1.4).

Between 61 and 153 bird species have been identified as occurring or having the potential to occur on base (USAF, 2001b). Of the 16 to 35 species known to nest on base, four are of special status (see Section 3.8.1.4). The red-winged blackbird is the most common bird species observed in all habitat types except riparian and residential areas, where the mallard duck is the most common (USAF, 2001b). The greatest number of birds occurred in the Union Creek riparian habitat, while the greatest number of species has been observed in the ruderal, wetland, and grassland habitats (USAF, 2001b).

Thirteen reptile species, listed in Table 3.8-4, have been observed or are known to exist on Travis AFB. Northwestern fence lizards and gopher snakes are both abundant and occupy a wide range of habitats. The western pond turtle and California red-sided garter snake occur only in the riparian habitat associated with Union Creek (USAF, 2001b).

The Pacific tree frog is the only amphibian commonly found on base, and is primarily associated with riparian and early successional habitat. Western toads are rarely observed on base. California tiger salamanders (federally listed as a candidate species), western toads, and bullfrogs have been identified in nearby water sources off base (Table 3.8-4).

Table 3.8-2 Wildlife Commonly Found on Travis AFB Property

Habitat Type	Scientific Name	Common Name
Grassland	<i>Aegialius phoeniceus</i> <i>Phasianus colchicus</i> <i>Sceloporus occidentalis</i> <i>Pituophis melanoleucus</i> <i>Peromyscus maniculatus</i>	Red-winged blackbird Ring-necked pheasant Northwestern fence lizard Pacific gopher snake Deer mouse
Ruderal	<i>Aegialius phoeniceus</i> <i>Charadrius vociferus</i> <i>Sturnella neglecta</i> <i>Hyla regilla</i> <i>Sceloporus occidentalis</i> <i>Pituophis melanoleucus</i> <i>Peromyscus maniculatus</i> <i>Mus musculus</i>	Red-winged blackbird Killdeer Western meadowlark Pacific tree frog Northwestern fence lizard Gopher snake Deer mouse House mouse
Riparian (Terrestrial)	<i>Aegialius phoeniceus</i> <i>Anas platyrhynchos</i> <i>Hyla regilla</i> <i>Clemmys marmota</i> <i>Thamnophis sirtalis</i>	Red-winged blackbird Mallard Pacific tree frog Western pond turtle California red-sided garter snake
Riparian (Aquatic)	<i>Gambusia affinis</i> <i>Pimephales promelas</i> <i>Lavinia exilicauda</i> <i>Gasterosteus aculeatus</i> <i>Micropterus salmoides</i> <i>Lucania parva</i> <i>Anas platyrhynchos</i> <i>Casmerodius allous</i> <i>Ardea herodias</i>	Western mosquitofish Fathead minnow Hitch Threespine stickleback Largemouth bass Rainwater killifish Mallard Great egret Great blue heron
Vernal Pools	<i>Branchinecta lynchi</i>	Vernal pool fairy shrimp
Lacustrine	<i>Micropterus salmoides</i> <i>Lepomis macrochirus</i> <i>Ictalurus punctatus</i> <i>Lepomis cyanellus</i>	Largemouth bass Bluegill Channel catfish Green sunfish

Source: USAF, 2001b

A total of nine fish species are known to occur on Travis AFB. Union Creek supports an abundance of fish (Table 3.8-1); other than the stickleback and hitch, the species are introduced. Approximately 100 acres of land adjacent to the flightline on the south side of the base are used for pheasant hunting. The eastern branch of Union Creek bisects the hunting area. The pheasant populations are not self-supporting and require periodic replenishment (USAF, 2001b).

Table 3.8-3 List of Mammal Species Observed or Known to Occur on Travis AFB

Scientific Name	Common Name
<i>Peromyscus maniculatus</i>	Deer mouse
<i>Mus musculus</i>	House mouse
<i>Reithrodontomys megalotis</i>	Western harvest mouse
<i>Thomomys bottae</i>	Botta's pocket gopher
<i>Sorex ornatos</i>	Ornate shrew
<i>Microtus californicus</i>	California meadow vole
<i>Lepus californicus</i>	Black-tailed jackrabbit
<i>Spermophilus beecheyi</i>	California ground squirrel
<i>Didelphis virginiana</i>	Virginia opossum
<i>Mephitis mephetis</i>	Striped skunk
<i>Felis domesticus</i>	Feral cats
<i>Canis latrans</i>	Coyote
<i>Vulpes vulpes</i>	Red fox
<i>Ondatra zibethi</i>	Muskrat
<i>Mustela frenata</i>	Long-tailed weasel
<i>Procyon lotor</i>	Raccoon
<i>Mustela vison</i>	Mink
<i>Castor canadensis</i>	Beaver
<i>Lynx rufus</i>	Bobcat

Source: USAF, 2001b

Table 3.8-4 List of Reptile and Amphibian Species Observed or Known to Occur on Travis AFB

Scientific Name	Common Name
<i>Fumaces skiltonianus</i>	Western skink
<i>Gerrhonotus</i> spp.	California alligator lizard
<i>Phrynosoma coronatum</i>	California horned lizard
<i>Uta stansburiana</i>	California side-blotched lizard
<i>Cnemidophorus tigris</i>	California whiptail
<i>Sceloporus occidentalis</i>	Northwestern fence lizard
<i>Thamnophis elegans</i>	Coast garter snake
<i>Pituophis melanoleucus</i>	Pacific gopher snake
<i>Coluber constrictor</i>	Racer
<i>Lampropeltis getulus</i>	California kingsnake
<i>Thamnophis sirtalis</i>	California red-sided garter snake
<i>Crotalus viridis</i>	Western rattlesnake
<i>Clemmys marmorata</i>	Western pond turtle
<i>Rana catesbeiana</i>	Bullfrog
<i>Bufo boreas</i>	California or western toad
<i>Rana aurora</i>	California red-legged frog
<i>Taricha torosa</i>	Coast range newt
<i>Hyla regilla</i>	Pacific tree frog

Source: USAF, 2001b

Both **Site 7** and **Site 8** are located within ruderal habitats, that may support foraging or nesting for bird species such as red-winged blackbirds, killdeer, and western meadowlarks, as well as reptiles such as the Northwestern fence lizard and gopher snake, and small mammals such as deer and house mice. Site 8 is also located within the area utilized for pheasant hunting. **Site 3** is located off-base within a grassland area primarily used for pasture; however, the site may also

support small animals such as the red-winged blackbird, Northwestern fence lizard, gopher snake, and deer mouse. The existing AN/GPN-20 is also located within a grassland, and is likely to support similar wildlife species to those identified above.

3.8.1.4 Threatened and Endangered Species. Thirteen species listed as either threatened or endangered by the USFWS or the State of California are known to occur or have the potential to occur at Travis AFB (Table 3.8-5)(USAF, 2001b). Of the thirteen, only two have been positively identified on the base: Contra Costa goldfields and vernal pool fairy shrimp; these two species are described in more detail in the paragraphs that follow.

Contra Costa goldfields is an annual plant species that grows in vernal pools and mesic grasslands in Napa and Solano Counties. It is generally abundant in the northwest corner of base and at the southwest end of the main runway, where it prefers drying borders of vernal pools and seasonally wet grasslands (USAF, 2001b).

Vernal pool fairy shrimp can be found in vernal pools, and sometimes found in a variety of temporary aquatic habitats such as roadside ditches. Fairy shrimp of the central valley survive the summer desiccation of vernal pools as eggs; the eggs hatch in response to inundation if environmental conditions are suitable. The habitat requirements for fairy shrimp are not completely understood, but factors affecting their distribution include the length of pool inundation, the chemical nature of the habitat, and water temperature (USAF, 2001b).

As noted above, the two threatened or endangered species known to occur on Travis AFB are generally associated with the northwestern portion of the base; all three alternative ASR-11 sites and the existing AN/GPN-20 are located in (or just beyond) the southern or eastern portions of the base. Additionally, both the Contra Costa goldfields and vernal pool fairy shrimp are generally limited to vernal pool habitat. Thus, to the extent that vernal pool habitat does not occur within the three alternative sites, the likelihood of either of these two species being present at Site 3, 7, or 8 is small. Habitat characterization as part of environmental studies of the Rapid Runway Repair facilities, which encompasses Site 7, indicated no threatened or endangered species were present (USAF, 2000).

Table 3.8-5. Rare, Threatened, and Endangered Species That Occur or Have the Potential to Occur at Travis Air Force Base

SCIENTIFIC NAME	COMMON NAME	LISTING	TYPICAL HABITAT
<i>Lasthenia conjugens</i>	Contra Costa Goldfields	Federal Endangered	Seasonally wet grasslands. Generally abundant in northwest corner of base and at southwest end of main flightline.
<i>Gratiola heterosepala</i>	Boggs Lake Hedge-hyssop	State Endangered	Drying borders of vernal pools.*
<i>Tuctoria mucronata</i>	Crampton's Tuctoria	Federal/State Endangered	Relatively undisturbed vernal pools.*
<i>Trifolium amoenum</i>	Snowy Indian Clover	Federal Endangered	Valleys and foothill grasslands.*
<i>Neostapfia colusana</i>	Colusa Grass	Federal Threatened/State Endangered	Relatively undisturbed vernal pools.*
<i>Rana aurora draytonii</i>	California Red-legged Frog	Federal Threatened	Marshes, stream pools, ephemeral ponds, grasslands.*
<i>Thamnophis gigas</i>	Giant Garter Snake	Federal/State Threatened	Riparian habitats, small pools, drains.*
<i>Buteo swainsoni</i>	Swainson's Hawk	State Threatened	Grasslands.*
<i>Elaphrus viridis</i>	Delta Ground Beetle	Federal Threatened	Near vernal pools.*
<i>Branchinecta conservatio</i>	Conservancy Fairy Shrimp	Federal Endangered	Vernal pools, roadside ditches.*
<i>Branchinecta lynchi</i>	Vernal Pool Fairy Shrimp	Federal Threatened	Vernal pools, roadside ditches. Adults and eggs have been identified in vernal pools on the base.
<i>Lepidurus packardi</i>	Vernal Pool Tadpole Shrimp	Federal Endangered	Vernal pools.*
<i>Desmocerus californicus dimorphus</i>	Valley Elderberry Longhorn Beetle	Federal Threatened	Elderberry trees associated with riparian forests.*
<i>Ambystoma californiense</i>	California Tiger Salamander	Federal Candidate Species	One dead adult observed on base.
<i>Eumops perotis</i>	Western Mastiff Bat	Federal Special Concern	Caves, grasslands*
<i>Athene cunicularia hypugaea</i>	Western Burrowing Owl	Federal/State Special Concern	Open, dry grasslands, agricultural and range lands, and desert habitats often associated with burrowing animals
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Federal Special Concern	Grasslands and open meadows.
<i>Numenius americanus</i>	Long-billed Curlew	Federal/State Special Concern	Large vernal pools, temporary aquatic habitats.
<i>Selasphorus rufus</i>	Rufous Hummingbird	Federal Special Concern	Eucalyptus groves

Source: USAF, 2001b.

* Has not been identified on site.

In addition to the thirteen listed threatened or endangered species, the California tiger salamander has current federal candidate status. A dead specimen was reported on base in 1999 (USAF, 2001b), and live adults have been identified within 40 feet of the installation perimeter. Candidate species are those which are being considered for addition to the list of threatened or endangered species. Although candidate species have no legal protection under the Endangered Species Act (ESA), it is recommended by the USFWS that these species be considered during the planning process in the event that the species becomes listed prior to project completion.

Additionally, a few species of special concern are known to occur or have the potential to occur at Travis AFB. Species of special concern do not receive a significant level of protection under the Endangered Species Act, but USFWS recommends that these species also be considered during the planning process. The western mastiff bat, a federal species of special concern, generally prefers small caves, cliffs, and rock crevices (which are not present on Travis AFB), but could utilize the munitions bunkers on base for roosting (USAF, 2001b). The western burrowing owl, listed as both a federal and state species of special concern, has been observed at various locations on base and has been noted to move around (USAF, 2001h); this owl is also sometimes found in manmade structures such as storm drains and beneath cement and asphalt structures. Other special-status birds observed on the base include: the loggerhead shrike, known to nest near the riparian habitat of Union Creek; the long-billed curlew; and the rufous hummingbird (USAF, 2001b).

3.8.2 Future Baseline Without the Project

A significant portion of the grassland at Travis AFB is subject to periodic mowing and discing, as part of the bird-aircraft strike hazard program and to provide firebreaks. The grasslands are also utilized as pasture for cattle and horse grazing. Without the project, the status of the vegetation, wetlands, and wildlife is expected to remain similar to existing conditions in the areas of the alternative ASR-11 sites and the existing AN/GPN-20.

3.9 AESTHETICS

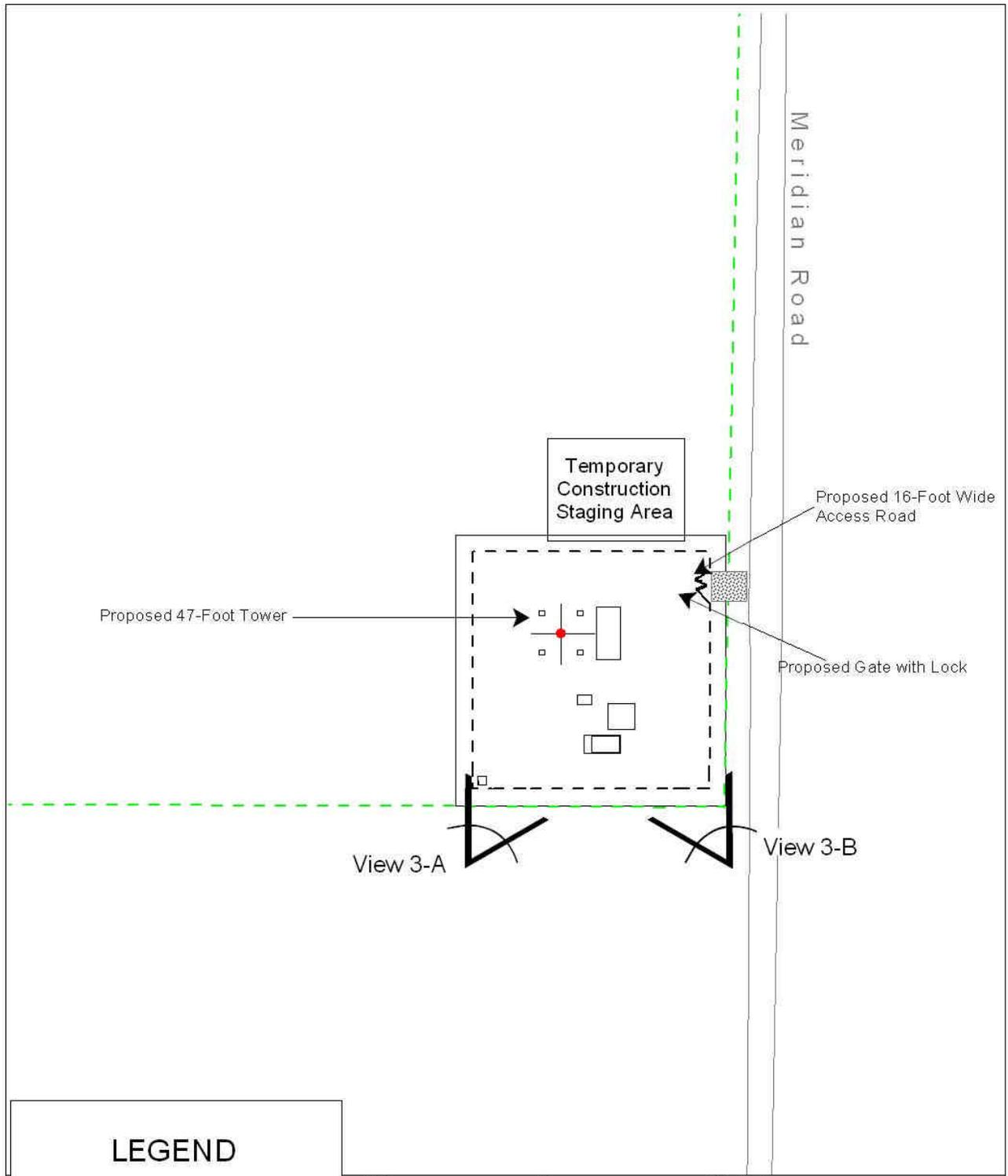
The purpose of this section is to characterize the aesthetic resources of the project area in order to provide a framework for determining the potential changes that could occur as a result of the construction and operation of the ASR-11 at the alternative sites. Figures 3.9-1, 3.9-3, 3.9-5, and 3.9-7 show the locations from which photographs were taken during the site survey in March 2001.

3.9.1 Existing Conditions

Travis AFB is relatively flat; however, as mentioned in Section 3.1.1, the overall topography slopes gently to the south. The area of Travis AFB includes part of the interior lowland of California known as the Sacramento Valley, though the eastern terminus of the coastal ranges bound the valley to the west (USAF, 2001b). Much of the base consists of developed areas used for aircraft operations, training, administration, medical services, and housing. Runways, aircraft hangars, lights, antennae, and towers are considered an integral part of the functional aesthetic quality of the Travis AFB landscape. These basic features and the typical base activities give the impression of an organized and functional military installation.

Site 3 is located southeast of Travis AFB at an off-base location. The site is approximately 1000 feet southeast of the base perimeter within an easement maintained by Travis AFB. The aesthetic character of Site 3 is that of an agricultural/pasture land. The site is located on a grassy area within a fenced pasture. Open fields/pasture surround the site on all sides. Base features are visible to the north and west of the site, with the existing radar clearly visible to the north (Figure 3.9-2, View 3-A) and the air traffic control tower visible to the northwest (Figure 3.9-2, View 3-B).

