

DRAFT
**ENVIRONMENTAL ASSESSMENT
ADDRESSING AN
ARMY AND AIR FORCE EXCHANGE SERVICE LIFESTYLE CENTER
AT
FORT SAM HOUSTON, SAN ANTONIO, TEXAS**



SEPTEMBER 2009

ABBREVIATIONS AND ACRONYMS

$\mu\text{g}/\text{cm}^3$	micrograms per cubic centimeter	EIS	Environmental Impact Statement
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter	EO	Executive Order
AAFES	Army and Air Force Exchange Service	ESA	Endangered Species Act
AAP	Army Alternate Procedures	FEMA	Federal Emergency Management Agency
ACHP	Advisory Council on Historic Preservation	FNSI	Finding of No Significant Impact
ACM	asbestos-containing material	FPPA	Farmland Protection Policy Act
AHERA	Asbestos Hazard Emergency Response Act	FSH	Fort Sam Houston
APE	area of potential effect	ft ²	square feet
AQCR	Air Quality Control Region	HAPs	hazardous air pollutants
AR	U.S. Army Regulation	ICRMP	Integrated Cultural Resources Management Plan
ASTs	aboveground storage tanks	IRP	Installation Restoration Program
BAMC	Brooke Army Medical Center	LBP	lead-based paint
BexarMet	Bexar County Metropolitan	LEED	Leadership in Energy and Environmental Design
BMPs	best management practices	LOS	level of service
BRAC	Base Realignment and Closure	LUST	leaking underground storage tank
CAA	Clean Air Act	MC	munition constituents
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	MEC	munitions and explosives of concern
CEQ	Council on Environmental Quality	MEDCOM	Medical Command
CFR	Code of Federal Regulations	MGD	million gallons per day
CO	carbon monoxide	mg/kg	milligrams per kilogram
CO ₂	carbon dioxide	mg/m ³	milligrams per cubic meter
CPS	City Public Service	MMRP	Military Munitions Response Program
CWA	Clean Water Act	MRS	Munitions Response Site
CY	Calendar Year	MS4	municipal separate storm sewer system
dBA	A-weighted decibels	MSA	Metropolitan Statistical Area
DNL	Day-Night Average Sound Level	MSAI	Metropolitan San Antonio Interstate
DOD	Department of Defense	MWh	megawatt hours
DPW	Directorate of Public Works	MWR	morale, welfare, and recreation
e ² M	engineering-environmental Management, Inc.	NAAQS	National Ambient Air Quality Standards
EA	Environmental Assessment		
EAC	Early Action Compact		<i>continued on inside back cover →</i>

← *continued from inside front cover*

NAGPRA	Native American Graves Protection and Repatriation Act	PX	Post Exchange
NCO	Noncommissioned Officer	RA-O	Remedial Action-Operation
NEPA	National Environmental Policy Act	RAP	Remedial Action Plan
NESHAP	National Emissions Standards for Hazardous Air Pollutants	RCRA	Resource Conservation and Recovery Act
NFA	No Further Action	ROD	Record of Decision
NHCD	National Historic Conservation District	SAP	satellite accumulation point
NHPA	National Historic Preservation Act	SAWS	San Antonio Water System
NO ₂	nitrogen dioxide	SDWA	Safe Drinking Water Act
NO _x	nitrogen oxides	SHPO	State Historic Preservation Officer
NOA	Notice of Availability	SIP	State Implementation Plan
NPDES	National Pollutant Discharge Elimination System	SO ₂	sulfur dioxide
NRCS	Natural Resources Conservation Service	SSA	Sole Source Aquifer
NRHP	National Register of Historic Places	TAC	Texas Administrative Code
O ₃	Ozone	TCE	Trichloroethylene
OSHA	Occupational Safety and Health Administration	TCEQ	Texas Commission on Environmental Quality
PA/SI	Preliminary Assessment/Site Investigation	TPWD	Texas Parks and Wildlife Department
Pb	lead	tpy	tons per year
PCB	polychlorinated biphenyl	TRRP	Texas Risk Reduction Program
pCi/L	picoCuries per liter	TSCA	Toxic Substances Control Act
PCE	perchloroethylene	VOC	Volatile Organic Compound
PCL	Protective Concentration Level	USACE	U.S. Army Corps of Engineers
P.L.	Public Law	USACERL	U.S. Army Construction Engineering Research Laboratories
PM _{2.5}	particulate matter equal to or less than 2.5 microns in diameter	U.S.C.	United States Code
PM ₁₀	particulate matter equal to or less than 10 microns in diameter	USDA	U.S. Department of Agriculture
POTW	Publicly Owned Treatment Works	USEPA	U.S. Environmental Protection Agency
Ppm	parts per million	USFWS	U.S. Fish and Wildlife Service
PSD	Prevention of Significant Deterioration	UST	underground storage tank
		UXO	unexploded ordnance

1 **COVER SHEET**

2
3 **DRAFT**

4 **ENVIRONMENTAL ASSESSMENT**

5 **ADDRESSING AN**

6 **ARMY AND AIR FORCE EXCHANGE SERVICE LIFESTYLE CENTER AT**
7 **FORT SAM HOUSTON, SAN ANTONIO, TEXAS**

8
9 **Responsible Agencies:** U.S. Army and Army and Air Force Exchange Service (AAFES), Dallas, Texas.

10 **Affected Location:** Fort Sam Houston (FSH), Texas.

11 **Report Designation:** Draft Environmental Assessment (EA) Addressing an Army and Air Force
12 Exchange Service Lifestyle Center.

13 **Abstract:** AAFES proposes to construct a Lifestyle Center at FSH. Preliminary plans place the Lifestyle
14 Center and associated facilities near the current Commissary and PX serving the installation. The
15 Lifestyle Center would be a Main Street-style promenade featuring retailers and tenants that are found in
16 many modern retail destination centers throughout the country, and will include name-brand apparel
17 stores, book stores, sit-down restaurants and food courts, and various service offerings. The Lifestyle
18 Center would be designed as an architecturally pleasing one-stop destination for shopping, dining, and
19 entertainment. The design of the proposed Lifestyle Center would seek to incorporate pedestrian-friendly
20 areas and sustainable design principles. It would be intended to appeal to and satisfy the needs of the
21 modern military consumer. The proposed Lifestyle Center is anticipated to create jobs in the local area.

22 This EA analyzes and documents potential environmental consequences associated with the Proposed
23 Action and reasonable alternatives to the Proposed Action at FSH. If the analyses presented in this EA
24 indicate that implementation of the management alternatives would not result in significant environmental
25 or socioeconomic impacts, a Finding of No Significant Impact (FNSI) would be prepared. If significant
26 environmental issues are identified that cannot be minimized to insignificant levels, an Environmental
27 Impact Statement (EIS) would be prepared or the Proposed Action would be abandoned and no action
28 would be taken. The EA is to be made available to government agencies and the public upon completion.
29 This EA evaluates the potential environmental consequences of the Proposed Action and alternatives,
30 including the No Action Alternative, on the following 10 general impact topics: noise; land use; air
31 quality; geological resources; water resources; biological resources; cultural and architectural resources;
32 socioeconomic resources and environmental justice; utilities, infrastructure, and transportation; and
33 hazardous materials and waste.

34 **Privacy Advisory**

35 Your comments on this document are requested. Letters or other written or oral comments provided may
36 be published in the EA. As required by law, comments will be addressed in the EA and made available to
37 the public. Any personal information provided will be used only to identify your desire to comment on
38 this document or to fulfill requests for copies of the EA or associated documents. Private addresses will
39 be compiled to develop a mailing list for those requesting copies of the EA. However, only the names of
40 the individuals making comments and the specific comments will be disclosed. Personal home addresses
41 and phone numbers will not be published in the EA.

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1. Purpose, Need, and Scope

1.1 Background

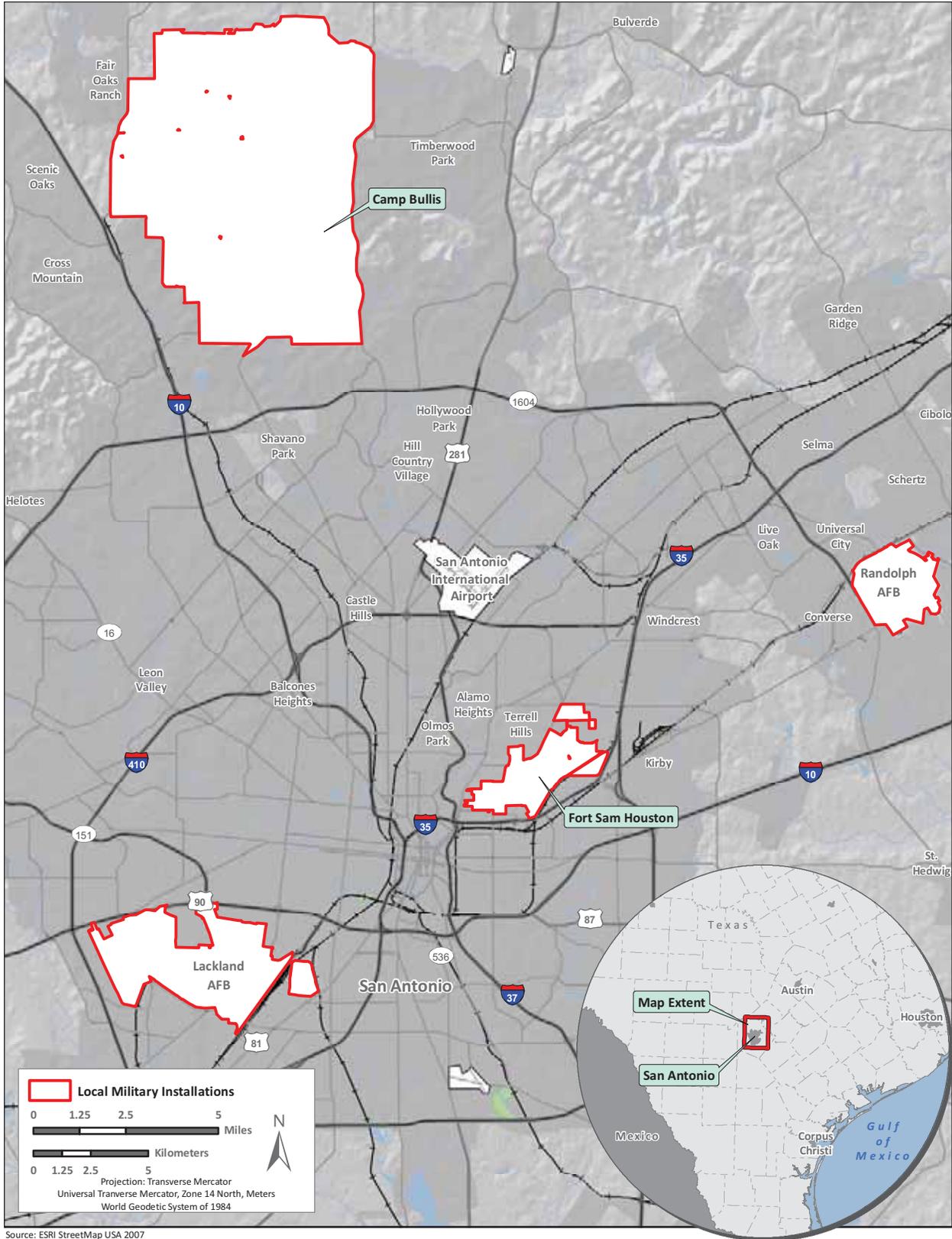
This environmental assessment (EA) describes the Army and Air Force Exchange Service's (AAFES) proposal to construct a Lifestyle Center that would include mixed retail, entertainment, and dining establishments at Fort Sam Houston (FSH), Texas. This EA addresses the potential environmental consequences associated with the Proposed Action and alternatives and has been prepared in accordance with the provisions of the National Environmental Policy Act (NEPA). This EA facilitates compliance with the U.S. Army Regulation (AR) 200-1, *Environmental Protection and Enhancement*, as set forth in 32 Code of Federal Regulations (CFR) Part 651, and Council on Environmental Quality (CEQ) Regulations set forth in 40 CFR parts 1500–1508.

AAFES provides merchandise and services to active-duty, guard, and reserve members; military retirees; and families of military personnel on military installations. The mission of AAFES is to provide quality goods and services at competitively low prices and generate earnings to support morale, welfare, and recreation (MWR) programs (AAFES 2009). The sale of AAFES merchandise and services is used for two general purposes: (1) improve service members' quality of life by providing a dividend to support MWR programs, and (2) provide revenue to construct new AAFES facilities or replace old ones. AAFES operates more than 3,000 facilities worldwide, in more than 30 countries, 5 U.S. territories, and 49 states. Currently, AAFES operates some 143 retail stores and more than 2,200 fast food restaurants (AAFES 2009). Roughly two-thirds of AAFES' earnings are paid to MWR programs. In the past 10 years, \$2.4 billion have been contributed by AAFES to military MWR programs for quality of life improvements (AAFES 2009).

FSH is in the northeast quadrant of the City of San Antonio, Bexar County, Texas (see **Figure 1-1**). The 2,940-acre installation is bounded on the east and south by Interstate 35, on the southwest by Mahncke Park and the San Antonio Botanical Gardens, and on the north and northwest by the San Antonio Country Club and the Terrell Hills neighborhood. FSH is one of the oldest military installations in the country and has more than 800 historic facilities in various historic zones (FSH 2004).

In the northeastern portion of the installation is the Veterans Administration cemetery, schools, recreation facilities, golf facilities, and housing. Within the east-central portion of the installation is the Brooke Army Medical Center (BAMC) along with medical research activities, military housing, company and battalion headquarter areas, and housing for families of patients. The central district, which is the area of the Proposed Action (see **Figure 1-2**), contains community support facilities including the post exchange (PX), PXtra, Commissary, gas stations, and a gymnasium.

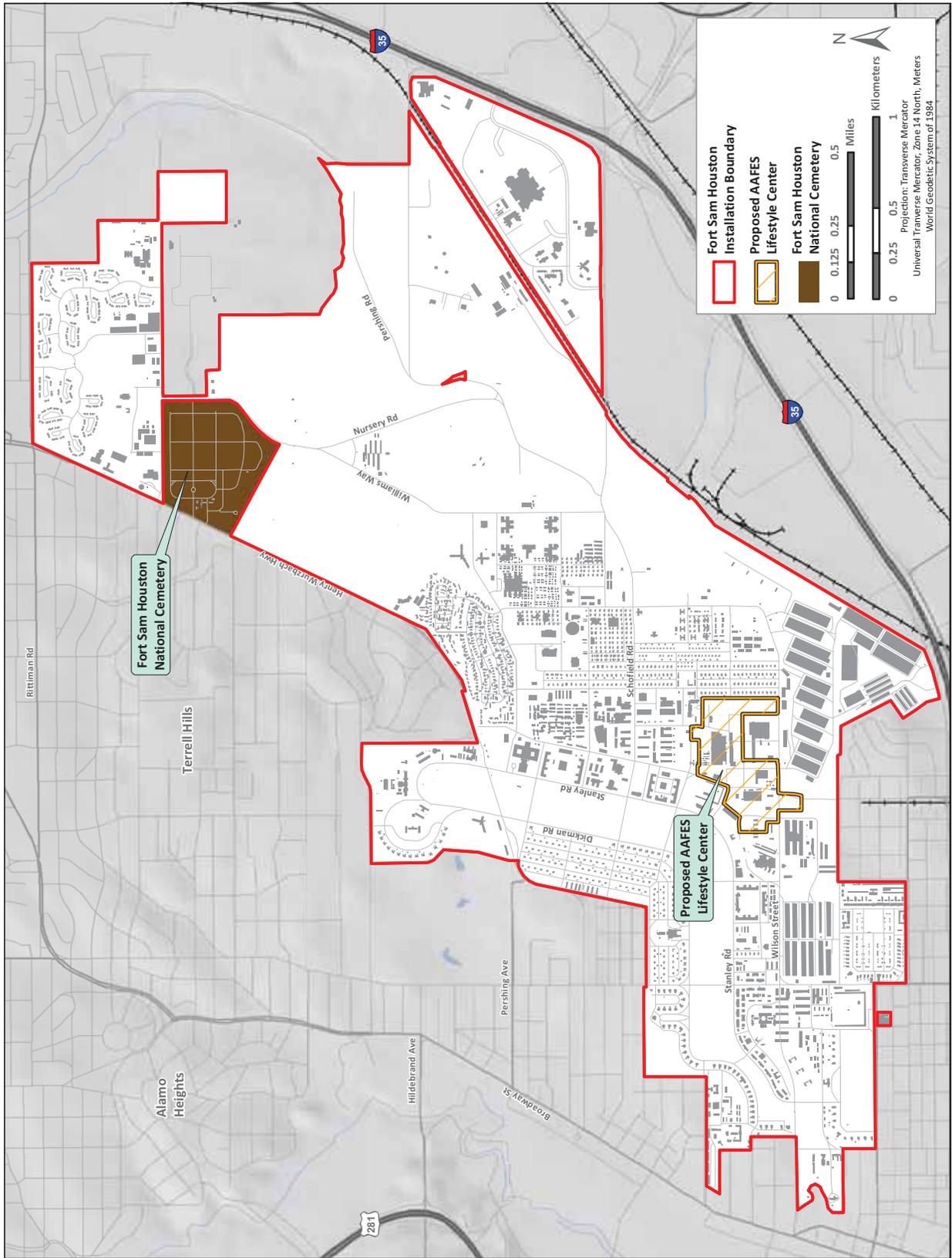
Originally known as the Post of San Antonio, FSH is San Antonio's oldest military installation and the ninth oldest installation in the U.S. Army. The post moved to its current location in 1870 when the City of San Antonio donated 40 acres of land for a permanent military facility. Installation resources include two subinstallations, Camp Bullis (the principal location of the FSH field training areas and ranges) and Canyon Lake Recreation Area (a leisure facility leased from the U.S. Army Corps of Engineers [USACE]). Camp Bullis was first established in 1917 approximately 20 miles northwest of FSH. Subsequently, the focus at FSH and Camp Bullis began to change toward training Army medical personnel; FSH became the "schoolhouse" for training of medics and medical students (FSH 2008a).



1
2

Figure 1-1. Fort Sam Houston, Texas Location Map

1



Sources: Base Data: Fort Sam Houston 2009; Proposed AAFES Lifestyle Center Site: e*TM, Inc. 2009.

Figure 1-2. Fort Sam Houston, Proposed Lifestyle Center Footprint Area and Existing Facilities

2

1 The primary mission at FSH is medical training and support. The installation is the home of the Army
2 Medical Department Center and School, BAMC, Medical Command (MEDCOM), Headquarters Fifth
3 Army, U.S. Army South, and Headquarters Fifth Recruiting Brigade. A number of additional tenants
4 operate from FSH, many of which are subcomponents of MEDCOM or AMEDD C&S. These include
5 the Institute of Surgical Research, Great Plains Regional Medical Command, Headquarters Dental
6 Command, Headquarters Veterinary Command, Defense Medical Readiness Training Institute, and Army
7 Medical Department Non Commissioned Officers Academy (FSH 2008a).

8 This EA will address potential environmental consequences associated with the Proposed Action and
9 reasonable alternatives.

10 If the analyses presented in the EA were to indicate that implementation of the Proposed Action would
11 not result in significant environmental or socioeconomic impacts, a Finding of No Significant Impact
12 (FNSI) would be prepared. A FNSI briefly presents the reasons why a Proposed Action would not have a
13 significant impact on the human environment and explains why the preparation of an Environmental
14 Impact Statement (EIS) would not be required. If significant environmental issues were to be identified
15 that cannot be mitigated to insignificant levels, an EIS would be prepared or the Proposed Action would
16 be abandoned and no action taken.

17 **1.2 Purpose and Need**

18 The purpose of the Proposed Action is to provide a modern sales, entertainment, and dining center at FSH
19 for military personnel and their families. This mixed-use Lifestyle Center would offer the FSH
20 community a modern town center-style development with name-brand shops, eateries, and entertainment,
21 such as a movie theater or bowling alley. Lifestyle Centers combine many aspects of a shopping mall
22 with an old-fashioned town square. It is common for centers to have a “Main Street” for cars to drive past
23 and park in front of many stores. The proposed Lifestyle Center brings a wider array of shopping and
24 entertainment options to service members and their families.

25 FSH supports approximately 36,000 personnel including military, civilian, and contractor personnel
26 (FSH 2007a). The proposed Lifestyle Center is needed because the current facilities are outdated and do
27 not adequately provide the necessary levels of service and quality merited by existing AAFES customers.
28 Over time retail store standards vary in size and service features, reflecting consumers’ changing
29 preferences and expectations of convenience, and variety of merchandise offerings. Lifestyle centers are
30 an example of updating standards. At least 21 years into a facility’s life cycle, but earlier if necessary,
31 AAFES conducts a functional review to determine whether the facility size and configuration reflects the
32 current and future needs of the business.

33 As one of the highest sales-generating Exchanges within the AAFES system, the FSH PX is undersized to
34 meet the current population’s needs. Although parking is provided in the vicinity of the PX site, much of
35 the parking is to the north and east of the existing facility and inconveniently located away from the PX’s
36 south-facing entrance. BAMC on FSH is one of the primary treatment locations for wounded military
37 personnel. Many of these personnel are temporarily or permanently disabled, thus facility accessibility is
38 important to maintain easily accessible options for “wounded warriors.”

39 In fiscal year 2002, an analysis was completed that determined that the current PX should be expanded to
40 better meet the needs of the customers at FSH. Two options were considered: construct a new
41 321,000-square foot (ft²) facility or build a new 275,596-ft² facility and move some categories of
42 merchandise into the existing PXtra. At the time of the 2002 analysis, however, the installation could not
43 make an appropriate site available for new construction. In fiscal year 2007, the expansion was reviewed
44 and one recommendation was to build a new 270,262-ft² facility and move some merchandise categories

1 into the PXtra facility, which encompasses 32,824 ft² and was built in 1991. In 2007, another alternative
2 to meet the needs of the customers at FSH was identified, the Lifestyle Center Pilot Program.

3 **1.3 Scope**

4 This EA is organized into seven sections. **Section 1** provides the background information and the
5 purpose of and need for the Proposed Action. **Section 2** contains a detailed description of the Proposed
6 Action. **Section 3** includes a discussion of alternatives to the Proposed Action that were considered.
7 **Section 4** presents the existing conditions and potential environmental consequences of alternatives
8 considered. **Section 5** presents the potential cumulative effects. **Section 6** presents the list of preparers
9 and **Section 7** presents the references used in the preparation of this EA. **Appendix A** includes a
10 description of environmental laws, regulations, and executive orders (EOs) potentially applicable to the
11 Proposed Action. **Appendix B** includes information about public involvement and agency coordination.
12 **Appendix C** presents the air quality calculations. **Appendix D** presents architectural resources.
13 **Appendix E** contains information related to threatened and endangered species.

14 **1.4 Public Involvement**

15 The premise of NEPA is that the quality of Federal decisions will be enhanced if proponents provide
16 information to the public and involve the public in the planning process. The U.S. Army, FSH, and
17 AAFES invite public participation in the NEPA process. Consideration of the views and information of
18 all interested persons promotes open communication and enables informed decisionmaking. All agencies,
19 groups, and members of the public having a potential interest in the Proposed Action, including
20 stakeholder, minority, low-income, disadvantaged, and Native American groups, are urged to participate
21 in the decisionmaking process.

22 Public participation opportunities with respect to this EA and decisionmaking on the Proposed Action are
23 guided by U.S. Army regulations contained in 32 CFR Part 651. The Draft EA will be made available for
24 public review for 30 days beginning the date that the Notice of Availability (NOA) is published. At the
25 end of the 30-day public review period, AAFES and FSH will consider any comments submitted by
26 individuals, agencies, or organizations on the Proposed Action, or the Draft EA.

27 **1.5 Framework for Analysis**

28 To comply with NEPA, the planning and decisionmaking process for actions proposed by Federal
29 agencies involves a study of other relevant environmental statutes and regulations. The NEPA process,
30 however, does not replace procedural or substantive requirements of other environmental statutes and
31 regulations. It addresses them collectively in the form of an EA or EIS, which enables the decisionmaker
32 to have a comprehensive view of key environmental issues and requirements associated with the Proposed
33 Action. According to CEQ regulations, the requirements of NEPA must be integrated “with other
34 planning and environmental review procedures required by law or by agency so that all such procedures
35 run concurrently rather than consecutively.”

36 This EA presents a discussion of the affected environment associated with the Proposed Action and
37 discusses the potential environmental consequences of the Proposed Action on the affected environment.
38 This EA has been prepared in accordance with requirements of NEPA (Public Law [P.L.] 91-190, 1969).
39 NEPA requires Federal agencies to consider the environmental consequences of all proposed actions in
40 their decisionmaking process. The intent of NEPA is to protect, restore, or enhance the environment
41 through a well-informed decisionmaking process. The CEQ was established under NEPA to implement
42 and oversee Federal policy in this process.

1 **1.5.1 U.S. Army Regulations**

2 AR 200-1, *Environmental Protection and Enhancement*, and 32 CFR Part 651, reference CEQ regulations
3 and present Army policy for complying with NEPA.

4 In 2000, the Advisory Council on Historic Preservation (ACHP) published revised implementing
5 regulations in 36 CFR Part 800. Those regulations authorized ACHP to approve agency “program
6 alternatives” for compliance with 36 CFR Part 800. One program alternative authorized under ACHP’s
7 revised regulations is Alternate Procedures. Alternate Procedures stand in place of the procedures for
8 project review set forth in 36 CFR Part 800, Subpart B. After consultation with State Historic
9 Preservation Officers (SHPOs) and Federally recognized Native American Tribes and interested parties,
10 the U.S. Army submitted, and the ACHP approved, the U.S. Army’s Alternate Procedures (AAP). The
11 AAP were published in the Federal Register in Volume 67, Number 44, p. 11038.

12 The AAP authorizes U.S. Army installation commanders to develop a Historic Property Component
13 (HPC) to the installation’s Integrated Cultural Resources Management Plan (ICRMP). FSH’s HPC, dated
14 November 2005, serves as the installation’s Section 106 compliance agreement for a five-year period.
15 The installation’s Section 106 compliance responsibilities are met through internal installation
16 implementation of the HPC rather than case-by-case, formalized, external review of individual
17 undertakings as presently required by 36 CFR Part 800.

18 **1.5.2 Applicable Environmental Statutes and Regulations**

19 In the preparation of the EA, FSH is also guided by relevant statutes (and their implementing regulations)
20 and EOs that establish standards and provide guidance on environmental and natural resources
21 management and planning. **Table 1-1** summarizes the pertinent environmental requirements that will be
22 considered in the development of the EA.