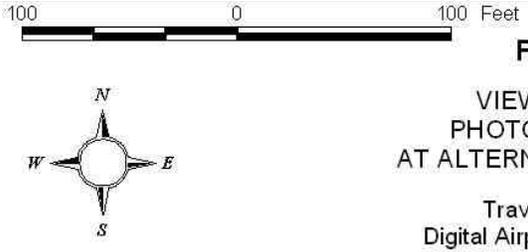
Site 7 is located in an open area approximately 1,600 feet southeast of the south end of Runway 03L/21R. Site 7 is located near the south perimeter of the base adjacent to the Suisun City limit. The site itself consists of a flat grassy area; however, windrows of construction debris are located in the vicinity of the site and are clearly visible in the photographs (Figure 3.9-4, View 7-A). The areas on the south side of the base perimeter, as observed during the March 2001 site visit, consist primarily of open space/pasture land with a few interspersed residences (Figure 3.9-4,



LEGEND

-  Photograph View Angle
-  Proposed ASR-11 Tower
-  Proposed Access Road
-  Proposed ASR-11 Site Fence
-  Existing Fence

100 0 100 Feet



A scale bar showing 100 feet on either side of a 0 mark. Below it is a compass rose with cardinal directions labeled N (North), S (South), E (East), and W (West).

Figure 3.9-1
 VIEW ANGLES FOR
 PHOTOGRAPHS TAKEN
 AT ALTERNATIVE ASR-11 SITE 3

Travis Air Force Base
 Digital Airport Surveillance Radar

Source: Travis AFB; Raytheon, 2001

travis02.apr; site3vwLs; site3angle

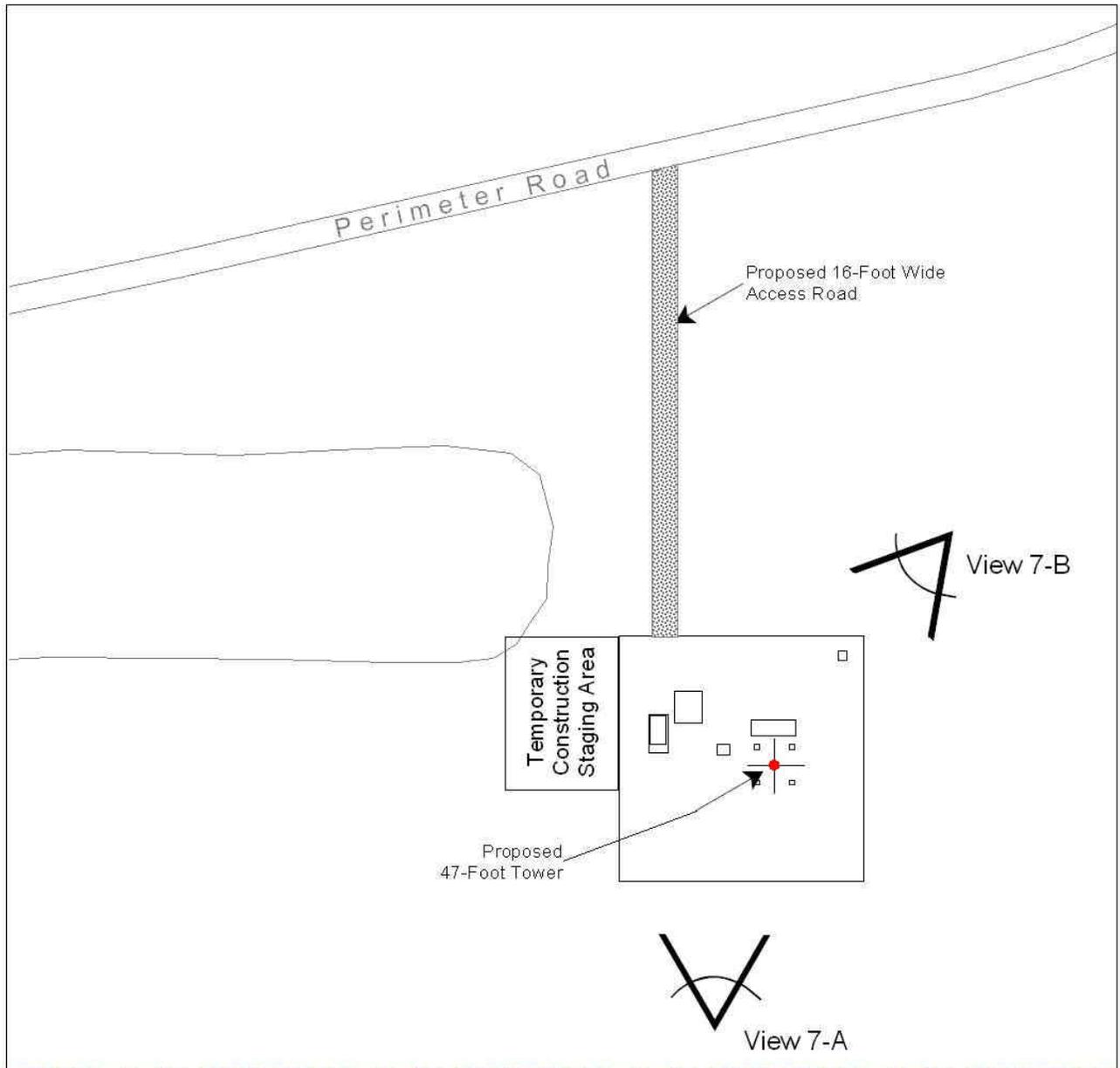
Figure 3.9-2 Photographs of Site 3 Taken During the March, 2001 Site Visit



View 3-A. Photograph of Site 3 facing to the north/northeast, toward the base perimeter fence and the existing RAPCON/GPN-12 (in the far distance).



View 3-B. Photograph of Site 3 facing northwest, towards the runways; the new ATCT is visible in the far distance.

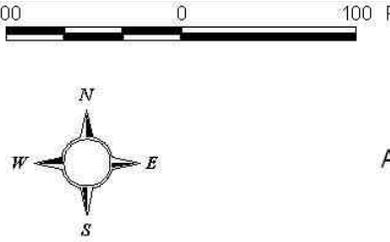


Creed Road (off-base road)

LEGEND

-  Photograph View Angle
-  Proposed ASR-11 Tower
-  Proposed Access Road
-  Travis AFB Boundary Fence

100 0 100 Feet



A scale bar showing 100 feet on either side of a 0 mark. Below it is a compass rose with North (N), South (S), East (E), and West (W) directions.

Figure 3.9-3
 VIEW ANGLES FOR
 PHOTOGRAPHS TAKEN
 AT ALTERNATIVE ASR-11 SITE 7
 Travis Air Force Base
 Digital Airport Surveillance Radar

Source: Travis AFB; Raytheon, 2001

travis02.apr; site7/vwLs; site7/angle

Figure 3.9-4 Photographs of Site 7 Taken During the March, 2001 Site Visit



View 7-A. Photograph of Site 7 facing to the north, toward the base (which is blocked from view by the windrows of construction debris and the 4-5 ft tall clumps of fennel).



View 7-B. Photograph of Site 7 facing southwest, towards the adjacent agricultural off-base area.

View 7-B). Though the majority of the privately-owned off-base residences are quite distant, at least one residence is located within approximately 1,200 feet west of Site 7. Base features, such as the ATCT, are visible to the north of the site, although partially obscured at ground level by tall vegetation.

Site 8 is located in the southeast corner of the base in an open space area. The site is located near the perimeter of the base adjacent to an area formerly used for sewage treatment. The formerly used oxidation ponds still exist immediately west and northwest of the site. The oxidation ponds are distinguishable by the appearance of vegetated mounds (Figure 3.9-6, View 8-B). The aesthetic character of the lands to the south and east of the site is that of open fields/pasture. Base features are visible to the north and west of the site, with the existing radar clearly visible to the northeast and the ATCT visible to the northwest (Figure 3.9-6, View 8-A).

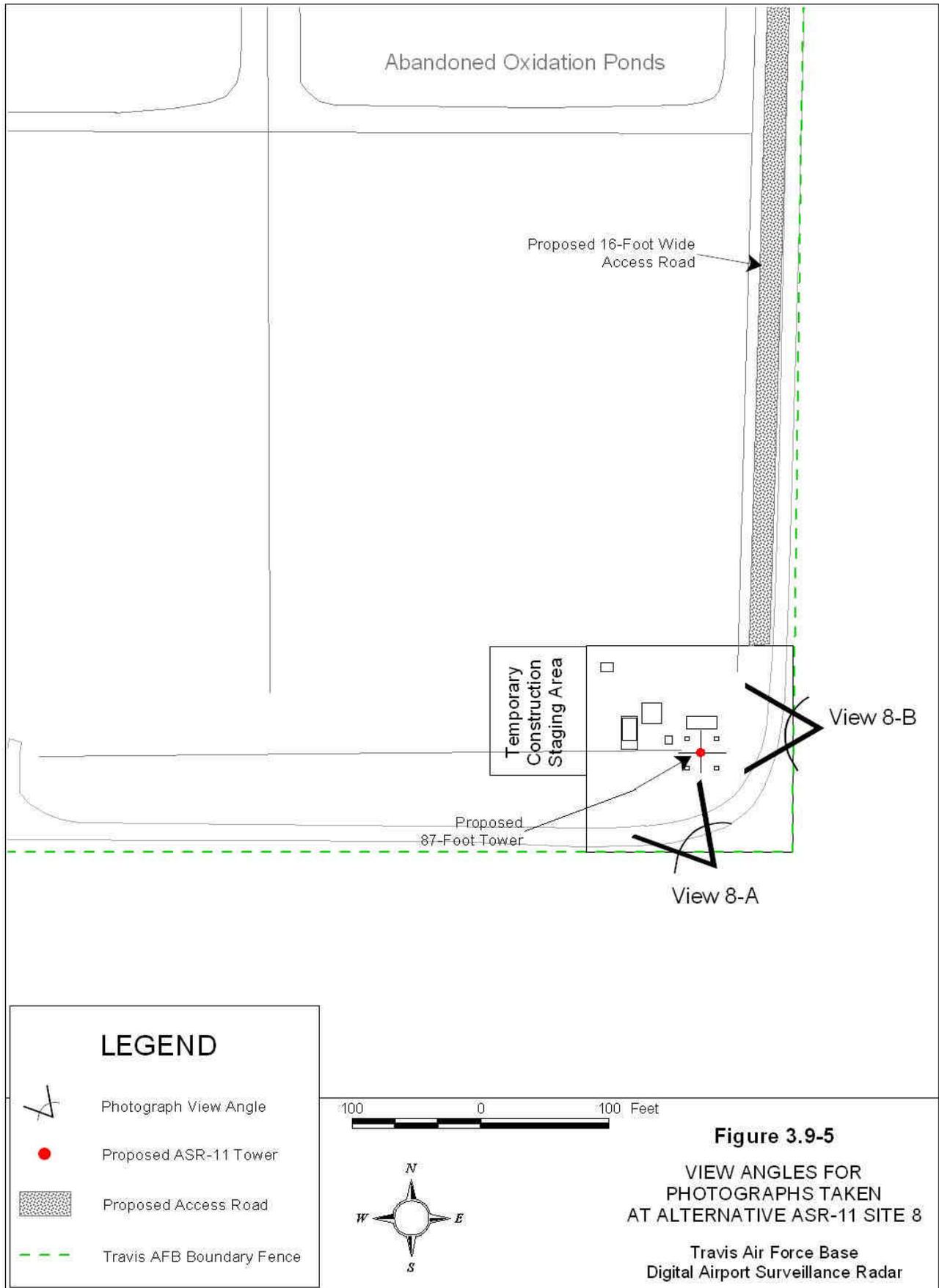
Similar to the three alternative sites, the existing **AN/GPN-20** is located on the east-southeast portion of the base along the base perimeter. The land on the opposite side of the base perimeter fence consists primarily of open fields/pasture (Figure 3.9-8, View E-2). The runways and base structures are clearly visible to the southwest from the perimeter road near the existing radar (Figure 3.9-8, View E-1).

3.9.2 Future Baseline Without the Project

In the future without the project, there are no proposed activities on Travis AFB in the vicinity of the alternative ASR-11 sites or the existing AN/GPN-20 that would have the potential to substantially alter aesthetic conditions.

3.10 CULTURAL RESOURCES

This section identifies cultural resources that have been identified at Travis AFB and indicates if any known resource areas are located in the vicinity of the alternative ASR-11 sites or the existing radar.



Source: Travis AFB; Raytheon, 2001

travis02.apr; site8vwLs; site8angle

Figure 3.9-6 Photographs of Site 8 Taken During the March, 2001 Site Visit



View 8-A. Photograph of Site 8 facing to the northwest; new ATCT is visible in the distance.



View 8-B. Photograph of Site 8, with elevated berm of former oxidation pond visible, as well as chainlink fence and access road along southern perimeter.



LEGEND

-  Photograph View Angles
-  Travis AFB Property Boundary
-  Existing Radar Facility
-  Proposed ASR-11 Site

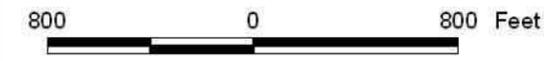
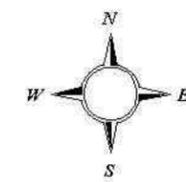


Figure 3.9-7.
VIEW ANGLES FOR PHOTOGRAPHS
TAKEN OF THE EXISTING AN/GPN-20 RADAR
TRAVIS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
 Solano County, California

Figure 3.9-8 Photographs of Existing AN/GPN-12 Taken During the March, 2001 Site Visit



View E-1. Photograph of existing radar, taken from Perimeter Road facing southwest



View E-2. Photograph of existing radar, taken at eastern edge of Meridian Road near Site 3

3.10.1 Existing Conditions

Travis AFB developed a *Cultural Resources Management Plan* (USAF, 1996b). The CRMP is intended to facilitate identification and management of important cultural resources that may be present on the main base and discontinuous properties for which Travis AFB has management responsibilities. Responsibility for implementation of the CRMP lies with the base Natural and Cultural Resources Manager.

3.10.1.1 Archaeological Sites. Native Americans, who called themselves Patwins, historically occupied what is now Solano County (USAF, 1996). Artifacts discovered south of Fairfield date to 2000 BC. The Potrero Hills Storage Annex has some potential for these types of resources to be present beneath the layer of fill that covers the area, but there are no known Native American sites or issues associated with the Travis AFB, itself. Thus, none of the on-base alternative ASR-11 sites nor the existing AN/GPN-20 is proximate to identified archaeological resources; there have been no known surveys for archaeological resources in the vicinity of Site 3, on private property just southeast of the base.

3.10.1.2 Historic Structures. Federal regulations define historic properties as prehistoric and historic sites, buildings, structures, districts, or objects included in, or eligible for inclusion in, the National Register of Historic Places (NHRP), as well as artifacts, records, and remains related to such properties. To qualify for inclusion in the National Register, properties must be important to American history, architecture, archaeology, engineering, or culture. Forty-two permanent World War II-era buildings are extant on Travis AFB. These properties are predominantly dormitory buildings, administrative buildings, and maintenance facilities that display simple, unadorned features. The Air Mobility Command (AMC) concluded that none of the 42 buildings have strong association with significant events or persons, none are architecturally significant, and none retain sufficient integrity for inclusion in the NRHP. The California State Historic Preservation Officer (SHPO) has concurred with this determination (USAF, 1996b).

Ordinarily, only properties 50 years or older, directly associated with the Air Force's military mission, are evaluated for National Register listing. Under certain circumstances, however,

younger properties may be evaluated. The USAF requires its installations to consider Cold War era properties for National Register eligibility because of the concern that highly significant properties may be destroyed prior to reaching the 50-year mark. Those properties less than 50-years old must meet the NHRP criteria of ‘exceptional significance’ to be considered for listing on the National Register. Broad examples of potential NHRP exceptional significance include properties interpreted as having an association with important events/missions or through their importance in architectural and engineering history. Of the approximately 50 inventoried Cold War properties at Travis AFB, 32 have been identified as potentially eligible for the NHRP, configured as two NRHP districts and one independently eligible structure. The NRHP-eligible districts are interpreted as the 25-building assembly, laboratory, and communications/intelligence section of the Armed Forces Special Weapons Project (AFSWP) Q Area of 1951-1960 (in the southwest portion of Travis AFB), and the six building Air Defense Command (ADC) readiness area of 1952-1955 (in the northeast portion of Travis AFB). Building 810 (near the center of Travis AFB) has been identified as independently eligible for the NRHP as an excellent example of the double-cantilever medium bomber hangar, used at Travis AFB for the B-36. The B36 was the Strategic Air Command’s (SAC) first long-range intercontinental bomber carrying nuclear weapons (USAF, 1996c). The status of these resources is tentative pending additional information on the National Cold War context and existing material resources.

The three alternative ASR-11 sites and the existing AN/GPN-20 facility are located within (or just beyond) the south/southeastern portion of Travis AFB, and therefore, are not located in proximity to either the potentially NHRP eligible historic districts or the potential NHRP eligible bomber hangar.

3.10.2 Future Baseline Without the Project

It is not anticipated that there would be any substantial change in cultural resource conditions at the alternative ASR-11 sites nor the existing AN/GPN-20 location in the future without the project due to the absence of cultural resources in the respective areas. Travis AFB will continue to treat Cold War era buildings NRHP eligibility status as tentative, pending future availability of any additional contextual and comparative information. Because a proper historical perspective

requires time depth, a definitive assessment of eligibility for the base's Cold War properties cannot be made "ahead of time".

3.11 POLLUTION PREVENTION AND HAZARDOUS WASTE

3.11.1 Existing Conditions

The following sections describe current conditions and practices on Travis AFB with regard to pollution prevention and hazardous waste.

3.11.1.1 Pollution Prevention. The Travis AFB SWPPP discusses management and monitoring of stormwater discharges. Travis AFB also has a hazardous waste management plan that establishes procedures, training requirements, inspections, and record management for hazardous waste on the base. This plan complies with requirements for the base-permitted hazardous waste storage facility in accordance with the U.S. Environmental Protection Agency and California regulations. The overall implementation of this plan is expected to reduce existing and potential pollution.

3.11.1.2 Hazardous Waste. Hazardous waste on Travis AFB involves four types of on-base sites: generation points, accumulation points (90-day), satellite accumulation points, and spill cleanup equipment and materials storage. There are 25 generation points, 11 accumulation points, and one satellite accumulation point. The largest volumes of wastes generated on base are asbestos and oil-water separator sludge (USAF, 1996).

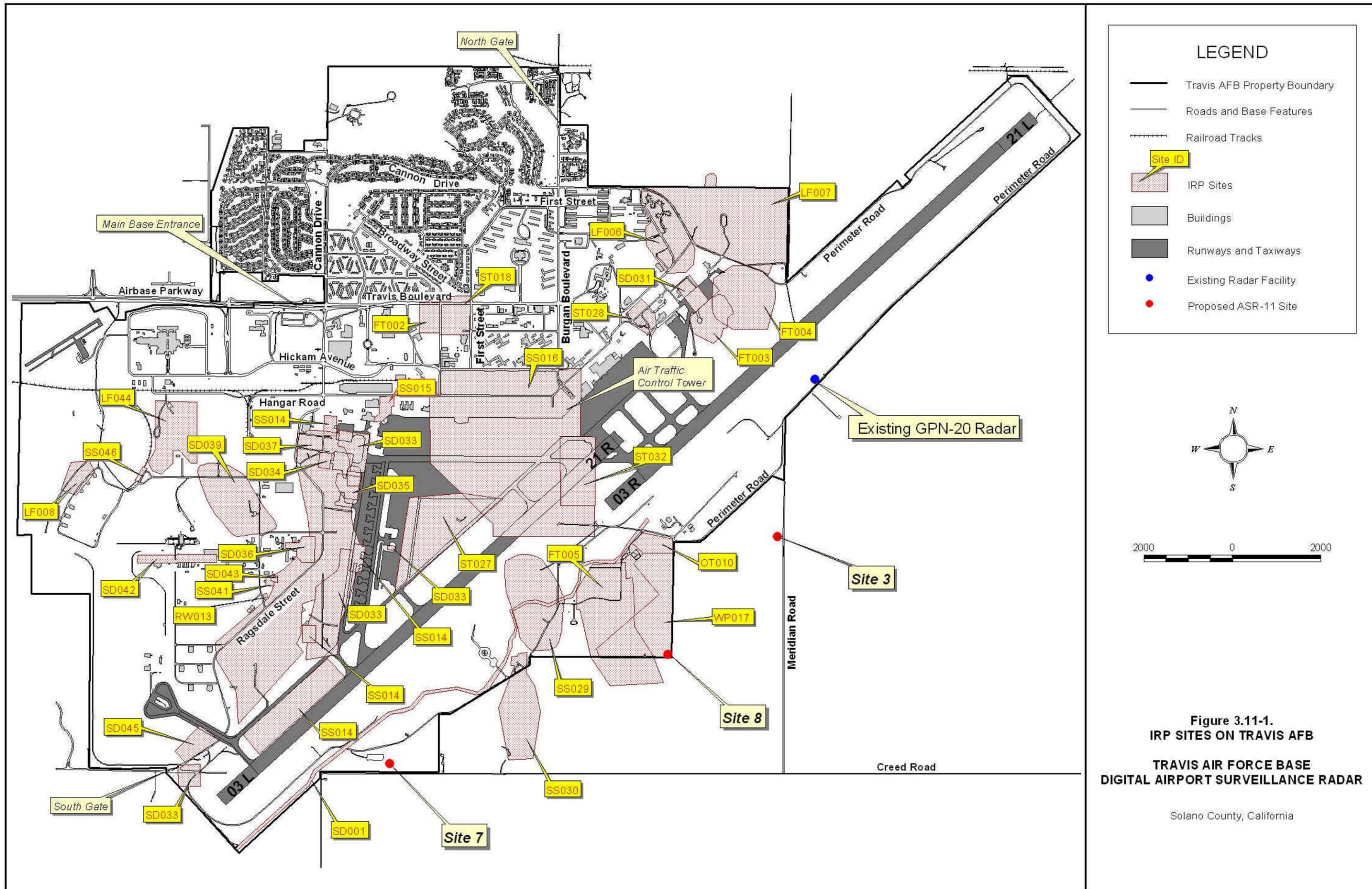
Hazardous waste is stored in containers ranging in size from one-gallon cans to 500-gallon tanks; however, most waste is stored in 55-gallon drums. The majority of the hazardous waste is stored at Building 1365. Building 1365 has a total containment capacity of 1,800 55-gallon drums, or an equivalent-sized collection of storage containers. PCB wastes are stored in a converted concrete munitions storage bunker known as Building 956. PCB waste is generally stored in the equipment in which the PCBs were used or, if the equipment was leaking, in 55-gallon drums. The storage capacity of Building 956 is estimated to be no more than 67 55-gallon drums, or equivalent-sized transformers and other PCB equipment (USAF, 1996).

Aboveground storage tanks (ASTs) and underground storage tanks (USTs) are used on Travis AFB for the storage of fuel and products. A network of these tanks is associated with an aircraft hydrant fueling system. Some tanks on base are used for dispensing gasoline for military vehicles and ground equipment, while other tanks are used for dispensing diesel fuel for some standby heating systems, generators, and vehicles (USAF, 1996).

Due to past releases of hazardous waste materials at DoD installations and the resulting environmental contamination, an Installation Restoration Program was initiated that requires each military installation to identify, investigate, and remediate hazardous waste disposal and/or spill sites. The goal of the Travis AFB IRP is to remediate all accident/spill/disposal sites that may pose a threat to public health, welfare, or the environment (USAF, 2001b).

Travis AFB has 33 IRP sites (Figure 3.11-1). The IRP sites include landfills, fire protection training areas, spill sites, waste disposal sites, drum storage areas, leaking underground storage tanks and piping, oil/water separators, waste treatment plants, munitions disposal sites, and other areas.

Travis AFB has several extraction and groundwater remediation facilities. The Central Groundwater Treatment Plant (CGWTP), first operated in 1995, was expanded in 1997 to include the addition of an ultraviolet oxidation system, which adds hydrogen peroxide to the contaminated water, causing a series of chemical reactions (in the presence of high-energy ultraviolet light) that effectively converts the contaminated groundwater to non-hazardous carbon dioxide, water, and minerals; activated carbon is used as a final treatment to ensure that all contaminants are fully removed from the treated water. The North Groundwater Treatment Plant (NGTP), which has been in operation since February 2000, treats solvent contamination from a number of facilities on base, including the fire training area and maintenance facility, a former fire training area, and a heavy equipment repair industrial facility. The West Treatment and Transfer Plant (WT&TP) is on the southwest portion of the base; here soil vapors are treated to remove VOCs.



Source: Travis AFB

travis01.apr : lrpsites : 3-11-1 .irp

Site 3 is not located within or proximate to any IRP sites; however, since Site 3 is located at an off-base location, little is known about potential soil or groundwater contamination at this location.

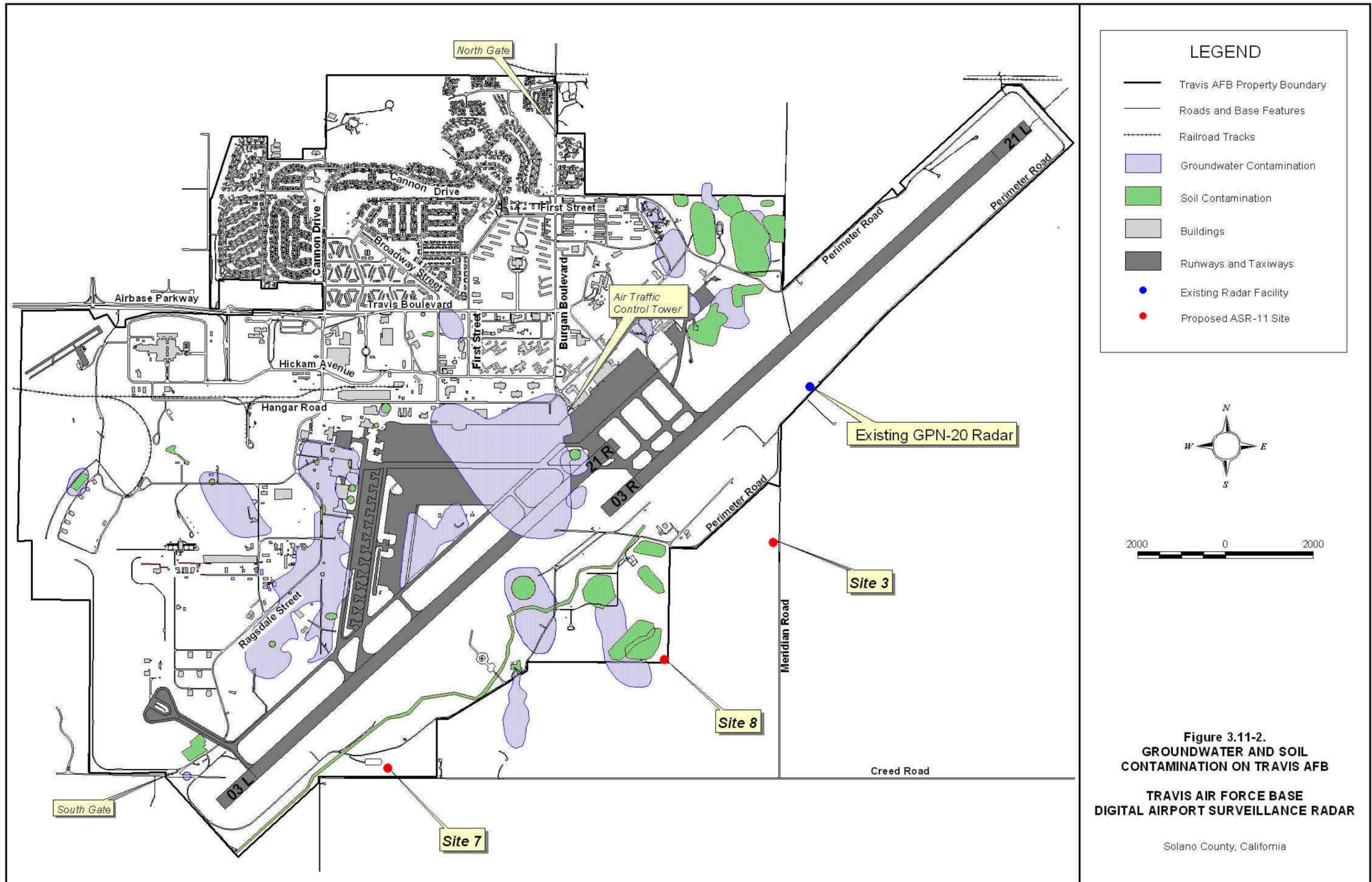
Site 7 is not located within an IRP site; however, there is the potential for asbestos containing materials (ACM) to be included in the construction debris that litters the area in the immediate vicinity of the site. As documented in other environmental studies, approximately 55,000 cubic yards of concrete and asphalt debris form a berm surrounding, and various piles within, the Rapid Runway Repair area, within which Site 7 is located. Mixed with the concrete and asphalt debris is an unknown quantity of building demolition debris; limited testing has shown that a portion of the debris contained ACM, such as pipe insulation, tar mastic, building tiles, etc. The site has remained inactive since 1994. Travis AFB has proposed to eliminate the ongoing hazard and return the site to uses consistent with the Travis AFB mission (USAF, 2000).

Site 8 is located within IRP site WP017, which consists of contamination (PCBs, metals, and pesticides) originating from previously used oxidation ponds associated with the former wastewater treatment plant. Though Site 8 is located within an IRP site, the site itself is not located directly over an area of known soil or groundwater contamination (Figure 3.11.2).

The existing **AN/GPN-20** is not located within or adjacent to any IRP sites or area with known soil or groundwater contamination.

3.11.2 Future Baseline Without the Project

It is anticipated that remediation of past hazardous waste sites will continue, as well as management of hazardous materials and newly generated wastes. Continuing pollution prevention measures on the base may reduce potential for new sources of contamination to arise at the alternative ASR-11 sites.



3.12 ELECTROMAGNETIC ENERGY

3.12.1 Existing Conditions

Electrical currents and components generate electrical fields and magnetic fields. These may be stationary or dynamic. Depending on the equipment, electromagnetic radiation that propagates outward may be created. Electromagnetic radiation, electrical fields and magnetic fields are localized effects. The electromagnetic environment at a particular location and time is the sum of all the localized electric and magnetic fields plus electromagnetic radiation arriving from both natural and manmade sources. Electric fields, magnetic fields, and electromagnetic radiation are of interest here because of the potential for health effects from some frequency ranges and the potential for electromagnetic interference on other electronic equipment. Electromagnetic radiation is discussed first in this introduction.

Electromagnetic radiation travels at a uniform speed (3×10^8 m/sec in a vacuum; the speed of light). It is often useful to consider electromagnetic radiation as a wave, and to describe it in terms of frequency (where 1 Hz means 1 cycle per second and 1 kHz means 1000 cycles per second). Some parts of the electromagnetic spectrum are more commonly described in terms of wavelength, which is inversely related to frequency.

The spectrum of electromagnetic radiation includes visible light, which has frequencies on the order of 5×10^{14} Hz [specifically, wavelengths from 400 nanometers (nm) to 760 (nm)]. Electromagnetic radiation frequencies higher than that of visible light include ultraviolet light, X-rays, and gamma-rays. These types of electromagnetic radiation are described as “high energy” and have the potential to “excite” electrons, to thereby ionize molecules, and to thus affect body chemistry. Especially in high absorbed doses, high frequency electromagnetic radiation can adversely affect health (NSC, 1979).

Electromagnetic radiation with frequencies lower than that of visible light include infrared light and radio waves. Frequencies below 10^{12} Hz (10^6 MHz) are categorized as radio waves. These include frequencies used for AM radio; short-wave, television, and FM broadcast bands; pagers; cellular telephones; mobile radios; radar; and microwave technologies. These frequencies are

non-ionizing, and have the following known health effects: (1) effects caused by directly heating body tissues and (2) electromagnetic interference with electronic medical devices such as pacemakers.

The heating of tissues caused by exposure to radio frequency radiation (RFR) at relatively low incident power densities can normally be accommodated. However, in some tissues, heat produced at higher radiation intensities may exceed temperature regulating mechanisms so compensation for heat gain may be inadequate. Thus, exposure at high intensities can cause thermal distress or irreversible thermal damage. Eye tissues are particularly vulnerable (NSC, 1979).

Electromagnetic interference with medical devices has become an issue because medical devices increasingly use sensitive electronics at the same time that RFR and other electromagnetic sources are proliferating (FDA, 1996). Medical equipment which may be susceptible to interference from RFR includes cardiac pacemakers, defibrillators, ventilators, apnea monitors, and electric wheelchairs (VTDPS, 1996; IEEE, 1998). Medical device manufacturers are expected to design and test their products to ensure conformance with standards for protection against radio frequency interference (IEEE, 1998). Nevertheless, users of medical devices are generally advised to keep RFR emitters as far away from their devices as is practical (IEEE, 1998).

There is currently considerable interest on the part of some researchers, the news media, and the public regarding the possibility of other health effects from non-ionizing radiation (and/or other electrical or magnetic fields). However, there is no scientific consensus that non-ionizing radiation presents any other health risks (USAF, 1995a) and no consensus about a mechanism by which non-ionizing radiation could have any such effects (i.e., effects other than those associated with heating of tissue and interference with medical devices). A 1996 National Academy of Science report, *Possible Health Effects of Exposure to Residential Electric and Magnetic Fields*, concluded that:

The current body of evidence does not show exposure to these fields presents a human health hazard. Specifically, no conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects. (National Academy of Science, 1996).

Existing equipment at the AN/GPN-20 radar emits electromagnetic radiation in the radio frequency range. Locations close to and directly in front of the antenna (whether rotating or stationary) are considered unsafe when the radar is operating, on the basis of the potential for heating of body tissues. Similarly, the tower immediately below the antenna is considered unsafe. The intensity of the radar energy diminishes with distance, so there would be less tissue heating at greater distances.

Within electronic systems for radar, any high-voltage tubes capable of emitting X-rays are typically shielded with lead, and shielding on other equipment is typically adequate to limit transmitted radiation to acceptable levels. While there are unshielded components present at the AN/GPN-20 site such as incandescent light bulbs, there is no indication or expectation that significant levels of electromagnetic radiation other than RFR are emitted into the environment by the AN/GPN-20 system.

Magnetic fields and electric fields other than electromagnetic radiation are also created by electrical equipment. In everyday situations, high-voltage power lines, televisions, computer monitors, fluorescent lights, light dimmer controls, improperly grounded equipment, and appliances used with non-polarized extension cords create measurable electric fields. Transformers, alternating current (A/C) adapters, motors (e.g., analog clocks and kitchen appliances), power lines, vehicles, and old electric blankets create measurable magnetic fields.

The presence of various electrical components in the AN/GPN-20 radar system inevitably means that there are a variety of magnetic and electrical fields in the vicinity of the AN/GPN-20 equipment.