23

1
2**Table 1-1. Major Environmental Statutes and Regulations
Applicable to Federal Projects**

Environmental Resource Area	Statute/Regulation/Executive Order
Land	Engle Act of 1958 (43 United States Code [U.S.C.] 155); Military Lands Withdrawal Act (P.L. 99-606); Wilderness Act of 1964 (P.L. 88-577); National Forest Management Act of 1976 (P.L. 94-588)
Water	Federal Water Pollution Control Act of 1972 (P.L. 92-500) and Amendments; Clean Water Act of 1977 (P.L. 95-217); Water Quality Act of 1987 (P.L. 100-4); Safe Drinking Water Act of 1972 (P.L. 95-923) and Amendments of 1986 (P.L. 99-339)
Biological Resources	Migratory Bird Treaty Act of 1918; Fish and Wildlife Coordination Act of 1958 (P.L. 85-654); Sikes Act of 1960 (P.L. 86-97) and Amendments of 1986 (P.L. 99-561) and 1997 (P.L. 105-85 Title XXIX); Endangered Species Act of 1973 (P.L. 93-205) and Amendments of 1988 (P.L. 100-478); Fish and Wildlife Conservation Act of 1980 (P.L. 96-366); Lacey Act Amendments of 1981 (P.L. 97-79)
Wetlands and Floodplains	Sections 401 and 404 of the Federal Water Pollution Control Act of 1972 (P.L. 92-500); Floodplain Management - 1977 (EO 11988); Protection of Wetlands - 1977 (EO 11990); Emergency Wetlands Resources Act of 1986 (P.L. 99-645); North American Wetlands Conservation Act of 1989 (P.L. 101-233)
Cultural and Architectural Resources	National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.) (P.L. 89-865) and Amendments of 1980 (P.L. 96-515) and 1992 (P.L. 102-575); Protection and Enhancement of the Cultural Environment - 1971 (EO 11593); Indian Sacred Sites - 1966 (EO 13007); American Indian Religious Freedom Act of 1978 (P.L. 94-341); Antiquities Act of 1906; Archaeological Resources Protection Act of 1979 (P.L. 96-95); Native American Graves Protection and Repatriation Act of 1990 (P.L. 101-601)
Air Quality	Clean Air Act of 1970 (P.L. 95-95), as amended in 1977 and 1990 (P.L. 91-604)
Noise	Noise Control Act of 1972 (P.L. 92-574) and Amendments of 1978 (P.L. 95-609)
Hazardous and Toxic Materials	Resource Conservation and Recovery Act of 1976 (P.L. 94-5800), as Amended by P.L. 100-582; Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9601) (P.L. 96-510); Toxic Substances Control Act (P.L. 94-496); Federal Insecticide, Fungicide, and Rodenticide Control Act (40 CFR 162-180); Emergency Planning and Community Right-to-Know Act (40 CFR 300-399)
Environmental Justice	Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898); Protection of Children from Environmental Health Risks and Safety Risks (EO 13045)

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2. Description of Proposed Action

2.1 Introduction

As discussed in **Section 1.5**, the NEPA process evaluates potential environmental consequences associated with a proposed action and considers reasonable alternative courses of action. Reasonable alternatives must satisfy the purpose of and need for a proposed action (see **Section 1.2**). For this Proposed Action, AAFES could choose to construct the Lifestyle Center in variously configured site designs to achieve the defined purpose and need. CEQ regulations also specify the inclusion of a No Action Alternative against which potential effects can be compared. While the No Action Alternative would not satisfy the purpose of or need for the Proposed Action, it is analyzed in detail in accordance with CEQ regulations. The proposed Lifestyle Center at FSH is one proposal of a larger AAFES Community Development Initiative, a pilot program to create contemporary retail developments that meet lifestyle needs on military installations.

2.2 Proposed Action

AAFES identified FSH as a candidate installation for a proposed Lifestyle Center based on area growth and the lack of available retail options at the installation serving military personnel and their families. The following selection criteria were developed to guide the site selection process:

- The site must be large enough to accommodate the proposed development
- The site should be located in a high-visibility area with ease of access from multiple points
- The site should be within walking distance of residential areas within FSH
- The site should be compatible with adjacent land uses
- The site should present minimal environmental issues.

Preliminary plans position the Lifestyle Center and associated facilities at a location near the current Commissary and PX serving the installation. The Lifestyle Center would be designed as a Main Street-style promenade featuring name-brand retailers and tenants such as those found in modern retail destination centers throughout the country. These would include name-brand apparel stores, book stores, sit-down restaurants and food courts, and various service tenants (REBusiness Online 2007). The proposed Lifestyle Center would be an architecturally pleasing one-stop destination for shopping, dining, and entertainment intended to appeal to and satisfy the needs of the modern military consumer. The proposed Lifestyle Center is anticipated to generate approximately 800 new jobs in the local area.

A conceptual design of the proposed Lifestyle Center is presented in **Figure 2-1**. The Lifestyle Center is proposed to include approximately 651,000 ft² of new and replacement retail, dining, and entertaining space. The proposed site is bounded by Henry T. Allen Road to the north, Wilson Street to the south, Schaffer Road to the east, and parts of Scott Road and Camp Travis Road to the west. Currently, the design of the proposed Lifestyle Center is ongoing. Therefore, exact boundaries of the Lifestyle Center could change as FSH and AAFES consider the best practical design to meet the AAFES's mission and FSH planning goals. Although the exact Lifestyle Center design and boundary could shift, the approximate square footage of impacted area is not expected to increase (see **Figure 2-2**).

Based on the current configuration of installation facilities on FSH development, the installation is characterized by four mission-related subareas: (1) patient care; (2), medical and other research, development, testing, and evaluation; (3) medical training; and (4) Headquarters administration and Army Modular Force. The subareas divide the installation and help to guide growth and future construction



1
2 **Figure 2-1. Conceptual Design of the AAFES Lifestyle Center**

3 considerations on-installation. The proposed Lifestyle Center would be located within Subarea 2 of the
4 installation.

5 The Proposed Action consists of constructing approximately 651,000 ft² of retail space. Parking would
6 be constructed at an industry standard of five spaces per 1,000 ft² of retail space, totaling approximately
7 3,255 parking spaces. The total parking lot size, including drive lanes and access roads, would be
8 approximately 1,464,750 ft² (33.63 acres), based on the number of spaces and the industry standard
9 multiplier of 450 ft² of gross surface area per parking space. The Proposed Action assumes that all
10 required parking and roadway surface would be newly constructed. In addition to the area taken up by
11 retail space, parking, and roadway surface, approximately 10 acres would be used for sidewalks,
12 pathways, courtyards, walking zones, and other elements required to tie the Lifestyle Center together.

13 Although there are historic properties within the area of potential effect (APE) it is not expected that any
14 historic properties at FSH would be demolished as part of the Proposed Action. Lifestyle Center
15 architecture would be designed for compatibility with the existing historic architectural context of FSH.
16 In order to make adequate space to construct the Lifestyle Center, some existing structures, parking, and
17 roadway surface within the project footprint (see **Figure 2-2**) would need to be removed. Demolition and
18 removal of the existing PX, the largest structure in the project footprint, would be coordinated with
19 construction and operation of the new PX. Other structures and roadway and parking surface would be
20 removed and replaced according to the overall construction design and Lifestyle Center design plan. The
21 Proposed Action would include the demolition of approximately 260,000 ft² of roads, 760,000 ft² of
22 parking, 43,000 ft² of driveways, and 209,603 ft² of buildings.

23 FSH and AAFES would attempt to recycle, reuse, and divert demolition and construction waste to the
24 maximum extent practicable.

1



Figure 2-2. Fort Sam Houston Proposed Footprint Area and Existing Facilities

2

1 The proposed Lifestyle Center would be constructed by private developers under a public-private venture
2 scenario. AAFES would enter into leases with desirable tenants, which would provide more flexibility
3 than traditional concessions contracts. It is assumed that AAFES would register the proposed Lifestyle
4 Center with the U.S. Green Building Council according to the USACE Engineering and Construction
5 Bulletin dated 25 September 2008 (USACE 2008). The public-private venture developer would be
6 required to integrate Leadership in Energy and Environmental Design (LEED) features to the maximum
7 extent possible throughout the design and construction phases. These features could lessen potential
8 impacts through the use of energy- and water-efficient building techniques and equipment, the use of
9 recycled materials, and the avoidance or enhancement of existing environmental features of the proposed
10 site.

11 Examples of LEED design principles include adapting low-impact design storm water collection and
12 treatment structures that integrate into the landscape and recycle water back to groundwater; finding uses
13 for recycled water such as fountains or irrigation systems; maintaining the maximum amount of open
14 space feasible; surveying, marking, and retaining older, desirable trees on site, where feasible; and using
15 solar or other alternative energy sources. Also, FSH would require the use of xeric and native landscape
16 design throughout the grounds at the proposed Lifestyle Center.

3. Alternatives Considered

3.1 Introduction

Consideration of alternatives could provide a means to avoid unnecessary impacts and allow analysis of possible alternative methods to achieve the stated purpose. To warrant detailed evaluation, an alternative must be reasonable. To be considered reasonable, an alternative must be “ripe” for decisionmaking (any necessary preceding events having taken place), affordable, feasible to implement, and satisfactory with respect to meeting the purpose of and need for the Proposed Action.

The Proposed Action described in **Section 2** is the U.S. Army’s preferred alternative. Potential alternatives to the Proposed Action were considered for their ability to meet the selection criteria in **Section 3.2**. However, due to customer service needs to provide retail outlets in one centralized contiguous area, land use constraints, and future development considerations on the installation, there were no other possible site locations for the proposed Lifestyle Center at FSH that met the selection criteria listed in **Section 2.2**.

Development options on FSH are extremely limited due to the locations of existing facilities and site constraints such as floodplains, historic properties, and security considerations. These existing conditions effectively eliminated the possibility of generating detailed siting alternatives to the preferred alternative. The U.S. Army considers various means of meeting increased space requirements, including:

1. Use of existing facilities
2. Modernization or renovation of existing facilities
3. Leasing of off-installation facilities
4. Construction of new facilities.

AR 210-20, *Master Planning for Army Installations*, establishes Army policy to maximize use of existing facilities. The regulation directs that new construction will not be authorized to meet a mission that can be supported by existing, underused, adequate facilities, if the use of such facilities does not degrade operational efficiency. Under this policy, selection and use of facilities to support mission requirements adhere to the foregoing five choices in the order in which they are listed; that is, if existing facilities are adequate to accommodate requirements and, absent other overriding considerations, further examination of renovation, leasing, or construction alternatives is not required. Similarly, if a combination of use of existing facilities and renovation satisfies the Army’s needs, leasing or new construction need not be addressed. New construction may proceed only when use of existing facilities, renovation, leasing, or a combination of such measures is inadequate to meet mission requirements. Leasing of off-installation facilities is not a viable option based on force protection requirements (FSH 2007a).

3.2 Alternatives Considered but Dismissed From Detailed Study

During development of the Proposed Action, AAFES and FSH considered alternatives to the Proposed Action. These included using and modifying existing facilities. However, no adequate facilities to meet the purpose and need of the Proposed Action currently exist at FSH. The existing PX, Popeyes restaurant, and other community functions do not have the appropriate square footage or parking to accommodate the Lifestyle Center concept. In addition it would be cost prohibitive to modify existing community facilities that are inadequate to meet the mission of AAFES and the desired clientele. There are extremely limited locations and existing facilities available on installation due to new construction and future build-out plans. Finally, this alternative for using existing community functions and facilities does not meet the selection criteria in **Section 2.2** and was therefore eliminated from further detailed evaluation

1 in the EA. Leasing of facilities off-installation was not considered a viable alternative because it would
2 not meet the mission of AAFES and little land is available for expansion due to urban build-up around
3 San Antonio. AAFES is a nonappropriated funds instrumentality and its governing regulation,
4 AR-215-8/AFI 34-211(I), only provides for access to AAFES facilities for authorized patrons, therefore
5 constructing or leasing facilities off-installation would not be feasible.

6 Therefore, based on this evaluation, there is no viable alternative to the Proposed Action as other
7 alternatives considered would not meet the selection criteria as stated in **Section 2.2**.

8 **3.3 Preferred Alternative**

9 Implementation of the Proposed Action, as identified in **Section 2.2**, is the Preferred Alternative.

10 **3.4 No Action Alternative**

11 Under the No Action Alternative, AAFES would not construct a Lifestyle Center at FSH. Customers
12 would continue to use the existing congested, outdated, and undersized facilities. AAFES could decide to
13 invest in a different military location, which would provide no economic benefit to FSH. This could
14 indirectly result in a loss of revenue for the MWR fund for the military. Finally, customers would not be
15 able to enjoy the increased variety of services that the proposed Lifestyle Center would provide to
16 military personnel and their families.

4. Affected Environment and Environmental Consequences

4.1 Noise

4.1.1 Definition of the Resource

Sound is defined as a particular auditory effect produced by a given source, for example the sound of rain on the roof. Sound is measured with instruments that record instantaneous sound levels in decibels. A-weighted sound level measurements are used to characterize sound levels that can be sensed by the human ear. “A-weighted” denotes the adjustment of the frequency content of a sound-producing event to represent the way in which the average human ear responds to the audible event. All sound levels analyzed in this EA are A-weighted decibels (dBA).

Noise and sound share the same physical aspects, but noise is considered a disturbance while sound is defined as an auditory effect. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Noise can be intermittent or continuous, steady or impulsive, and can involve any number of sources and frequencies. It can be readily identifiable or generally nondescript. Human response to increased sound levels varies according to the source type, characteristics of the sound source, distance between source and receptor, receptor sensitivity, and time of day. How an individual responds to the sound source will determine if the sound is viewed as music to one’s ears or as annoying noise. Affected receptors are specific (i.e., schools, churches, or hospitals) or broad areas (e.g., nature preserves or designated districts) in which occasional or persistent sensitivity to noise above ambient levels exists.

Federal Regulations. The Federal government has established noise guidelines and regulations for the purpose of protecting citizens from potential hearing damage and from various other adverse physiological, psychological, and social effects associated with noise. According to the USAF, the Federal Aviation Administration, and the U.S. Department of Housing and Urban Development criteria, residential units and other noise-sensitive land uses are “clearly unacceptable” in areas where the Day-Night Average Sound Level (DNL) noise exposure exceeds 75 dBA, “normally unacceptable” in regions exposed to noise between 65 and 75 dBA, and “normally acceptable” in areas exposed to noise of 65 dBA or less. The Federal Interagency Committee on Noise developed land use compatibility guidelines for noise in terms of DNL (FICON 1992). For outdoor activities, the U.S. Environmental Protection Agency (USEPA) recommends a DNL of 55 dBA as the sound level below which there is no reason to suspect that the general population would be at risk from any of the effects of noise (USEPA 1974). DNL is the metric recognized by the U.S. government for measuring noise and its effects on humans.

In 1978, EO 12088, *Federal Compliance with Pollution Control Standards*, made the head of each executive agency responsible for ensuring that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to Federal facilities and activities under the control of the agency. The head of each executive agency is responsible for compliance with applicable pollution control standards, which includes the Noise Control Act of 1972. “Applicable pollution control standards” means the same substantive, procedural, and other requirements that would apply to a private person under the Act. The executive agency is responsible for submitting an annual plan for the control of environmental pollution, which shall provide for any necessary improvement in the design, construction, management, operation, and maintenance of Federal facilities and activities. The head of each Executive agency also ensures that sufficient funds for compliance with applicable pollution control standards are requested in the agency budget.

1 Under the Noise Control Act of 1972, the Occupational Safety and Health Administration (OSHA)
 2 established workplace standards for noise. The minimum requirement states that constant noise exposure
 3 must not exceed 90 dBA over an 8-hour period. The highest allowable sound level to which workers can
 4 be constantly exposed to is 115 dBA, and exposure to this level must not exceed 15 minutes within an
 5 8-hour period. The standards limit instantaneous exposure, such as impact noise, to 140 dBA. If noise
 6 levels exceed these standards, employers are required to provide hearing protection equipment that will
 7 reduce sound levels to acceptable limits.

8 **Ambient Sound Levels.** Noise levels vary depending on the density of buildings, and proximity to parks
 9 and open space, major traffic areas, or industrial facilities. As shown on **Table 4-1**, a typical suburban
 10 residential area has a DNL of about 55 dBA, which increases to 60 dBA for an urban residential area, and
 11 to 80 dBA in the downtown section of a city (FHWA 1980).

12 **Table 4-1. Typical Outdoor Noise Levels**

DNL (dBA)	Location
50	Residential area in a small town or quiet suburban area
55	Suburban residential area
60	Urban residential area
65	Noisy urban residential area
70	Very noisy urban residential area
80	City noise (downtown of major metropolitan area)
88	3rd floor apartment in a major city next to a freeway

Source: FHWA 1980

13 Most people are exposed to sound levels of 50 to 55 dBA or higher on a daily basis. Studies specifically
 14 conducted to determine noise effects on various human activities show that about 90 percent of the
 15 population is not significantly bothered by outdoor sound levels below a DNL of 65 dBA (FICON 1992).
 16 Studies of community annoyance in response to numerous types of environmental noise show that DNL
 17 correlates well with effect assessments and that there is a consistent relationship between DNL and the
 18 level of annoyance.

19 **Construction Sound Levels.** Construction activities such as clearing, grading, and building construction
 20 can cause an increase in sound that is well above the ambient level. A variety of sounds come from
 21 graders, pavers, trucks, welders, and other work processes. **Table 4-2** lists sound levels associated with
 22 common types of construction equipment that could be used under the Proposed Action. Construction
 23 equipment usually exceeds the ambient sound levels by 20 to 25 dBA in an urban environment and up to
 24 30 to 35 dBA in a quiet suburban area.

25 **4.1.2 Description of the Affected Environment**

26 The ambient sound environment around the proposed Lifestyle Center is affected mainly by vehicle
 27 traffic and the surrounding land uses. Contributors include vehicles traveling south and east of the
 28 installation on Interstate 35 and the roadways within the installation boundary. In addition, noise is
 29 generated at and around the commercial businesses within and adjacent to the proposed Lifestyle Center
 30 site (north and south). Additional buildings around the proposed Lifestyle Center include residential and
 31 institutional facilities that do not typically contribute significantly to the ambient sound environment. The
 32 cumulative ambient sound environment is likely comparable to a noisy urban residential area.

1

Table 4-2. Predicted Noise Levels for Construction Equipment

Construction Category and Equipment	Predicted Noise Level at 50 feet (dBA)
Clearing and Grading	
Bulldozer	80
Grader	80–93
Truck	83–94
Roller	73–75
Excavation	
Backhoe	72–93
Jackhammer	81–98
Building Construction	
Concrete mixer	74–88
Welding generator	71–82
Pile driver	91–105
Crane	75–87
Paver	86–88

Source: USEPA 1971

2 **4.1.3 Environmental Consequences**

3 **Evaluation Criteria**

4 An analysis of the potential impacts associated with noise typically evaluates potential changes to the
5 existing acoustical environment that would result from implementation of a proposed action. Potential
6 changes in the acoustical environment can be beneficial (i.e., they reduce the number of sensitive
7 receptors exposed to unacceptable noise levels or reduce the ambient sound level), negligible (i.e., the
8 total number of sensitive receptors to unacceptable noise levels is essentially unchanged), or adverse
9 (i.e., they result in increased sound exposure to unacceptable noise levels or ultimately increase the
10 ambient sound level). Projected noise effects were evaluated qualitatively for the alternatives considered.

11 **Proposed Action**

12 Under the Proposed Action, an increase in noise levels could originate from several sources and this
13 analysis addresses construction activities and vehicle traffic.

14 **Short-term Construction Noise.** Short-term minor adverse effects are anticipated as a result of
15 demolition, paving, and building activities under the Proposed Action. Noise from construction activities
16 varies depending on the type of construction being done, the area that the project would occur in, and the
17 distance from the source. To predict how these construction activities under the Proposed Action would
18 affect populations, noise from the anticipated construction was estimated. For example, as shown in
19 **Table 4-2**, building construction usually involves several pieces of equipment (e.g., mixers and cranes)
20 that can be used simultaneously. Cumulative noise from the construction equipment during the busiest
21 day was estimated to determine the total effect of noise from construction activities at a given distance.
22 Cumulative noise from construction activities was estimated to determine the total impact at a given

1 distance. Examples of expected construction noise during daytime hours, Monday through Friday, for the
2 Proposed Action are as follows:

- 3 • FSH personnel accessing the veterinary school, motor pool, or residences surrounding the
4 proposed Lifestyle Center that are approximately 150 feet west, northwest, and east of the
5 proposed construction site would likely experience noise levels of approximately 80 dBA
- 6 • The closest residences off-installation of the proposed Lifestyle Center are approximately
7 1,400 feet south of the proposed construction site, would likely experience noise levels of
8 approximately 60 dBA
- 9 • Persons accessing the warehouses approximately 500 feet south of the proposed Lifestyle Center
10 would likely experience noise levels of approximately 66 dBA from construction activities.

11 Implementation of the Proposed Action would have short-term, minor, adverse effects on the acoustical
12 environment from the use of heavy equipment during construction activities. Noise generation would last
13 only for the duration of construction activities and would be isolated to normal working hours
14 (i.e., between 7:00 a.m. and 5:00 p.m.).

15 **Vehicle Noise from Construction Activities.** Short-term, minor, adverse effects on the ambient
16 environment are anticipated as a result of the increase in construction vehicle traffic under the Proposed
17 Action. Construction traffic would likely use the main gate on Scott Road to enter the installation and
18 would then proceed to the proposed Lifestyle Center construction area. The additional traffic resulting
19 from construction vehicles would likely cause minor increases in noise levels on noise-sensitive
20 populations adjacent to these roadways.

21 **Long-term Noise.** Long-term negligible to minor adverse effects on the ambient noise environment are
22 anticipated as a result of increased vehicle traffic to the completed Lifestyle Center. It is not expected
23 that there would be a higher volume of vehicle traffic to the area for a greater portion of the day due to the
24 nature of retail already serving the proposed Lifestyle Center area (e.g., PX, Commissary, and PXtra).
25 See **Section 4.9.3** for a discussion of traffic related impacts.

26 **No Action Alternative**

27 Under the No Action Alternative, the proposed Lifestyle Center would not be constructed. The acoustical
28 environment described in **Section 4.1.2** would remain primarily unchanged. No adverse effects on the
29 ambient noise environment would occur under the No Action Alternative.

30 **4.2 Land Use**

31 **4.2.1 Definition of the Resource**

32 The term “land use” refers to real property classifications that indicate either natural conditions or the
33 types of human activity occurring on a parcel. In many cases, land use descriptions are codified in local
34 zoning laws. There is, however, no nationally recognized convention or uniform terminology for
35 describing land use categories. As a result, the meanings of various land use descriptions, “labels,” and
36 definitions vary among jurisdictions.

37 Two main objectives of land use planning are to ensure orderly growth and compatible uses among
38 adjacent property parcels or areas. Compatibility among land uses fosters the societal interest of
39 obtaining the highest and best uses of real property. Tools supporting land use planning include written

1 master plans/management plans and zoning regulations. In appropriate cases, the locations and extent of
2 proposed actions need to be evaluated for their potential effects on project site and adjacent land uses.

3 The foremost factor affecting a proposed action in terms of land use is compliance with any applicable
4 land use or zoning regulations. Other relevant factors include matters such as existing land use at the
5 project site, the types of land uses on adjacent properties and their proximity to a proposed action, and the
6 duration of a proposed activity and its “permanence.”

7 **4.2.2 Description of the Affected Environment**

8 FSH is in the northeast quadrant of the City of San Antonio, Bexar County, Texas (see **Figure 1-1**). The
9 2,940-acre installation is bounded on the east and south by Interstate 35, on the southwest by Mahncke
10 Park and the San Antonio Botanical Gardens, and on the north and northwest by the San Antonio Country
11 Club and the Terrell Hills neighborhood. FSH is one of the oldest military installations in the country and
12 has more than 800 historic facilities in various historic zones (FSH 2004).

13 FSH is made up of a variety of land uses, including Administration, Ammunition Storage, Community
14 Support, Equipment and Maintenance, Family Housing, Fort Sam Houston National Cemetery, Medical,
15 Open Space, Recreation, Supply and Warehouse, Services and Utilities, Training Buildings, and
16 Unaccompanied Personnel Housing (FSH 2007a). The proposed Lifestyle Center is currently developed
17 with the PX, PXtra, Burger King, Pharmacy, Popeye’s, Class IV facility, and parking (see **Figure 2-2**).
18 Although not within the proposed Lifestyle Center development footprint, the commissary is immediately
19 adjacent to the Proposed Action boundary. The current land use type of the proposed Lifestyle Center is
20 Community Support and surrounding land use types include Family Housing, Supply and Warehouse,
21 Administration, and Equipment and Maintenance.

22 As discussed in **Section 3.1**, the U.S. Army considers various means of meeting increased space
23 requirements, including:

- 24 1. Use of existing facilities
- 25 2. Modernization or renovation of existing facilities
- 26 3. Leasing of off-installation facilities
- 27 4. Construction of new facilities.

28 **On-Installation Land Use.** In the northeastern portion of the installation is the FSH National Cemetery,
29 which is administered by the Veterans Administration, schools, recreation facilities, golf facilities, and
30 military family housing. Within the east-central portion of the installation is the BAMC, along with
31 medical research activities, more military family housing, company and battalion headquarter areas, and
32 housing for families of patients. The central district, which is the area of the proposed Lifestyle Center
33 (see **Figure 1-2**), contains community support facilities including the PX, Commissary, gas stations, and
34 a gymnasium. The south-central portion of the installation, which is south of the proposed Lifestyle
35 Center, is an industrial area primarily dedicated to logistics, facilities services, vehicle and equipment
36 maintenance, supply distribution, and warehousing. The older and more developed areas are in the
37 southwestern and south-central portions of the installation.

38 The northern end of FSH is less developed than other portions of the installation. Salado Creek runs
39 through FSH from north to south along the eastern border of the northern section. Development potential
40 of the floodplain areas around Salado Creek is limited; therefore, it has mostly been used as an open
41 training area and for outdoor recreation. There are two 18-hole golf courses, picnic and camping areas,
42 and a riding stable in this area. Salado Creek also divides the southwest and south-central main

1 installation from the easternmost portion of the installation that primarily supports medical patients and
2 research. The easternmost area has more than 1 million ft² of BAMC and support facilities (FSH 2007a).

3 **Off-Installation Land Use.** FSH does not fall under the jurisdiction of the City of San Antonio. The San
4 Antonio City Planning Department oversees the master planning efforts in the city and compliance with
5 existing city ordinances. The Alamo Area Council of Governments is a voluntary association of local
6 governments and organizations that provides technical planning assistance and coordination within the
7 region between parties that include the Federal Government. The Alamo Area Council of Governments
8 has the objective to coordinate public and private investments and plans, manage development of
9 communities, and minimize conflict between land uses.

10 Land use surrounding FSH is varied and includes single- and multifamily residential, lodging,
11 commercial business, light industrial, office space, warehouse/distribution, institutional, religious, and
12 recreational uses. The southeastern border of the installation runs parallel to Interstate 35, a major
13 thoroughfare that defines a corridor of various land uses along the service roads. The southwestern and
14 western adjacent areas are mostly developed, with older single- and multifamily residential areas
15 interspersed with neighborhood and strip commercial uses at intersections and along primary roadways.
16 To the northwest are the San Antonio Botanical Center, the San Antonio Country Club, single-family
17 residential areas in the City of Terrell Hills, and limited office commercial developments. Areas to the
18 north are medium-density, single-family residential neighborhoods. The eastern boundary is largely
19 open, with rural land and sporadic houses. Some industrial uses are interspersed, but floodplains
20 constrain further development. To the southeast and south, open land along the boundaries and highways
21 is zoned mostly for industry. San Antonio's John James Park and the FSH National Cemetery are
22 contiguous with FSH property on the northwestern end of the installation (FSH 2007a).

23 **4.2.3 Environmental Consequences**

24 **Evaluation Criteria**

25 The evaluation of impacts on land use is based on the degree of land use sensitivity in areas affected by a
26 proposed action and compatibility of proposed actions with existing conditions. Land use can remain
27 compatible, become compatible, or become incompatible. Projected compatibility issues were measured
28 both qualitatively and quantitatively. Effects on land use were assessed by evaluating the following:

- 29 • Consistency and compliance with existing land use plans, zoning, or policies
- 30 • Alteration of the viability of existing land use
- 31 • The degree to which the Proposed Action or alternatives preclude continued use or occupation of
32 an area
- 33 • The degree to which the Proposed Action or alternatives conflict with planning criteria
34 established to ensure the safety and protection of human life and property
- 35 • Potential noise changes conflicting with sensitive land uses.

36 **Proposed Action**

37 Short- and long-term, negligible, adverse impacts on land use would be expected as a result of
38 implementing the Proposed Action. Under the Proposed Action, the proposed Lifestyle Center would be
39 constructed within FSH boundaries. The proposed Lifestyle Center would provide approximately
40 651,000 ft² of new and replacement retail, dining, and entertaining space. This additional retail space
41 would be compatible with existing uses at FSH, which serve a similar function. The Proposed Action

1 would likely not result in any reclassification of land uses. Although the U.S. Army considers five means
2 to meet increased space requirements (see **Section 3.1**), the Proposed Action would not meet any of the
3 five selection criteria (see **Section 2.2**) and as a result would have a long-term, negligible, adverse effect
4 on land use at FSH. Short-term, negligible, adverse impacts on land use would also be expected from a
5 temporary increase in traffic and congestion associated with construction personnel and equipment, and
6 temporary traffic detouring around construction sites.

7 The surrounding San Antonio area would not be impacted by the Proposed Action. The Proposed Action
8 would be contained entirely within the boundaries of FSH and would not have the potential to affect off-
9 installation land use planning in the surrounding San Antonio area. See **Section 4.1.3** for potential noise
10 impacts related to the Proposed Action. There is little potential for encroachment of off-installation
11 development as the surrounding areas to FSH are built up and floodplain restrictions to the east have
12 constrained development.

13 Transportation and traffic impacts are discussed in **Section 4.9.3**. Although short-term construction-
14 related traffic congestion and delays could occur during rush hours, it is not anticipated that the Proposed
15 Action would adversely impact the viability of the existing land use.

16 **No Action Alternative**

17 The No Action Alternative would result in continuation of the existing condition. The affected
18 environment would remain essentially unchanged from what was described in **Section 4.2.2**. No effects
19 on land use would be expected.

20 **4.3 Air Quality**

21 **4.3.1 Definition of the Resource**

22 In accordance with Federal Clean Air Act (CAA) requirements, the air quality in a given region or area is
23 measured by the concentration of various pollutants in the atmosphere. The measurements of these
24 “criteria pollutants” in ambient air are expressed in units of parts per million (ppm), milligrams per cubic
25 meter (mg/m^3), or micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). The air quality in a region is a result not only of
26 the types and quantities of atmospheric pollutants and pollutant sources in an area, but also surface
27 topography, the size of the topological “air basin,” and the prevailing meteorological conditions.

28 The CAA directed the USEPA to develop, implement, and enforce strong environmental regulations that
29 would ensure clean and healthy ambient air quality. To protect public health and welfare, USEPA
30 developed numerical concentration-based standards, or National Ambient Air Quality Standards
31 (NAAQS), for pollutants that have been determined to impact human health and the environment.
32 USEPA established both primary and secondary NAAQS under the provisions of the CAA. NAAQS are
33 currently established for six criteria air pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide
34 (NO_2), sulfur dioxide (SO_2), respirable particulate matter (including particulate matter equal to or less
35 than 10 microns in diameter [PM_{10}] and particulate matter equal to or less than 2.5 microns in diameter
36 [$\text{PM}_{2.5}$]), and lead (Pb). The primary NAAQS represent maximum levels of background air pollution that
37 are considered safe, with an adequate margin of safety to protect public health. Secondary NAAQS
38 represent the maximum pollutant concentration necessary to protect vegetation, crops, and other public
39 resources along with maintaining visibility standards. **Table 4-3** presents the primary and secondary
40 USEPA NAAQS.

1

Table 4-3. National Ambient Air Quality Standards

Pollutant	Averaging Time	National Standard	
		Primary	Secondary
O ₃	1 Hour ^a	0.12 ppm	Same as Primary Standard
	8 Hours ^b	0.08 ppm (157 µg/m ³)	
	8 Hours	0.075 ppm ^g	
PM ₁₀	24 Hours ^c	150 µg/m ³	Same as Primary Standard
	Annual Arithmetic Mean ^d	----	
PM _{2.5}	24 Hours ^e	35 µg/m ³	Same as Primary Standard
	Annual Arithmetic Mean ^f	15 µg/m ³	
CO	8 Hours ^c	9.0 ppm (10 mg/m ³)	None
	1 Hour ^c	35 ppm (40 mg/m ³)	
NO ₂	Annual Arithmetic Mean	0.053 ppm (100 µg/m ³)	Same as Primary Standard
SO ₂	Annual Arithmetic Mean	0.03 ppm (80 µg/m ³)	0.5 ppm 1,300 µg/m ³ , 3-Hour averaging time
	24 Hours ^c	0.14 ppm (365 µg/m ³)	
Pb	Quarterly Average	1.5 µg/m ³	Same as Primary Standard

Source: USEPA 2009a

Notes: Parenthetical values are approximate equivalent concentrations.

- a. (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1 . (b) As of June 15, 2005, USEPA revoked the 1-hour ozone standard in all areas except the 14 8-hour ozone nonattainment Early Action Compact Areas.
- b. (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. (b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as USEPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
- c. Not to be exceeded more than once per year.
- d. To attain this standard, the expected annual arithmetic mean PM₁₀ concentration at each monitor within an area must not exceed 50 µg/m³.
- e. To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³.
- f. To attain this standard, the 3-year average of the annual arithmetic mean PM_{2.5} concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m³.
- g. To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)

- 2 Although O₃ is considered a criteria air pollutant and is measurable in the atmosphere, it is not often
- 3 considered a regulated air pollutant when calculating emissions because O₃ is typically not emitted
- 4 directly from most emissions sources. Ozone is formed in the atmosphere by photochemical reactions
- 5 involving sunlight and previously emitted pollutants or “O₃ precursors.” These O₃ precursors consist

1 primarily of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) that are directly emitted from
2 a wide range of emissions sources. For this reason, regulatory agencies attempt to limit atmospheric O₃
3 concentrations by controlling VOC pollutants (also identified as reactive organic gases) and NO₂.

4 As authorized by the CAA, USEPA has delegated responsibility for ensuring compliance with NAAQS to
5 the states and local agencies. As such, each state must develop air pollutant control programs and
6 promulgate regulations and rules that focus on meeting NAAQS and maintaining healthy ambient air
7 quality levels. These programs are detailed in State Implementation Plans (SIPs) that must be developed
8 by each state or local regulatory agency and approved by USEPA. A SIP is a compilation of regulations,
9 strategies, schedules, and enforcement actions designed to move the state into compliance with all
10 NAAQS. Any changes to the compliance schedule or plan (e.g., new regulations, emissions budgets,
11 controls) must be incorporated into the SIP and approved by USEPA.

12 In 1997, USEPA initiated work on new General Conformity rules and guidance to reflect the new 8-hour
13 O₃, PM_{2.5}, and regional haze standards that were promulgated in that year. The 1-hour O₃ standard will no
14 longer apply to an area 1 year after the effective date of the designation of that area for the 8-hour O₃
15 NAAQS. The effective designation date for most areas was June 15, 2004. USEPA designated PM_{2.5}
16 nonattainment areas in December 2004, and finalized the PM_{2.5} implementation rule in January 2005.

17 On March 10, 2009, the USEPA issued a proposed rule for mandatory greenhouse gas reporting from
18 large greenhouse gas emissions sources in the United States. The proposed rule was published in the
19 *Federal Register* on April 10, 2009. The purpose of the rule is to collect comprehensive and accurate data
20 on carbon dioxide (CO₂) and other greenhouse gas emissions that can be used to inform future policy
21 decisions. The proposed rule would require reporting of greenhouse gases including CO₂. Although
22 greenhouse gases are not currently regulated under the CAA, the USEPA has clearly indicated that
23 greenhouse gas emissions and climate change are issues that need to be considered in future planning.
24 Greenhouse gases are produced by the burning of fossil fuels and through industrial and biological
25 processes.

26 Title V of the CAA Amendments of 1990 requires states and local agencies to permit major stationary
27 sources. A major stationary source is a facility (i.e., plant, installation, or activity) that has the potential to
28 emit more than 100 tons per year (tpy) of any one criteria air pollutant, 10 tpy of a hazardous air pollutant,
29 or 25 tpy of any combination of hazardous air pollutants.

30 Federal Prevention of Significant Deterioration (PSD) regulations also define air pollutant emissions from
31 proposed major stationary sources or modifications to be “significant” if (1) a proposed project is within
32 10 kilometers of any Class I area, and (2) regulated pollutant emissions would cause an increase in the
33 24-hour average concentration of any regulated pollutant in the Class I area of 1 µg/m³ or more
34 [40 CFR 52.21(b)(23)(iii)]. PSD regulations also define ambient air increments, limiting the allowable
35 increases to any area’s baseline air contaminant concentrations, based on the area’s designation as Class I,
36 II, or III [40 CFR 52.21(c)]. Because FSH is not within 10 kilometers of a Class I area, PSD regulations
37 do not apply and are not discussed further in this EA.

38 **4.3.2 Description of Affected Environment**

39 FSH is in Bexar County, which is within the Metropolitan San Antonio Intrastate (MSAI) Air Quality
40 Control Region (AQCR) (40 CFR 81.40). The MSAI AQCR consists of the counties of Atascosa,
41 Bandera, Bexar, Comal, Dimmit, Edwards, Frio, Gillespie, Guadalupe, Karnes, Kendall, Kerr, Kinney, La
42 Salle, Maverick, Medina, Real, Uvalde, Val Verde, Wilson, and Zavala. On December 9, 2002, portions
43 of MSAI, including Bexar County, signed an Early Action Compact (EAC). The EAC consisted of an 8-
44 hour ozone attainment demonstration in order to comply with Federal guidelines. On March 31, 2004, a

1 final EAC plan was given to the Texas Commission on Environmental Quality (TCEQ) for incorporation
 2 into the SIP. On April 2, 2008, the USEPA announced a final decision to designate 13 EAC areas
 3 (including Bexar County) as attainment for the 8-hour ozone standard, as they have met all requirements
 4 of the EAC program and demonstrated attainment of the 8-hour ozone standard (TCEQ 2008). FSH and
 5 surrounding area is in attainment for all criteria pollutants.

6 The most recent emissions inventories for Bexar County and the MSAI AQCR are shown in **Table 4-4**.
 7 Bexar County is considered the local area of influence, and the MSAI AQCR is considered the regional
 8 area of influence for the air quality analysis.

9 **Table 4-4. Local and Regional Air Emissions Inventory for 2002**

	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO₂ (tpy)	PM₁₀ (tpy)	PM_{2.5} (tpy)
Bexar County, Texas	64,989	59,819	377,889	35,779	71,270	10,180
MSAI AQCR	113,510	101,692	568,948	54,950	193,580	26,667

Source: USEPA 2009b

10 The U.S. Department of Energy, Energy Information Administration states that in 2005, gross CO₂
 11 emissions in Texas were 625.2 million metric tons of CO₂ (EIA 2009).

12 TCEQ is the air pollution control authority for Bexar County. FSH is classified as being in attainment
 13 with all criteria pollutants with the TCEQ. There are various sources on installation that emit criteria and
 14 hazardous air pollutants (HAPs), including emergency generators, boilers, hot water heaters, fuel storage
 15 tanks, gasoline service stations, surface coating and miscellaneous chemical usage. As required by the
 16 TCEQ, FSH calculates annual criteria pollutant emissions from stationary sources and provides this
 17 information to the TCEQ. **Table 4-5** summarizes the calendar year 2007 air emissions inventory for
 18 FSH.

19 **Table 4-5. Calendar Year 2007 Air Emissions Inventory for Fort Sam Houston for Stationary**
 20 **Sources**

	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO₂ (tpy)	PM₁₀ (tpy)
2007 Actual Emissions	26.75	12.83	21.51	0.63	2.32

Source: FSH 2007b

21 **4.3.3 Environmental Consequences**

22 **Evaluation Criteria**

23 The environmental consequences to local and regional air quality conditions near a proposed Federal
 24 action are determined based upon the increases in regulated pollutant emissions relative to existing
 25 conditions and ambient air quality. Specifically, the impact in NAAQS "attainment" areas would be
 26 considered significant if the net increases in pollutant emissions from the Federal action would result in
 27 any one of the following scenarios:

- 1 • Cause or contribute to a violation of any national or state ambient air quality standard
- 2 • Expose sensitive receptors to substantially increased pollutant concentrations
- 3 • Represent an increase of 10 percent or more in an affected AQCR emissions inventory
- 4 • Exceed any Evaluation Criteria established by a SIP.

5 Effects on air quality in NAAQS “nonattainment” areas are considered significant if the net changes in
6 project-related pollutant emissions result in any of the following scenarios:

- 7 • Cause or contribute to a violation of any national or state ambient air quality standard
- 8 • Increase the frequency or severity of a violation of any ambient air quality standard
- 9 • Delay the attainment of any standard or other milestone contained in the SIP.

10 With respect to the General Conformity Rule, effects on air quality would be considered significant if the
11 proposed Federal action would result in an increase of a nonattainment or maintenance area’s emissions
12 inventory by 10 percent or more for one or more nonattainment pollutants, or if such emissions exceed
13 *de minimis* threshold levels established in 40 CFR 93.153(b) for individual nonattainment pollutants or
14 for pollutants for which the area has been redesignated as a maintenance area.

15 In addition to the *de minimis* emissions thresholds, Federal PSD regulations define air pollutant emissions
16 to be significant if the source is within 10 kilometers of any Class I area, and emissions would cause an
17 increase in the concentration of any regulated pollutant in the Class I area of 1 µg/m³ or more (40 CFR
18 52.21(b)(23)(iii)).

19 **Proposed Action**

20 Under the Proposed Action, short-term, minor, adverse effects on air quality would be expected from
21 construction emissions and land disturbance. The Proposed Action would result in minor impacts on
22 regional air quality during construction activities, primarily from site-disturbing activities and operation
23 of construction equipment. All emissions associated with construction operations would be temporary in
24 nature. The Proposed Action includes demolition and removal of buildings, roads, and parking lots, and
25 new construction of retail space, sidewalks and roadway surface. It is not expected that emissions from
26 the Proposed Action would contribute to or affect local or regional attainment status with the NAAQS.
27 Emissions from the Proposed Action are summarized in **Table 4-6**. Emissions estimation spreadsheets
28 and methodology are included in **Appendix C**.

29 Construction activities in the Proposed Action would generate particulate matter emissions as fugitive
30 dust from ground-disturbing activities (e.g., road demolition, paving, and construction). Appropriate
31 fugitive dust control measures would be employed during construction activities to suppress emissions.
32 Emissions of all criteria pollutants would result from the general construction activities, new road
33 construction, and construction commuter emissions.

34 Fugitive dust emissions would be greatest during the initial site preparation activities and would vary
35 from day-to-day depending on the construction phase, level of activity, and prevailing weather conditions.
36 The quantity of uncontrolled fugitive dust emissions from a construction site is proportional to the area of
37 land being worked and the level of construction activity. Fugitive dust emissions for various construction
38 activities were calculated using emissions factors and assumptions published in USEPA AP-42. These
39 estimates assume that the project duration is 18 months or 345 working days for construction. Emissions
40 estimations and methodology are included in **Appendix C**.

1 **Table 4-6. Estimated Air Emissions Resulting from Construction Activities from Mobile and**
 2 **Stationary Sources**

Activity	NO _x tpy	VOC tpy	CO tpy	SO ₂ tpy	PM ₁₀ tpy	PM _{2.5} tpy	CO ₂ tpy
2011							
<i>Construction Combustion</i>	23.606	1.400	9.332	0.472	1.428	1.385	2,749
<i>Construction Fugitive Dust</i>	--	--	--	--	8.326	0.833	--
<i>Construction Commuter</i>	0.425	0.540	5.909	0.018	0.228	0.062	87.822
Total Proposed Action Emissions in 2011	24.03	1.94	15.24	0.49	9.98	2.28	2,837
Percent of MSAI Inventory	0.0212	0.0019	0.0027	0.0009	0.0052	0.0085	NA
2012							
<i>Construction Combustion</i>	5.523	1.008	2.400	0.380	0.387	0.375	634.519
<i>Construction Fugitive Dust</i>	--	--	--	--	32.857	3.286	--
<i>Construction Commuter</i>	1.699	2.161	23.636	0.071	0.913	0.249	351.289
Total Proposed Action Emissions in 2012	7.22	3.17	26.04	0.45	34.16	3.91	985.81
Percent of MSAI Inventory	0.0064	0.0031	0.0046	0.0008	0.0176	0.0147	NA
2013							
<i>Construction Combustion</i>	4.594	0.587	1.902	0.161	0.294	0.285	553.996
<i>Construction Fugitive Dust</i>	--	--	--	--	20.079	2.008	--
<i>Construction Commuter</i>	0.425	0.540	5.909	0.018	0.228	0.062	87.822
Total Proposed Action Emissions in 2013	5.02	1.13	7.81	0.18	20.60	2.36	641.82
Percent of MSAI Inventory	0.0044	0.0011	0.0014	0.0003	0.0106	0.0088	NA

3 The Energy Information Administration states that in 2005, gross CO₂ emissions in Texas were 625.2
 4 million metric tons of CO₂ (EIA 2009). Maximum CO₂ emissions are estimated during the 2011 project
 5 year. Approximately 2,573 metric tons of CO₂ (2,837 tons) were estimated to be emitted by the Proposed
 6 Action in 2011. The CO₂ emitted is approximately 0.0004 percent of the Texas statewide CO₂.
 7 Therefore, the Proposed Action would have a negligible contribution towards the Texas statewide
 8 greenhouse gas inventory. CO₂ emission estimates are included in **Appendix C**.

9 Since FSH is in attainment for all criteria pollutants, General Conformity Rule requirements are not
 10 applicable. In addition, the Proposed Action would generate emissions below 10 percent of the emissions

1 inventory for the MSAI AQCR and the emissions would be short-term. Therefore, the construction
2 activities associated with the Proposed Action would not have significant effects on air quality at FSH or
3 on regional or local air quality. **Appendix C** includes the air emission estimation spreadsheets.

4 **No Action Alternative**

5 Under the No Action Alternative, FSH would not construct the proposed Lifestyle Center, which would
6 result in the continuation of existing conditions. Therefore, no direct or indirect environmental effects
7 would be expected on local or regional air quality from implementation of the No Action Alternative.

8 **4.4 Geological Resources**

9 **4.4.1 Definition of the Resource**

10 Geological resources consist of the Earth's surface and subsurface materials. Within a given
11 physiographic province, these resources typically are described in terms of topography and physiography,
12 geology, soils, and, where applicable, geologic hazards and paleontology.

13 Topography and physiography pertain to the general shape and arrangement of a land surface, including
14 its height and the position of its natural and human-made features.

15 Geology is the study of the Earth's composition and provides information on the structure and
16 configuration of surface and subsurface features. Such information derives from field analysis based on
17 observations of the surface and borings to identify subsurface composition.

18 Soils are the unconsolidated materials overlying bedrock or other parent material. Soils typically are
19 described in terms of their complex type, slope, and physical characteristics. Differences among soil
20 types in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential affect
21 their abilities to support certain applications or uses. In appropriate cases, soil properties must be
22 examined for their compatibility with particular construction activities or types of land use.

23 Prime farmland is protected under the Farmland Protection Policy Act (FPPA) of 1981. Prime farmland
24 is defined as land that has the best combination of physical and chemical characteristics for producing
25 food, feed, forage, fiber, and oilseed crops, and is also available for these uses. The soil qualities,
26 growing season, and moisture supply are needed for a well-managed soil to produce a sustained high
27 yield of crops in an economic manner. The land could be cropland, pasture, rangeland, or other land, but
28 not urban built-up land or water. The intent of the FPPA is to minimize the extent that Federal programs
29 contribute to the unnecessary conversion of farmland to nonagricultural uses. The Act also ensures that
30 Federal programs are administered in a manner that, to the extent practicable, will be compatible with
31 private, state, and local government programs and policies to protect farmland.

32 The implementing procedures of the FPPA and Natural Resources Conservation Service (NRCS) require
33 Federal agencies to evaluate the adverse effects (direct and indirect) of their activities on prime and
34 unique farmland, as well as farmland of statewide and local importance, and to consider alternative
35 actions that could avoid adverse effects. Determination of whether an area is considered prime or unique
36 farmland and potential impacts associated with a proposed action is based on preparation of the farmland
37 conversion impact rating form AD-1006 for areas where prime farmland soils occur and by applying
38 criteria established at Section 658.5 of the FPPA (7 CFR 658). The NRCS is responsible for overseeing
39 compliance with the FPPA and has developed the rules and regulations for implementation of the Act
40 (see 7 CFR Part 658, 5 July 1984).

4.4.2 Description of the Affected Environment

Regional Geology. The regional geology of FSH is composed primarily of Cretaceous-aged (from 145.5 to 65 million years before present) undifferentiated marine and fluvial sediments, which are overlain in places with Quaternary-aged (from 1.8 million years before present to Recent) fluvial terrace deposits. Specific Cretaceous-aged lithographic units underlying the FSH includes the Marlbrook Marl and Navarro Group, which are composed of medium-sized, gray-colored, clays, silts, and sands that are between 150 and 775 feet thick in places. The Quaternary-aged fluvial terrace deposits consist of gravel, sand, and silt that are approximately 45 feet thick overall and extend to the surface at the proposed Lifestyle Center (FSH 2007a).

Topography. FSH is in the Gulf Coastal Plains physiographic province of Texas on the boundary of the Interior Coastal Plain and Blackland Prairies subprovinces. The elevation of the Gulf Coastal Plain physiographic province gradually increases from mean sea level along the Gulf of Mexico to approximately 800 to 1,000 feet above mean sea level near the innermost portions of the province near Austin and Del Rio, Texas, respectively (Bureau of Economic Geology 2009). The elevation of FSH ranges from approximately 620 to 750 feet above mean sea level, and the topography contains gently sloping terrain. The elevation of the proposed Lifestyle Center is approximately 750 feet above mean sea level and is virtually flat (FSH 2007a).

Soils. The primary soil characteristics at FSH include silty-clays, gravelly-clays, and clayey-loam from approximately six different soil series (FSH 2007a). Specific soil types at the proposed Lifestyle Center include the Heiden-Ferris complex, Houston Black clay, and Houston Black gravelly clay (USDA NRCS 2009). **Table 4-7** lists the typical properties of the soils mapped at the proposed Lifestyle Center. None of the soils mapped at the proposed Lifestyle Center are classified as hydric soils (soils typically associated with wetlands).

Table 4-7. Soil Properties Found Within the Proposed Lifestyle Center Site

Mapping Unit	Texture	Percent Slope	Depth to Water Table (inches)	Drainage	Prime Farmland
Heiden-Ferris complex	Clay	5 to 10	More than 80	Well-drained	No
Houston Black clay	Clay	1 to 3	More than 80	Moderately well-drained	Yes
Houston Black gravelly clay	Clay and gravelly clay	3 to 5	More than 80	Moderately well-drained	Yes

Source: USDA NRCS 2009

Although two of the soils found within the proposed Lifestyle Center area are classified as moderately well-drained and another is classified as well-drained by the U.S. Department of Agriculture (USDA) NRCS, clay soil types generally have poor storm water infiltration properties, which can often cause rapid runoff in areas with a 1 percent or greater slope. As a result, moderate to severe erosion potential exists at nonvegetated areas that do not have adequate storm water handling infrastructure (FSH 2007a).

Prime Farmland. Two of the three soils series mapped within the proposed Lifestyle Center are considered prime farmland soils by the USDA NRCS. However, because of the existing development at the proposed Lifestyle Center, agricultural activities presently do not occur and are not planned for the proposed Lifestyle Center. Therefore, these soils are not available for current and future agricultural use.

1 **Geologic Hazards.** Geologic hazards are defined as a natural geologic event that can endanger human
2 lives and threaten property. Examples of geologic hazards include earthquakes, landslides, and sinkholes.
3 No major geologic hazards exist for the FSH area. The terrain at the proposed Lifestyle Center is
4 generally flat and level. The U.S. Geological Survey has classified the FSH area as having a low
5 potential for earthquake hazards. The region of FSH has a seismic hazard rating of approximately 4 to
6 8 percent gravity, meaning little or no damage to buildings would be expected during an earthquake that
7 has a 2 percent chance of occurring during a 50-year time period (USGS 2008). Based on the
8 predominantly clay soil types at the proposed Lifestyle Center, erosion would be the primary concern for
9 implementing the Proposed Action.

10 **4.4.3 Environmental Consequences**

11 **Evaluation Criteria**

12 Protection of unique geological features, minimization of soil erosion, and the siting of facilities in
13 relation to potential geologic hazards are considered when evaluating potential effects of a proposed
14 action on geological resources. Generally, adverse effects can be avoided or minimized if proper
15 construction techniques, erosion-control measures, and structural engineering design are incorporated into
16 project development.

17 Effects on geology and soils would be significant if they were to alter the lithology, stratigraphy, and
18 geological structures that control groundwater quality; distribution of aquifers, confining beds, and
19 groundwater availability; or change the soil composition, structure, or function (including prime farmland
20 and other unique soils) within the environment.

21 **Proposed Action**

22 Short-term, negligible to minor, adverse impacts on geological resources would be expected during the
23 implementation of the Proposed Action. Demolition of existing buildings, parking areas, and
24 infrastructure at the proposed Lifestyle Center, as well as trenching to install new utilities, building
25 foundations, and other associated infrastructure, would involve disturbance of soil, removal of existing
26 vegetation, and elimination of current storm water handling infrastructure. This would temporarily
27 increase the potential for erosion and sedimentation until revegetation and long-term storm water
28 handling methods are established. Soil erosion and associated sedimentation would be minimized during
29 all construction operations by following an approved sediment-and-erosion-control plan in accordance
30 with State of Texas regulations and the *Storm Water Management Plan for Fort Sam Houston Bexar
31 County, Texas* (FSH 2008b). Use of properly designed storm water control measures, as well as
32 construction best management practices (BMPs) would minimize the potential for erosion and associated
33 sedimentation resulting from storm events during proposed construction activities. Erosion and sediment
34 control BMPs could include installing silt fencing and sediment traps, applying water to disturbed soil,
35 and revegetating disturbed areas as soon as possible following disturbances, as appropriate.

36 Long-term, negligible to minor, adverse impacts on geological resources would be expected as a result of
37 implementing the Proposed Action. The modification of the soil structure would result in a net increase
38 of approximately 1,278,747 ft² of impervious surface from the 1,272,603 ft² of existing structures, which
39 could result in changes to existing storm water drainage patterns. Increased storm water runoff volume
40 and velocity could locally increase the velocity of flows in nearby streams during storm events. This
41 could increase stream bank erosion and downstream sedimentation as streams adjust to accommodate the
42 increased flow volume and velocity. Long-term soil erosion- and sediment-control measures would be
43 included in site plans to minimize long-term erosion and sediment production. A storm water
44 management plan would be developed consistent with State of Texas regulations and the *Storm Water*

1 *Management Plan for Fort Sam Houston Bexar County, Texas* (FSH 2008b); and storm water controls
2 and infrastructure would be designed and implemented in accordance with the plan to address any
3 increases in storm water runoff. The use of properly designed storm water control measures would
4 minimize the potential for long-term erosion and sediment production. It also must be noted that the
5 proposed Lifestyle Center is already heavily developed. The natural soil structure at the proposed
6 Lifestyle Center has already been disturbed and approximately 1,272,603 ft² of imperious surface already
7 exists and will be replaced by the Proposed Action. As such, it is anticipated that the Proposed Action
8 would have negligible to minor, long-term, adverse impacts on soil erosion and sedimentation. See
9 **Section 4.5.3** for a discussion of impacts from the Proposed Action on water resources.

10 Soil productivity, which is the capacity of the soil to produce vegetative biomass, would decline in areas
11 where soil structure is disturbed and it would be eliminated in areas within the footprint of structures,
12 roadways, or parking facilities. However, these effects would be considered negligible to minor as the
13 proposed Lifestyle Center is already developed; therefore, soils already have been disturbed heavily. The
14 proposed Lifestyle Center also is currently not used or proposed for agricultural use, so adverse impacts
15 on soil productivity would not be noted.