3.12.2 Future Baseline Without the Project

Without the project, the future electromagnetic field conditions in the vicinity of the three proposed ASR-11 sites and the existing AN/GPN-20 are expected to remain similar to those currently present. There is no planned change in land use at the site locations that would substantially alter the electromagnetic field characteristics in the area.

4.0 ENVIRONMENTAL CONSEQUENCES

The No Action alternative would leave existing radar systems and air traffic control equipment in place. In addition, no new construction, renovation, or operations would be required. Since the no action alternative would involve no alteration to any of the three proposed ASR-11 sites at Travis AFB, this alternative would result in no impact to environmental resources. Thus, the environmental consequences of the No Action alternative would result in identical conditions to those identified in Section 3.0, Future Baseline without the Project. However, selecting the No Action alternative, and thereby having to maintain the existing AN/GPN-20, would require relying on existing radar equipment that is not capable of meeting future user requirements for transmitting digital signal data to new digital automation system air traffic controller displays. The existing facilities also do not meet user requirements for increased target detection, weather reporting, and improved reliability.

The proposed action would involve the construction of a new ASR-11 facility. Potential impacts associated with the action alternative involve those resulting from construction (short-term) and operation (long-term) of the DASR systems. The potential impacts are described in this section for each of the alternative ASR-11 sites (Site 3, Site 7, and Site 8). Impacts are presented by environmental parameter. Mitigation measures that may be required to reduce impacts are described in Section 6.0.

4.1 LAND USE

4.1.1 Short-term Impacts

Short-term impacts associated with the construction of the ASR-11 would include temporary disruption of land uses due to elevated noise levels, increased dust, interference with roadway access, and visual effects. Construction of the ASR-11 facilities would also include the installation of a temporary construction staging area approximately 75 feet by 100 feet adjacent to the ASR-11 site. This staging area would be used by construction personnel to store equipment for use during construction of the ASR-11.

Site 3 is located off-base within an area of pasture and open space. Noise and dust impacts during construction are anticipated to be minimal and not likely to cause significant disruption or disturbance to these surrounding land uses. Construction of the ASR-11 at Site 3 would, however, remove the area of the DASR footprint, the access way, and the staging area from the available grazing land. Due to the relatively small area of anticipated disturbance and the large amount of available grazing land in the vicinity, this impact is not considered significant.

Site 7 is located south of the base runways in an undeveloped open space area, which had been previously proposed for the development of a Rapid Runway Repair facility. Noise and dust impacts during construction of an ASR-11 at this location are anticipated to be minimal, given the undeveloped nature of the surrounding land uses. However, development of the Rapid Runway Repair facility, which was of a much larger scale, was halted in 1994 due to an off-base resident's complaint about unhealthy conditions resulting from the construction. Thus, coordination during construction should be initiated to minimize the potential for creating nuisances or health hazards during construction. Additional investigation may be required to determine whether a suitable construction site exists among the construction debris (some of which contains ACM) or whether Travis AFB will independently remove this material prior to initiation of the DASR construction, should this site be chosen for the ASR-11.

Site 8 is also located south of the base runways, in an area of open space that supports seasonal pheasant hunting. The site is also within close proximity to the former oxidation ponds. Noise and dust impacts during construction are anticipated to be minimal, given the undeveloped nature of the surrounding land uses. Depending on the time of year that construction occurs, the installation of the ASR-11 at Site 8 may potentially interfere with hunting activities, although sufficient hunting area exists that the temporary loss of use of this small corner of the base would not be significant.

The installation of utilities, such as power and telephone, as well as fiber optic cable to each of the sites could temporarily affect land uses along the proposed alignment routes. While specific alignments would not be defined until final design, it is anticipated that land uses along the alignments could be affected by elevated noise levels and increased dust associated with open trench excavation. Generally, although the length of utility connections could be up to 9,300 feet (depending on the site chosen), the installation of these utilities would occur within the same general south/southeastern portion of the base as the alternative ASR-11 sites, and would largely be confined to alignments along existing roadways. Similarly, the fiber optic connection between the selected ASR-11 site and the RAPCON may extend up to 14,800 feet (depending on the site chosen), but would also largely be confined to existing roadways along the south/southeastern portion of the base, thereby minimizing the potential impact to adjacent land uses.

Upon the successful completion of the construction of the ASR-11, the existing **AN/GPN-20** radar would be dismantled. Impacts to surrounding land uses related to the removal of the AN/GPN-20 would be minimal due to the location of the radar in a relatively open area along the perimeter of the base proximate to undeveloped areas, and because of the short duration of the dismantling activities.

4.1.2 Long-term Impacts

Installation of the ASR-11 at any of the three alternative sites would be generally compatible with the surrounding land uses. **Site 3** is located approximately 1000 feet southeast of the base's perimeter fence at an off-base location. Though the site is within an area of open space/pastureland, it is located within a Travis AFB easement and within Phasing Area E preserved for Travis expansion. Installation and operation of the ASR-11 at Site 3 would remove the immediate area from the available grazing land; however, as stated above, due to the relatively small footprint of the radar facility and the large amount of available grazing land in the vicinity, this impact is not considered significant. **Site 7** and **Site 8** are located within relatively undeveloped sections of the base and operation of the ASR-11 would not be expected to significantly impact land use. Furthermore, after the proposed Rapid Runway Repair facility in the location of Site 7 stalled, the base has expressed the desire to utilize Site 7 in a manner

consistent with the mission of the Travis AFB. Since the proposed ASR-11 would support base operations, utilization of a portion of the undeveloped area containing Site 7 would be consistent with overall base land use strategies.

Removal of the existing **AN/GPN-20** is not anticipated to result in any long-term land use impacts. Following demolition/disassembly of the AN/GPN-20, the land where the existing radar is presently located could be reclaimed by Travis AFB for purposes consistent with its setting.

4.2 SOCIOECONOMICS

4.2.1 Short-term Impacts

Construction of the ASR-11 at any of the three alternative sites would require similar work efforts, and would, therefore, have similar effects on socioeconomic conditions at the base and the surrounding area. Construction at **Site 3**, **Site 7**, or **Site 8** would not adversely impact the socioeconomic conditions at Travis AFB. A slight short-term increase in the revenue generated in the surrounding area would occur due to construction employees utilizing local businesses for supplies and personal use. During the construction period, the work crew would consist of approximately 10 persons.

Upon successful completion of the construction of the ASR-11, the existing **AN/GPN-20** radar would be dismantled and packed for shipment and possible reuse at another location. No effects on socioeconomic conditions are anticipated as a result of this activity.

4.2.2 Long-term Impacts

In the absence of other independent activities at Travis AFB, socioeconomic conditions would return to the existing conditions once radar construction is completed. The new radar facility would not be staffed, and would therefore have no long-term effects on socioeconomic conditions.

4.2.3 Environmental Justice

Under its instructions for the Environmental Impact Analysis Process (32 CFR Part 989), the Air Force must demonstrate compliance with Executive Order 12898, entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, to determine the effects of federal programs, policies, and activities on minority and low income populations.

As stated in Section 3.2, the main portion of Travis AFB is located within census block group 06095-252800-8 while six other census blocks surround the main base. **Site 3** is located in a different block group (06095-252398-1) than the base and borders block group 06095-253500-1. **Site 7** and **Site 8** are located within the base, however border block group 06095-252398-1 at the base's perimeter. The block group which includes Site 3 does have a much higher percentage (29.5%) of persons below the poverty level than the averages for California (12.5%), Solano County (7.5%), or the surrounding block groups; however, this statistic is somewhat skewed by the very small population (96 persons) within the block group. For the sake of comparison, the adjoining block groups each contain between 873 and 3,940 persons. Also, block group 06095-252398-1 spans a much larger area (98.0 square miles) than most of the other adjoining block groups (1.7 to 12.0 square miles). Given the large land area of the block group encompassing Site 3, it is not possible to definitively identify whether the low income population is located adjacent to the base, or at some substantial distance within the 98.0 square mile extent of the block group. Residences are sparsely located within the entire block group, including that portion containing Site 3 adjacent to base property; the nearest residence to Site 3 is approximately 3,750 feet away. The population within this block group is characterized by much lower ethnic diversity than California, Solano County, or the adjoining block groups. Although a unique low-income population may exist in the vicinity of Site 3, there is not a unique minority population within the vicinity of Site 3, given that 92 of the 96 persons within the block group are White.

Sites 7 and 8 are within the block group of the main portion of Travis AFB; the distribution of low-income and minority populations within this block group is generally consistent (although the Black population is somewhat higher) with those of Solano County and California. Thus,

there does not appear to be a unique low-income or minority population within the block group containing Sites 7 and 8. However, both these alternative sites are located on the perimeter of the block group boundary, and thus are adjacent to block group 06095-252398-1 (the block group which contains Site 3). Thus, Sites 7 and 8 are also within close enough proximity to a possible low-income population that consideration of potential environmental justice concerns is warranted.

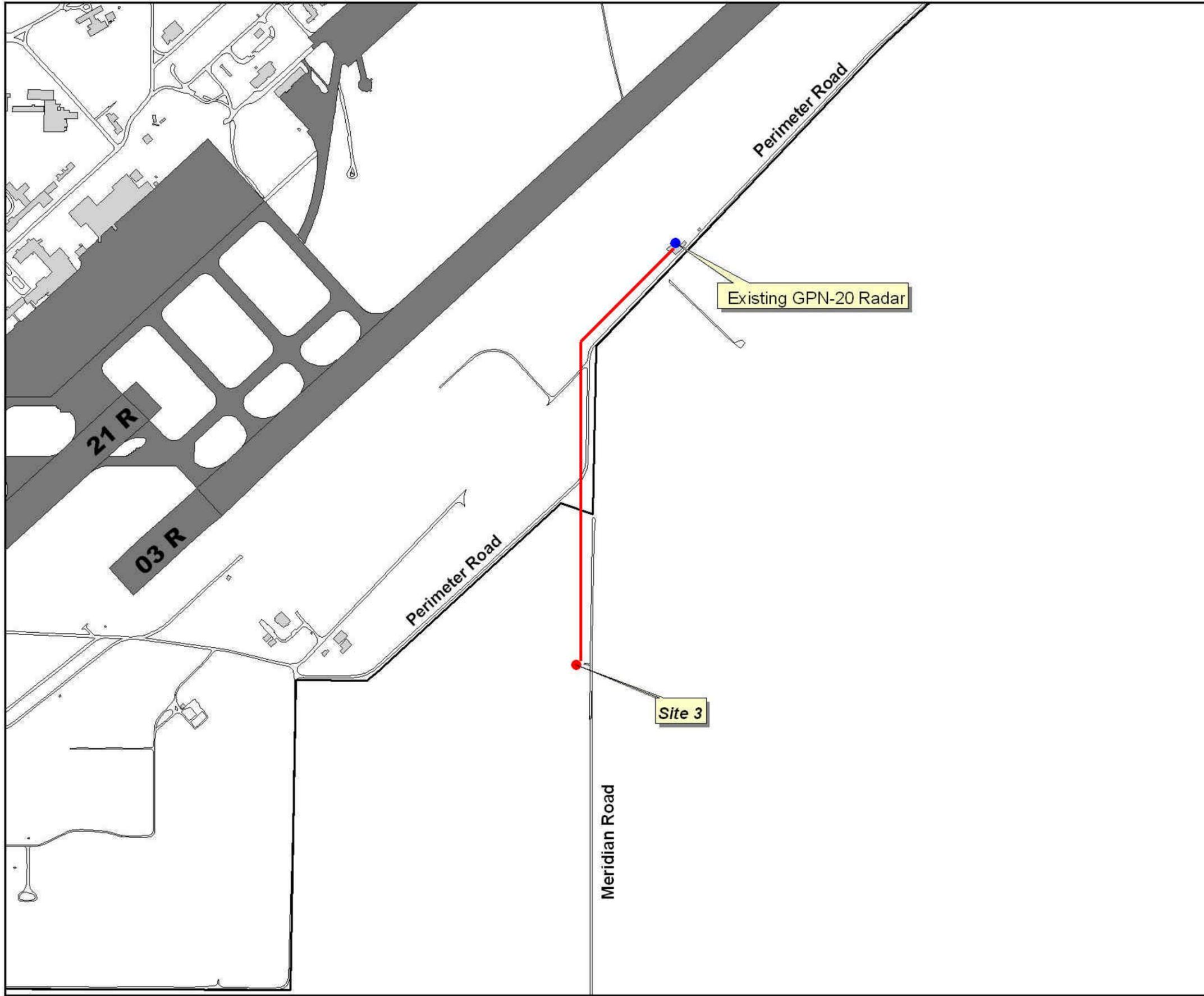
The presence of a low-income population alone does not imply a potential environmental justice impact. In order to present a potential environmental justice impact, there must also be a significant adverse impact that would be borne by the unique population. As described throughout Section 4.0, the proposed DASR installation is not expected to have significant human health or environmental impacts. Therefore, the proposed project is not expected to pose adverse health or environmental impacts to residents of adjacent neighborhoods, regardless of income or ethnicity. Thus, the proposed project is consistent with the objectives of Executive Order 12898.

4.3 UTILITIES AND TRANSPORTATION

The following describes potential short- and long-term effects to utilities as a result of the installation of the DASR system. At any of the three alternative sites, connections to electrical and telephone service would require between 450 and 9300 feet of new cabling and wire. Fiber optic cable connections, which must be made from each alternative site to the existing RAPCON, are depicted in Figures 4.3-1, 4.3-2, and 4.3-3, and would span a distance of 3700 to 7800 feet, depending on the site selected.

4.3.1 Short-term Impacts

Various lengths of open trench excavation would be needed to provide utility connections, such as electrical, telephone, and fiber optics (Table 4.3-1). The ASR- 11 would not require water or wastewater services for operation, although these utilities will be required, to a limited extent, during construction.



LEGEND

- Travis AFB Property Boundary
- Roads and Base Features
- Proposed Fiber Optic Cable
- Buildings
- Runways and Taxiways
- Existing Radar Facility
- Proposed ASR-11 Site

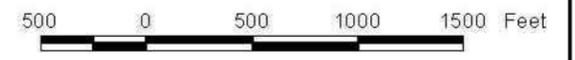
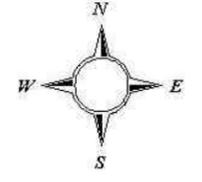


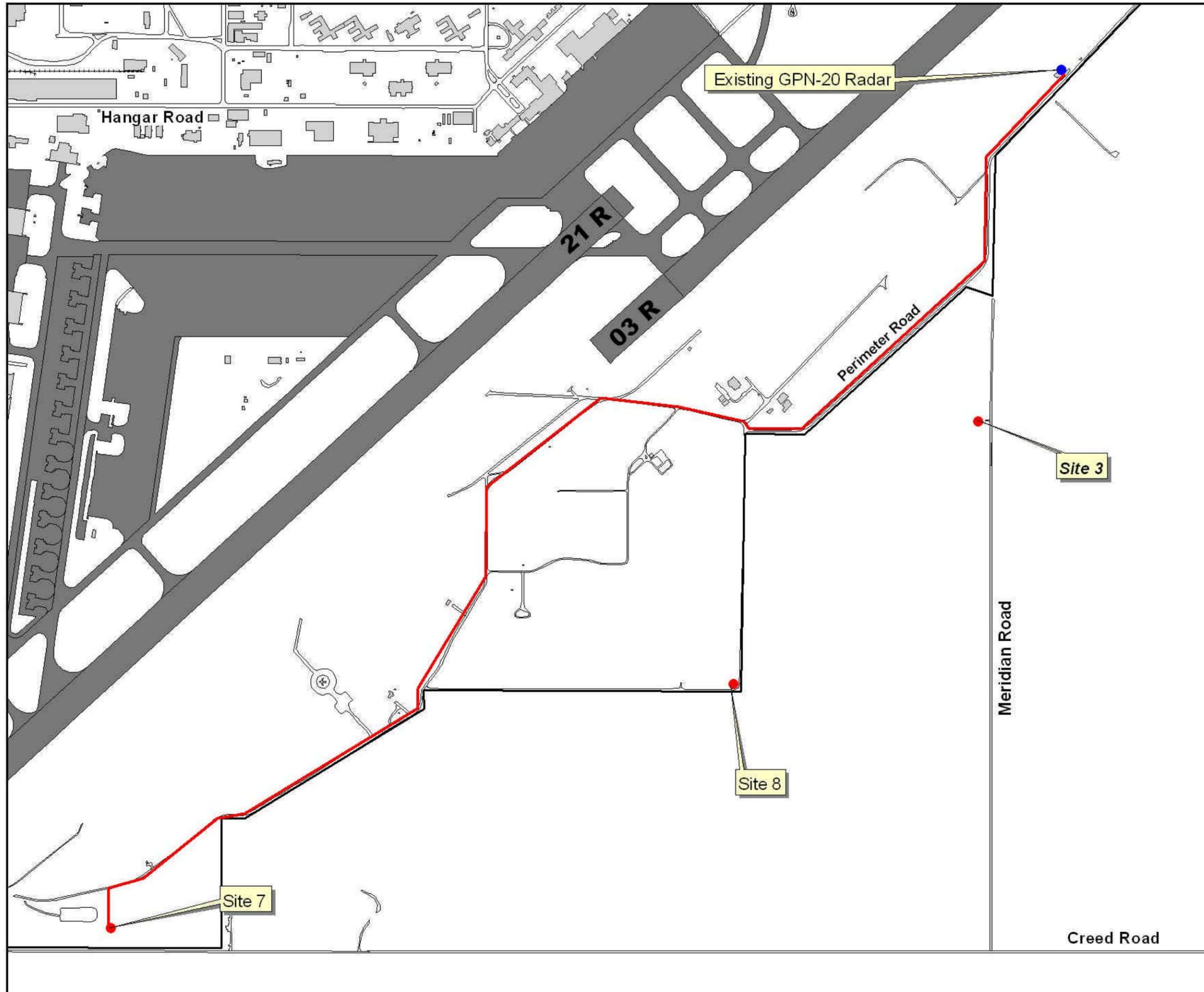
Figure 4.3-1.
FIBER OPTIC CABLE DETAIL,
SITE 3