16 **No Action Alternative**

17 Under the No Action Alternative, the proposed Lifestyle Center would not be constructed at FSH.
18 Geological resource conditions would remain the same as described in **Section 4.4.2** and no effects would
19 be expected.

20 **4.5 Water Resources**

21 **4.5.1 Definition of the Resource**

22 Water resources include groundwater, surface water, and floodplains. Evaluation of water resources
23 examines the quantity and quality of the resource and its demand for various purposes. Groundwater
24 consists of subsurface hydrologic resources. It is an essential resource often used for potable water
25 consumption, agricultural irrigation, and industrial applications. Groundwater typically can be described
26 in terms of its depth from the surface, aquifer or well capacity, water quality, surrounding geologic
27 composition, and recharge rate.

28 An aquifer can be designated as a Sole Source Aquifer (SSA) by the Administrator of the USEPA under
29 Section 1424(e) of the Safe Drinking Water Act (SDWA). An SSA is an underground water supply
30 designated by the USEPA as the sole or principal source of drinking water for an area. The intention of
31 the program is to prevent Federal funding of projects that might contaminate an SSA.

32 The USEPA may review projects with Federal financial assistance that are within an SSA. The project
33 review area includes the surface recharge area of the aquifer and the area overlying the subsurface
34 portions of the aquifer that are connected with the recharge area. It can also include the watershed area
35 that contributes to the surface water flowing across the aquifer. The purpose of the project review process
36 is to identify federally assisted projects that might contaminate the aquifer and then to work with the
37 applicants to modify those projects so as to prevent contamination of the aquifer. As a final step, Federal
38 funding can be denied if the project is not modified to remove the hazard to the aquifer.

39 Surface water resources consist of lakes, rivers, and streams. Surface water is important for its
40 contributions to the economic, ecological, recreational, and human health of a community. Storm water is
41 an important component of surface water systems because of its potential to introduce sediments and
42 other contaminants that could degrade lakes, rivers, and streams. Proper management of storm water

1 flows, which can be exacerbated by high proportions of impervious surfaces associated with buildings,
2 roads, and parking lots, is important to the management of surface water quality and natural flow
3 characteristics. Storm water management systems are typically designed to contain runoff onsite during
4 construction and to maintain predevelopment storm water flow characteristics following development,
5 either through the application of infiltration or retention practices. Maintaining storm water flows onsite
6 during construction reduces potential for the transport of sediments, or construction-related pollutants into
7 adjacent water bodies during or as the result of storm events. The application of properly designed
8 permanent storm water management structures following site development is designed to maintain or
9 reduce predevelopment storm water flow volumes and velocity. Prolonged increases in storm water
10 volume and velocity associated with development and increased impervious surfaces has potential to
11 impact adjacent streams as a result of bank and channel scour and stream bank modifications associated
12 with the adjustment of the stream to the change in flow characteristics. Failure to size storm water
13 systems appropriately to hold or delay conveyance of the largest predicted precipitation event often leads
14 to downstream flooding and the environmental and economic damages associated with flooding.

15 The Clean Water Act (CWA) (33 United States Code [U.S.C.] 1251 et. seq., as amended) establishes
16 Federal limits, through the National Pollutant Discharge Elimination System (NPDES), on the amounts of
17 specific pollutants that are discharged to surface waters to restore and maintain the chemical, physical,
18 and biological integrity of the water. The NPDES program regulates the discharge of point (end of pipe)
19 and nonpoint sources (storm water) of water pollution. Section 404 of the CWA regulates the discharge
20 of fill material into waters of the United States, which includes wetlands.

21 Floodplains are areas of low level ground present along rivers, stream channels, or coastal waters. Such
22 lands might be subject to periodic or infrequent inundation due to a flood created by rain or melting snow.
23 Risk of flooding typically hinges on local topography, the frequency of precipitation events, the size of
24 the watershed above the floodplain and upstream development. Flood potential is evaluated by the
25 Federal Emergency Management Agency (FEMA), which defines the 100-year floodplain as an area
26 within which there is a 1 percent chance of inundation by a flood event in a given year. Certain facilities
27 inherently pose too great a risk from flooding to be within a 100- or 500-year floodplain, such as
28 hospitals, schools, or storage buildings for irreplaceable records. Federal, state, and local regulations
29 often limit floodplain development to passive uses, such as recreational and preservation activities, to
30 reduce the risks to human health and safety.

31 EO 11988, *Floodplain Management*, requires Federal agencies to determine whether a proposed action
32 would occur within a floodplain. This determination typically involves consultation of appropriate
33 FEMA Flood Insurance Rate Maps, which contain enough general information to determine the
34 relationship of the project area to nearby floodplains. EO 11988 directs Federal agencies to avoid
35 floodplains unless the agency determines that there is no practicable alternative. Where the only
36 practicable alternative is to site in a floodplain, a specific eight-step process must be followed to comply
37 with EO 11988. The process is outlined in the FEMA document *Further Advice on EO 11988 Floodplain*
38 *Management*. As a planning tool, the NEPA process incorporates floodplain management through
39 analysis and through coordination with applicable regulatory agencies that will review this EA.

40 **4.5.2 Description of the Affected Environment**

41 **Groundwater**

42 *The Edwards Aquifer.* FSH overlies the Edwards Aquifer. FSH obtains its drinking water from five
43 wells, which extend into the Edwards Aquifer to depths of 728 to 1,106 feet below ground surface. See
44 **Table 4-8** for current and projected water withdrawal rates. The Edwards Aquifer covers an area of
45

**Table 4-8. Current and Projected Annual Water Withdrawal Rates
from Edwards Aquifer at Fort Sam Houston, Texas**

Time Period	Water Withdrawal (gallons per year)
Total Annual Use of Edwards Aquifer, CY 2005	549,118,310
Projected Maximum Annual Use of Edwards Aquifer, CY 2006–2011	969,320,020

Source: USFWS 2008

Key: CY = Calendar Year

approximately 4,700 square miles, is approximately 180 miles long from west to east, and ranges from 5 to 40 miles wide north to south. Approximately 1.5 million people are dependent upon the aquifer for their water supply. San Antonio is the largest city in the United States that obtains its water supply from a sole source aquifer, the Edwards Aquifer. In 1975, the Edwards Aquifer was the first designated SSA in the United States (FSH 2007a). The SDWA requires projects that will receive Federal financial assistance and that have the potential to contaminate an SSA and thereby create a significant hazard to public health to coordinate with USEPA for their review and project approval.

The Edwards Aquifer is one of the most permeable and productive carbonate aquifers in the United States. Its major natural springs are Comal and San Marcos springs, approximately 30 miles and 45 miles northeast of FSH, respectively. San Antonio Springs and San Pedro Springs are south-southwest of FSH and are dry when the water level in the aquifer is low (FSH 2007a).

The Edwards Aquifer consists of four zones: the contributing or catchment zone, the recharge zone, the artesian zone, and the transition zone. Surface water in the contributing zone has the potential to flow into the Edwards Aquifer. Within the recharge zone, the majority of the surface water flows into the Edwards Aquifer, resulting in an ecologically sensitive area. The transition zone is the area between the recharge zone and the artesian zone that has characteristics of both zones. Several rivers drain into the Edwards Plateau and lose much of their flow to the Edwards Aquifer as they pass over the recharge zone. Other forms of recharge come directly from precipitation on the limestone outcrop.

FSH is above the artesian zone of the aquifer. The artesian zone is a complex network of interconnecting spaces varying from microscopic pores to open caverns. The artesian zone differs from the recharge zone because it is situated between two relatively less permeable layers that confine water to the system. These confining layers are the Glen Rose formation, which underlies the artesian zone and the Del Rio clay that caps the zone. The weight of new water entering the aquifer in the recharge zone puts pressure on water that is already deeper in the formation in the confining layers. Flowing artesian wells and springs exist in this area, where hydraulic pressure is sufficient to force water up through wells and faults to the surface (Eckhardt 2009a).

Surface Water

Surface water on FSH includes Salado Creek, the San Antonio River (via the Alamo Ditch), and a portion of the City of San Antonio storm drainage system (see **Figure 4-1**). Storm water runoff drains primarily into Salado Creek. Salado Creek runs north to south for 35 miles, from just north of the Camp Bullis Military Reservation, along the northeastern side of San Antonio, and through the eastern portion of FSH. Salado Creek is a tributary of the San Antonio River. The Salado Creek watershed encompasses 218 square miles (FSH 2007a). The upper portion of the watershed is largely undeveloped. Dense urban development occurs within the lower portion of the watershed (TCEQ 2003).

1

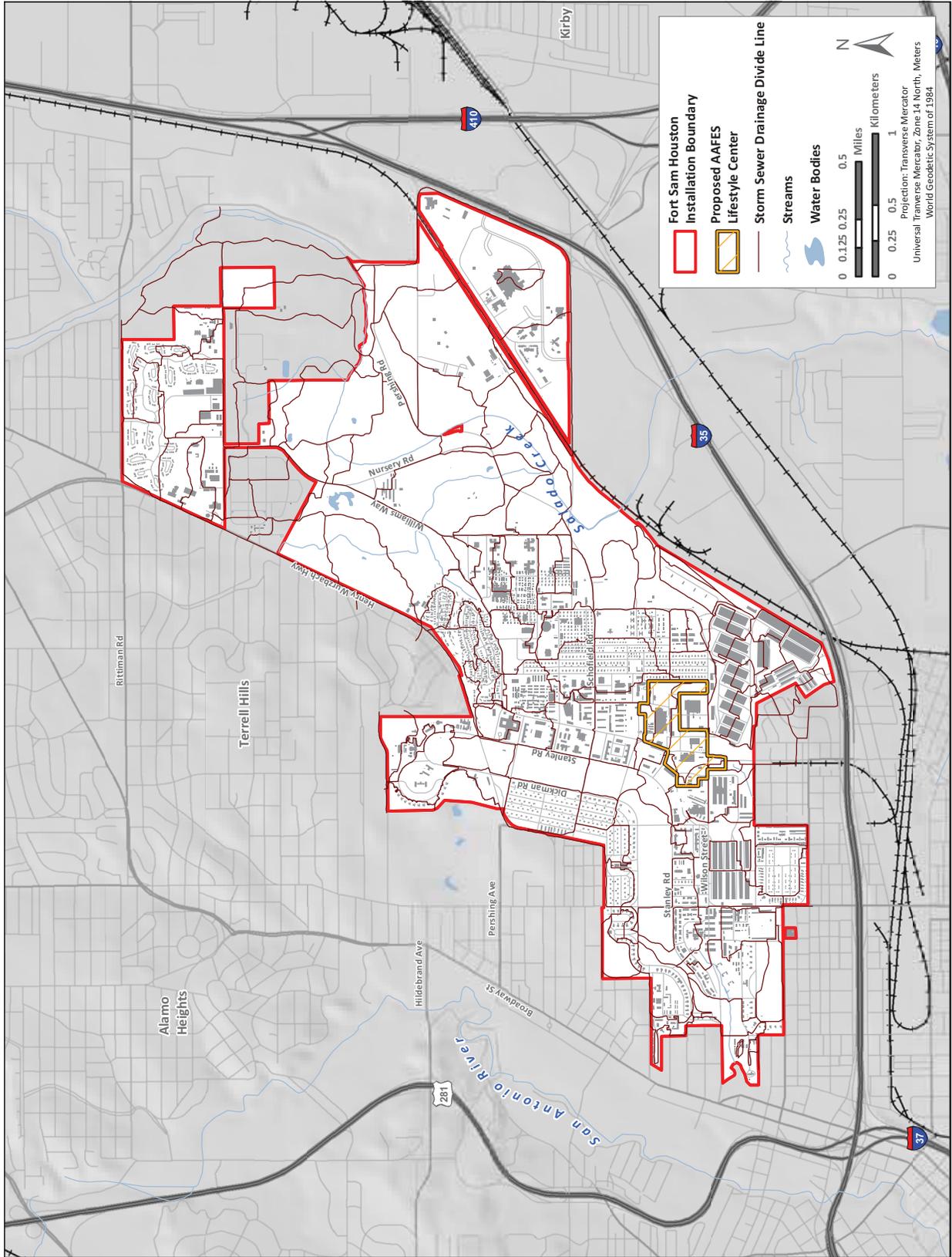


Figure 4-1. Surface Water on Fort Sam Houston

Sources: Base Data, Water Bodies, and Storm Sewer Drainage: Fort Sam Houston 2009; Proposed AAFES Lifestyle Center Site: eM, Inc. 2009.

2

3

1 Floodplains

2 Although infiltration of storm water is generally rapid in the region of the Edwards Aquifer recharge
 3 zone, subsurface drainage is typically inadequate during large rain events. FSH is prone to high flooding
 4 from Salado Creek and other surface water resources on the installation, which carry an increase in water
 5 levels during a storm event due to a high volume of water unable to drain into the recharge zone of the
 6 Edwards Aquifer in northern San Antonio. On average, FSH has major flooding once every 3 to 4 years,
 7 which affects a large portion of the training area in the eastern section of FSH along Salado Creek. The
 8 western, southern, and central portions of FSH do not experience similar flooding; however, some
 9 localized flooding has occurred just off-installation on the western arm at the end of the drainage channel
 10 (FSH 2007a).

11 In 1987, a study was performed to determine Salado Creek flood level elevations based on projected 1990
 12 and 2000 conditions. The study showed that the channel and undeveloped floodplain of Salado Creek are
 13 adequate to contain and convey the 100-year flood event with a few exceptions (FSH 2008c). The area
 14 between Binz-Engleman Road and W.W. White Road, which is close to Salado Creek, would be subject
 15 to flooding from something as small as a 2-year flood. West of Salado Creek, the 100- and 500-year
 16 flood events would inundate portions of the golf course as well as the area near the helipad approach on
 17 the east side of the creek. The helipad approach and the Naval and Marine Corps Reserve Center could
 18 also be affected by low-level flooding resulting from a 500-year flood event. The proposed Lifestyle
 19 Center is outside of the projected extent of flooding associated with the 100- or 500-year flood event.

20 4.5.3 Environmental Consequences

21 Evaluation Criteria

22 Evaluation criteria for effects on water resources are based on water availability, quality, and use;
 23 existence of floodplains; and associated regulations. A proposed action would have significant effects on
 24 water resources if it were to do one or more of the following:

- 25 • Substantially reduce water availability or supply to existing users.
- 26 • Exceed safe annual yield of water supply sources.
- 27 • Substantially adversely affect water quality.
- 28 • Endanger public health by creating or worsening health hazard conditions, such as flooding. The
 29 potential effect of flood hazards on a proposed action is important if such an action occurs in an
 30 area with a high probability of flooding.
- 31 • Threaten or damage unique hydrologic characteristics.
- 32 • Violate established laws or regulations adopted to protect water resources.

33 Proposed Action

34 Implementation of the Proposed Action has the potential to result in short- and long-term, minor, adverse
 35 effects on water resources.

36 ***Edwards Aquifer Water Withdrawal.*** FSH obtains its water, via five wells, from the Edwards Aquifer.
 37 The construction of a larger Lifestyle Center and the corresponding water usage increase will make an
 38 increase in water withdrawal from the Edwards Aquifer necessary.

1 Please refer to **Section 4.6**, Biological Resources, for a discussion on how aquifer withdrawal could affect
2 biological resources around and within the aquifer.

3 The existing buildings within the proposed Lifestyle Center area total 320,379.1 ft² (7.4 acres) and the
4 parking areas associated with the buildings within the proposed Lifestyle Center total 1,062,689.67 ft²
5 (24.4 acres). The industry standard states that parking spaces should each be 450 ft². Based on 450 ft² per
6 parking space, the existing shopping center has 2,362 associated parking spaces. Federal water use
7 indices state that shopping center water usage can be approximated as 10 gallons per parking space per
8 day (USDOE 2007). Based on this analysis, the water usage of the current lifestyle center is
9 approximately 23,620 gallons per day, or 8,621,300 gallons annually.

10 The proposed Lifestyle Center is projected to be 651,000 ft² (14.9 acres). The industry standard states
11 that there should be five parking spaces for every 1,000 ft² of the retail center. Following this standard,
12 the proposed Lifestyle Center is estimated to have approximately 3,255 parking spaces. Therefore, based
13 on approximate water usage of 10 gallons per parking space per day (USDOE 2007), the proposed
14 Lifestyle Center can be projected to have a total water usage of 32,550 gallons per day and
15 11,880,750 gallons annually.

16 The Proposed Action could result in a water withdrawal increase of 8,930 gallons per day and
17 3,259,450 gallons annually. **Table 4-8** shows FSH's annual water withdrawal from the Edwards Aquifer
18 for calendar year (CY) 2005, as well as the projected annual water withdrawal from the Edwards Aquifer
19 for CY 2006–2011. The increase in water withdrawal estimated as a result of the Proposed Action is
20 0.34 percent of the projected maximum annual water withdrawal for CY 2006–2011.

21 The U.S. Fish and Wildlife Service's (USFWS) 2008 Biological Opinion (BO) issued for renewal of the
22 1999 consultation BO for water withdrawals from the Edwards Aquifer for Randolph and Lackland AFBs
23 and FSH considered the Base Realignment and Closure (BRAC) actions on FSH. The 2008 renewal
24 concluded that the increase in annual water consumption resulting from an increased installation
25 population for FSH would not have a significant adverse impact on the 30 threatened and endangered
26 species within the Edwards Aquifer (USFWS 2008) as long as common sense water usage guidelines and
27 pumping limits were adhered to. These guidelines include stopping the use of water for nonessential
28 activities, such as watering lawns and the use of water in non-military-use swimming pools, during times
29 of drought. Therefore, as these common sense water usage guidelines are already in place and FSH is
30 well under its water quantity pumping limits, the increase of water withdrawal at the installation by
31 0.34 percent is unlikely to have significant adverse effects on the groundwater levels within the Edwards
32 Aquifer.

33 ***Storm Water Runoff and Spill Prevention.*** Edwards Aquifer has experienced water pollution problems.
34 Instances of groundwater contamination, resulting in cessation of use of some water wells, have occurred
35 and are concentrated in Bexar County. The Edwards Aquifer was found to be the most vulnerable aquifer
36 in terms of pollution in Texas (FSH 2007a). During a storm event, overland storm flow can pick up and
37 carry contaminants (e.g., soil or leaked motor oil) directly into Salado Creek and other receiving surface
38 waters within the installation, as well as the Edwards Aquifer. The proposed Lifestyle Center would be
39 built over the artisan zone of the Edwards Aquifer, where the recharge of water into the aquifer would
40 likely be less compared to the recharge of water that occurs in the Recharge Zone. The major concern is
41 the storm water runoff into Salado Creek and other surface water resources, which eventually flow over
42 the Recharge zone and provide recharge to the aquifer.

43 Construction activities that would occur during the construction of the proposed Lifestyle Center, such as
44 grading, excavating, and recontouring of the soil, would result in soil disturbance. This could lead to an
45 increase in contaminants in the storm water that could flow offsite during storm events. Long-term

operational activities associated with the Proposed Action have the potential to produce more nonpoint source pollution. Due to higher facility usage, there could be more cars onsite that could leak fuel or other pollutants. The Proposed Action could have short to long-term, minor adverse effects on surface and groundwater quality. In the event of a spill or leak of fuel or other construction-related products, adverse effects on the Edwards Aquifer are possible. Therefore, in the event of the spill there could be minor, adverse effects on surface water resources and groundwater within the Edwards Aquifer. Erosion and sediment control, storm water management, and spill prevention practices would be implemented and properly maintained to minimize potential for adverse effects on water resources.

The construction contractor would obtain all necessary construction permits and comply with the requirements and guidelines set forth in those permits. The Proposed Action would require an NPDES General Permit for Storm Water Discharge from Large Construction Activities. A site-specific Storm Water Pollution Prevention Plan would be prepared in association with the NPDES construction permit that includes BMPs to reduce the potential for soil erosion and prevent contaminant-laden storm water from leaving the construction site. The site-specific Storm Water Pollution Prevention Plan would be developed by the construction contractor as a bid requirement for the contract, and could include the following measures:

- Erosion control by stabilizing exposed soils, protecting steep slopes, and phasing construction
- Sediment control by installing perimeter controls, sediment trapping devices, and inlet protection
- Good housekeeping to include general construction site waste management, a spill prevention and control plan, and establishing appropriate vehicle maintenance and washing areas
- Adequate personnel training and documentation.

All construction equipment would be maintained according to the manufacturer's specifications to ensure it is in proper working order. All fuels and other potentially hazardous materials would be contained and stored appropriately. In the event of a spill, procedures identified in the Spill Prevention Control and Countermeasures Plan would be followed to quickly contain and clean up a spill. There remains the possibility that a spill or leak could occur, but implementation of the BMPs identified in the site-specific Storm Water Pollution Prevention Plan would minimize the extent of contamination. No water quality violations would be expected.

In addition to the NPDES general storm water permit for construction activities, FSH would need to coordinate with Bexar County for the implementation of storm water management BMPs that are consistent with each jurisdiction's municipal separate storm sewer system (MS4) permit and storm water management plan. The MS4 permit program requires development, implementation, and enforcement of a Storm Water Management Program for construction (i.e., building the proposed Lifestyle Center) as well as operations (i.e., parking lot spill management, trash bin management, storm water collection management).

Post-construction runoff control is accomplished using a variety of structural and nonstructural BMPs. Specific BMPs would be developed during the final design stage of construction and included in the appropriate permits. Structural BMPs could include combinations of the following:

- Construction of ponds (e.g., dry extended detention ponds, wet ponds)
- Infiltration practices (e.g., infiltration basin, infiltration trench, porous pavements)
- Filtration practices (e.g., bioretention, sand and organic filters)
- Vegetative practices (e.g., storm water wetland, grassed swales, grassed filter strip)

- Runoff pretreatment practices (e.g., catch basin, in-line storage, manufactured products for storm water inlets).

Nonstructural BMPs would be used in conjunction with structural BMPs. Good housekeeping and pollution prevention measures would be followed to minimize potential sources of pollution during operations. Existing pollution prevention measures would be used since the kinds of operations associated with the Proposed Action would be similar to ongoing activities.

Increase in Impervious Surfaces. The increase in impervious surfaces has the potential to decrease storm water quality and increase storm water quantity and flow velocity, particularly during large rain events. Overland storm flows can pick up contaminants and carry them directly into receiving water bodies. Large areas of impervious pavement that once were pervious soils increase the speed at which storm water leaves a site and enters drainage channels. If a stream channel cannot accommodate the increased volume of storm water, areas downstream can flood. In addition, prolonged increases in storm water volume and velocity associated with development and increased impervious surfaces has potential to impact adjacent streams as a result of bank and channel scour and stream bank modifications associated with the adjustment of the stream to the change in flow characteristics. An increase in impervious areas can also reduce the land that is available for groundwater recharge.

The Proposed Action would result in an increase of impervious surfaces. The retail facilities of the proposed Lifestyle Center would have a footprint of 651,000 ft² (14.9 acres). The facility would need approximately 3,255 parking spaces; therefore, the total parking lot size, including drive lanes and access roads, would be approximately 1,464,750 ft² (33.63 acres), based on the number of spaces and the industry standard multiplier of 450 square feet per parking space. It is assumed that all required parking and roadway surface would be newly constructed under the Proposed Action. In addition to the area taken up by retail space and parking and roadway surface, approximately 435,600 ft² (10 acres) would be used for sidewalks, pathways, courtyards, walking zones, and other elements required to tie the proposed Lifestyle Center together. The total square footage of the proposed Lifestyle Center is 2,551,350 ft² (58.5 acres). The retail facility at the current Lifestyle Center has a footprint of 209,603 ft² (4.8 acres). The parking and roadway surfaces add an area of 1,013,000 ft² (23.3 acres), making the total impervious surface of the current Lifestyle Center 1,222,603 ft² (28 acres). Therefore, it is anticipated that the overall increase in impervious surfaces under the Proposed Action would be 1,328,747 ft² (30.5 acres).

The proposed Lifestyle Center is not within the Salado Creek floodplain and construction of the AAFES Lifestyle Center at this site would not be expected to stimulate development within the floodplain. Although the increase in impervious surfaces of 1,328,747 ft² (30.5 acres) is an irretrievable adverse effect, this loss of recharge area for the Edwards Aquifer would not be significant. The installation is within the artisan zone of the Edwards Aquifer, not the contributing zone or transition zone where the majority of the Edwards Aquifer recharge takes place. The final destination of storm water runoff is Salado Creek, which is a tributary of the San Antonio River. The area is already heavily developed and an extensive storm water drainage system is in place around the proposed site and the installation. It is not anticipated that the increase in impervious surfaces will increase the risk of flooding significantly.

No Action Alternative

Under the No Action Alternative, the proposed Lifestyle Center would not be constructed, resulting in continuation of the existing condition. No effects on water resources would be expected.

4.6 Biological Resources

4.6.1 Definition of Resource

Biological resources include plants, animals, and the habitats in which they exist such as wetlands, forests, and grasslands. The biological resources of an area can be protected and sensitive. Protected and sensitive plants and animals can be listed as either endangered or threatened at the Federal or state level, candidate species for Federal listing, a species of special concern, or managed under conservation agreements or management plans. Habitats necessary to support listed species can also be proposed or designated as critical habitat.

Under the Endangered Species Act (ESA) (16 U.S.C. 1536), an endangered species is defined as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species likely to become an endangered species in the foreseeable future. Although candidate species receive no statutory protection under the ESA, the USFWS advises government agencies, industry, and the public that these species are at risk and might warrant protection under the ESA in the future. The ESA requires Federal agencies to provide documentation that ensures that agency actions would not adversely affect the existence of any federally threatened or endangered species. The ESA requires that all Federal agencies avoid “taking” threatened or endangered species, which includes jeopardizing threatened or endangered species habitat. Section 7 of the ESA directs all Federal agencies to use their existing authorities to conserve threatened and endangered species and, in consultation with the USFWS or National Marine Fisheries Service, as appropriate, to ensure that their actions do not jeopardize listed species or destroy or adversely modify critical habitat. Section 7 applies to management of Federal lands as well as other Federal actions that may affect listed species, such as Federal approval of private activities through the issuance of Federal permits, licenses, or other actions.

In 1973, the Texas legislature authorized the Texas Parks and Wildlife Department (TPWD) to establish a list of endangered animals in the state. TPWD regulations prohibit the taking, possession, transportation, or sale of any of the animal species designated by state law as endangered or threatened without the issuance of a permit. State laws and regulations prohibit commerce in threatened and endangered plants and the collection of listed plant species from public land without a permit issued by TPWD. In addition, some species listed as threatened or endangered under state law are also listed under Federal regulations. These animals are provided additional protection by the USFWS (TPWD 2007a).

The Migratory Bird Treaty Act (16 U.S.C. 703–712; 1997-Supp) and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, protect migratory birds and their habitats and establish a permitting process for legal taking. A migratory bird is defined by the USFWS as any species or family of birds that lives, reproduces, or migrates within or across international borders at some point during their annual life cycle. For normal and routine operations such as installation support functions, actions of the Department of Defense (DOD) may not result in pursuit, hunting, taking, capturing, killing, possession, or transportation of any migratory bird, bird part, nest, or egg thereof, except as permitted.

Wetlands are important natural systems and habitats that can support a diverse number of different species. Wetlands perform a number of important biological functions, some of which include water quality improvement, groundwater recharge, nutrient cycling, wildlife habitat provision, and erosion protection. Wetlands are protected as a subset of “the waters of the United States” under Section 404 of the CWA. The term “waters of the United States” has a broad meaning under the CWA and incorporates deepwater aquatic habitats and special aquatic habitats, including some wetlands. USACE defines wetlands as “those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs,

1 and similar areas” (33 CFR Part 328). The USACE has jurisdiction over wetlands that are determined to
 2 be jurisdictional under Section 404 of the CWA. Section 404 of the CWA authorizes the Secretary of the
 3 Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill
 4 materials into the waters of the United States, including jurisdictional wetlands. In addition, Section 404
 5 of the CWA also grants states with sufficient resources the right to assume these responsibilities. The
 6 USACE also makes jurisdictional determinations under Section 10 of the Rivers and Harbors Act of
 7 1899.

8 Section 401 of the CWA gives states and regional boards the authority to regulate through water quality
 9 certification any proposed federally permitted activity that could result in a discharge to water bodies,
 10 including wetlands. The state may issue certification with or without conditions, or deny certification for
 11 activities that might result in a discharge to water bodies.

12 EO 11990, *Protection of Wetlands*, requires that Federal agencies provide leadership and take actions to
 13 minimize or avoid the destruction, loss, or degradation of wetlands and to preserve and enhance the
 14 natural and beneficial values of wetlands. Federal agencies are to avoid new construction in wetlands,
 15 unless the agency finds there is no practicable alternative to construction in the wetland, and the proposed
 16 construction incorporates all possible measures to limit harm to the wetland.

17 **4.6.2 Description of Affected Environment**

18 FSH is in an urban setting and much of the land has been developed for military purposes. The proposed
 19 Lifestyle Center is planned for the central district area, a highly developed and disturbed area, which
 20 contains community support facilities including the PX, Commissary, gas stations, and gymnasium. San
 21 Antonio, Texas, has hot summers, with an average summer temperature of 95 degrees Fahrenheit. The
 22 winters are mild with a dozen subfreezing nights each year, and average annual precipitation is
 23 29.05 inches. Due to the high temperatures and low rainfall, water is one of the most important factors
 24 for biological resources that exist in the South Texas region (NWS 2009).

25 **Vegetation.** Approximately 30 percent of FSH is undeveloped. Undeveloped, natural areas are mainly
 26 along the floodplain of Salado Creek. The creek crosses through the eastern portion of the installation,
 27 running northeast to southeast, and is maintained as greenbelt in combination with an adjacent recreation
 28 park (FSH 2008c). Salado Creek is approximately 1 mile northeast of the proposed Lifestyle Center.

29 Vegetation at FSH is dominated primarily by maintained grasslands and vegetation typical of disturbed,
 30 developed areas within the San Antonio area. Vegetation in the undeveloped areas of the installation
 31 along Salado Creek includes grasslands dominated by little bluestem, (*Schizachyrium scoparium*) big
 32 bluestem (*Andropogon gerardii*), yellow Indian grass (*Sorghastrum nutans*), tall dropseed (*Sporobolus*
 33 *composites*, alt. *Sporobolus asper*), eastern gamagrass (*Tripsacum dactyloides*) and switchgrass (*Panicum*
 34 *virgatum*). Flora along Salado Creek includes asters (Asteraceae), prairie bluet (*Coenagrion angulatum*),
 35 prairie clovers (*Petalostemum purpureum*), and black-eyed Susan (*Rudbeckia hirta* L.). Trees along the
 36 undeveloped Salado Creek include bur oak (*Quercus macrocarpa*), Shumard’s oak (*Quercus shumardii*),
 37 sugar hackberry (*Celtis laevigata*), elm (*Ulmus* spp.), ash (*Fraxinus* spp.), eastern cottonwood (*Populus*
 38 *deltoids*), pecan (*Carya illinoensis*), juniper (*Juniperus ashei*), evergreen sumac (*Rhus virens*), common
 39 sotol (*Dasyilirion wheeleri* S. Watson), acacia (*Acacia* spp.), honey mesquite (*Prosopis glandulosa*), and
 40 ceniza (*Agave colorata*) (FSH 2007a).

41 The proposed Lifestyle Center site is almost entirely developed and does not contain native vegetation.
 42 Approximately 10 percent of the proposed Lifestyle Center is currently landscaped. A field dominated by
 43 nonnative grasses, such as King Ranch bluestem (*Bothriochloa ischaemum*), is on the southwestern side
 44 of the proposed Lifestyle Center.

1 **Wildlife.** Wildlife at FSH can be divided into species tolerant of urbanized areas and those that occur in
2 the floodplain of Salado Creek (FSH 2008c). Salado Creek supports a diverse bird fauna, including
3 nesting, migrating, and wintering species. A large number of waterfowl and other waterbirds are
4 expected to use the Salado Creek floodplain throughout the year. Common species observed during
5 winter months include the white-winged dove (*Zenaida asiatica*) and northern cardinal (*Cardinalis*
6 *cardinalis*). Fish species in the creek include bluegill (*Lepomis macrochirus*), largemouth bass
7 (*Micropterus salmoides*), and Rio Grande perch (*Cichlasoma cyanoguttatum*) (FSH 2007a). Mammals
8 such as armadillo (*Dasypus novemcinctus*), beaver (*Castor canadensis*), and opossum (*Didelphis*
9 *virginiana*) inhabit the floodplains of Salado Creek.

10 Fox squirrel (*Sciurus niger*), house sparrow (*Passer domesticus*), grackle (*Quiscalus* spp.), and American
11 robin (*Turdus migratorius*) are species that can be found in the urbanized areas of the installation
12 (FSH 2007a). These species are expected to occur at the proposed Lifestyle Center.

13 **Protected Species.** According to USFWS, 16 federally listed species (15 endangered, 1 threatened)
14 potentially occur in Bexar County (see **Appendix E**). No critical habitat occurs on the installation.

15 There are eight federally and state-listed threatened and endangered aquatic species residing in Comal and
16 Hays counties, Texas, which are sensitive to decreased spring flow and water level within the Edwards
17 Aquifer and therefore could be indirectly affected by the water withdrawal associated with the Proposed
18 Action (see **Table 4-9**) (USFWS 2008). The Comal Springs dryopid beetle (*Stygoparnus comalensis*),
19 Comal Springs riffle beetle (*Heterelmis comalensis*), fountain darter (*Etheostoma fonticola*), San Marcos
20 salamander (*Eurycea nana*), San Marcos gambusia (*Gambusia georgei*), and the Texas wild-rice (*Zizania*
21 *texana*) require habitat provided by the San Marcos and Comal Springs in the artesian zone of the
22 Edwards Aquifer (50 miles and 30 miles northwest of FSH, respectively). The Texas blind salamander
23 (*Eurycea rathbuni*) and Peck's cave amphipod (*Stygobromus pecki*) have habitat in water-filled
24 underground caves within the artesian zone of the Edwards Aquifer at the headwaters of Comal Springs,
25 San Marco Springs, and Hueco Springs, which flow into the Guadalupe River. Critical habitat for these
26 species does not occur on FSH (FSH 2007a).

27 Increases in water withdrawal caused by human population growth could lead to the lowering of the water
28 level within the Edwards Aquifer, which could in turn lead to the reduction of flow at springs, such as
29 Comal and San Marcos springs. The flow of these springs is intimately tied to the water usage over the
30 entire Edwards Aquifer region. Increase in water withdrawal would also affect the water level within the
31 caves of the Edwards Aquifer. Species that inhabit these caves are in danger of loss of habitat if water
32 levels within the aquifer drop too low. Other threats associated with increased urbanization include
33 increased flooding and erosion, pollution, siltation, and storm water runoff, which could degrade the
34 quality of these species' critical habitat (Campbell 2003). Also, increased introduction of nonnative
35 species is a threat because they can destroy aquatic vegetation, prey on endangered animals, or compete
36 with them for food (TPWD 2009b). See **Section 4.5** for detail regarding the hydrology of the Edwards
37 Aquifer.

38 The TPWD listed 20 species in Bexar County as state threatened or endangered (TPWD 2009a). Two
39 fish species listed as threatened by TPWD in Bexar County, the widemouth blindcat (*Satan euryotomus*)
40 and the toothless blindcat (*Trogloglanus pattersoni*), might be present near FSH (FSH 2007a). Both of
41 these species are blind catfish that live entirely in the dark parts of caves in the Edwards Aquifer and are
42 endemic to five artesian wells in the San Antonio pool of the Edwards Aquifer, in the southern and
43 eastern portions of San Antonio, Bexar County (TPWD 2009a). A decrease in the water levels within
44 these five artesian wells, which might be caused by increased water withdrawal, will lead to a loss of
45 habitat for both these species (Texas State Biology 2007a, Texas State Biology 2007b).

Table 4-9. Threatened and Endangered Edwards Aquifer Species

Common Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Habitat and Life History
Comal Springs dryopid beetle	<i>Stygoparnus comalensis</i>	Endangered	Endangered	Not likely to adversely affect	The beetles live primarily in flowing, uncontaminated waters and crawl along and cling to objects on the bottom of streams. These beetles do not swim. The Comal Springs dryopid beetle is known from Comal Springs and Fern Bank springs in Hays County, Texas.
Comal Springs riffle beetle	<i>Heterelmis comalensis</i>	Endangered	Endangered	Not likely to adversely affect	The beetle has critical habitat designated at the headwaters of the Comal and San Marcos springs, in Comal and Hays counties, Texas.
Fountain darter	<i>Etheostoma fonticola</i>	Endangered	Endangered	Not likely to adversely affect	Fountain darters require clean, spring-fed waters with bottom vegetation. They are most often found in mats of filamentous green algae, in the quiet and flowing parts of the river. Only two populations exist in the world. The critical habitat for this species is in the San Marcos and Comal River headwaters in Hays and Comal counties, Texas. Small aquatic invertebrates form the fountain darter's diet. Females lay eggs year-round. Their lifespan is 1–2 years. Fountain darters are endangered because there is less water flowing from the springs now than in the past. Human population growth and increased use of groundwater in the area have caused decreased flow from the springs, especially in years of low rainfall.
San Marcos salamander	<i>Eurycea nana</i>	Threatened	Threatened	Not likely to adversely affect	The San Marcos salamander is endemic to the San Marcos River in Hays County, Texas. Critical habitat for the San Marcos salamander is designated as Spring Lake and approximately 50 meters downstream in the San Marcos River, approximately 50 miles northwest of the FSH installation. Moss and algae provide hiding places for the salamanders and habitat for small animals that serve as their food. Clean, clear, flowing water of constant temperature is required for suitable habitat. It eats tiny aquatic crustaceans, aquatic insects, and snails. Females lay eggs singly or in small groups, eggs are attached to plants or under rocks.

Common Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Habitat and Life History
San Marcos gambusia	<i>Gambusia georgei</i>	Endangered	Endangered	Not likely to adversely affect	The critical habitat for the San Marcos gambusia is spring water at headwaters of the San Marcos River in Hays County, Texas. The San Marcos gambusia was last collected in the wild in 1983. It is one of the rarest animals of the San Marcos River, and might already be extinct. Reduced spring flow and water pollution from nearby population growth are the major threats to the San Marcos gambusia.
Texas wild-rice	<i>Zizania texana</i>	Endangered	Endangered	Not likely to adversely affect	Texas wild-rice is an aquatic perennial grass. Critical habitat for Texas wild-rice occurs in the upper 2 miles of the San Marcos River, Hays County, Texas. This plant is endangered due to a reduction in water quality and habitat from urbanization and increased recreational use. Nutria, a nonnative rodent that lives in wetland areas, is also a threat to Texas wild-rice because it eats the wild-rice.
Texas blind salamander	<i>Eurycea rathbuni</i>	Endangered	Endangered	Not likely to adversely affect	The Texas blind salamander lives in water-filled caves of the Edwards Aquifer near San Marcos, Hays County, Texas. The salamander hunts tiny snails, shrimp, and other aquatic invertebrates by sensing water pressure waves created by prey in the still underground waters. It is unknown how many exist. The Texas blind salamander depends on a constant supply of clean, cool water from the Edwards Aquifer. Pollution and overuse of water caused by the growth of cities threaten its survival. No critical habitat is designated for the Texas blind salamander.
Peck's cave amphipod	<i>Stygobromus pecki</i>	Endangered	Endangered	Not likely to adversely affect	This small, aquatic, crustacean has critical habitat designated as underground water-filled caves at Comal Springs and Hueco Springs in Comal County, Texas, approximately 35 miles northeast of FSH.

1 Sources: Eckhardt 2009b, TPWD 2009b, USFWS 1980, TPWD 2009c, TPWD 2009d, TPWD 2009e, USFWS 2007, TPWD 2009f, USFWS 2009

1 **Wetlands.** In 1999, USFWS conducted a wetland survey within FSH (FSH 2007a). Fifteen wetlands
2 were identified totaling 22 acres, less than 1 percent of the land area of the installation. However, no
3 wetlands are within the immediate vicinity of the Proposed Action. The closest wetland is approximately
4 1 mile northeast from the proposed Lifestyle Center.

5 **4.6.3 Environmental Consequences**

6 **Evaluation Criteria**

7 The significance of effects on biological resources is based on the following:

- 8 • Importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource
- 9 • Proportion of the resource that would be affected relative to its occurrence in the region
- 10 • Sensitivity of the resource to proposed activities
- 11 • Duration of ecological effects.

12 A habitat perspective is used to provide a framework for analysis of general classes of effects (i.e.,
13 removal of critical habitat, noise, human disturbance).

14 Ground disturbance and noise associated with construction activities might directly or indirectly cause
15 potential adverse effects on biological resources. Effects from ground disturbance were evaluated by
16 identifying the types and locations of potential ground-disturbing activities in correlation to important
17 biological resources. Mortality of individuals, habitat removal, and damage or degradation of habitats
18 might be effects associated with ground-disturbing activities.

19 To evaluate the effects of noise, considerations were given to the number of individuals or critical species
20 involved, amount of habitat affected, relationship of the APE to total available habitat within the region,
21 type of stressors involved, and magnitude of the effects.

22 **Proposed Action**

23 The proposed Lifestyle Center would include approximately 651,000 ft² (14.9 acres) of new and
24 replacement retail, dining, and entertaining space. The facility would need approximately 3,255 parking
25 spaces, following the industry standard that states that there should be five parking spaces per every
26 1,000 ft² of the retail center. Therefore, the total parking lot size, including drive lanes and access roads,
27 would be approximately 1,464,750 ft² (33.63 acres), based on the number of spaces and the industry
28 standard multiplier of 450 ft² per parking space. It is assumed that all required parking and roadway
29 surfaces would be newly constructed under the Proposed Action. In addition to the area taken up by retail
30 space, parking, and roadway surface, approximately 435,600 ft² (10 acres) would be used for sidewalks,
31 pathways, courtyards, walking zones, and other elements required to tie the proposed Lifestyle Center
32 together. The total square footage of the proposed Lifestyle Center is 2,551,350 ft² (58.5 acres).

33 The retail facility at the current shopping center has a footprint of 209,603 ft² (4.8 acres). The parking
34 and roadway surfaces add a square footage of 1,013,000 ft² (23.3 acres). The total square footage of the
35 existing shopping center is 1,222,603 ft² (28 acres). Therefore, it is anticipated that the overall increase in
36 footprint would be 1,328,747 ft² (30.5 acres).

37 Implementing the Proposed Action would result in direct and indirect, short- and long-term, negligible to
38 minor, adverse effects on biological resources within or adjacent to FSH. All construction activities
39 would occur within developed and urbanized portions of the installation and water withdrawal increase is
40 projected to be minimal; therefore, no substantial effects on biological resources would be expected.

1 **Vegetation.** The proposed Lifestyle Center is within an urban setting that does not contain native
2 vegetation. No native vegetation or undeveloped land would be affected by the Proposed Action.
3 Approximately 2 acres of landscaped vegetation, including undeveloped grassland field, would be
4 permanently lost as a result of construction of the buildings and parking lots associated with the Proposed
5 Action. Climate-appropriate landscaping would be used for the proposed Lifestyle Center. Direct, long-
6 term, minor, adverse impacts on vegetation would occur as a result of the Proposed Action.

7 **Wildlife.** Noise created during construction and renovation activities would result in short-term, direct
8 and indirect, adverse effects on wildlife that utilize the installation. These effects would include subtle,
9 widespread effects from the overall elevation of ambient noise levels during construction. This would
10 result in reduced communication ranges, interference with predator/prey detection, or habitat avoidance.
11 More intense effects would include behavioral change, disorientation, or hearing loss. Predictors of
12 wildlife response to noise include noise type (i.e., continuous or intermittent), prior experience with noise,
13 proximity to a noise source, stage in the breeding cycle, activity, age, and sex composition. Prior
14 experience with noise is the most important factor in the response of wildlife to noise, because wildlife
15 can become habituated to the noise. The rate of habituation to short-term construction is not known, but
16 the proposed construction activities would occur in an area where there is currently a medium level of
17 ambient noise (e.g., PX, PXtra, and Commissary). Wildlife that occurs in the proposed Lifestyle Center
18 is assumed to be tolerant of urbanization and is therefore expected to be habituated to the noises
19 associated with urbanization. Wildlife could be permanently displaced from the areas where the habitat is
20 cleared and temporarily dispersed from areas adjacent to the proposed Lifestyle Center during
21 construction periods; however, no native, undeveloped, irreplaceable lands would be affected as a result
22 of the Proposed Action. Direct and indirect impacts on wildlife and migratory bird habitat would be
23 negligible.

24 **Protected Species.** Noise created during construction and renovation activities could result in direct and
25 indirect, short-term, adverse effects on migratory birds, if present at the time of construction. The effects
26 would include subtle, widespread effects from the overall elevation of ambient noise levels during
27 construction. This would result in reduced communication ranges, interference with predator/prey
28 detection, or habitat avoidance. More intense effects would include behavioral change, disorientation, or
29 hearing loss. Predictors of wildlife response to noise include noise type (i.e., continuous or intermittent),
30 prior experience with noise, proximity to a noise source, stage in the breeding cycle, activity, age, and sex
31 composition. Prior experience with noise is the most important factor in the response of wildlife to noise,
32 because wildlife can become habituated to the noise. The rate of habituation to short-term construction is
33 not known, but the proposed construction activities would occur in an area where there is currently a
34 medium level of ambient noise (e.g., the existing shopping center). Because migratory birds are transient
35 visitors to FSH, effects are not expected to be widespread or intense; a few individuals could be
36 displaced. No permanent displacement is expected. Direct and indirect impacts on migratory birds are
37 expected to be negligible.

38 The Proposed Action would have a negligible effect on threatened and endangered species that live in the
39 springs or within the caves of the Edwards Aquifer and species that use the aquifer as their primary source
40 of water. The Proposed Action is expected to result in a 3,259,450-gallon annual increase in water usage
41 from the Edwards Aquifer. The increase in water withdrawal as a result of the Proposed Action is
42 0.34 percent of the projected maximum annual water withdrawal for CY 2006–2011 and would be
43 considered negligible. Additionally, a negligible amount of water would be used during construction for
44 dust suppression. See **Section 4.5** for detailed discussion on increases in water withdrawal and the
45 associated impacts on the aquifer.

46 Increases in water withdrawal can lead to the lowering of the water level within the aquifer, causing the
47 reduction of flow at springs, such as the Comal and San Marcos springs, and reduction in the water-level

1 of subterranean caves. Reduction in spring flow would lead to the degradation of the subterranean and
2 spring aquatic habitats of threatened and endangered Edwards Aquifer species. However, these short-
3 term and long-term negligible increases in water withdrawal associated with the Proposed Action are
4 expected to have a localized effect on Edwards Aquifer. Therefore, the Proposed Action may affect, but
5 not likely to adversely affect threatened and endangered species that live in the springs or within the caves
6 of the Edwards Aquifer and species that use the aquifer as their primary source of water.

7 Possible increases in storm water runoff contaminants, due to the expected increase in utilization of the
8 proposed Lifestyle Center (e.g., parking lots) could cause indirect, long-term, minor, adverse effects on
9 the recharge water of the Edwards Aquifer. The limestone aquifer is very permeable and no filtering of
10 recharging water occurs before it becomes part of the Edwards Aquifer groundwater. However, erosion
11 and sediment control and storm water management practices would be developed and implemented
12 consistent with the *Storm Water Management Plan for Fort Sam Houston Bexar County, Texas*
13 (FSH 2008b). This would minimize the potential for adverse effects on recharge water associated with
14 runoff from the proposed Lifestyle Center.

15 **Wetlands.** No direct impacts on wetlands would be expected. There are no wetlands within the
16 immediate vicinity of the proposed Lifestyle Center. The closest wetland is approximately 1 mile from
17 the proposed Lifestyle Center. Indirect, long-term, minor, adverse effects on wetlands could occur as
18 result of increase in the volume and velocity of runoff from the proposed Lifestyle Center. However,
19 erosion and sediment control and storm water management practices would be developed and
20 implemented consistent with *Storm Water Management Plan for Fort Sam Houston Bexar County, Texas*
21 (FSH 2008b). Potential for adverse effects on adjacent wetlands associated with runoff from the proposed
22 Lifestyle Center would be minimized.

23 **No Action Alternative**

24 Under the No Action Alternative, FSH would not carry out the Proposed Action and existing conditions
25 would continue; therefore, there would be no effects on biological resources as a result of the No Action
26 Alternative.

27 **4.7 Cultural and Architectural Resources**

28 **4.7.1 Definition of the Resource**

29 “Cultural resources” is an umbrella term for many heritage-related resources defined in a number of
30 Federal laws and executive orders. These include the NHPA (1966), the Archeological and Historic
31 Preservation Act (1974), the American Indian Religious Freedom Act (1978), the Archaeological
32 Resources Protection Act (1979), and the Native American Graves Protection and Repatriation Act
33 (NAGPRA) (1990).

34 The NHPA focuses on cultural resources such as prehistoric and historic sites, buildings and structures,
35 districts, or any other physical evidence of human activity considered important to a culture, a subculture,
36 or a community for scientific, traditional, religious, or other reason. Such resources might provide insight
37 into the cultural practices of previous civilizations or they might retain cultural and religious significance
38 to modern groups. Resources that are judged to be important under the NHPA are determined eligible for
39 or listed in the National Register of Historic Places (NRHP). They are termed “historic properties” and
40 are provided some level of protection under the NHPA.

1 NAGPRA requires consultation with culturally affiliated Native American tribes for the disposition of
2 Native American human remains, burial goods, and cultural items recovered from Federal or federally
3 controlled lands.

4 Typically, cultural resources are subdivided into archeological resources (prehistoric or historic sites
5 where human activity has left physical evidence of that activity but no structures remain standing);
6 architectural resources (buildings or other structures or groups of structures, or designed landscapes that
7 are of historic or aesthetic significance); and resources of traditional, religious, or cultural significance to
8 Native American tribes.

9 *Archeological resources* comprise areas where human activity has measurably altered the earth or
10 deposits of physical remains are found (e.g., projectile points and bottles).

11 *Architectural resources* include standing buildings, bridges, dams, and other structures of historic or
12 aesthetic significance. Generally, architectural resources must be more than 50 years old to be considered
13 for the NRHP. More recent structures, such as Cold War-era resources, might warrant protection if they
14 are of exceptional importance or if they have the potential to gain significance in the future.

15 *Historic Landscapes* include elements such as lighting, mature tree rows, parade fields, and other open
16 spaces.

17 *Resources of traditional, religious, or cultural significance to Native American tribes* can include
18 archeological resources, sacred sites, structures, neighborhoods, prominent topographic features, habitat,
19 plants, animals, and minerals that Native Americans consider essential for the preservation of traditional
20 culture.

21 The EA process requires assessment of the potential impact of a Federal action on cultural resources. In
22 addition, under Section 106 of the NHPA, Federal agencies are to take into account the effect of their
23 undertakings on historic properties and to afford the ACHP an opportunity to comment. In lieu of the
24 Section 106 process and as discussed in **Section 1.5.1**, Alternate Procedures stand in place of the
25 procedures for project review set forth in 36 CFR Part 800, Subpart B. After consultation with
26 SHPOs and Federally recognized Native American Tribes and interested parties, the U.S. Army
27 submitted, and the ACHP approved, the U.S. Army's Alternate Procedures (AAP). The AAP were
28 published in the Federal Register at Volume 67, Number 44, p. 11038.

29 The AAP authorizes U.S. Army installation commanders to develop a Historic Property Component
30 (HPC) to the installation's Integrated Cultural Resources Management Plan (ICRMP). FSH's HPC, dated
31 November 2005, serves as the installation's Section 106 compliance agreement for a five-year period.
32 The installation's Section 106 compliance responsibilities are met through internal installation
33 implementation of the HPC rather than case-by-case, formalized, external review of individual
34 undertakings as presently required by 36 CFR Part 800.

35 **4.7.2 Description of the Affected Environment**

36 FSH was established in 1845 as a U.S. Army post in San Antonio for use as a base of operations during
37 the Mexican War (1846–1848) and for protection from local Native American groups. Shortly after the
38 Mexican War, San Antonio became the headquarters of the U.S. Army Eighth Military District
39 (FSH 2008a).

40 By 1914, the 600-acre Army post became the largest in the United States. After World War I, a new
41 phase of construction was ushered in to replace many of the World War I-era temporary buildings that

1 were in poor condition. Many of the new buildings including an Infantry Regimental Headquarters, an
2 Infantry Battalion Barracks, and the Field Artillery Barracks were constructed in the distinctive Spanish
3 mission style. Land acquisition and new construction continued during the period between World Wars I
4 and II and dramatically increased during World War II with the construction of more than 400 barracks
5 and other temporary buildings (FSH 2008a).

6 After World War II, the primary function of FSH was redirected to that of a medical mission and soon
7 after, during the Korean Conflict, the Medical Replacement Training Center was reactivated, later
8 renamed the Medical Training Center at BAMC. Since then, numerous support buildings have been
9 constructed, such as school buildings for military dependents, a swimming pool complex, Child Support
10 Service Center, Youth Center, Army Reserve Center and Army Reserve Maintenance Shop, museum,
11 cafeteria, and gas station (FSH 2008a).

12 Within the 2,940 acres that compose FSH, 41 cultural resources investigations and related studies have
13 been completed. These include 13 archeological investigations, 7 architectural surveys, 3 cultural
14 resources management plans, 2 landscape inventories, 1 cultural affiliation study, 17 historic context
15 studies, and 7 properties nominated to the NRHP (FSH 2008a).

16 **Archeological Resources**

17 To date, 12 archeological sites have been recorded within undisturbed lands at FSH (see **Table 4-10**). Of
18 these, seven contain prehistoric cultural components, one contains an historic cultural component, and one
19 contains a military-era cultural component. Three sites are multicomponent sites of which two contain
20 historic and prehistoric cultural components and one contains historic and military-era cultural
21 components. Ten sites have been determined ineligible through consultation with the SHPO, while two
22 potentially eligible sites, 41BX1209 and 41BX1407, were subjected to further evaluation through
23 archeological testing. These sites were also determined ineligible through consultation with the SHPO.
24 These sites are located a distance from the proposed Lifestyle Center. No archeological sites have been
25 identified within or near the proposed Lifestyle Center area.

26 **Architectural Resources**

27 The systematic inventory and assessment of architectural resources at FSH began in 1974 and has
28 continued to the present. In 1975, the National Park Service designated 103 buildings at FSH as
29 contributing elements to a National Historic Landmark District (NHLD) (see **Figure 4-2**). Historic
30 properties from the Quadrangle, Staff Post, Infantry Post, and Calvary and Artillery Post are included in
31 the NHLD. In 2002, a National Historical Conservation District (NHCD) was designated to encompass
32 the New Post Area, an extensive portion of FSH that was developed during the 1920s and 1930s. The
33 NHCD has been determined eligible for inclusion in the NRHP (FSH 2008a).