TRAVIS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR

Solano County, California

Source: Travis AFB; Raytheon

travis02.apr : fiber3 : 3tblayout



LEGEND

- Travis AFB Property Boundary
- Roads and Base Features
- Proposed Fiber Optic Cable
- Buildings
- Runways and Taxiways
- Existing Radar Facility
- Proposed ASR-11 Site

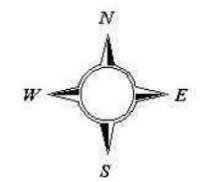


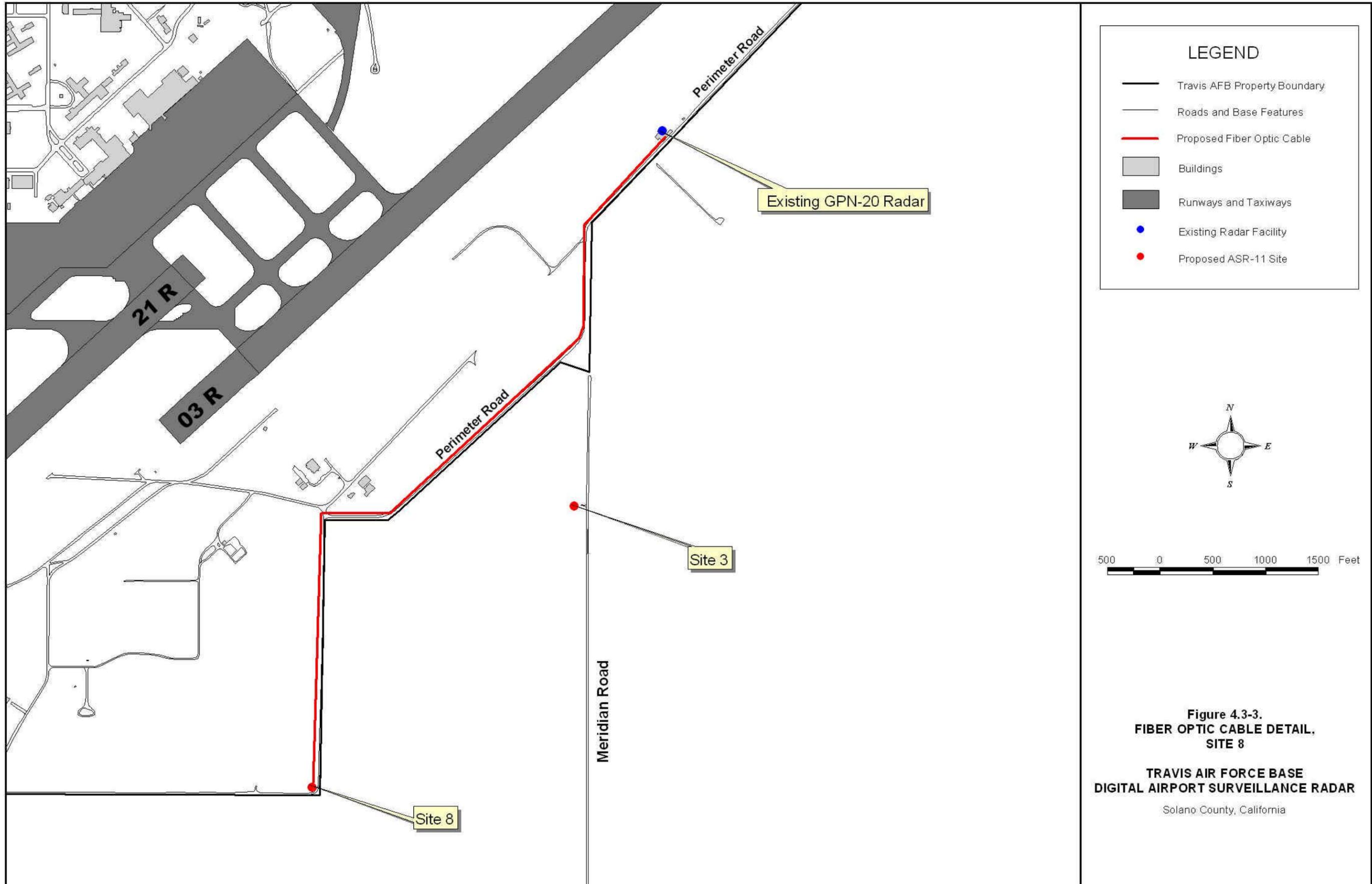
Figure 4.3-2.
FIBER OPTIC CABLE DETAIL,
SITE 7

TRAVIS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR

Solano County, California

Source: Travis AFB; Raytheon

travis02.apr : fiber7 : 7forlyout



Source: Travis AFB; Raytheon

travis02.apr : fiber8 : 8forlyout

Table 4.3-1. Required Lengths of New Utility Connections and Access Roads

ASR-11 Alternative Site	Length of New Access Road Required	Length of Electric Power Conduit Required	Length of Telephone Cable Required	Length of Fiber Optic Cable Required
Site 3	225 feet	3,700 feet	1,500 feet	3,700 feet (0.7 miles)
Site 7	450 feet	9,300 feet	450 feet	14,800 feet (2.8 miles)
Site 8	2,600 feet	2,800 feet	2,800 feet	7,800 feet (1.4 miles)

Source: USAF, 2001a

4.3.1.1 Water Supply. A temporary increase in water demand would occur during construction. A water source would be supplied on site by mobile water tanks. Due to the limited number of construction workers, short construction period, and the adequate supply of water to the base, it is not anticipated that the water demand both for workers’ personal need and dust control during construction of the ASR-11 would adversely impact the water supply at Travis AFB.

4.3.1.2 Wastewater Treatment. There would be an insignificant short-term increase in demand for sewage treatment during construction. Portable toilets would be available during the construction, and waste would be transported to the nearby treatment facility.

4.3.1.3 Solid Waste. As the existing AN/GPN-20 is dismantled, material that is not suitable for reuse or recycling would need to be removed. All solid waste would be handled in accordance with standard base procedures. Any hazardous materials would be disposed of following Travis AFB policies and protocols and relevant state and federal regulations (see Section 4.11 on hazardous waste).

4.3.1.4 Electricity. Adequate electrical power is available to each of the alternative ASR-11 sites. Trenching would be required to install new underground conduits to carry electrical distribution lines from the alternative site to the nearest existing electrical source. **Site 3** would require 3,700 feet of new wire and underground conduit to tie into existing distribution lines at

Building 1150. **Site 7** would require 9,300 feet of new conduit and wire, also to connect to existing distribution lines at Building 1150. Similarly, **Site 8** would require 2,800 feet of new conduit and wire to connect to existing distribution lines at Building 1150. Short-term disruption of power to the immediate area around the alternative ASR-11 sites may occur while connections are made.

4.3.1.5 Telephone. Telephone lines would be extended from the existing locations identified in Section 3.3.1.5. The final route and distance to the new ASR-11 site will be determined when the final site and design are selected. Telephone line connections for **Site 3** can be made to the line currently running along Perimeter Road, a distance of 1,500 feet. Telephone line connections to **Site 7** would also be made from existing telephone lines along Perimeter Road, at a distance of approximately 450 feet. Telephone line connections to **Site 8** would be made from Building 1150, at a distance of approximately 2,800 feet. No disruption to telephone service in the immediate area of the alternative ASR-11 sites is expected.

4.3.1.6 Fiber Optic Cable. The preferred medium of data communication link is a redundant direct government-owned fiber optic cabling. The proposed 3,700 foot long fiber optic route for **Site 3** would run along Meridian Road and Perimeter Road to the existing RAPCON. **Site 3** would require the least amount of cabling and trenching. **Site 7** would require a 14,800 foot long fiber optic line running from the site, along Perimeter Road to the RAPCON building. The proposed fiber optic route for **Site 8** would run 7,800 feet in length from the site north along the new access road (to be constructed as part of the DASR project) to Perimeter Road, then along Perimeter Road to the existing RAPCON building.

4.3.1.7 Natural Gas. Natural gas is not required for the proposed ASR-11 radar. Therefore, no impacts are expected to occur with regard to natural gas on Travis AFB. Utility trenching for electric, telephone, and fiber optic connections are not anticipated to impact existing natural gas lines, although the absence of natural gas lines in the vicinity of the proposed sites and utility connections should be confirmed prior to construction.

4.3.1.8 Transportation. Impacts to transportation systems at Travis AFB during construction would be minimal. Increased activity in the vicinity of the ASR-11 site, including connection of the ASR-11 to existing utilities, could temporarily disrupt local traffic. Personal and commercial vehicles operated by the contractor and subcontractors would be on site or at an area designated by the Air Force. There would be a period of approximately 10 hours where cement trucks would access the site for the foundation placement. The foundation concrete must be placed continuously, thus necessitating the 10-hour period. Heavy vehicles, including cement trucks, are frequently on base roads. Therefore, the cement trucks and other construction vehicles necessary for construction are not expected to have an impact on base roads.

Site 3 would require a new access road across private property, extending 215 feet from Perimeter Road to the present terminus of Meridian Road; a short access road of approximately 10 feet would be required from Meridian Road to the site itself. **Site 7** would require a 450 foot long road, also connecting with Perimeter Road, but constructed entirely on-base. **Site 8** would require approximately 2,800 feet (1/2 mile) of new roadway, along the base boundary to connect to Perimeter Road. The access road to the selected site would consist of either gravel or crushed stone, and thus should not create a significant dust impact.

4.3.2 Long-term Impacts

It is not anticipated that future utility and transportation conditions at Travis AFB would be affected as a result of operating the proposed ASR-11 radar system. The addition of telephone lines and fiber optic cable at any of the alternative radar sites would not have a significant effect on those utilities in the area. The operation of the ASR-11 radar system would not require water resources, wastewater treatment, collection of solid waste, or natural gas; therefore, no impacts to those utilities are anticipated.

Although selection of any of the three alternative sites would require the construction of an access road connecting to Perimeter Road, the overall length of the new roadway would be relatively short compared to the extensive transportation network on-base. Additionally, Perimeter Road is not heavily traveled and the addition of a few vehicle trips per day (for inspection and/or maintenance of the ASR-11) would not decrease the level of service provided

by this roadway. Meridian Road is presently a dead-end road which receives very little traffic; however, should an ASR-11 be constructed at Site 3, the number of daily vehicle trips accessing the site via Meridian Road is anticipated to be very few and would not represent a long-term impact to traffic.

Discontinuing the operations at the existing AN/GPN-20 radar is not expected to affect area utilities or transportation.

4.4 NOISE

4.4.1 Short-term Impacts

Construction of the radar tower and supporting infrastructure, including connections to power and telephone, and installation of the fiber optic cable, would result in elevated noise levels as grading and minor excavation occur, and as construction of the tower proceeds. These elevated noise levels, which would be short-term in duration, are not likely to disrupt activities on or off base because the ASR-11 sites are located in areas of open space or pasture, away from the majority of base activities and off-base human activity. Typical construction equipment noise levels may be reduced by using well-maintained equipment and by installing mufflers and engine jackets. Construction of the towers and supporting infrastructure is anticipated to take approximately three weeks; therefore, any elevated noise levels would be restricted to this short-term period.

Dismantling of the existing AN/GPN-20 could result in localized, temporary elevation of noise levels. However, due to the existing noise levels, which are strongly influenced by the proximity to the flightline, and the expected short duration of the dismantling activity, noise impacts are expected to be minimal.

4.4.2 Long-term Impacts

No long-term noise impacts are anticipated to result from operation of the proposed ASR-11 radar. Noise levels generated by the ASR-11 would be maintained at a level consistent with current Occupational Safety and Health Administration (OSHA) regulations as specified in CFR

Title 29, Part 1910. Noise from ASR-11 equipment would be designed not to exceed 55 decibels at any time. Noise from the ASR-11 system equipment located in general work areas is not expected to exceed 65 decibels, including periods when the cabinet doors are open. The antenna pedestal with its drives, mounted on the tower, will be designed not to produce noise levels in excess of 55 decibels outdoors on the ground at a distance of 100 feet from the tower. The contribution to noise in the surrounding areas is expected to be negligible, especially considering the persistent nature of existing noise produced from the surrounding aircraft operations.

4.5 AIR QUALITY

The Clean Air Act requires that actions of federal agencies or federally supported activities should not 1) cause or contribute to any new air quality standard violation; 2) increase the frequency or severity of any existing standard violation; or 3) delay the timely attainment of any standard or any required interim emission reductions or other milestones.

4.5.1 Short-term Impacts

The short-term air quality impacts of constructing an ASR-11 would be similar at all of the three alternative sites. Construction vehicle operation and traffic would generate fugitive dust during the construction of access road, utility trenches, and foundation. Due to potential for long dry spells, a dust suppressant should be applied to the site during the construction activities. The disturbed area at any of the three ASR-11 alternative sites would be variable, proportional to the amount of utility trenching and access road construction (see Section 4.3).

All construction vehicles and some equipment would produce engine emissions that could temporarily affect air quality. However, because the number of vehicles and duration of construction required to perform the work is limited, emissions are not anticipated to cause an exceedence of NAAQS or CAAQS in the vicinity of the selected ASR-11 radar site.

Dismantling of the existing AN/GPN-20 radar would generate some fugitive dust and some vehicle and equipment emissions. The nominal emissions and dust generated during the AN/GPN-20 dismantling are not anticipated to cause an exceedence of either the federal or state air quality standards.

4.5.2 Long-term Impacts

Operation of the ASR-11 radar station at any of the three alternative sites would produce identical emissions, which are not anticipated to have adverse impacts on air quality. Sources of emissions during the operation of the ASR-11 would include the operation of the emergency diesel generator at the ASR-11 site, and evaporative loss of fuel from the aboveground storage tank at the radar site. As described in the Programmatic EA for the NAS program (USAF, 1995a), the emergency generator is anticipated to be operated approximately once a week for testing and during occasional power outages. The emissions anticipated to be produced by the emergency generator would be far below the 100 tons per year threshold, which requires review under the Prevention of Significant Deterioration regulations. Emissions are therefore expected to have no adverse impact on air quality (USAF, 1995a). The evaporative loss from the associated aboveground storage tank (AST) is also expected to be minimal, and to have no adverse impact on air quality. At all three of the alternative sites, minimal fugitive dust is expected to be generated by maintenance vehicles, due to the location of these sites along improved roadways.

The emergency generator and fuel tank would need to be added to the Travis AFB Title V Air Quality Permit. However, the corresponding removal of the existing AST and generator at the AN/GPN-20 site should result in no net increase in emissions from generator operation. Assuming the new generator is more efficient than the existing generator, the base may be able to receive credit for a slight reduction in emissions from the active diesel generators on the current permit.

4.6 GEOLOGY AND SOILS

4.6.1 Short-term Impacts

The construction of the ASR-11 radar system would have similar effects on soil at each of the alternative ASR-11 sites. Excavation for the footings of the radar tower is not anticipated to exceed 7 to 8 feet in depth. Excavation for the utility trenches is typically 4 feet deep, and may be up to 10 feet wide. The temporary construction staging area would be removed upon project completion and would not be anticipated to substantially impact geology or soils. The

dismantling of the AN/GPN-20 would not require any ground disturbance; therefore, there would be no impact to the soil or geology from dismantling.

4.6.2 Long-term Impacts

No long-term impacts to the existing soils or geology would result if the ASR-11 radar system were constructed at any of the three alternative sites. Similarly, dismantling of the existing AN/GPN-20 is not anticipated to result in any long-term impact to the existing soils or geology.

4.7 SURFACE WATER AND GROUNDWATER

4.7.1 Short-term Impacts

4.7.1.1 Surface Water. No surface water features exist within at least 1000 feet of any of the three alternative sites, or the existing AN/GPN-20; therefore, it is anticipated that the installation of the ASR-11 and the dismantling of the existing radar would not adversely impact surface water. The temporary construction activities at any of the three alternative ASR-11 sites, or at the AN/GPN-20, are not anticipated to impact stormwater runoff. Precaution would be taken to protect Union Creek, drainage channels, and vernal pools. To minimize sedimentation and erosion during storm events, the proposed construction must comply with the Travis AFB Stormwater Pollution Prevention Plan (SWPPP). During construction, all activities will follow the base best management practices (BMPs) and will be subject to inspection by Travis AFB personnel to ensure that environmental requirements are being addressed.

4.7.1.2 Groundwater. During the rainy season, groundwater at the site may rise as high as 5 ft bgs. Trenching and construction of radar tower footings (approximately 7 to 8 feet deep) at any of the three alternative ASR-11 sites may require dewatering if conducted during the wet season. No groundwater will be discharged from trenches during construction, if there is known contamination in the area, without consulting 60 CES/CEV. The dismantling of the AN/GPN-20 would not require ground disturbance.

4.7.2 Long-term Impacts

There would be no long-term impact to surface water if the ASR-11 were to be constructed at any of the three alternative sites. Final design of the DASR facility will accommodate surface drainage. Travis AFB personnel have indicated that the proposed project should incorporate appropriate BMPs, such as vegetative swales or buffer strips, to reduce the effects of stormwater runoff from the site and along access roads (USAF, 2000i). Removal of the AN/GPN-20 is not anticipated to have an impact on stormwater runoff.

Similarly, there would be no anticipated long-term impacts to the groundwater if the ASR-11 were to be constructed at any of the three alternative sites. Underground utility conduits will be constructed to prevent leaking, so seepage from elevated groundwater during the rainy season will not interfere with operation or maintenance of underground telephone, electric, and fiber optic cables. Removal of the AN/GPN-20 is also not expected to have an impact on groundwater.