34 Of the 1,427 buildings and structures inventoried at FSH, 723 NRHP-eligible architectural resources have
35 been identified. Most are located within the NHLD and the NHCD and date from the 1880s to the end of
36 World War II. These include 257 contributing properties in the NHLD and 425 NRHP-eligible properties
37 in the NHCD. In addition, five buildings are individually listed in the NRHP:

- 38 • Quadrangle (Building 16)
- 39 • Clock Tower (Building 40)
- 40 • Pershing House (Building 6)
- 41 • Gift Chapel (Building 2200)
- 42 • Old BAMC (Building 1000).

1

Table 4-10. Archeological Sites at Fort Sam Houston

Site No.	Components	Description	NRHP Historic	NRHP Prehistoric	Recommendations
BX0194	Prehistoric	Camp	N/A	Not eligible	No further work
BX0389	Prehistoric	Camp	N/A	Not eligible	No further work
BX0422	Prehistoric	Scatter	N/A	Not eligible	No further work
BX0778	Historic and Military era	Farmstead Foxholes	Not eligible	N/A	No further work
BX0779	Military	Refuse Dump	Not eligible	N/A	No further work
BX0780	Prehistoric	Scatter	N/A	Not eligible	No further work
BX0880	Prehistoric and Historic	Scatter	Not eligible	Not eligible	No further work
BX1209	Prehistoric	Scatter	N/A	Not eligible	No further work
BX1405	Prehistoric	Scatter	N/A	Not eligible	No further work
BX1406	Prehistoric	Scatter	N/A	Not eligible	No further work
BX1407	Prehistoric and Historic	Scatter	Not eligible	Not eligible	No further work
BX1408	Historic	Refuse Dump	Not eligible	N/A	No further work

Source: FSH 2008a

2 The proposed site for the Lifestyle Center is bounded by Henry T. Allen Road to the north, Wilson Street
3 to the south, Shafter Road to the east, and parts of Scott Road and Camp Travis Road to the west. Eight
4 buildings are within the footprint of the proposed Lifestyle Center (see **Figure 4-2** and **Table 4-11**). Of
5 these, seven (Buildings 330, 331, 350, 372, 2400, 2401, and 2540) are within the NHCD. One building,
6 the Post Exchange (Building 2420) built in 1971, is situated in the northern portion of the proposed
7 Lifestyle Center and just outside NHCD. Building 2420 has been determined NRHP-ineligible through
8 consultation with the SHPO. Building 330, a laundry facility built in 1922, and Building 372, a
9 Commissary built in 1934, are NRHP-eligible under Criteria A and C. It should be noted that Building
10 330 has been completely demolished due to the presence of hazardous materials. Plans for the demolition
11 of the building, however, were carried out in accordance with consultation and Memorandum of
12 Agreement with the SHPO (Brigham 2009). The remaining buildings have been inventoried and
13 determined NRHP-ineligible through consultation with the SHPO, while the final building is of very
14 recent construction and consists of a Popeye's Chicken/Godfather's Pizza restaurant.

15 In order to assess potential visual impacts on nearby or adjacent historic buildings or landscapes, a visual
16 APE was established (see **Figure 4-2**) and all architectural resources within an approximate one-eighth-
17 (0.125) mile radius of the proposed Lifestyle Center were identified. To the east, the APE extends along
18 Road No. S-1100, which also forms the eastern boundary of the Conservation District. The area east of
19 the proposed Lifestyle Center is primarily composed of multiple rows of single-story, noncommissioned
20 officer (NCO) family housing. The APE's northern boundary was established along Schofield Road.
21 This portion of the APE contains NCO quarters to the east, infantry quarters, consisting of three-story
22 barracks, to the west; and a large two-block area situated outside the boundaries of the Conservation
23 District and between the areas of military housing. To the northwest, the APE is bounded by Stanley
24 Road which extends along the eastern and southern boundary of the parade grounds. The boundary of the
25 APE then extends south along the FSH corner boundary. Buildings in this area consist of a gym, post
26 office, dental clinic, laboratory, and administrative buildings. The southern portion of the APE extends
27 along portions of the southern boundary of FSH and Parker Road and is largely composed of large
28 warehouse and operations facility buildings outside the Conservation District.

1



Sources: Base Data, Historic Structures, and Historic Districts: Fort Sam Houston 2009; Proposed AAFES Lifestyle Center Site and Architectural APE: e*MI, Inc. 2009.

Figure 4-2. Architectural Resources within Area of Potential Effect of Proposed Lifestyle Center

2
3

1 **Table 4-11. Buildings Within the Footprint of the Proposed AAFES Lifestyle Center**

Building No.	Historic Use	Date of Construction	Property Type	NRHP Status
330*	Laundry	1922	Service and support	Eligible – Significant Criteria A & C
331	Retail store	1991	Base operations support	Ineligible; lacks exceptional Significance
350	Retail store	1991	Base operations support	Ineligible; lacks exceptional Significance
372	Commissary	1934	Service and support	Eligible – Significant Criteria A & C
2400	Bakery	1947	Base operations support	Ineligible
2401	Pharmacy	1990	Base operations support	Ineligible; lacks exceptional Significance
2420	Exchange Main Retail Store	1971	Shops	Ineligible; lacks exceptional Significance
2540	Exchange Cafeteria	1987	Base operations support; Recreation	Ineligible; lacks exceptional Significance
N/A	N/A	Modern	Restaurant	None

Source: FSH 2008a

Note: *Building 330 is no longer standing.

2 Within the visual APE, 135 architectural resources are identified including 104 NCO houses, 14 detached
3 car garages, 6 warehouses, 2 hospital facilities, 2 retail stores, and 1 of each of the following: cold
4 storage plant, commissary, maintenance shop, morgue, post office, post prison, and a motor vehicle repair
5 shop (see **Appendix D**). All have been determined NRHP-eligible through consultation with the SHPO.

6 **Historic Landscapes**

7 Three historic landscape studies have been undertaken at FSH. The first was the 1996 U.S. Army
8 Construction Engineering Research Laboratories (USACERL) study designed to establish the methods
9 and guidelines for considering historic landscapes on military installations. The historic development of
10 FSH was examined in this study and several historic military landscapes were identified including the
11 Quadrangle, Staff Post, Infantry Post, Calvary and Artillery Post, and New Post. The 1997 historic
12 landscape study identified 14 historic landscape features associated with the design and function of FSH,
13 13 of which were considered potentially eligible for inclusion in the NRHP. Historic landscape
14 components as identified by the 1997 historic landscape study are presented in **Table 4-12**.
15 Miscellaneous landscape components were also identified in the 1997 CRMP and required further
16 consideration to determine NRHP-eligibility status.

17 Finally, USACERL completed a Historic Landscape Master Plan in 1999. The Landscape Plan was
18 designed for the following reasons:

- 19 • To guide future landscape planning in order to protect the historic fabric of the fort
- 20 • To help preserve the historic landscape character at Fort Sam Houston
- 21 • To enhance the public and military image
- 22 • To improve quality of life
- 23 • To conserve water through proper landscape practices.

1

Table 4-12. Historic Landscapes

Landscape Component	Eligibility Recommendation	Date Constructed
Quadrangle	Eligible	1876–1946
Staff Post	Eligible	1881–1946
Infantry Post	Not Eligible	1885–1946
Cavalry/Light Artillery Post	Eligible	1906–1946
Channel Pastures	Eligible	1875–1946
New Post	Eligible	1926–1946
Gorgas Circle	Eligible	1930s–1946
Depot	Eligible	1917–1946
NCO Housing	Eligible	1930s–1946
Golf Course	Eligible	1930s–1946
National Cemetery	Eligible	1931–1946

Source: FSH 2008a

2 While no historic landscapes have been formally nominated, 13 were recommended eligible for inclusion
3 in the NRHP and are considered NRHP-eligible by FSH (FSH 2008a). Under the AAP Plan, the FSH
4 Historic Landscape Management Plan will continue to be employed along with National Park Service
5 Preservation Briefs and the *Secretary of the Interior's Standards for the Treatment of Historic Properties*
6 (36 CFR § 68) (FSH 2008a).

7 A large portion of the proposed Lifestyle Center lies within the New Post area, which is designated a
8 NHCD and is also recognized as an NRHP- Historic Landscape. The New Post represented a major phase
9 of expansion (1918–1939) at FSH that was initially undertaken to replace the temporary World War I-era
10 facilities of Camp Travis. The completion of the New Post was later driven through involvement with
11 Federal public works projects and the need to prepare for possible war in Europe. The architects and
12 planners of the New Post integrated the principles of the City Beautiful Movement with the Spanish
13 mission style of architecture. As part of the planning for the New Post, military wives were surveyed for
14 preferences in family housing which resulted in the design and construction of single-family, Spanish
15 mission-style bungalows. Trees and shrubs were also planted to complement the new buildings and
16 nurseries were established and work crews were formed during the Great Depression to maintain the
17 grounds and older buildings at the post (FSH 1996; FSH 1999a).

18 The primary components of the New Post include the extension of the parade grounds, infantry barracks
19 on the southern and eastern sides of the parade ground, and officers' quarters on the northern and western
20 sides. Finally, NCO quarters were constructed along a peninsula-like alignment east of the parade
21 grounds (see **Figure 4-2**).

22 **Resources of Traditional, Religious, or Cultural Significance to Native American Tribes**

23 At present, no Traditional Cultural Properties studies have been undertaken within FSH. There are no
24 known Traditional Cultural Properties within or near the proposed Lifestyle Center site.

1 **4.7.3 Environmental Consequences**

2 **Evaluation Criteria**

3 Adverse impacts on cultural resources can include physically altering, damaging, or destroying all or part
4 of a resource; altering characteristics of the surrounding environment that contribute to the resource's
5 significance; introducing visual or audible elements that are out of character with the property or that alter
6 its setting; neglecting the resource to the extent that it deteriorates or is destroyed; or the sale, transfer, or
7 lease of the property out of agency ownership (or control) without adequate legally enforceable
8 restrictions or conditions to ensure preservation of the property's historic significance.

9 **Proposed Action**

10 For this Proposed Action, the most relevant potential effects on cultural resources would be related to the
11 potential visual impacts on nearby or adjacent historic buildings and landscapes if the new facility is not
12 sited and designed in a manner compatible with the historic buildings and landscape.

13 The Proposed Action involves the construction of approximately 651,000 ft² of new retail space and
14 approximately 1,464,750 ft² of parking including drive lanes and access roads. No historic properties
15 would be demolished or affected by the Proposed Action. Although the current design for the proposed
16 Lifestyle Center is conceptual, it is not expected that that any historic properties at FSH would be
17 impacted given the current design. Architecture of the proposed Lifestyle Center would be designed for
18 compatibility with the existing historic architectural context of FSH.

19 Currently only Building 372, the Commissary, is a NRHP-eligible historic property within the footprint of
20 the proposed Lifestyle Center. However, given the current design, Building 372, would be preserved and
21 incorporated into the overall design of the proposed Lifestyle Center. A second architectural resource,
22 Building 330, the laundry facility, was completely demolished. As such, significant impacts would not
23 occur on Building 330 as it is no longer standing. No previously recorded archeological sites are known
24 to occur within the footprint of the project area or within the established architectural APE.

25 The design for the new PX is expected to be less than two stories in height, the tallest of the new
26 buildings that are proposed for construction as part of proposed Lifestyle Center. The remaining new
27 buildings, under the current plan, are expected to employ single-story designs (McDonald 2009). Given
28 these design plans, it is not expected that significant visual impacts would occur that would be
29 inconsistent with the historic character of the NHCD at FSH.

30 The proposed Lifestyle Center would be constructed by private developers under a public-private venture
31 scenario. AAFES would enter into leases with desirable tenants, which would provide more flexibility
32 than traditional concessions contracts. It is assumed that AAFES would register the proposed Lifestyle
33 Center with the U.S. Green Building Council according to the USACE Engineering and Construction
34 Bulletin dated 25 September 2008 (USACE 2008). The public-private venture developer would be
35 required to integrate LEED features to the maximum extent possible throughout the design and
36 construction phases. These features could lessen potential impacts through the use of energy- and
37 water-efficient building techniques and equipment, the use of recycled materials, and the avoidance or
38 enhancement of existing environmental features of the proposed site.

39 Examples of LEED design principles include adapting low-impact design storm water collection and
40 treatment structures that integrate into the landscape and recycle water back to groundwater; finding uses
41 for recycled water such as fountains or irrigation systems; maintaining the maximum amount of open
42 space feasible; surveying, marking, and retaining older, desirable trees on site, where feasible; and using

1 solar or other alternative energy sources. Also, FSH would require the use of xeric and native landscape
2 design throughout the grounds at the proposed Lifestyle Center. Overall, these principles are consistent
3 with the recommendations outlined in the Historic Landscape Master Plan at FSH; therefore, no
4 significant impacts on historic landscapes at FSH would be expected.

5 **No Action Alternative**

6 Under the No Action Alternative, the construction of the proposed Lifestyle Center would not occur.
7 Baseline conditions for cultural resources as described in **Section 4.7.2** would remain unchanged.
8 Therefore, no significant impacts on cultural resources would occur as a result of the implementation of
9 the No Action Alternative.

10 **4.8 Socioeconomic Resources and Environmental Justice**

11 **4.8.1 Definition of the Resource**

12 **Socioeconomics.** Socioeconomics are defined as the basic attributes and resources associated with the
13 human environment, particularly population levels and economic activity. Factors that describe the
14 socioeconomic environment represent a composite of several interrelated and nonrelated attributes. There
15 are several factors that can be used as indicators of economic conditions for a geographic area, such as
16 average educational attainment, personal income, employment/unemployment rates, percentage of
17 residents living below the poverty level, employment by business sector, and cost of housing. Data on
18 employment can identify gross numbers of employees, employment by industry or trade, and
19 unemployment trends. Data on personal income in a region can be used to compare the before and after
20 effects of any jobs created or lost as a result of a proposed action. Data on industrial, commercial, and
21 other sectors of the economy provide baseline information about the economic health of a region. After
22 the project the same data can be gathered again to analyze any impacts from the proposed action to the
23 economic health of the region.

24 The Proposed Action has the greatest potential to affect the construction and retail industries; therefore,
25 this section focuses primarily on the construction industry and retail industry to provide a baseline level of
26 data to evaluate potential impacts.

27 **Environmental Justice.** EO 12898, *Federal Actions to Address Environmental Justice in Minority*
28 *Populations and Low-Income Populations*, pertains to environmental justice issues and relates to various
29 socioeconomic groups and the health effects that could be imposed on them. This EO requires that
30 Federal agencies' actions substantially affecting human health or the environment do not exclude persons,
31 deny persons benefits, or subject persons to discrimination because of their race, color, or national origin.
32 The EO was enacted to ensure the fair treatment and meaningful involvement of all people regardless of
33 race, color, national origin, or income with respect to the development, implementation, and enforcement
34 of environmental laws, regulations, and policies. Consideration of environmental justice concerns
35 includes race, ethnicity, and the poverty status of populations in the vicinity of a proposed action.

36 **4.8.2 Description of Affected Environment**

37 The Proposed Action's impacts on socioeconomics will be analyzed using four spatial levels: (1) Fort
38 Sam Houston¹; (2) census tracts adjacent to FSH²; (3) San Antonio Metropolitan Statistical Area³ (MSA),

¹ Defined as census tract 1201.

² Defined as census tracts 1110, 1202, 1204, 1205.01, 1206, 1307, 1308 and aggregated accordingly.

³ Defined by the U.S. Census Bureau and the Office of Management and Budget as a centralized urban area.

1 defined as Atascosa, Bandera, Bexar, Comal, Guadalupe, Kendall, Medina and Wilson counties; and
 2 (4) State of Texas. FSH data will provide socioeconomic characteristics for the installation, allowing for
 3 comparison with surrounding areas. Adjacent census tract data will illustrate socioeconomic
 4 characteristics for the area immediately around FSH (see **Figure 4-3**). The San Antonio MSA is the
 5 largest spatial scale where impacts from the Proposed Action might occur; therefore, it is included in the
 6 analysis (see **Figure 4-4**). State of Texas data will provide baseline comparisons for the spatial levels
 7 mentioned above.

8 **Demographics.** Population levels within the San Antonio MSA increased substantially from 1990 to
 9 2000 with a growth rate of 22.3 percent, and continued substantial growth from 2000 to 2008 with a rate
 10 of 27.6 percent. The census tracts adjacent to FSH experienced substantial growth during the decade
 11 ending in 2000 with a growth rate of 22.5 percent. FSH did not grow during this time period; rather the
 12 installation's population decreased 33.2 percent from 8,245 people in 1990 to 5,508 in 2000. Population
 13 estimates conducted between decennial censuses are not available for smaller areas, like census tracts;
 14 therefore 2008 estimates are not available for FSH or the census tracts adjacent to FSH. Detailed
 15 population data can be found in **Table 4-13**.

16 **Table 4-13. Population and Population Growth Rates from 1990 to 2008**

Spatial Level	Population			Growth Rate (percent)	
	1990	2000	2008	1990 to 2000	2000 to 2008
Fort Sam Houston	8,245	5,508	N/A	- 33.2	N/A
Census Tracts adjacent to FSH	28,026	34,197	N/A	22.1	N/A
San Antonio MSA	1,302,099	1,592,383	2,031,445	22.3	27.6
State of Texas	16,986,510	20,851,820	24,326,974	22.8	17.7

Sources: U.S. Census Bureau 1990, U.S. Census Bureau 2000, U.S. Census Bureau 2008, U.S. Census Bureau 2009

KEy: N/A = Not Available

17 **Employment Characteristics.** Employment data sorted by industry is displayed in **Table 4-14**. As would
 18 be expected, FSH has a larger percentage of persons employed in the Armed Forces compared to the
 19 census tracts adjacent to FSH, the San Antonio MSA, and the State of Texas. The greatest number of
 20 people within FSH not employed by the Armed Forces work in the educational, health and social services
 21 industry followed by the retail trade industry and the public administration industry. Educational, health,
 22 and social services represent the largest part of the labor force when categorized by industry for census
 23 tracts adjacent to FSH, the San Antonio MSA, and the State of Texas. The educational, health, and social
 24 services industry is just not as predominant in the census tracts adjacent to FSH, the San Antonio MSA,
 25 or the State of Texas as within FSH. Also, outside of FSH the construction industry is much larger
 26 representing between 6 and 8 percent of the labor force versus 2 percent of the labor force on the
 27 installation.

28 **Environmental Justice.** Certain minority populations within FSH are slightly higher than the
 29 surrounding areas. Approximately 27 percent of FSH population is of Black or African American origins
 30 compared to the 16 percent in the neighboring census tracts and 6 percent within the San Antonio MSA.
 31 The Hispanic or Latino population within FSH, 17 percent, is smaller when compared to the surrounding
 32 areas which have Hispanic or Latino populations greater than 30 percent. The median household income
 33 within FSH is \$45,185, none of the spatial levels used for comparison have a median household income
 34 greater than \$40,000. The percent of families living below the poverty level within FSH is significantly
 35 lower than the census tracts immediately adjacent to FSH. The poverty level for FSH is 4 percent while
 36 the poverty level for the adjacent Census tracts is 17 percent. Detailed data can be found in **Table 4-15**.

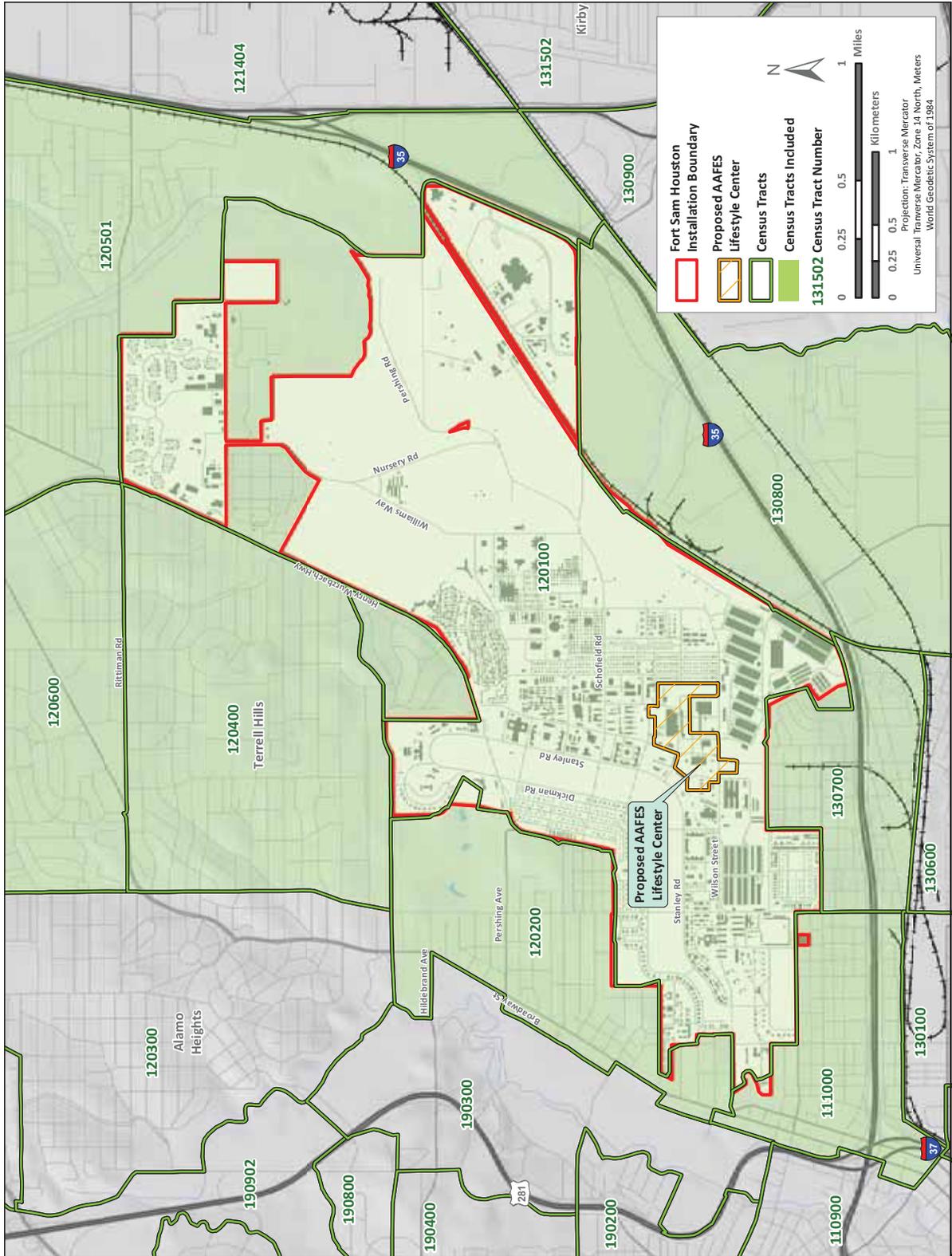
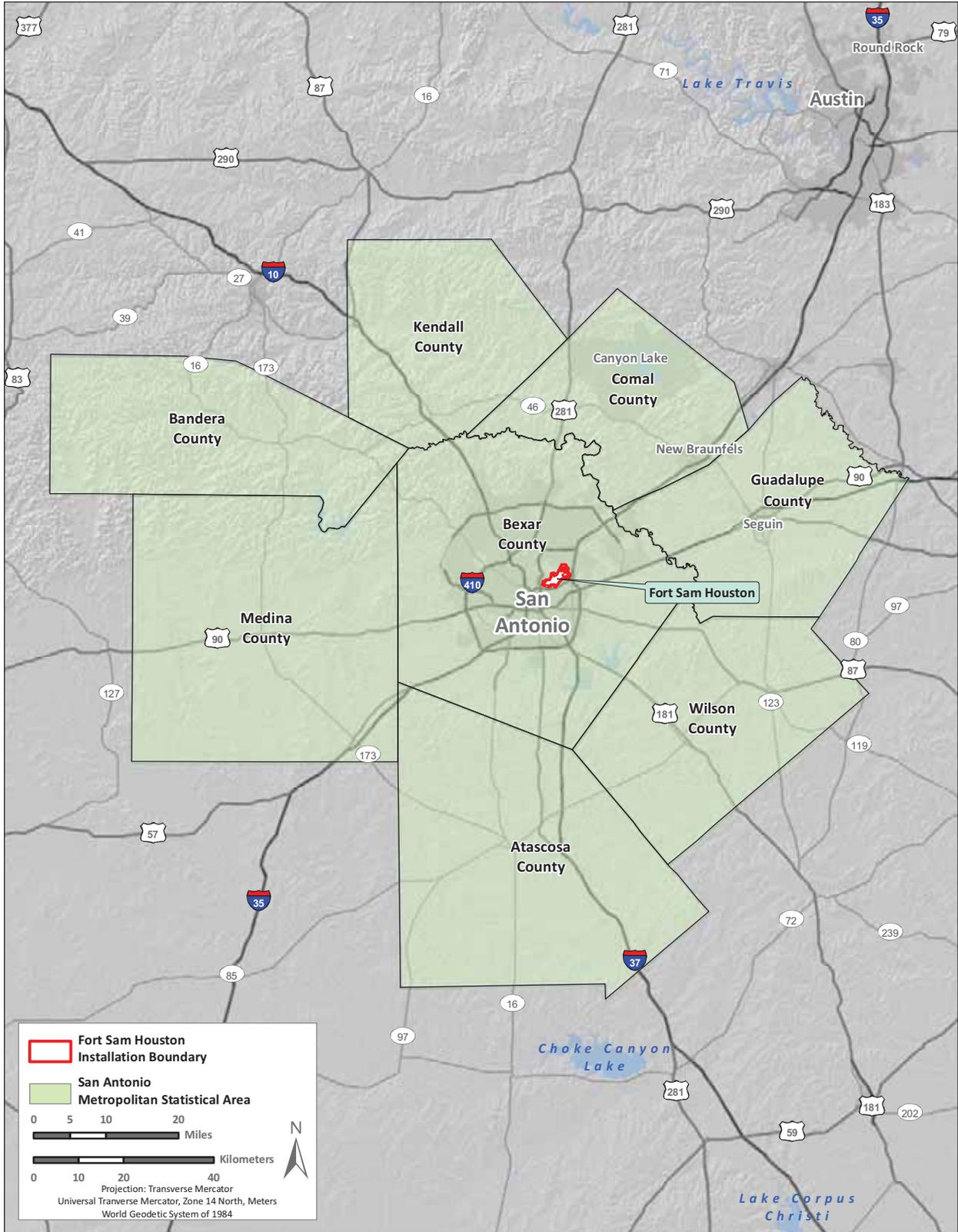


Figure 4-3. Census Tracts Adjacent to Fort Sam Houston

Sources: Base Data: Fort Sam Houston 2009; Proposed AAFES Lifestyle Center Site: e3M, Inc. 2009; Census Tracts: ESRI StreetMap 2007.