4.8 BIOLOGICAL RESOURCES

The following describes potential short- and long-term effects of the installation of the DASR system on biological resources. The biological resources addressed in this section consist of vegetation, wetlands, wildlife, and threatened and endangered species.

4.8.1 Short-term Impacts

4.8.1.1 Vegetation. The construction of the ASR-11 (i.e. the installation of the antenna foundation and tower, utilization of a temporary construction staging area, and other site improvements and grading) will require the clearing of vegetation in the immediate areas of the facility, within the temporary construction staging area, and within the corridor of the short access roads. The three alternative ASR-11 sites are generally covered with grasses and relatively devoid of trees and/or shrubs. Vegetation in the vicinity of **Site 3** is predominantly mixed grasses associated with the pastoral use of the site. **Site 7** and **Site 8** are also primarily grassland, although these areas do have occasional, more scrubby vegetation characteristic of the

ruderal (disturbed) habitat within which they are located. Given the relatively small areas that will be cleared, such as the 160 foot by 160 foot fenced area surrounding the ASR-11, the access road (varying between 225 and 2,600 feet, depending on the site selected), and the temporary staging area (75 feet by 100 feet), the clearing of vegetation associated with the DASR facility is not anticipated to present a significant impact to vegetative communities on Travis AFB, in light of the fact the base supports over 1,700 acres of grassland and ruderal habitats. However, a number of mapped vernal pools and/or wetland meadows have been indicated in the vicinity of the alternative sites (as described in Section 4.8.1.2). These small isolated stands of seasonal wetland vegetation should be delineated, so that they can be avoided by construction activities.

4.8.1.2 Wetlands and Vernal Pools. As noted in Section 3.8.1.2, **Site 7** is within 275 to 400 feet of several mapped, small isolated wetland areas, which were not readily apparent during the site walkover in March 2001. **Site 8** is located approximately 100 feet north of a mapped vernal swale, likely associated with a depression along the edge of the existing roadway; Site 8 is also within 100 to 400 feet of other mapped wetland features, including the former oxidation ponds. **Site 3** is located off-base in a grassy pasture, and thus is beyond the scope of wetland mapping conducted by Travis AFB. Although no wetlands were identified during the site walkover in March 2001, given the abundance of mapped wetlands in the adjacent southeast corner of the base, it is possible that the area near Site 3 may support wetland meadows or other seasonal wetland features. Travis AFB personnel have indicated there is an approximately 80 percent chance that wetlands occur in the area of Site 3 (USAF, 2001h). Thus, regardless of the site selected for the ASR-11, the proximate wetland resources should be delineated, so that they can be avoided during construction activities. Construction of the associated access road and utility lines would be designed to minimize disturbance to vernal pools and wetland resource areas, and mitigation would be provided if necessary. Dismantling of the existing **AN/GPN-20** is not anticipated to impact wetlands.

4.8.1.3 Wildlife. Due to the relatively limited area proposed for disturbance, the construction of the ASR-11 facility or the dismantling of the AN/GPN-20 is not anticipated to substantially impact wildlife in the area. Wildlife populations found on any of the alternative ASR-11 sites, or near the existing radar, are likely to be accustomed to periodic noise intrusions because of the

persistent nature of the airfield operations. Some brief displacement of wildlife populations may occur in the area of each site during construction. The wildlife which most commonly utilizes all three of the alternative ASR-11 sites consists primarily of small birds such as red-winged blackbirds, killdeer, and meadowlarks, or small reptiles (such as lizards and snakes) and small mammals (such as mice); these species are generally mobile and would be capable of temporarily relocating from the vicinity of construction activities.

4.8.1.4 Threatened and Endangered Species. Thirteen federal or state-listed threatened or endangered species have been identified as potentially occurring on Travis AFB, although only two of these species (Contra Costa goldfields and vernal pool fairy shrimp) have been positively identified on base. As noted in Section 3.8.1.4, both of these species are generally associated with the northwest portion of the base (all three alternative ASR-11 sites and the existing AN/GPN-20 are located in, or just beyond, the southern or eastern portions of the base). Additionally, both the Contra Costa goldfields and the vernal pool fairy shrimp are generally limited to vernal pool habitat. Thus, to the extent that vernal pool habitat does not occur within the vicinity of the three alternative ASR-11 sites, it is unlikely that the proposed construction would impact these threatened or endangered species. Base environmental personnel have indicated a slightly higher probability of encountering fairy shrimp in the vicinity of **Site 3**, and thus recommend that surveys be conducted to determine the presence/absence of threatened/endangered species prior to land purchase; it should be noted that such a survey may require two years (USAF, 2001h). Construction of the associated utility lines and fiber optic cabling should be limited to areas within existing roadway alignments to the maximum extent possible, to lessen the potential for vernal pool (and potential threatened and endangered species) impacts.

In addition to these two threatened or endangered species, Travis AFB also contains habitat that may be suitable to the California Tiger Salamander, a federal candidate species; however, no live individuals of this salamander have yet been identified on base. The fact that no live individuals of the California Tiger Salamander have been identified on the vast expanse of Travis AFB makes it unlikely that this species would be present within the relatively small footprint of the proposed DASR construction activities.

Travis AFB also provides, or may provide, suitable habitat for a few species of special concern. Base environmental staff have indicated that the only species of special concern present at either **Site 7** or **8** is the western burrowing owl. Since these birds tend to move around, an onsite survey would be required prior to the start of the breeding season (late March or April) in the year of construction. If the owls are present and in the way of construction, they can be relocated in coordination/compliance with the California Department of Fish and Game protocols. It is assumed that the more time-consuming survey described above for Site 3 with regard to fairy shrimp would also encompass a survey for the presence/absence of the western burrowing owl.

4.8.2 Long-term Impacts

Operation of the ASR-11 at any of the three alternative sites has the potential to result in limited long-term impacts on biological resources, as noted below.

4.8.2.1 Vegetation. Installation of the ASR-11 facility at any of the three alternative sites would result in clearing of grassland and/or ruderal vegetation as described above. Regardless of the site selected for the ASR-11, the proximate wetland resources should be delineated, so that areas of wetland meadows or seasonal wetland vegetation are not filled or obliterated by placement of the DASR facilities. Dismantling of the existing AN/GPN-20 is not anticipated to substantially impact vegetation.

4.8.2.2. Wetlands and Vernal Pools. As noted in Section 4.8.1.2, **Site 7** is within 275 to 400 feet of several mapped, small isolated wetland areas. **Site 8** is located within 100 to 400 feet of several mapped wetland features, including the former oxidation ponds. **Site 3** is located off-base in a grassy pasture, which potentially may support wetland meadows or other seasonal wetland features. Thus, regardless of the site selected for the ASR-11, the proximate wetland resources should be delineated, so that they are not filled or obliterated by placement of the DASR facilities. Design of the access road should consider alterations to stormwater runoff patterns, since a new access road could divert runoff away from a wetland/vernal pool or transport silt and debris into other wetlands/vernal pools. Alignments for the associated utility

lines would be designed to minimize disturbance to vernal pools and wetland resource areas, and mitigation would be provided if necessary. Dismantling of the existing **AN/GPN-20** is not anticipated to impact wetlands.

4.8.2.3 Wildlife. Given the relatively small area required for the DASR facility, the presence and operation of a DASR system should not interfere with wildlife. The ASR-11 tower could theoretically pose an obstacle to birds flying through the area of the site. However, as discussed in the Programmatic EA for the NAS program (USAF, 1995a), the relatively low height of the ASR-11 antenna is not anticipated to pose a substantial threat to birds flying through the area.

4.8.2.4 Threatened and Endangered Species. Due to the specific habitat conditions for each of the federal or state listed threatened and endangered species, as indicated in Table 3.8-5, it is anticipated that the siting and operation of the ASR-11 at either **Site 7** or **Site 8** would not significantly impact the potential habitat of the aforementioned species. However, as noted in Section 4.8.1.4, a threatened & endangered species survey would be required for **Site 3** prior to land purchase.

4.9 AESTHETICS

4.9.1 Short-term Impacts

The construction of the ASR-11 at any of the three alternative sites would not be expected to significantly impact the aesthetic resources at Travis AFB; however, due to the location of the alternatives ASR-11 sites along, or just beyond, the base's perimeter, construction activities would be visible from off-base locations. Though the majority of the surrounding off-base area consists of undeveloped open space and pastureland, some privately owned off-base residences would have views of the DASR construction activities, regardless of the alternative site selected. Although Sites 7 and 8 are located on-base, they are actually closer to off-base privately owned residences than Site 3, which itself is off base. The nearest residences to Site 7 and 8 are approximately 1,200 and 2,000 feet away, respectively. The nearest residence to Site 3 is approximately 3,750 feet distant.

In general, the aesthetic value of south/southeastern portion of Travis AFB is linked to the military function of the base. Thus, views of construction activity associated with installation of the ASR-11 and removal of the AN/GPN-20 would not significantly alter the aesthetic resources at the sites. Additionally, construction of the ASR-11 facility (or dismantling of the existing radar) is expected to be of relatively short duration (approximately three weeks), further reducing the potential for short-term aesthetic impacts.

4.9.2 Long-term Impacts

The long term presence and operation of the ASR-11 at **Site 7** or **Site 8** would generally be consistent with the aesthetic character of the south/southeastern portion of Travis AFB. Both of these alternative sites are located along the base perimeter, and thus the proposed radar would be visible from off-base, privately-owned residences. The land on the south/southeastern side of the base is relatively flat, and few trees exist that would screen the view of the tower, which would likely be 67 feet at Site 7, or 87 feet at Site 8 (the rotating antenna is placed on top of the tower, increasing the height of the structure by approximately 20 feet). Offbase residences in this area currently have views of a number of military structures/facilities associated with the flightline, such as large hangars and the new ATCT. Although the proposed radar would extend into the visible skyline, the supporting tower is quite narrow, and at distance would not substantially interrupt the visual aesthetic provided by Travis AFB. **Site 3** is located off-base within a flat grassland used as pasture; however, it is not more than 1000 feet from the south/southeastern boundary of Travis AFB. As noted above, although Site 3 is off-base, it is actually somewhat further from private residences than the other alternative ASR-11 locations. Those residences that would potentially have views of Site 3 also currently have views of the structures along the flightline at Travis AFB. Thus, for similar reasons as presented for Sites 7 and 8, operation of an ASR-11 at Site 3 is not anticipated to significantly disrupt the visual aesthetic provided by Travis AFB. A tower at Site 3 would likely be 47 feet, and thus would not extend into the skyline as far as the other two alternative ASR-11 sites.

Operation of the ASR-11 facility at any of the alternative sites would require the installation of security lighting. Lighting fixtures to be installed at the ASR-11 facility would generally consist of the following: two red, steady burning, 116-watt obstruction lights on top of the antenna; 200-

watt area lights on each stair landing of the tower to provide illumination for authorized personnel; two 1,000-watt outdoor area lights to be projected downward to illuminate the area within the fenced footprint; and fluorescent indoor area lighting installed in the equipment shelter on the site. The tower stairway lights and outdoor area lighting will be illuminated only when needed for nighttime maintenance activities.

The removal of the existing AN/GPN-20, also located near the south/southeastern boundary of Travis AFB would somewhat offset the introduction of a new ASR-11 in this general vicinity, although the DASR facility would be constructed somewhat closer to residences (and thus appear larger) than the existing radar.

4.10 CULTURAL RESOURCES

4.10.1 Short-term Impacts

Based on cultural resource surveys for Travis AFB, cultural resources are not likely to be present within the proposed project areas for the three alternative sites or the existing AN/GPN-20 facility; however, since Site 3 is located off-base, it may be necessary to conduct an archaeological survey to confirm the absence of cultural resources. Neither the construction activities associated with the installation of the ASR-11 nor the dismantling of the existing AN/GPN-20 is anticipated to impact any cultural resources. In addition, trenching that will be required for utility connection at any of the three potential ASR-11 sites is not anticipated to impact cultural resources.

4.10.2 Long-term Impacts

No long-term impacts to cultural resources are anticipated to result from the operation of the ASR-11 at any of the three alternative sites or the removal of the existing AN/GPN-20.

4.11 POLLUTION PREVENTION AND HAZARDOUS WASTE

4.11.1 Short-term Impacts

The potential short-term pollution and hazardous waste impacts resulting from construction of the ASR-11 are discussed in the following sections.

4.11.1.1 Pollution Prevention. The construction phase of the ASR-11 radar system would comply with applicable Travis AFB policies and guidelines for pollution prevention. In addition, a pollution prevention plan has been developed for the NAS program. This plan prohibits the use of all Class I ozone depleting chemicals and directs the contractor to minimize the use of Class II ozone depleting chemicals and toxic substances. Consequently, hazardous waste generation is anticipated to be reduced to the maximum extent possible during construction of the new radar facility. Similar pollution prevention measures would be implemented during ASR-11 construction regardless of the alternative site at which the facility is constructed.

4.11.1.2 Hazardous Waste. At any of the three alternative ASR-11 sites, some hazardous materials and waste would likely be used and generated during the ASR-11 construction, including: equipment fuel, engine oil, hydraulic oil, grease, and other equipment operation and maintenance material. Refueling of equipment may also take place at the alternative ASR-11 site selected for construction. Any hazardous materials used during the ASR-11 construction would be stored, transported, and disposed in accordance with base, state, and federal regulations. In the event that any contaminated soil or groundwater is encountered at any of the alternative sites, proper base procedures would be followed.

Since **Site 3** is on private property and no data are available on the presence/absence of contaminated soil, an Environmental Due Diligence Audit would be required before the USAF acquires or leases this property. Should contaminated soil be found or evidence of possible contamination revealed, the USAF would most likely select another alternative site. There is the potential for asbestos containing materials to be included in the construction debris that litters the area in the immediate vicinity of **Site 7**. Travis AFB has proposed removal of this debris under a separate contract, although the certainty and potential timing of the removal are not known. It

may be possible to locate an ASR-11 facility at Site 7 between the existing windrows and debris piles, otherwise this material would likely require relocation, or more likely off-site disposal. Although **Site 8** is within IRP WP017, the site itself is outside the known plume of contaminated soil or groundwater. Although construction and landscape-related debris have been placed in the former ponds in the vicinity of Site 8, this material is not anticipated to include hazardous waste.

The existing **AN/GPN-20** radar may have been painted with lead paint. The AN/GPN-20 will be dismantled and transported off-site. The contractor will be required to separately and properly package, mark, and dispose of hazardous materials encountered during the dismantling of the AN/GPN-20 and associated facilities. Small pieces of lead paint may chip off the AN/GPN-20 during the dismantling process; however, substantial amounts of lead paint would not be left on site as a consequence of the decommissioning of the radar. As part of the dismantling, the area would be surveyed prior to final site decommissioning, and, if present, lead paint chips will be collected and disposed of in accordance with applicable Travis AFB policies and procedures.

4.11.2 Long-term Impacts

The potential long-term pollution and hazardous waste impacts resulting from operation of the ASR-11 are discussed in the following sections.

4.11.2.1 Pollution Prevention. As indicated above, a pollution prevention plan has been developed for the NAS program, which prohibits the use of all Class I ozone depleting chemicals, and directs the contractor to minimize the use of Class II ozone depleting chemicals and toxic substances. In addition, operation of the ASR-11 radar system would comply with all applicable Travis AFB policies and guidelines for pollution prevention. Consequently, hazardous waste generation is anticipated to be reduced to the maximum extent possible during the operation of the ASR-11 facility.

4.11.2.2 Hazardous Waste. Operation of the radar facility at any of the three alternative sites would include the installation of a 1,000-gallon aboveground storage tank for the storage of diesel fuel to be used by an emergency generator. The fuel tank would be affixed with the National Fire Protection Agency Fire Diamond label to indicate the presence of hazardous

materials/chemicals. The tank would comply with all federal, state, and base spill control requirements, including a leak detention system, overflow alarm, and double-wall and/or secondary containment as specified in 40 CFR 112.

In addition, hazardous materials and waste would likely be used and generated during operation, including: equipment fuel, engine oil, hydraulic oil, grease, and other equipment operation and maintenance material. All hazardous waste would be used and disposed of in accordance with applicable regulations and base policies. Consequently, it is not anticipated that any soil or groundwater contamination would occur as a result of operating the radar.

4.12 ELECTROMAGNETIC ENERGY

4.12.1 Short-term Impacts

Construction at any of the three ASR-11 alternative sites on Travis AFB is not expected to generate RFR at levels that would be harmful to human health. Some low levels of RFR could be generated from commonly used devices at construction sites, such as cellular telephones or portable computers. However, any RFR generated, and any other electric or magnetic fields, would be typical of that which exists throughout the human environment and is not anticipated to be harmful to human health.

Dismantling of the existing AN/GPN-20 would occur only after operation of the radar has ceased. Consequently, there should be no RFR hazard to workers involved in the AN/GPN-20 dismantling. Similar to the ASR-11 construction, dismantling activities at the AN/GPN-20 site could generate low levels of RFR from commonly used devices; however, these are not anticipated to be harmful to human health.

4.12.2 Long-term Impacts

Operation of the ASR-11 radar at any of the three alternative sites would generate identical levels of electric and magnetic fields, including RFR. As discussed in Section 3.12, the RFR generated by the existing AN/GPN-20 is only hazardous at close distances to the radar when it is operating. Similarly, the RFR generated by the ASR-11 would only be hazardous at close

ranges, while the radar is operating (see below). The tower immediately below the radar would be in the spillover region, and would be hazardous to humans while the radar is operating. At any of the three alternative sites, the facility would be sited a sufficient distance from occupied buildings that the radar operation would not pose a RFR hazard to personnel within the general vicinity of any of the ASR-11 sites. To advise personnel in the area of the RFR hazard at close ranges, signs would be posted at the perimeter of the ASR-11 facility warning against approaching the antenna while it is in operation. There would be no RFR generated from the antenna, and therefore no RFR hazard, when the antenna is not in operation.

The following comparison to various RFR safety standards is adapted from the October 1997 *Radiofrequency Impact Analysis for Airport Surveillance Radar-11* (FAA, 1997), prepared for the FAA.

Terms such as “safety standards” and “exposure standards” generally refer to, and are frequently used interchangeably with, specifications or guidelines on maximum public or occupational exposure levels to electromagnetic fields. Such levels are usually expressed as maximum power densities or field intensities in specific frequency ranges for stated exposure durations. Exposure guidelines have been developed by private organizations such as the American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE), and the National Council on Radiological Protection (NCRP, now called the National Council on Radiation Protection and Measurements) as voluntary guidelines for occupational or general public exposure, or both. Governmental agencies such as the Federal Communications Commission (FCC) and various state and municipal bodies have adopted such guidelines or variations thereof as enforceable stands. The draft version of FAA Order 3910.3B, Radiation Safety Program (1997) adopts the ANSI/IEEE exposure guidelines.

The ANSI/IEEE (1992) guidelines cover the frequency range from 0.003 MHz to 300,000 MHz, and separately specify the maximum permissible exposure (MPE) in “uncontrolled environments” (accessible by the general population) and “controlled environments” (such as occupational exposure). In the ASR-11 frequency band of 2,700-2,900 MHz, the MPE for uncontrolled environments is 1.80-1.93 milliwatts per square centimeter (mW/cm^2) averaged

over a 30-minute period. The guideline level for controlled environments is 9-10 mW/cm² averaged over a 6-minute period.

In 1988, the International Radiation Protection Association (IRPA) published guidelines (1988) for occupational and public exposure to RFR in the frequency range 0.001 MHz to 300,000 MHz. At the ASR-11 frequency, the MPE for occupational exposure is 5 mW/cm² averaged over a 6-minute period. The MPE for non-occupational exposure is 1 mW/cm² averaged over a 6-minute period. The MPE for pulsed RFR is set at 1,000 times the MPE for time-averaged exposure. Thus, at ASR-11 frequency, the MPE for pulsed RFR is 1,000 mW/cm² peak pulse power density. The NCRP also published guidelines for human exposure. For RFR at ASR-11 frequency, the MPE for occupational exposure is 5 mW/cm², averaged over 6 minutes. The corresponding MPE for exposure of the general population is 1 mW/cm², averaged over 30 minutes.

In August 1996, the FCC adopted a hybrid standard based in part on the ANSI/IEEE (1992) guidelines and in part on the NCRP guidelines. For occupational exposure to RFR in the ASR-11 frequency band, the FCC MPE is the same as the NCRP guideline level.

The power density of the ASR-11 beam varies considerably between the near-field (within 260 feet of the antenna) and the far-field (greater than 260 feet away) (FAA, 1997). Thus, far-field conditions apply to almost all the receptors near the proposed radar sites and are presented herein. Any differences in power densities would be conservative, because nearfield calculations lead to lower predicted power densities than do far-field calculations. The power density of the ASR-11 signal can be represented by peak pulse power - the maximum power level of a single pulse - or as the power averaged over a time period, usually several or more minutes. At a distance of 23 meters (75 feet) from the ASR-11 antenna, the peak power density of the ASR-11 signal will be 945 mW/cm², less than the 1,000 mW/cm² MPE for peak power density established by the IRPA, as discussed above. The peak power density will decrease rapidly with distance from the antenna. At all locations more than 23 meters (75 feet) from the ASR-11 antenna, the ASR-11 signal will comply with the MPE for peak power density established by the IRPA.

The average (mean) power radiated by the ASR-11 is 2.1 kilowatts (kW). At any point near the ASR-11 in normal operation (i.e. antenna is rotating), the average power density is lower than the peak density by the factor 0.00034. For the ASR-11 frequency range (uncontrolled environments), the ANSI/IEEE MPE is 1.8 to 1.93 mW/cm², averaged over 30 minutes. The average power density of the ASR-11 signal decreases with distance from the antenna and will fall below 1.9 mW/cm² at a distance of 10 meters (33 feet) from the radar antenna. Since the ASR-11 will be mounted on a tower greater than 10 meters in height, persons at ground level would not be exposed to RFR levels exceeding the ANSI/IEEE MPE. At distances of more than 13 meters (43 feet) from the ASR-11 antenna, the ASR-11 signal will comply with the MPE levels for the general population, 1.0 mW/cm², set forth in IRPA, NCRP, and FCC guidelines, discussed above. Thus, no impacts to nearby receptors are anticipated at any of the three alternative sites. At all locations near the radar, the ASR-11 signal will comply by an even wider margin with the guideline levels for occupational exposure set forth by ANSI/IEEE, IRPA, NCRP, and FCC. As a precautionary measure, signs would be posted at the perimeter of the DASR facility advising personnel and the public against approaching the radar facility during operation.

On infrequent occasions, the ASR-11 antenna will remain stationary and transmit a signal for maintenance and testing purposes. This type of operation is expected to occur no more than once every several months. In maintenance mode, the ASR-11 signal will be directed at a fixed location above the horizon for up to several minutes at a time. Because the beam will be stationary, average power densities will be higher than during normal operation. In this mode, average power density of the main beam within 153 meters (500 feet) of the ASR-11 will exceed the ANSI/IEEE guideline levels. During this mode of operation, the ASR-11 will be under the direct control of an operator at the radar site. At locations greater than 153 meters (500 feet) from the ASR-11 antenna, the average power density of the signal from the ASR-11 operating in maintenance mode will comply with the ANSI/IEEE MPE for uncontrolled environments. At locations greater than 205 meters (672 feet) from the ASR-11 antenna, the average power density of the signal from ASR-11 operating in maintenance mode will comply with the IRPA, NCRP, and FCC MPEs for uncontrolled environments.

5.0 COMPARISON OF ENVIRONMENTAL CONSEQUENCES AND SELECTION OF ENVIRONMENTALLY PREFERRED ALTERNATIVE

The three alternative ASR-11 sites are relatively comparable with regard to existing environmental conditions. All three sites occur on the south/southeastern side of the base, either just along the perimeter boundary or slightly beyond on private property. The three sites are characterized by similar socioeconomic, air quality, geologic, hydrologic, archaeological and cultural resource conditions, and noise levels. Site 3, located approximately 1000 feet beyond the base perimeter, is characterized by a grassy pasture. Sites 7 and 8, located just within the base boundaries, also contain grassland, but are more characterized by early succession ruderal vegetation. Site 7 is within 275 to 400 feet of several mapped, small isolated wetland areas. Site 8 is within 100 feet of a mapped vernal swale, and within 100 to 400 feet of several other mapped wetland features, including the former oxidation ponds. Site 3 is beyond the limits of base wetland mapping, but given its proximity to the other sites, may also be characterized as having the potential to support wetland meadows or seasonal wetland features; base personnel have indicated a relatively high probability that wetlands occur in the area of Site 3. Neither of the two threatened or endangered species known to occur on Travis AFB are anticipated to be within the limits of any of the three alternative sites, primarily because both the Contra Costa goldfields and the vernal pool fairy shrimp generally favor vernal pool habitat; however, an endangered species survey would be required if the off-base alternative (Site 3) is selected. Surveys to identify, and possibly relocate, western burrowing owls, a federal and state species of special concern, would be required prior to the breeding season in the year of construction, regardless of the alternative location selected. Site 3 is not anticipated to have soil or groundwater contamination present, although an Environmental Due Diligence Audit would be required before the USAF acquires or leases this property. Site 7 is within the area of the formerly proposed rapid runway repair facility, and is within the vicinity of several windrows or random piles of construction debris, some of which include asbestos containing material. Site 8 is within IRP WP017, but is outside the plume of known soil and groundwater contamination. The former ponds in the vicinity of Site 8 have been partially filled with construction and landscaping debris. The three alternative sites share relatively similar aesthetic characteristics, with the airfield structures (hangars, air traffic control tower, etc) contributing to the functional

military aesthetic of the south/southeastern side of Travis AFB. No significant differences in ambient electromagnetic radiation are expected at any of the sites.

No adverse short-term socioeconomic, hydrologic, archaeological and cultural resources impacts are expected at any of the three sites. Construction activities at any of the three alternative sites may encounter seasonally elevated groundwater, which approaches to within approximately 5 feet of the ground surface; thus, dewatering during installation of tower footings may be necessary. Although Site 8 is within the boundaries of an IRP site and Site 7 is within the vicinity of construction debris with ACM, contaminated groundwater is not expected to be encountered during the construction of the ASR-11 at any of the three alternative sites. Short-term impacts may occur to land use, air quality, noise, and biological resources at any of the three alternative sites. The three alternative sites are at various distances from existing electric, telephone, and data communication lines. Generally, the longer the length of trench required for utility connections, the greater the potential for increased dust and noise levels for a small portion of the construction period. Site 7 would require the longest trenches for electric and fiber optic connections, as well as the longest access road; however, Site 7 would have the shortest telephone connection. Site 3 would require the shortest access road and shortest fiber optic connections, but a portion of both of these would be constructed off base. Site 8 would have the shortest electric connection, but the longest telephone connection. Construction of the ASR-11 at any of the three sites would require the clearing of vegetation, primarily grassland or grassland/ruderal communities; the amount of vegetation to be removed is anticipated to be relatively similar, regardless of the site selected. Alignments for the access road and utility trenches will be designed to avoid wetland resources areas, thereby reducing the potential for clearing and destruction of sensitive wildlife habitat. Given the location of all three sites near the south/southeastern perimeter of the base, construction activity at any of the three sites may be visible to a few randomly scattered residences, all of which are more than 1000 feet from any of the sites.

No long-term socioeconomic, utilities, noise, air quality, hydrologic, or archaeological/cultural resources impacts are anticipated at any of the three sites. All three sites also share a similar potential for seismic activity, given the historic seismic activity in the San Francisco Bay Area. Although Site 3 is located on privately-owned property and some grazing area/open space would

be lost as a result of the installation of an ASR-11, the site is within an easement held by Travis AFB and is zoned to favor compatibility with future expansion of Travis AFB. Similarly, both Sites 7 and 8 are within areas of undeveloped open space, but installation of mission supporting facilities within these undeveloped areas is compatible with the base comprehensive planning. As noted previously, installation of the ASR-11 at any of the three sites would require the clearing of vegetation within the 160' by 160' footprint of the ASR-11 facility, as well as within the areas of the associated access road and utility connections. Generally, the amount of clearing is relatively small, considering the abundance of similar grassland/ruderal habitats available on and in the vicinity of Travis AFB. Thus, with care taken to avoid vernal pools and other wetland resources, as well as sensitive wildlife habitat, long-term impacts to biological resources are anticipated to be minimal regardless of the alternative site selected. Off-base residences in the general vicinity of the three alternative sites currently have views of a number of military structures/facilities associated with the flightline. Although the proposed radar may extend into the visible skyline, as seen from the residences, the supporting tower is quite narrow, and at a distance would not substantially interrupt the visual aesthetic provided by Travis AFB. Although the radar would generate RFR while operating, persons at ground level would not be exposed to RFR levels exceeding the maximum permissible exposure (MPE) levels for the general population, since the ASR-11 will be mounted on a tower greater than 47 feet in height. As a precautionary measure, signs would be posted at the perimeter of the DASR facility advising personnel and the public against approaching the radar facility during operation. During the DASR operation, fuel and other hazardous materials such as engine oil and grease may be used at the site. However, use and disposal of any hazardous materials would occur in compliance with Travis AFB protocols and guidelines, as well as applicable state and federal regulations. Consequently, it is anticipated that operational use of hazardous materials would not adversely affect the natural or human environments.

In summary, construction and operation of the ASR-11 facility would result in minimal short-term and long-term impacts at any of the three alternative sites. Any of the three sites would be an acceptable location for the ASR-11 facility from an environmental perspective. Due to operational and other base considerations, the Air Force has selected Site 8 as the preferred ASR-11 location.

6.0 MITIGATION

Most of the impacts that may occur at any of the sites during construction and operation of the DASR system are minor in nature and few mitigation measures would be required. Care should be taken during final design of alignments for access roads and utility connections to avoid proximate vernal pools or other wetland resources. Surveys for federal/state species of special concern (western burrowing owl) would be required, prior to breeding season in year of construction. If the owls are present and in the way of construction, they would be relocated in coordination/compliance with the California Department of Fish and Game protocols (should Site 3 be selected, additional survey for threatened and endangered species, such as fairy shrimp, would be required). To minimize noise impacts during construction, mufflers would be used on construction equipment and vehicles. In addition, all equipment and vehicles used during construction would be maintained in good operating condition so that emissions are minimized, thus reducing the potential for air quality impacts. Dust will be controlled on-site by using water to wet down disturbed areas. The small area that will be permanently cleared for the DASR facilities would be stabilized using either geotextile fabric with gravel or pavement, to minimize the potential for erosion. In addition, all other areas disturbed outside of the ASR-11 facility area, including the temporary staging area, would be seeded or re-paved, whichever applicable, upon project completion. Travis AFB personnel have indicated that the proposed project should incorporate appropriate BMPs, such as vegetative swales or buffer strips, to reduce the effects of stormwater runoff from the site and along access roads. All hazardous materials used during construction would be handled and disposed of in accordance with Travis AFB policies and protocols and all applicable state and federal regulations. Traffic management measures would be developed to facilitate traffic flow and pedestrian access. Additionally, due to the potential for RFR hazards at close distance during operation of the ASR-11, warning signs indicating the safe distance from the operating radar would be installed at the facility perimeter.

7.0 REFERENCES

- Air Resources Board (ARB), California, 1999. Ambient Air Quality Standards.
- Association of Bay Area Governments (ABAG), 2001. 2000 Census Fact Sheets.
<http://census.abag.ca.gov/cities/cities.htm>
- Association of Bay Area Governments (ABAG) 1998. 1990 Census Data.
<http://www.abag.ca.gov/bayarea/census90/pickhtml.html>
- Belden, S. J., 1999. Air Surveillance Radar (ASR) Siting Worksheet, Interference Prediction for Collocation of ASR-11 and Existing ASR Assets. September, 1999.
- California Department of Finances, 2001. County Population Projections with Age, Sex and Race/Ethnic Detail, 1990-2040 in 10-year Increments. http://www.dof.ca.gov/html/Demograp/Proj_age.htm
- California Employment Development Department, 2001. Labor Market Information; Employment by Industry. <http://www.calmis.ca.gov/htmlfile/subject/indtable.htm>
- Council on Environmental Quality (CEQ), 1978. *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*. 40 CFR Parts 1500-1580. November 28, 1978 (and as updated through July 1, 1998).
- Environmental Protection Agency (EPA), 1998. National Primary and Secondary Air Quality Standards. 40 CFR 50.
- Environmental Protection Agency (EPA), 1999. Endangered Species Protection Program Databases. Updated December 31, 1999. Available at: <http://www.epa.gov/espp/database.htm>.
- Environmental Protection Agency (EPA), 2000a. National Ambient Air Quality Standards (NAAQS). Available at: <http://www.epa.gov/airs/criteria.html>.
- Fairfield, 2001a. Personal communication between B. Parker (Fairfield Planning Office) and J. Petras & J. Athey (Metcalf & Eddy). Re: Zoning in Vicinity of ASR-11 Alternative Site 3. 22 March 2001.
- Fairfield, 2001b. Personal communication between E. Somjen (Fairfield Planning Office) and J. Athey (Metcalf & Eddy). Re: Land Use Classifications East and North of Travis AFB. 3 May 2001.
- Fairfield, 2001c. Fairfield – Suisun Chamber of Commerce: General Information. <http://www.ffsc-chamber.com/GenInfo/index.html>
- Environmental Protection Agency (EPA), 2000b. Office of Air Quality Planning and Standards USA Air Quality Nonattainment Areas, Effective: July 31, 2000. <http://www.epa.gov/airs/nonattn.html>.
- Federal Aviation Administration (FAA), 1992. *Primary/Secondary Terminal Radar Siting Handbook*. FAA Order 6310.6, Change 1. June 22, 1992.

- Federal Aviation Administration (FAA), 1997. *Radio Frequency Impact Analysis for Airport Surveillance Radar – 11*. Prepared by SRI International. Final Report, October 1997.
- Food and Drug Administration (FDA), 1996. Annual Report, Fiscal Year 1996; section on *Electromagnetic Interference (EMI) Testing of Medical Devices*. FDA Center for Devices and Radiological Health, Office of Science and Technology. Available at <http://www.fda.gov/cdrh/ost/section4.html>.
- Institute of Electrical Electronics Engineering (IEEE), 1998. *Radiofrequency Interference with Medical Devices; IEEE Engineering in Medicine and Biology Magazine* 17(3):111-114. Available at: <http://www.seas.upenn.edu/~kfoster/interfer.htm>.
- MITRE, 1997. Personal communication via email between MITRE (David C. Miller) and ESC-TG (Holly Arbaczawski), Re: DASR Radar Parameters. August 21, 1997.
- National Academy of Science, 1996. *Possible Health Effects of Exposure to Residential Electric and Magnetic Fields*. October 31, 1996; as cited by VTDPS, 1996.
- National Safety Council (NSC), 1979. *Fundamentals of Industrial Hygiene*, Second Edition.
- Solano, 2001. Personal communication between DEM, Planning Division (Solano County) and J. Athey (Metcalf & Eddy). Re: Zoning Designation (A-160) for Alternative ASR-11 Site 3. 4 June 2001.
- SRI International (SRI), 1997. *Radiofrequency Impact Analysis for Airport Surveillance Radar-11*. Prepared for Federal Aviation Administration.
- United States Air Force (USAF), 1991. Air Force land use compatibility guidelines are documented in the *Air Installation Compatible Use Zone (AICUZ) Program Handbook*.
- United States Air Force (USAF), 1994. *Department of the Air Force Program Management Directive for Air Traffic Control and Landing Systems Integrated Weapons System Management*. January 14, 1994.
- United States Air Force (USAF), 1995a. *Department of Defense National Airspace System Final Programmatic Environmental Assessment*. Prepared by Metcalf & Eddy, Wakefield, MA.
- United States Air Force (USAF), 1995b. *Department of Defense National Airspace System Digital Airport Surveillance Radar Siting Plan*. Prepared by Metcalf & Eddy, Wakefield, MA.
- United States Air Force (USAF), 1996. *Travis Air Force Base General Plan*.
- United States Air Force (USAF), 1996b. *Cultural Resources Management Plan, Travis AFB*
- United States Air Force (USAF), 1996c. *Travis AFB Inventory of Cold War Properties*. Prepared by Geo-Marine, October 1996.
- United States Air Force (USAF), 1999. Environmental Impact Analysis Process (EIAP). Federal Register. Vol 64, No. 135 38127. AFI 32-7061. July 15, 1999.