1
2
3



Source of San Antonio Metropolitan Statistical Area: e2M, Inc. 2009

1
2

Figure 4-4. Extent of the San Antonio MSA

1

Table 4-14. Overview of Employment by Industry, 2000

	Fort Sam Houston	Census Tracts Adjacent to FSH	San Antonio MSA	State of Texas
Population 16 years and over in the labor force	3,434	15,724	1,190,329	15,617,373
Percentage of Employed Persons in Armed Forces	62.90%	1.0%	2.3%	0.7%
Agriculture, forestry, fishing and hunting, and mining	0.4%	0.6%	0.7%	2.7%
Construction	2.0%	6.0%	7.8%	8.1%
Manufacturing	1.7%	5.9%	7.6%	11.8%
Wholesale trade	1.1%	2.8%	3.5%	3.9%
Retail trade	12.8%	11.3%	12.6%	12.0%
Transportation and warehousing, and utilities	1.8%	4.7%	5.0%	5.8%
Information	0.8%	3.5%	3.4%	3.1%
Finance, insurance, real estate, and rental and leasing	3.5%	7.9%	8.7%	6.8%
Professional, scientific, management, administrative, and waste management services	9.1%	12.7%	9.5%	9.5%
Educational, health, and social services	41.4%	22.8%	21.1%	19.3%
Arts, entertainment, recreation, accommodation, and food services	8.4%	12.1%	9.4%	7.3%
Other services (except public administration)	4.3%	5.2%	5.0%	5.2%
Public administration	12.6%	4.7%	5.7%	4.5%

Source: U.S. Census Bureau 2000

2

Table 4-15. Race, Ethnicity, and Poverty Characteristics, 1999

	Fort Sam Houston	Census Tracts adjacent to FSH	San Antonio MSA	State of Texas
Total Population	5,508	28,145	1,302,099	16,986,510
Percent White	56.4	69.7	70.6	71
Percent Black or African American ^a	27.3	16.6	6.6	11.5
Percent American Indian and Alaska Native	0.8	0.7	0.8	0.6
Percent Asian	3.4	1.8	1.5	2.7
Percent Native Hawaiian and Other Pacific Islander	0.7	0.1	0.1	0.1
Percent Other Race	7.5	11.2	16.9	11.7
Percent Two or More Races	3.9	3.1	3.5	2.5
Percent Hispanic or Latino ^b	17.1	39.3	51.2	32.0
Percent Families below poverty	4.3	16.6	11.9	9.2
Median Household Income	\$45,185	\$36,876	\$39,140	\$39,927

Source: U.S. Census Bureau 2000

Notes:

a. Having origins in any of the black racial groups of Africa.

b. Hispanic origin, could be of any race.

1 **4.8.3 Environmental Consequences**

2 **Evaluation Criteria**

3 ***Socioeconomics.*** This section addresses the potential for direct and indirect impacts the Proposed Action
 4 could have on the local or regional economy, as discussed in **Section 4.8.1**. The focus of analysis is on
 5 the construction and retail industries. Impacts on the local or regional economy are evaluated according
 6 to their potential to stimulate the economy through the purchase of goods or services and increases in
 7 employment. Similarly, impacts are evaluated to determine if overstimulation of the economy
 8 (e.g., housing availability is inadequate to accommodate increases in permanently based workforce) could
 9 occur as a result of the Proposed Action.

10 ***Environmental Justice.*** Ethnicity and poverty status are examined for FSH and compared to census
 11 tracts adjacent to FSH, the San Antonio MSA, and the State of Texas statistics to determine if a low-
 12 income or minority population could be disproportionately affected by the Proposed Action. Minority
 13 populations within FSH and the adjacent census tracts would be considered elevated in other areas of the
 14 country (see **Table 4-15**). However, the minority population levels for FSH and adjacent census tracts are
 15 not substantially different from the San Antonio MSA or from the State of Texas. Furthermore, few
 16 adverse impacts could result from the Proposed Action and, if so, they would be short-term and negligible
 17 to minor and no adverse effects are expected on minority populations in and around FSH. Rather, the
 18 proposed Lifestyle Center is likely to benefit the local population; therefore, no environmental justice
 19 issues from the Proposed Action are anticipated.

20 **Proposed Action**

21 Construction of the facilities for the proposed Lifestyle Center would result in direct, minor to moderate,
 22 short-term, beneficial impacts on the local economy and local employment levels. The Proposed Action
 23 would result in the construction of approximately 651,000 ft² of new and replacement retail, dining, and
 24 entertainment space. Direct expenditures for the proposed Lifestyle Center, which will be paid for by the
 25 developer, could total at least \$100 million dollars; this estimate is based upon a similar AAFES Lifestyle
 26 Center built on Eglin AFB. Additional indirect expenditures throughout the local economy can be

27 anticipated to support the construction workforce during the length of the project. The San Antonio
 28 MSA, characterized as metropolitan San Antonio, contains approximately 90,000 construction workers.
 29 The demand for construction workers needed for this project should be adequately met by the
 30 metropolitan San Antonio workforce resulting in an increase of workers' wages and subsequently an
 31 increase in income tax revenue. Therefore, short-term, minor to moderate, direct and indirect beneficial
 32 impacts are expected for employment within the construction industry.

33 Indirect, negligible to minor, long-term, adverse impacts would occur from FSH workers and residents
 34 using the new Lifestyle Center to meet their shopping needs in lieu of accessing similar facilities that are
 35 off-installation. This shift in shopping pattern could result in a minor loss of revenue for off-installation.

36 At the same time indirect, minor, long-term, beneficial impacts are expected to occur as a result of
 37 increases in tax revenue that would result from all sales occurring in non-AAFES direct run activities.
 38 The creation of new jobs to support non-AAFES run facilities will also lead to beneficial impacts.

39 The Proposed Action would result in minor to moderate, short-term to long-term, adverse and beneficial,
 40 impacts on the socioeconomic climate of the San Antonio region.

1 **No Action Alternative**

2 Under the No Action Alternative the proposed Lifestyle Center would not be constructed. No impacts on
3 socioeconomic resources would be expected as no additional jobs would be created, no purchase of
4 construction materials, and no increase in tax revenue as a result of employee wages and sales receipts
5 would be realized.

6 **4.9 Utilities, Infrastructure, and Transportation**

7 **4.9.1 Definition of the Resource**

8 Infrastructure consists of the systems and physical structures that enable a population in a specified area
9 to function. Infrastructure is wholly human-made, with a high correlation between the type and extent of
10 infrastructure and the degree to which an area is characterized as “urban” or developed. The availability
11 of infrastructure and its capacity to support growth are generally regarded as essential to the economic
12 growth of an area. Utilities and infrastructure include power supply, water supply, sewer and wastewater
13 systems, gas supply, liquid fuel supply, communications, and solid waste disposal. The infrastructure
14 information contained in this section provides a brief overview of each infrastructure component and
15 comments on its existing general condition.

16 The transportation resource is defined as the system of roadways and highways that are in the vicinity of
17 the proposed site and could reasonably be expected to be potentially impacted by the Proposed Action.
18 The focus of this transportation analysis is on the road network within the boundaries of FSH, especially
19 in the vicinity of the proposed Lifestyle Center.

20 Operational characteristics of roadway facilities are described in terms of level of service (LOS). The
21 concept of LOS uses quantitative methods to develop a qualitative measure that characterizes operational
22 conditions within a traffic stream and its perception by motorists and passengers. The descriptions of
23 individual levels of service characterize these conditions in terms of such factors as speed and travel time,
24 freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are
25 defined and given letter designations A through F, with A being the best and F being the worst operating
26 conditions. Most jurisdictions adopt a minimum of LOS C or D threshold for transportation facilities in
27 urbanized areas.

28 **4.9.2 Description of the Affected Environment**

29 **Power Supply.** City Public Service (CPS) Energy, owned and operated by the City of San Antonio,
30 currently provides electrical service to FSH (CPS Energy 2007). CPS Energy’s service territory spans
31 approximately 1,566 square miles and includes more than 700,000 customers in the San Antonio area
32 (McCullough 2009). CPS Energy has a variety of power sources, including coal and natural gas plants
33 and wind power facilities; and is a 40 percent stakeholder in the South Texas Project nuclear power
34 facility (CPS Energy 2007). Together, these plants can produce a total generating capacity of more than
35 4,500 megawatts to serve customers in the greater San Antonio area (CPS Energy 2007).

36 In the proposed Lifestyle Center site, there are multiple overhead electric lines with supporting wooden
37 poles south of the site along Wilson Street that tie into power lines along Broadway Street. There are also
38 overhead electrical lines along the eastern side of the proposed Lifestyle Center. **Table 4-16** describes the
39 average utility demand/generation for FSH in 2007.

1

Table 4-16. Fort Sam Houston 2007 Average Daily Utility Demand

Utility (units)	Average Use
Electrical consumption (MWh/day)	604.2
Potable water consumption (MGD)	1.4
Wastewater generation (MGD)	0.8
Recycled water (MGD) (September 2005 to January 2006)	2.3
Natural gas consumption (K-therms/day)	108.7
Solid waste generation (tons/day)	29.6

Sources: FSH 2007a, FSH 1999c

Key:

MWh = megawatt hours

MGD = million gallons per day

1 K-therm = 1 million British thermal units (Btu)

2 **Water Supply.** FSH is in the Bexar County Metropolitan (BexarMet) water district, which encompasses
3 the greater San Antonio area, including all of Bexar County and parts of Atascosa, Comal and Medina
4 counties. BexarMet supplies approximately 86,000 customers within this area (BexarMet 2009). The
5 water supply and distribution system at the installation is owned and operated by FSH. Water is pumped
6 out of the Edwards Aquifer (FSH 2008d) to supply the installation. FSH has its own water treatment
7 facility in Building 3190. Water is treated at this facility to meet the standards set by the TCEQ in 30
8 Texas Administrative Code (TAC)

9 Chapter 290, Subchapter F. Water is pumped from the water treatment facility to one of two 1 million-
10 gallon elevated storage tanks for storage. Public potable water supply is supplied through 421,740 feet of
11 distribution and transmission lines running through FSH (FSH 2008d).

12 Public water supply demand projections for FSH from 2008 to 2014 show an expected increase of
13 1.8 million gallons per day (MGD) (an increase from 1.5 MGD currently to 3.3 MGD projected) (FSH
14 2008d).

15 The BexarMet water district projects that the aquifers that it draws from will be able to supply only
16 85 percent of the regional potable water demand by 2035. As the BexarMet water district also draws
17 from the Edwards Aquifer, long-range water potential could be hampered in the BexarMet water district,
18 including FSH.

19 **Sewer and Wastewater Systems.** Domestic wastewater is regulated in Bexar County by the TCEQ and
20 the Texas On-Site Wastewater Treatment Research Council in accordance with the CWA. The CWA acts
21 to establish water quality standards, regulate domestic wastewater facility management and industrial
22 waste treatment, establish domestic wastewater treatment plant monitoring requirements, and regulate
23 storm water discharge. Local wastewater is handled by the City of San Antonio Water System (SAWS)
24 Publicly Owned Treatment Works (POTW). Edwards Aquifer has two separate TCEQ instructions
25 regarding wastewater: TCEQ-00582, dealing with Sewage Collection Systems; and TCEQ-006243,
26 dealing with Lift Station/Force Main Systems. Both TCEQ-00582 and TCEQ-006243 pertain to
27 Regulated Activities on the Edwards Aquifer Recharge Zone. FSH has both a sewage collection system
28 and a lift station. An Industrial Wastewater Permit from the SAWS POTW gives the installation
29 permission to use city lines for its wastewater (FSH 2008e). FSH attempts to recycle wastewater before

1 sending it out to the SAWS POTW. The installation recycles 2.3 MGD of potable and nonpotable water
2 (see **Table 4-16**).

3 In 2008, FSH conducted a Comprehensive Infrastructure Study of its cantonment area. A wastewater
4 collection study was undertaken to determine the status of the wastewater collection system and to
5 identify necessary repairs and upgrades in the system to prepare for future growth at the installation
6 (FSH 2008f). The study concluded that many pipelines in the existing system have exceeded their
7 50-year design life, there are some potential structural problems with the system, and several areas
8 operate at more than 50 percent dry weather capacity, indicating that the system could have difficulty
9 discharging in wet weather (FSH 2008f). The lift station also has several design and efficiency problems,
10 which led to it missing the standards of DOD and TCEQ codes (FSH 2008f).

11 **Natural Gas.** Natural gas in the San Antonio area is also supplied by CPS Energy. CPS Energy provides
12 approximately 21.2 billion cubic feet of natural gas to the San Antonio area each year. However, natural
13 gas consumption is expected to decrease in 2009 (CPS Energy 2008).

14 **Liquid Fuel.** Liquid fuels such as diesel distillates are commonly used in trucks and tractors. FSH has
15 both aboveground storage tanks (ASTs) and underground storage tanks (USTs). Only one of the storage
16 tanks is within 0.5 miles of the proposed Lifestyle Center. Building 2630 has a 500-gallon, diesel AST
17 that supplies Building 2630 and is not used by other facilities on-installation (FSH 2003).

18 **Communications.** FSH has more than 227,000 linear feet of telephone and fiber-optic communication
19 cabling on-installation (FSH 2007a). Presently, there are aboveground telephone lines to the south and
20 east of the proposed Lifestyle Center. There are no aboveground or underground fiber-optic lines within
21 the proposed Lifestyle Center area.

22 **Solid Waste Management.** FSH created an Integrated Solid Waste Management Plan in 1999
23 (FSH 1999c). This plan outlines steps that the installation is taking to reduce solid waste generation and
24 to promote recycling activities, as well as to ensure that solid waste is stored and collected by Federal,
25 state, local, and DOD guidelines. Solid waste on-installation is handled by a janitorial contractor.

26 Off-installation, solid waste is taken to the Covell Garden Landfill. The landfill is a 502-acre, permitted
27 facility approximately 15 miles from FSH near Lackland AFB. The estimated closure date of the landfill
28 is 2027. The contractor is required to comply with all transportation, safety, health, and environmental
29 regulations during disposal of solid waste (FSH 1999c). FSH currently generates 29.6 tons of waste per
30 day, as shown in **Table 4-16**.

31 **Transportation.** FSH is bounded by Interstate 35 on the south and east, Broadway Street to the west, and
32 Harry Wuzbach Highway and Rittiman Road to the north. Ten restricted access-control points are along
33 FSH's perimeter to help maintain security. These access-control points are on Walters Street, Harry
34 Wurzbach (east), and Binz-Engleman Road. The proposed Lifestyle Center is bounded by Road No. S-4
35 and Stanley Road on the west, Wilson Street and Taylor Road on the south, Shafter Road on the east, and
36 Henry T Allen Road and Lawton Road on the north.

37 The proposed Lifestyle Center is in the central-south transportation section of FSH. The central-south
38 transportation section is the most heavily trafficked area within the installation. This transportation
39 system is composed of an urban downtown grid pattern of roadways, generally at perpendicular
40 intersections. The roads are two-lane, low-speed, and relatively low-volume. At several intersections,
41 traffic signals were removed and replaced with four- or two-way stop conditions representing a positive
42 indicator of acceptable traffic flow (FSH 2008g).

1 According to the Comprehensive Traffic Engineering Study conducted at FSH in 2007 (FSH 2008g), both
2 the morning and evening peak-hour existing conditions reflect the intersections within the central-south
3 transportation section are operating at acceptable LOS, generally C or higher. The
4 Headquarters/Administrative area at the southwestern end of the installation is operating under desirable
5 traffic conditions at LOS A for most roadway segments. The volume and capacity ratios in the area are
6 also within acceptable ranges. Individual intersections in this area are generally nonsignalized, two-way
7 stop conditions that are also indicative of desirable traffic conditions. This area of the installation does
8 not experience critical traffic backups during peak hours or throughout the regular business weekday
9 (FSH 2008g). All intersections are significantly below operational capacities, allowing opportunities for
10 growth.

11 **4.9.3 Environmental Consequences**

12 **Evaluation Criteria**

13 Effects on infrastructure are evaluated based on their potential for disruption, excessive use, or additional
14 needs for energy and water consumption, sanitary sewer and wastewater systems, and other utilities.
15 Effects might arise from physical changes to infrastructure, construction activities, and energy and utility
16 needs created by either direct or indirect workforce and population changes related to installation
17 activities. In considering the basis for evaluating the significance of effects on infrastructure resources,
18 several factors are considered, including evaluating the degree to which the proposed construction
19 projects could affect the existing solid waste management program and capacity of the area landfill. An
20 effect might be considered adverse if a proposed action would result in exceedance in the capacity of a
21 utility. Impacts on transportation are considered to be adverse if a proposed action would result in a
22 substantial increase in traffic on local roadways.

23 **Proposed Action**

24 **Power Supply.** No short- or long-term, adverse effects on electricity would be expected from the
25 construction and operation of the proposed Lifestyle Center. There is adequate capacity and
26 infrastructure for electrical power in the area. It is anticipated that the proposed Lifestyle Center would
27 obtain power from the existing service with CPS Energy. Existing infrastructure on the site itself would
28 be left as is in most places. As needed, existing infrastructure would be removed or modified; however,
29 the power lines on Wilson Street would still be available to connect to for electric service. As discussed
30 in **Section 2.2**, the project developers would consider integration of energy-efficient building techniques
31 and equipment where feasible, such as use of solar or other alternative energy sources and use of green
32 building design principles.

33 **Water Supply.** No adverse effects on water supply are expected as a result of the construction and
34 operation of the proposed Lifestyle Center. On-installation pumps and tanks would continue to serve
35 FSH, and current capacity is such that expansion would not hinder the ability of on-installation facilities
36 to provide potable water to the proposed Lifestyle Center facilities.

37 The proposed Lifestyle Center would integrate water-efficient building techniques and equipment
38 wherever feasible through sustainable design techniques and principles. Examples might include
39 installation of low-flow plumbing fixtures, low-impact design storm water collection and treatment
40 structures that recycle water back to groundwater, finding uses for recycled water such as fountains or
41 irrigation systems, and installing xeric landscape features.

42 **Sewer and Wastewater Systems.** Long-term, minor, adverse effects would be expected on the sanitary
43 sewer and wastewater systems from the construction and operation of the proposed Lifestyle Center.

1 Current wastewater systems on-installation are near or at wet-weather capacity. Additional facilities
2 could cause limited overflows unless current deficiencies in the system are addressed. The
3 Comprehensive Infrastructure Study identified specific areas where the system can be improved (FSH
4 2008f). If these steps are undertaken, effects from the Proposed Action would be reduced.

5 **Natural Gas.** No adverse effects on natural gas supply would be expected from the construction and
6 operation of the proposed Lifestyle Center. Excessive needs for natural gas would not be expected. CPS
7 Energy would continue to supply natural gas for FSH, including the proposed Lifestyle Center. Natural
8 gas infrastructure and supplies are adequate to handle the proposed Lifestyle Center with no interruption
9 of service (McCullough 2009).

10 **Liquid Fuel.** No adverse effects on liquid fuels are expected from the construction and operation of the
11 proposed Lifestyle Center.

12 **Communications.** No adverse effects on the communication systems would be anticipated considering
13 there is adequate capacity. Any communication lines impacted by the system would be relocated prior to
14 development of the proposed Lifestyle Center.

15 **Solid Waste Management.** Short- and long-term, minor, adverse effects would be expected on solid
16 waste management as a result of generation of construction debris. Debris that is not recycled would be
17 put in a landfill, which would be considered an irreversible adverse effect. Construction debris is
18 generally composed of clean materials, and most of this waste would be recycled or ground into gravel for
19 reuse. Contractors hired for the various construction projects would be responsible for the removal and
20 disposal of their construction wastes generated onsite. Impacts would also be expected on solid waste
21 management as a result of the generation of packaging debris and food waste that would be generated
22 from the proposed Lifestyle Center. The Covell Garden Landfill has adequate capacity for waste
23 generated by the Proposed Action (FSH 1999c).

24 **Transportation.** Under the Proposed Action, existing roadways, driveways, and parking lots would be
25 demolished within the boundaries of the proposed Lifestyle Center. A new transportation network
26 including access roads, driveways, and parking lots would be constructed to accommodate the proposed
27 Lifestyle Center and associated facilities. The new transportation network would be constructed to allow
28 easy access for workers and customers. Transportation network design and alignments would be
29 constructed in accordance with U.S. Army, Texas Department of Transportation, and TAC Title 43,
30 *Transportation* regulations and requirements.

31 Short-term, minor, adverse impacts on traffic circulation due to road and lane closures from construction
32 and demolition activities would be anticipated. The Proposed Action would require delivery of materials
33 to construction sites and removal of debris from demolition sites. Construction traffic would compose a
34 small percentage of the total existing traffic at FSH and many of the vehicles would be driven to and kept
35 on site for the duration of construction and demolition activities, resulting in relatively few additional
36 trips. Furthermore, potential increases in traffic volume associated with Proposed Action would be
37 temporary. Heavy vehicles are frequently on installation roads; therefore, the vehicles necessary for
38 construction and demolition would be expected to have a minor, adverse impact on installation roads. All
39 road and lane closures would be temporary in nature and would be coordinated with FSH Security Forces.
40 In addition, appropriate signage would be in place; therefore, no long-term, adverse impacts on
41 transportation systems during construction and demolition phases of the Proposed Action are anticipated.

42 The full occupancy of the proposed Lifestyle Center is expected to have no adverse effects on traffic
43 operations in the vicinity of the site. It is expected that patrons of the proposed Lifestyle Center would
44 include military personnel, civilian employees, and their families. The Comprehensive Traffic

1 Engineering Study conducted on FSH’s roadways and intersections in the vicinity of the proposed
2 Lifestyle Center shows that traffic conditions are generally at C or higher and intersections are
3 significantly below operational capacities with opportunities for growth (FSH 2008g). The
4 Comprehensive Traffic Engineering Study also projected future transportation growth to 2011, indicating
5 that increases in traffic flow from additional personnel and planned facilities would have a minimal
6 impact on the transportation network at FSH (FSH 2008g). Therefore, no adverse impact is anticipated
7 on FSH and surrounding community transportation networks from the Proposed Action.

8 **No Action Alternative**

9 The No Action Alternative would result in a continuation of the existing condition. Under the No Action
10 Alternative, the proposed Lifestyle Center would not be constructed and there would be no change in
11 baseline conditions; therefore, no impacts on utilities, infrastructure, and transportation would be
12 expected.

13 **4.10 Hazardous Wastes and Materials**

14 **4.10.1 Definition of the Resource**

15 A hazardous substance, pursuant to the Comprehensive Environmental Response, Compensation and
16 Liability Act (CERCLA) (42 U.S.C. 9601(14)), is defined as: “(A) any substance designated pursuant to
17 section 1321(b)(2)(A) of Title 33; (B) any element, compound, mixture, solution, or substance designated
18 pursuant to section 9602 of this title; (C) any hazardous waste having the characteristics identified under
19 or listed pursuant to section 3001 of the Resource Conservation and Recovery Act (RCRA) of 1976, as
20 amended, (42 U.S.C. 6921); (D) any toxic pollutant listed under section 1317(a) of Title 33; (E) any
21 hazardous air pollutant listed under section 112 of the CAA (42 U.S.C. 7412); and (F) any imminently
22 hazardous chemical substance or mixture with respect to which the Administrator of the USEPA has
23 taken action pursuant to section 2606 of Title 15. The term does not include petroleum, including crude
24 oil or any fraction thereof, which is not otherwise specifically listed or designated as a hazardous
25 substance, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic
26 gas usable for fuel (or mixtures of natural gas and such synthetic gas).”

27 Hazardous materials are defined by 49 CFR 171.8 as “hazardous substances, hazardous wastes, marine
28 pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials
29 Table (49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions” in
30 49 CFR Part 173. Transportation of hazardous materials is regulated by the U.S. Department of
31 Transportation regulations within 49 CFR Parts 105–180.

32 RCRA defines a hazardous waste in 42 U.S.C. 6903, as “a solid waste, or combination of solid wastes,
33 which because of its quantity, concentration, or physical, chemical, or infectious characteristics may
34 (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or
35 incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or
36 the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.”

37 **4.10.2 Description of the Affected Environment**

38 **Hazardous Materials and Wastes.** AR 200-1, *Environmental Protection and Enhancement*, outlines U.S.
39 Army policy for hazardous materials management and related pollution prevention. Activities and
40 maintenance processes at FSH require the use of hazardous and toxic materials such as aviation and motor
41 fuels, various grades of petroleum products, paints, solvents, thinners, adhesives, cleaners, batteries,
42 acids, bases, refrigerants, compressed gases, and pesticides. The management and distribution of most of

1 the hazardous materials at FSH are through Directorate of Logistics supply channels, based on forecast
2 and immediate needs. Pesticides, medical supplies, and fuels are maintained and distributed through
3 alternative channels. The Directorate of Public Works (DPW) performs hazardous material reporting for
4 compliance with the Emergency Planning and Community Right-to-Know Act and Federal, state, and
5 local regulations (FSH 2007a).

6 Operations at FSH produce RCRA hazardous waste, as defined in 40 CFR Parts 261 to 265 and 30 TAC
7 335. The majority of hazardous waste is generated by processes related to vehicle and equipment
8 maintenance and medical activities. FSH generates more than 2,204 pounds of hazardous waste per
9 month and is therefore categorized as a large-quantity generator of hazardous waste. The installation
10 maintains a Hazardous Waste Management Plan that provides procedures for achieving and maintaining
11 regulatory compliance regarding hazardous waste management, administrative responsibilities, inventory,
12 training, tracking, storage, packaging, labeling, and shipment. In addition, a *Spill Prevention Control and*
13 *Countermeasures Plan* and *Installation Spill Contingency Plan* have been developed and implemented at
14 FSH. These plans provide prevention and control measures to minimize the potential for spills of
15 hazardous and toxic chemicals, and establish procedures for controlling and managing sudden releases of
16 petroleum products and other hazardous materials (FSH 2007a).

17 FSH operates satellite accumulation points (SAPs) throughout the installation. A SAP is an area at or
18 near the point of waste generation where the user accumulates small quantities of “total regulated
19 hazardous waste” up to 55 gallons or up to 1 quart of “acutely hazardous waste.” When volume exceeds
20 these limits, hazardous wastes are moved within the installation to a regulated, less-than-90-day,
21 hazardous waste storage area (Facility 3600). Facility 3600 accommodates the storage of hazardous
22 waste containers for up to 90 days until they are collected by a USEPA-licensed transporter and delivered
23 to an approved off-installation disposal facility (FSH 2007a). Hazardous wastes are not stored at FSH for
24 longer than 90 days.

25 ***Asbestos-Containing Materials.*** AR 200-1 outlines U.S. Army policy for handling asbestos. Asbestos-
26 containing material (ACM) at FSH falls under the USEPA and OSHA regulations. Asbestos fiber
27 emissions into the ambient air are regulated in accordance with Section 112 of the CAA. National
28 Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations address the demolition and
29 renovation of facilities with ACM. The Toxic Substances Control Act (TSCA), Asbestos Hazard
30 Emergency Response Act (AHERA), and Asbestos School Hazard Abatement Reauthorization Act
31 provide the regulatory basis for handling ACM in school facilities. In addition, AHERA regulations
32 cover ACM in commercial and public buildings (FSH 2007a).

33 There are two categories used to describe ACM: friable and nonfriable. Friable ACM is defined as any
34 material containing more than 1 percent asbestos (as determined by polarized light microscopy) that,
35 when dry, can be crumbled, pulverized or reduced to powder by hand pressure. Nonfriable ACM is
36 material that contains more than 1 percent asbestos and does not meet the criteria for friable ACM.
37 Facilities most likely to contain friable asbestos are those built or remodeled between 1945 and 1978,
38 when asbestos was commonly used and its impacts on the environment and human health were only
39 beginning to be understood. Present-day renovation or demolition of such facilities with asbestos has
40 potential to release asbestos fibers into the air. Asbestos fibers could be released by disturbance or
41 damage to building materials such as pipe and boiler insulation; acoustical ceiling; sprayed-on fire
42 proofing; and other materials used for soundproofing, insulation, siding, roofing, and flooring
43 (FSH 2007a).

44 FSH maintains an *Asbestos Management Plan* that establishes a framework for preventing asbestos
45 exposure to facility occupants and maintenance personnel and specifies the roles of installation offices in
46 aspects of the Asbestos Management Program. In addition, the plan provides guidance in identifying

1 potential asbestos hazards, prioritizing abatement activities, and managing ACM in such a way as to
2 minimize potential exposures to post personnel, their families, and all maintenance workers (FSH 2000).

3 **Lead-Based Paint.** In 1978, the United States Consumer Products Safety Commission banned the use of
4 lead-based paint (LBP) for residential use (FSH 1999b). Under the LBP Poisoning Prevention Act
5 (42 U.S.C. 4822), as amended, public housing authorities were required to inspect their projects for LBP
6 by 1994. Under the statute, LBP hazards equal to or greater than 1 microgram per cubic centimeter
7 ($\mu\text{g}/\text{cm}^3$) must be abated (FSH 2007a).