- United States Air Force (USAF), 1999. *Final Environmental Assessment, Travis Air Force Base Burke Property Housing*. Prepared by Engineering Field Activity West, Naval Facilities Engineering Command. June 7, 1999
- United States Air Force (USAF), 2000. Final Environmental Assessment for Debris Removal from the Rapid Runway Repair Area, Travis AFB. Prepared by Tetra Tech EM, Inc. October 11, 2000.
- United States Air Force (USAF), 2001a. *Digital Airport Surveillance Radar (DASR), Integrated Site Survey Report – Travis Air Force Base*. Prepared by: Raytheon Systems Company, Transportation Systems, Sudbury, MA. June 25, 2001.
- United States Air Force (USAF), 2001b. Integrated Natural Resources Management Plan, Travis AFB. February 2001.
- United States Air Force (USAF), 2001c. GIS Contour Coverages of Travis AFB. Provided by SSgt Christopher Lapp
- United States Air Force (USAF), 2001d. *Travis 2010: Commander's Summary*.
- United States Air Force (USAF), 2001e. Travis AFB. http://www.aafes.com/conus_wer/travis/
- United States Air Force (USAF), 2001f. Personal communication between SrA Masters (Travis AFB) and J. Athey (Metcalf & Eddy). Re: Status of Fiber Optic, Telephone, and Electric Service at Travis AFB. 23 May 2001.
- United States Air Force (USAF), 2001g. Personal communication between MSgt Santiago (Travis AFB) and J. Athey (Metcalf & Eddy). Re: Pollution Prevention Status at Travis AFB. 11 July 2001.
- United States Air Force (USAF), 2001h. Personal communication between 2Lt Bohn (Travis AFB) and J. Petras (Metcalf & Eddy). Re: Response to Questions on the Environmental Assessment on the Digital Airport Surveillance. 10 October 2001.
- United States Air Force (USAF), 2001i. Personal communication between Giok Thung (Travis AFB) and J. Petras (Metcalf & Eddy). Re: DASR ASR-11 Stormwater Concerns. 31 October 2001.
- United States Bureau of the Census (USBC), 1990. State and County Quickfacts. Data derived from Population Estimates, 1990 Census of Population and Housing, Small Area Income and Poverty Estimates.
- United States Fish and Wildlife Service, 2000. Threatened and Endangered Species System. Threatened and Endangered Species Listing by State. Updated August 17, 2000. Available at: http://ecos.fws.gov/webpage/webpage_usa_lists.html.
- Vermont Department of Public Service (VTDPS), 1996. *Radiofrequency Radiation: Health Effect and Interference; Status of Current Research and Regulation*. December 1996. Available at <http://www.cit.state.vt.us/psd/rfrprt>.

8.0 ACRONYMS AND ABBREVIATIONS

A/C	Alternating current
AFB	Air Force Base
AFI	Air Force Instruction
AM	Amplitude modulation (radio)
AN/GPN-20	(airport surveillance radar model designation)
ANSI	American National Standards Institute
ASR-11	(airport surveillance radar model designation)
AST	aboveground storage tank
ATCT	air traffic control tower
CFR	Code of Federal Regulations
DASR	Digital Airport Surveillance Radar
dB	decibel, A-weighted
DoD	(U.S.) Department of Defense
DRMO	Defense Reutilization and Marketing Office
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
°F	degrees Fahrenheit (temperature)
FAA	Federal Aviation Administration (Dept of Transportation)
FAR	Federal Aviation Regulation
FCC	Federal Communications Commission
FM	Frequency modulation (radio)
FONSI	Finding of no significant impact
FY	Fiscal Year
Hz	hertz
IEEE	Institute of Electrical Electronics Engineers
IRP	Installation Restoration Program
IRPA	International Radiation Protection Association

ACRONYMS AND ABBREVIATIONS (continued)

kGal	kilogallon
kHz	kilohertz
kVA	kilovolt-amperes
kW	kilowatts
L_{eq}	equivalent sound level
LOS	line of sight
m	meters
MCL	Maximum Concentration Level
m/sec	meters per second
mg/m^3	milligrams per cubic meter
MHz	megahertz
MMBtu	Million British Thermal Unit
MPE	Maximum Permissible Exposure
MSSR	Monopulse Secondary Surveillance Radar
MW	megawatts
mW/cm^2	milliwatts per square centimeter
$\mu g/m^3$	micrograms per cubic meter
μm	micrometers (microns)
NAAQS	National Ambient Air Quality Standards
NAS	National Airspace System
NCRP	National Council on Radiological Protection
NDI	Non Destructive Inspection
NEPA	National Environmental Policy Act
nm	nanometers
nmi	nautical mile
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PM-2.5	Particulate matter below 2.5 microns
PM-10	Particulate matter below 10 microns
ppm	parts per million (by volume in air)
PSR	Primary Surveillance Radar

ACRONYMS AND ABBREVIATIONS (continued)

RAPCON	Radar Approach Control
RCRA	Resource Conservation and Recovery Act
RFR	Radiofrequency radiation
ROW	right-of-way
USAF	United States (Department of the) Air Force
UST	Underground storage tank
VOC	Volatile Organic Compound

9.0 LIST OF PREPARERS

Metcalf & Eddy prepared this document to fulfill the requirements of the National Environmental Policy Act (NEPA) for the proposed action of constructing a DASR facility at Travis AFB in California. Other entities that provided information on an as-needed basis included Travis AFB Environmental Flight personnel, hired contractors, and various technical personnel at URS Corporation. The following persons authored and provided direct oversight for the preparation of this environmental assessment:

MANAGEMENT

Charles Freeman, ESC/GAA. B.S. in Biology; Master of Landscape Architecture; registered Landscape Architect, Commonwealth of Massachusetts. Oasis Systems Inc. As the environmental coordination lead for the DASR program site survey, provided technical review and oversight for preparation of the environmental assessment and acted as liaison among hired contractors.

Shreve-Gibb, Betsy. M.R.P. Urban and Regional Planner. M&E. As Senior Project Manager responsible for all NEPA compliance on National Airspace System (NAS) projects, with extensive experience preparing environmental assessments and permits, provided technical review and oversight for preparation of all sections of the environmental assessment.

TASK LEADERS

Athey, James. B.S. Biology. M&E. As a Senior Environmental Scientist with broad experience in aquatic and terrestrial ecology, GIS and CAD applications, the preparation of technical and scientific documents, and the implementation of environmental protection measures, performed data collection, provided GIS oversight and prepared maps and figures for the environmental assessment, and authored and reviewed portions of the environmental assessment.

Petras, James. B.S. Biology. M&E. As a Project Scientist with diverse experience in preparing environmental assessments and impact reports for federal, municipal, and commercial entities, performed data collection, authored some sections, and reviewed all sections of the environmental assessment.

PRIMARY AUTHORS

Rodolakis, Antony M. M.E.Sc. Aquatic and Watershed Science. M&E. As a Project Scientist with specialized experience in ecological risk assessments and technical consulting services for hazardous waste and environmental quality projects, authored portions of the baseline and impacts sections of the environmental assessment.

APPENDIX A: LISTING OF AGENCIES AND INDIVIDUALS CONTACTED

LISTING OF AGENCIES AND INDIVIDUALS CONTACTED

Capt Edward Lambrecht, Travis AFB, OSS/OSA

SrA William Masters, Travis AFB, CS/SCXP

Lt. Josh Tyler, Travis AFB, CES

Bob Holmes, Travis AFB, Natural Resources Manager

Allen Brickeen, Travis AFB, IRP Manager

Susan Harris, Travis AFB, Community Planner (no longer assigned to Travis AFB)

SrA Cobarrubia, Travis AFB, Drafting

Arvey Andrews, Travis AFB, Pollution Prevention Chief

Xuyen Lieu, Travis AFB, Air Quality Manager

Mr. Musselwhite, Travis AFB, Storage Tanks and OWS

Karen Harten, Travis AFB, Real Property

Noel Fagen, Travis AFB, Ground Safety

SSgt Christopher Lapp, Travis AFB, GIS

Giok Thung, Travis AFB, Water Quality

Brian Parker, Solano County Department of Environmental Management, Senior Planner

Eve Somjen, Solano County Department of Environmental Management, Planning

APPENDIX B: PRELIMINARY SITE SCREENING CRITERIA FOR TRAVIS AFB

**(AS PRESENTED IN THE *INTEGRATED SITE SURVEY REPORT – PRELIMINARY*,
TRAVIS AFB, PREPARED BY RAYTHEON SYSTEMS COMPANY, 25 JUNE 2001)**

PRELIMINARY SITE SCREENING CRITERIA FOR TRAVIS AFB

EXCLUSIONARY CRITERIA

These criteria consider the essential environmental, constructional, and operational constraints that could eliminate a site from further consideration as a potential site for the ASR-11 System. These criteria relate to environmental parameters that could lead to unmitigable significant impacts and physical parameters regarding a site's suitability for construction.

Criteria	Rejected Sites					Alternative Sites		
	Site 1	Site 2	Site 4	Site 5	Site 6	Site 3	Site 7	Site 8
Impacts occupied existing structures	No	No		No	No	No	No	No
Within railroad ROW	No	No		No	No	No	No	No
Within highway ROW	No	No		No	No	No	No	No
Within runways and/or taxiways	No	No		No	No	No	No	No
Within power line ROW	No	No		No	No	No	No	No
Impacts wilderness areas	No	No		No	No	No	No	No
Impacts national natural landmarks	No	No		No	No	No	No	No
Site less than 160 by 160 feet	No	Yes ¹		No	No	No	No	No
Lacks coverage of departing aircraft targets within 1 nmi of the takeoff runway ends	N/A ²	No		N/A ²	N/A ²	No	Yes ³	No
Lacks coverage of aircraft on final approach up to the missed approach point	N/A ²	No		N/A ²	N/A ²	No	Yes ³	No
Within 1,500 feet of any above ground screening object	No	No		No	No	No	No	No
Airport specific exclusions	No	No		No	No	No	No	No

No = Meets Criteria

Yes = Does Not Meet Criteria

¹ Site 2, if selected, would likely have required a modified site layout plan, due to close proximity of drainage ditch.

² Sites 1, 4, 5, and 6 were eliminated from further evaluation prior to the line of sight analysis; thus "N/A" reflects that the coverage analysis was not performed for sites previously removed from the list of alternative sites being considered.

³ The 0.5 nmi Minimum Detection Range of the ASR-11 at Site 7 might impact the visibility of departures from Runway 21L and approaches to Runway 03R.

Source: U.S. Air Force, 2001

RESTRICTIVE SCREENING CRITERIA

These criteria could eliminate a site from further consideration due to the extensive mitigation required to offset potentially significant impacts. Many of these criteria originate from Federal law. In these cases, the law has been noted. Additionally, many of the criteria are covered by state and local laws, which were consulted as appropriate.

Criteria	Rejected Sites					Alternative Sites		
	Site 1	Site 2	Site 4	Site 5	Site 6	Site 3	Site 7	Site 8
Ecological or wildlife refuges	5	5	5	5	5	5	5	5
Wild and scenic rivers	5	5	5	5	5	5	5	5
Prime farmland	5	5	5	5	5	5	5	5
National, state, and municipal parks and recreation areas	5	5	5	5	5	5	5	5
Historical, archeological, and cultural sensitive sites	5	5	5	5	5	5	TBD	5
Wetlands	5	5	5	5	3 ^a	5	5	5
Endangered and threatened species habitat	TBD	TBD	TBD	5	TBD	TBD	5	TBD
Non-airfield or non-federal land	5	5	5	5	5	1 ^b	5	5
Hazardous waste site	3 ^c	3 ^c	3 ^c	1 ^d	3 ^c	5	3 ^c	3 ^c
Capped landfill	5	5	5	5	5	5	5	5
Scenic highways	5	5	5	5	5	5	5	5
Coastal zones	5	5	5	5	5	5	5	5
Steep terrain	5	5	5	5	5	5	5	5
Floodplain	5	5	5	5	5	5	5	5
Within 2,500 feet of existing electronic facilities or power lines that could interfere with operation	3 ^e	5	3 ^e	5	3 ^e	5	5	5
Cone of silence impacts coverage of radar/instrument approaches, navigational fixes, airway/route, and special air traffic coverage requirements	N/A ^f	5	N/A ^f	N/A ^f	N/A ^f	3 ^g	3 ^h	3 ^g
Within 2,500 feet of industrial operations that could interrupt or contaminate the site	5	5	5	5	5	5	5	5
Within 0.5 nmi of edges of any operational runways and approach and departure paths	Rwy 03R/ 21L	Rwy 03L/ 21R	5	5	5	5	Rwy 03R/ 21L	5
Violates FAR Part 77 requirements	5	5	5	5	5	5	5	5

5 = No Adverse Impacts/Meets Criteria

3 = Partially Impacted/Marginal

1 = Significantly Impacted/Does Not Meet Criteria

^a Site 6 is located near a delineated wetland.

^b Site 3 is located on privately owned property.

^c Sites 1, 2, 4, 5, 6, and 8 are located on Installation Restoration Program sites. Site 7 is located on an area that may be contaminated by lead and asbestos.

^d Site 5 has a monitoring well system that would be affected by site development.

^e Sites 1, 4, and 6 are located within 2,500 feet of electronic equipment or towers.

^f Sites 1, 4, 5, and 6 were eliminated from further evaluation prior to the line of sight analysis; thus "N/A" reflects that the coverage analysis was not performed for sites previously removed from the list of alternative sites being considered.

^g The cone of silence affects the upper altitudes of fix "EMBER". For Site 3, coverage will not be provided above 19,000 feet. Note that 19,000 is above the maximum required coverage altitude.

^h The 0.5 nmi Minimum Detection Range of the ASR-11 at Site 7 encroaches upon the approach path to Runway 03R. Coverage of the ASR approach to Runway 03L at the missed approach point is not provided above 1,900 feet due to the Cone of Silence. The Cone of Silence affects coverage of fix "EMBER" above 21,400 feet. Note that 21,400 feet is above the required maximum coverage altitude.

Source: U.S. Air Force, 2001

SELECTIVE SCREENING CRITERIA

These criteria provide positive or negative considerations that will form the basis for comparison of candidate sites. Much of the information required will be obtained during site visits.

Criteria	Rejected Sites					Alternative Sites		
	Site 1	Site 2	Site 4	Site 5	Site 6	Site 3	Site 7	Site 8
Visual sensitivity	+	+	+	+	+	+	+	+
Accessibility to roads	+	+	+	+	+	+	- ¹	o ²
Soils	o ³	o ³	o ³					
Geology	- ⁴	- ⁴	- ⁴					
Proximity to power	o ⁵	o ⁵	o ⁵	+	o ⁵	o ⁵	o ⁵	o ⁵
Proximity to telephone lines	o ⁵	+	o ⁵	+	o ⁵	o ⁵	o ⁵	o ⁵
Zoning	+	+	+	+	+	TBD	+	+
Subsurface rights	+	+	+	+	+	+	+	+
Unique habitat	+	+	+	+	+	TBD	+	TBD
Utilities	+	o ⁶	+	+	+	+	+	+
Planned use of site	+	+	+	+	+	+	+	+
Roadways	+	+	+	+	+	+	+	+
Water resources	+	+	+	+	+	+	+	+
Recreational use	+	+	+	+	+	+	+	+
Underground cable routing	+	+	+	+	+	+	+	+
LOS visibility to air traffic coverage requirements	50 of 56	43 of 56	48 of 56	49 of 56	45 of 56	48 of 56	40 of 56	50 of 56
Secondary radar coverage, on the surface, over the entire length of runways	N/A	o ⁷	N/A	N/A	N/A	o ⁷	+	o ⁷

+ = Positive

- = Negative

o = Neutral

¹ Asbestos removal and cleanup may be required for the construction of the access road.

² The site requires a 2,600 foot long access road.

³ All sites are located on soils with a high shrink swell potential and a slight erosion hazard.

⁴ According to the 1994 Uniform Building Code-Seismic Zone Map, all of the candidate sites are located in Seismic Zone 4, which is a very high earthquake hazard area.

⁵ These sites are not in close proximity to suitable electrical or telephone service.

⁶ There are overhead lines in the vicinity of the site that may require relocation if this site is constructed.

⁷ Runways are partially screened from these sites.

NA Sites 1, 4, 5, and 6 were eliminated from further evaluation prior to the line of sight analysis; thus "N/A" reflects that the coverage analysis was not performed for sites previously removed from the list of alternative sites being considered.