8 U.S. Army policy requires LBP to be managed in-place as opposed to LBP removal. In-place
9 management is used to prevent deterioration over time of surfaces likely to contain LBP, followed by
10 replacement, as necessary. Future renovation, construction, and demolition projects at existing facilities
11 are required to include LBP abatement. The installation is responsible for ensuring that demolition
12 debris, whether from entire structures or individual components from renovation projects, is disposed of
13 properly. Suspected lead contamination and characterization activities should be carried out using the
14 installation's *Lead Hazard Management Plan*. The plan is designed to establish management
15 responsibilities and procedures for identifying and controlling hazards related to the presence of LBP.
16 The plan also specifies sampling, abatement, storage, transportation, manifest, and disposal procedures
17 (FSH 2007a).

18 **Polychlorinated Biphenyls.** AR 200-1 outlines U.S. Army policy for handling polychlorinated biphenyls
19 (PCBs). PCBs are used in electrical equipment (e.g., capacitors and transformers), because they are
20 electrically nonconductive and stable at high temperatures. The disposal of PCBs is regulated under
21 TSCA, which banned the manufacture and distribution of PCBs in the late 1970s except for those used in
22 closed systems. By Federal definition, "non-PCB equipment" contains less than 50 ppm of PCBs,
23 "PCB-contaminated equipment" contains 50 ppm of PCBs or more and less than 500 ppm of PCBs, and
24 "PCB equipment" contains 500 ppm of PCBs or more. USEPA, under TSCA guidance, regulates the
25 removal and disposal of all sources of PCBs containing 50 ppm or more (FSH 2007a).

26 FSH manages PCBs in accordance with AR 200-1 and the installation's Hazardous Waste Management
27 Plan. The Directorate of Emergency Services is required to oversee the management of PCBs at FSH,
28 including monitoring the storage procedures and maintaining the PCB inventory. The DPW Operation
29 and Maintenance Division is responsible for updating the PCB inventory at FSH whenever a transformer
30 or other electrical device is removed from service. As of January 2000, there are no transformers
31 containing PCBs at FSH (FSH 2007a).

32 **Pesticides.** The Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 *et seq.*) of 1972, as
33 amended, regulates the registration and use of pesticides to protect applicators, consumers, and the
34 environment. Pesticide management activities are subject to Federal regulations contained in 40 CFR
35 Parts 162, 165, 166, 170, and 171. Texas regulations are promulgated under Act 171, the Pesticide
36 Control Act of 1976, as amended (FSH 2007a). FSH maintains a *Pest Management Plan* that addresses
37 all pest control operations and requirements (i.e., storage, transportation, use, and disposal) and is
38 applicable to all personnel who reside on, work on, or conduct pest control operations on FSH or Federal
39 properties under the jurisdiction of FSH. In addition, FSH has an Integrated Pest Management Plan,
40 which includes control strategies such as structural and procedural modifications to reduce food and
41 habitat used by pests; nonpesticide technologies, including traps and monitoring devices; and application
42 of chemical compounds that present the lowest potential hazard to human health and the environment
43 (FSH 2008h).

44 Pesticides are stored and maintained in accordance with applicable DOD and U.S. Army regulations.
45 Pesticides used by the DPW and FSH Golf Course are stored at Facility 4168 (Self Help/Pest Control

1 Shop) and prefabricated hazardous materials storage facilities adjacent to Facility 3100, respectively
2 (FSH 2007a). Pesticides and herbicides are also stored in Buildings 3100, 3395, 3392, 3382 (golf course
3 groundskeeping and maintenance facilities), 3881, and 3882 (leased by Goodwill for storage) (FSH
4 2004). No releases have been reported to have occurred at any of these locations. Furthermore, no
5 pesticides or herbicides have been stored or disposed of at FSH beyond usable quantities (FSH 2007a).

6 **Radon.** FSH, Bexar County, and Comal County are in Federal USEPA Radon Zone 3, where the
7 predicted average indoor radon screening level is less than 2 picocuries per liter (pCi/L) (FSH 2007a).

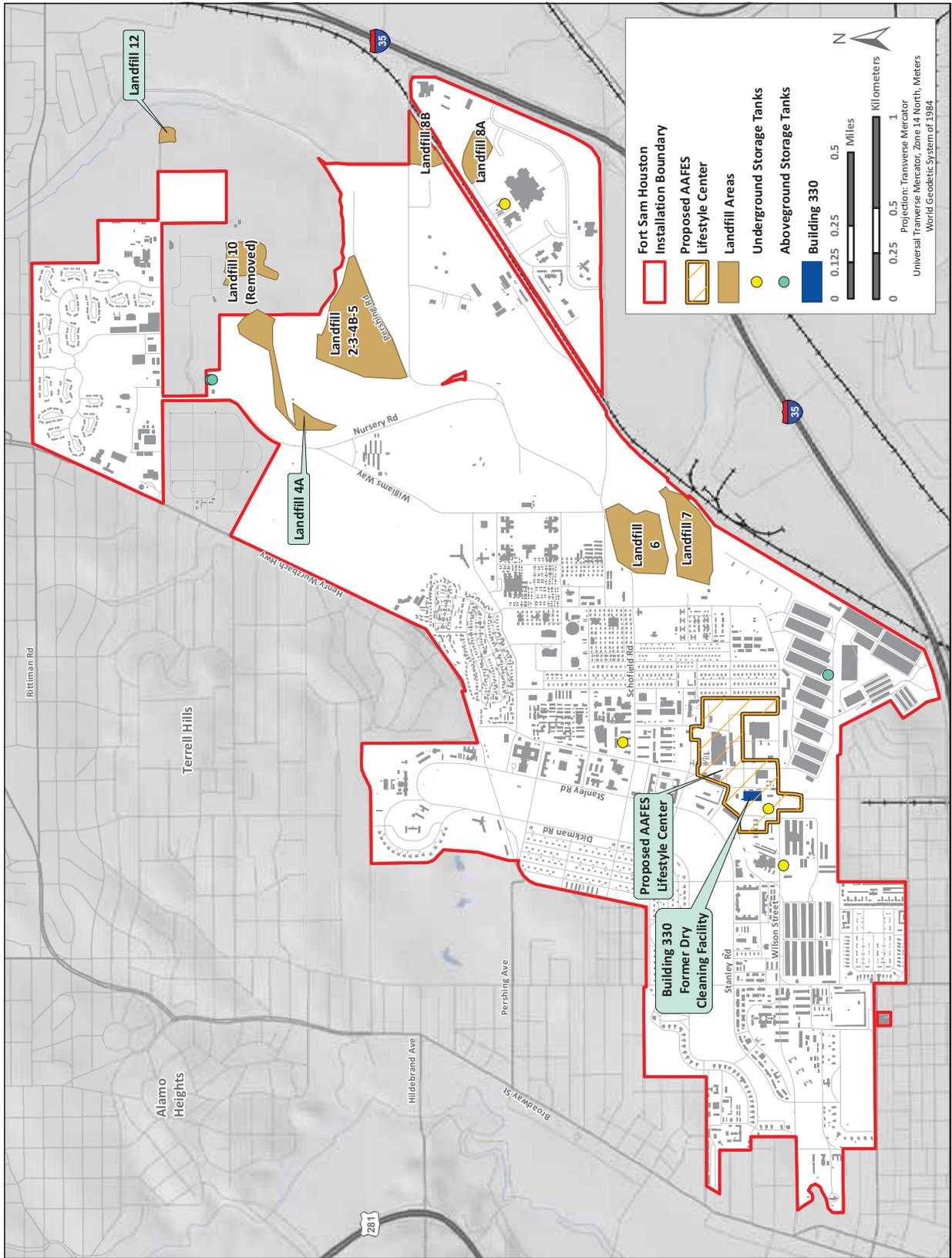
8 **Aboveground and Underground Storage Tanks.** AR 200-1 outlines U.S. Army policy for storage tank
9 management and incorporates Federal regulations. The DPW Environmental Office manages storage
10 tanks and storage tank releases at FSH in accordance with AR 200-1 and the FSH *Spill Prevention*
11 *Control and Countermeasures Plan and Installation Spill Contingency Plan*. These plans provide
12 prevention and control measures to reduce the potential for spills from storage tanks and to establish plans
13 and procedures for controlling and managing sudden releases of petroleum products or hazardous
14 materials. Petroleum fuels and products and waste petroleum, oil, and lubricants (e.g., No. 2 diesel fuel,
15 gasoline, jet propellant, motor oil, and waste oil) are stored in various tanks throughout FSH (FSH
16 2007a).

17 There are no known ASTs within the proposed Lifestyle Center area. There are three USTs currently in
18 operation under Building 331 (AAFES gas station) on the west-southwestern portion of the proposed
19 Lifestyle Center (see **Figure 4-5**). There is one reported leaking UST (LUST) site (Building 2610)
20 adjacent to and east of the proposed project area. According to the TCEQ Leaking Petroleum Storage
21 Tank Database, the LUST was discovered and reported in October 1991. Minor soil contamination and
22 no groundwater contamination were found at the site. Remediation was completed at the site in October
23 1993 and the site was closed on October 1995 (TCEQ 2009).

24 **Compliance-Related Cleanup.** Compliance-related cleanup includes actions to address the cleanup of
25 contaminated sites not funded under the Defense Environmental Restoration Program (i.e., Installation
26 Restoration Program [IRP] or Military Munitions Response Program [MMRP]) and contaminated sites at
27 U.S. Army facilities overseas. There is one compliance-related cleanup site at FSH. Building 330
28 (Former Dry Cleaning Facility [CC FSH330]), known as the Camp Travis Laundry Facility, was in the
29 west-central portion of the proposed Lifestyle Center (see **Figure 4-5**). The former dry cleaning facility
30 was constructed in 1922 and the site is approximately 16,000 ft² (FSH 2007a).

31 In 2003, a geotechnical investigation was conducted at the proposed Lifestyle Center that included soil
32 sampling for VOCs and total petroleum hydrocarbons. Perchloroethylene (PCE) and trichloroethylene
33 (TCE) were found in two soil borings, as deep as 8 feet below ground surface, that exceeded the State
34 Regulatory Texas Risk Reduction Program (TRRP) Tier I residential 30-acre soil Protective
35 Concentration Levels (PCLs). In June 2004, 10 additional soil borings and 3 temporary monitoring wells
36 were installed. Fifty-five soil samples and three groundwater samples were collected. Analytical results
37 indicated that PCE, TCE, trichloropropane, and dichloropropane were present in the soil samples above
38 residential TRRP PCLs. In addition, PCE was reported in the groundwater above the residential TRRP
39 PCL. In December 2005, 11 soil boring and groundwater samples were collected to further delineate the
40 groundwater plume. The plume was estimated to be 2 acres in size. In February 2006, abandoned sewer
41 lines in the vicinity of the proposed Lifestyle Center were removed to reduce or eliminate preferential
42 exposure pathways (FSH 2007a). A Remedial Action Plan (RAP) was then developed and implemented
43 at the site to manage restoration activities at the site. Five groundwater monitoring wells were installed at
44 a depth of 50 feet below ground surface at the site; however, no groundwater has been found at this depth.
45 Remediation of contaminated soil at the site has been completed. The site is currently in the Remedial
46 Action-Operation (RA-O) stage (Rivera 2009).

1



Sources: Base Data, Landfill Areas, and Storage Tanks: Fort Sam Houston 2009; Proposed AAFES Lifestyle Center Site: eM, Inc. 2009.

Figure 4-5. ASTs, USTs, Landfills, and the Former Dry Cleaning Facility at FSH

2
3

1 **Installation Restoration Program.** The DOD’s IRP requires each installation to identify, investigate, and
 2 clean up hazardous waste disposal or release sites. Contamination of groundwater and soil is tracked and
 3 mitigated through the U.S. Army Environmental Database for Restoration. There are three IRP sites at
 4 FSH: FTSH-26, which includes Landfills 8A, 8B, 10, and 12; FTSH-29, which includes Landfills 4A, 6,
 5 and 7; and FTSH-30, which includes Landfills 2, 3, 4B, and 5 (see **Figure 4-5**) (FSH 2007a). There are
 6 no known IRP sites at or within the vicinity of the proposed Lifestyle Center.

7 **Ordnance.** Seventeen closed ranges, one closed unexploded ordnance (UXO) disposal site, and nine
 8 transferred ranges previously operated at FSH. Because the installation has been used since the 1800s,
 9 there is potential for encountering munitions and UXO at the installation; however, a majority of the
 10 installation has been disturbed during previous construction and maintenance activities (FSH 2007a).
 11 There are three operational ranges within 0.5 miles of the proposed Lifestyle Center; however, there are
 12 no operational ranges within the proposed project site (see **Figure 4-6**).

13 **Military Munitions Response Program.** The MMRP was established at FSH in 2001 to manage the
 14 environmental health and safety issues presented by UXO, discarded military munitions, and munition
 15 constituents (MC) (FSH 2007a). Currently, there are 18 Munitions Response Sites (MRSs) that have
 16 been identified for inclusion under the MMRP at FSH (FSH 2008i). The proposed Lifestyle Center is
 17 within the boundaries of two MRSs (FTSH-005-R-01 and FTSH-025-R-01). The Staff Post Firing Range
 18 MRS (FTSH-005-R-01) covers nearly all of the proposed Lifestyle Center, except for small northern
 19 portions of the project area that are covered by the 200-Yard Rifle Range MRS (FTSH-025-01) (see
 20 **Figure 4-6**).

21 In 2008, a Preliminary Assessment/Site Investigation (PA/SI) was conducted at FSH of MRSs with
 22 known or suspected munitions and explosives of concern (MEC), munitions debris, or MC. **Table 4-17**
 23 summarizes the results of the PA/SI for FTSH-005-R-01 and FTSH-025-R-01.

24 **Table 4-17. Summary of MRSs at the Proposed Lifestyle Center**

MRS	CTT Acreage	Assessment/ Sampling Acreage	MEC	MC	Recommendation
FTSH-005-R-01	667.38	538.82	No evidence of MEC was identified	Soil samples for lead were below 500 mg/kg, which is the TRRP Tier I Residential PCL	No Further Action (NFA)
FTSH-025-R-01	417.3	440.96	No evidence of MEC was identified	Soil samples for lead were below 500 mg/kg, which is the TRRP Tier I Residential PCL.	NFA

Source: FSH 2008i

Key: mg/kg = milligrams per kilogram

25 FTSH-005-R-01 includes two former small arms ranges (the Staff Post Firing Range and the 1926 Pistol
 26 Range). The Staff Post Firing Range was used from 1867 to 1887 and the 1926 Pistol Range was used
 27 from 1926 until 1938. Since then, the areas have been developed into residential, commercial,
 28 administrative, and industrial properties. Results from the PA/SI indicated that munitions debris was not
 29 anticipated to be present at FTSH-005-R-01 and was not observed during the investigation. In addition,
 30 there is no evidence of the presence of MEC and MC at FTSH-005-R-01. FTSH-005-R-01 does not have
 31

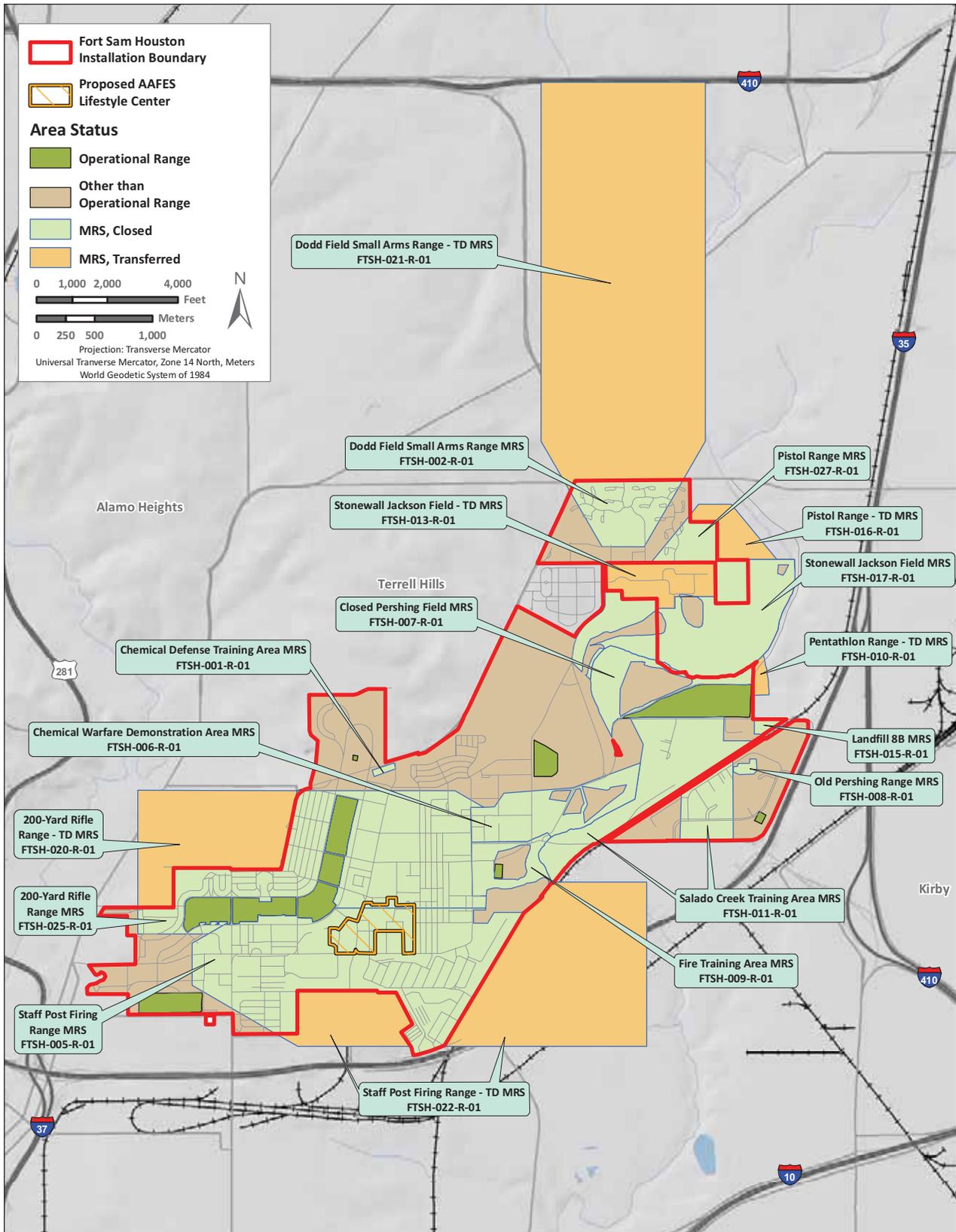


Figure 4-6. Ranges and MRSs at FSH

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1 restricted access and is open to on-installation traffic, routine grounds maintenance, and construction
2 activities. Currently there are no zoning or land use restrictions imposed on FTSH-005-R-01. Based on
3 the results of PA/SI and current site use, FTSH-005-R-01 was recommended for no further action (NFA)
4 (FSH 2008i).

5 FTSH-025-R-01 is a portion of the range fan from the former 200-Yard Rifle Range firing point in the
6 southern portion of the Salado Creek Training Area. The small arms range was used from 1926 until
7 1951. Currently, FTSH-025-R-01 contains a single-family residential area, administrative buildings, and
8 commercial buildings (i.e., Base Exchange and Commissary). Results from the PA/SI indicated that
9 munitions debris was not anticipated to be present at FTSH-025-R-01 as the area was part of a safety fan
10 for a rifle range and munitions debris was not observed during the investigation. In addition, there is no
11 evidence of the presence of MEC and MC at FTSH-025-R-01. Access to FTSH-025-R-01 is not
12 restricted on-installation and there are no zoning or land use restrictions. Based on the results of PA/SI
13 and current site use, FTSH-025-R-01 was also recommended for NFA (FSH 2008i).

14 **4.10.3 Environmental Consequences**

15 **Evaluation Criteria**

16 Effects on pollution prevention would be considered significant if the Federal action resulted in worker,
17 resident, or visitor exposure to hazardous materials, or if the action generated quantities of these
18 hazardous materials beyond the capability of management procedures. Effects on hazardous materials
19 and waste management would be considered significant if the Proposed Action resulted in noncompliance
20 with applicable Federal and state regulations and permit capabilities. Effects on the IRP would be
21 considered significant if the Federal action disturbed (or created) contaminated sites resulting in adverse
22 effects on human health or the environment.

23 **Proposed Action**

24 ***Hazardous Materials and Wastes.*** Short-term, minor, adverse impacts would be expected. Construction
25 activities would require the use of certain hazardous materials such as paints, welding gases, solvents,
26 preservatives, and sealants. It would be anticipated that the quantity of products containing hazardous
27 materials used during the Proposed Action would be minimal and their use would be of short duration.
28 The quantity of hazardous wastes generated from proposed construction activities would be minor and
29 would not be expected to exceed the capacities of existing hazardous waste disposal facilities. Hazardous
30 materials and wastes would be handled under the existing DOD RCRA-compliant waste management
31 programs and therefore, would not be expected to increase the risks of exposure to workers and
32 installation personnel.

33 ***Asbestos-Containing Materials.*** Short-term, minor, adverse impacts could be expected. Demolition of
34 the existing structures within the proposed Lifestyle Center area could generate ACM wastes. Any ACM
35 encountered during building demolition and cleanup would be handled in accordance with established
36 U.S. Army policy, NESHAP and AHERA regulations, and the *Asbestos Management Plan*. Demolition
37 plans would be reviewed by FSH civil engineering personnel to ensure appropriate measures were taken
38 to reduce potential exposure to, and release of, asbestos. FSH would follow its current practices for
39 removal of friable asbestos and other ACM. Friable ACM would be removed and disposed of at an
40 asbestos-permitted landfill. An asbestos survey would be completed prior to commencement of
41 demolition activities.

42 ***Lead-Based Paint.*** Short-term, minor, adverse impacts could be expected. Demolition of the existing
43 structures within the proposed project area could generate LBP wastes. Any LBP encountered during

1 building demolition and cleanup would be handled in accordance with established U.S. Army policy and
2 the *Lead Hazard Management Plan*. Demolition plans would be reviewed by FSH civil engineering
3 personnel to ensure appropriate measures were taken to reduce potential exposure to, and release of, lead
4 from LBP. FSH would follow its current practices for removal and disposal of LBP. A LBP survey
5 would be completed prior to commencement of demolition activities as appropriate.

6 ***Polychlorinated Biphenyls.*** No impacts would be expected. There are no transformers containing PCBs
7 at FSH. Any fluorescent light fixtures containing PCBs encountered during demolition would be handled
8 in accordance to U.S. Army policy and the installation's Hazardous Waste Management Plan.

9 ***Pesticides.*** No impacts would be expected. All pesticides and herbicides are handled and applied
10 according to Federal, state, and local regulations and the Integrated Pest Management Plan. There are no
11 known releases at any of the pesticide or herbicide storage locations. In addition, no pesticides or
12 herbicides have been stored or disposed of at FSH beyond usable quantities.

13 ***Radon.*** No impacts would be expected. The average indoor radon level at FSH is 2 pCi/L, which is less
14 than the USEPA-recommended action level of 4 pCi/L.

15 ***Aboveground and Underground Storage Tanks.*** Short-term, negligible, adverse impacts might be
16 expected. Updated site-specific information regarding USTs within the proposed Lifestyle Center would
17 be obtained prior to commencement of construction and demolition activities. If the three USTs within
18 the proposed project area would continue to be used under the Proposed Action, no impacts would be
19 expected. The three USTs would continue to be used with appropriate BMPs in place (e.g., secondary
20 containment, leak detection systems, and alarm systems). However, if the three USTs within the
21 proposed project area would not continue to be used under the Proposed Action, short-term, negligible,
22 adverse impacts might be expected. The three USTs would be closed in-place or removed as appropriate
23 in accordance with Federal, state, and U.S Army regulations. Any contaminated soil discovered during
24 the closure or removal of the USTs should be removed and disposed of in accordance with Federal and
25 state regulations. There are no known open LUST cases at or within the vicinity of the proposed Lifestyle
26 Center. If any soil potentially containing petroleum substances was subsequently discovered during
27 construction and demolition activities, the contractor would be required to immediately stop work, report
28 the discovery to the installation, and implement appropriate safety precautions. Commencement of field
29 activities could not continue in this area until the issue was investigated.

30 ***Compliance-Related Cleanup.*** Short-term, minor, adverse impacts would be expected. The former dry
31 cleaning facility has been completely demolished and remediation of contaminated soil at the site has
32 been completed. No groundwater has been found at any of the five groundwater monitoring wells at the
33 site. The site is currently in the RA-O stage (Rivera 2009). According to previous investigations,
34 contamination including PCE in the groundwater at the former dry cleaning facility site is above the
35 residential TRRP PCL. The former dry cleaning facility site would be used for the newly constructed
36 parking lot. If groundwater or soil potentially containing contaminants is encountered during construction
37 or demolition activities, it would be addressed in accordance with applicable Federal and state
38 regulations, U.S. Army policy, and FSH management procedures. Project planning would include
39 protection of groundwater monitoring wells to avoid disruption of RA-O activities and minimize potential
40 impacts on compliance-related cleanup infrastructure.

41 ***Environmental Restoration Program.*** No impacts would be expected. There are no known IRP sites at
42 or within the vicinity of the proposed Lifestyle Center.

43 ***Ordinance.*** No impacts would be expected. There are no known operational ranges within the proposed
44 project area. If inadvertent discovery of munitions or UXO occurs during construction or demolition

1 activities, the contractor would be required to immediately stop work in the area, personnel would move
2 away from the site, and the U.S. Army Explosive Ordnance Disposal personnel would be contacted.

3 ***Military Munitions Response Program.*** No impacts would be expected. Munitions debris is not
4 anticipated to be present at FTSH-005-R-01 or FTSH-025-01 and was not observed during the 2008
5 PA/SI. In addition, there is no evidence of the presence of MEC and MC at FTSH-005-R-01 and FTSH-
6 025-01. There are no zoning or land use restrictions imposed on FTSH-005-R-01 or FTSH-025-01, and
7 both MRSs are recommended for NFA. If inadvertent discovery of MEC or MC occurs during
8 construction or demolition activities, the contractor would be required to immediately stop work in the
9 area, personnel would move away from the site, and the U.S. Army Explosive Ordnance Disposal
10 personnel would be contacted.

11 **No Action Alternative**

12 Under the No Action Alternative, no impacts would be expected. There would be no soil disturbance at
13 the proposed Lifestyle Center and therefore no risk of encountering hazardous substances. No demolition
14 of structures would occur as planned under the Proposed Action. In general, there would be no change in
15 or impacts on environmental restoration or hazardous materials and wastes at FSH if the Proposed Action
16 were not implemented.

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5. Cumulative Effects

5.1 Cumulative Effects Analysis

CEQ regulations stipulate that the cumulative effects analysis in an EA should consider the potential environmental effects resulting from “the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions” (40 CFR 1508.7). CEQ guidance in considering cumulative effects affirms this requirement, stating that the first steps in assessing cumulative effects involves defining the scope of the other actions and their interrelationship with a proposed action. The scope must consider other projects that coincide with the location and timetable of a proposed action and other actions. Cumulative effects analyses must also evaluate the nature of interactions among these actions (CEQ 1997).

To identify cumulative effects, the analysis needs to address two fundamental questions:

1. Does a relationship exist such that affected resource areas of the Proposed Action or alternatives might interact with the affected resource areas of past, present, or reasonably foreseeable actions?
2. If such a relationship exists, then does an EA or EIS reveal any potentially significant impacts not identified when the Proposed Action is considered alone?

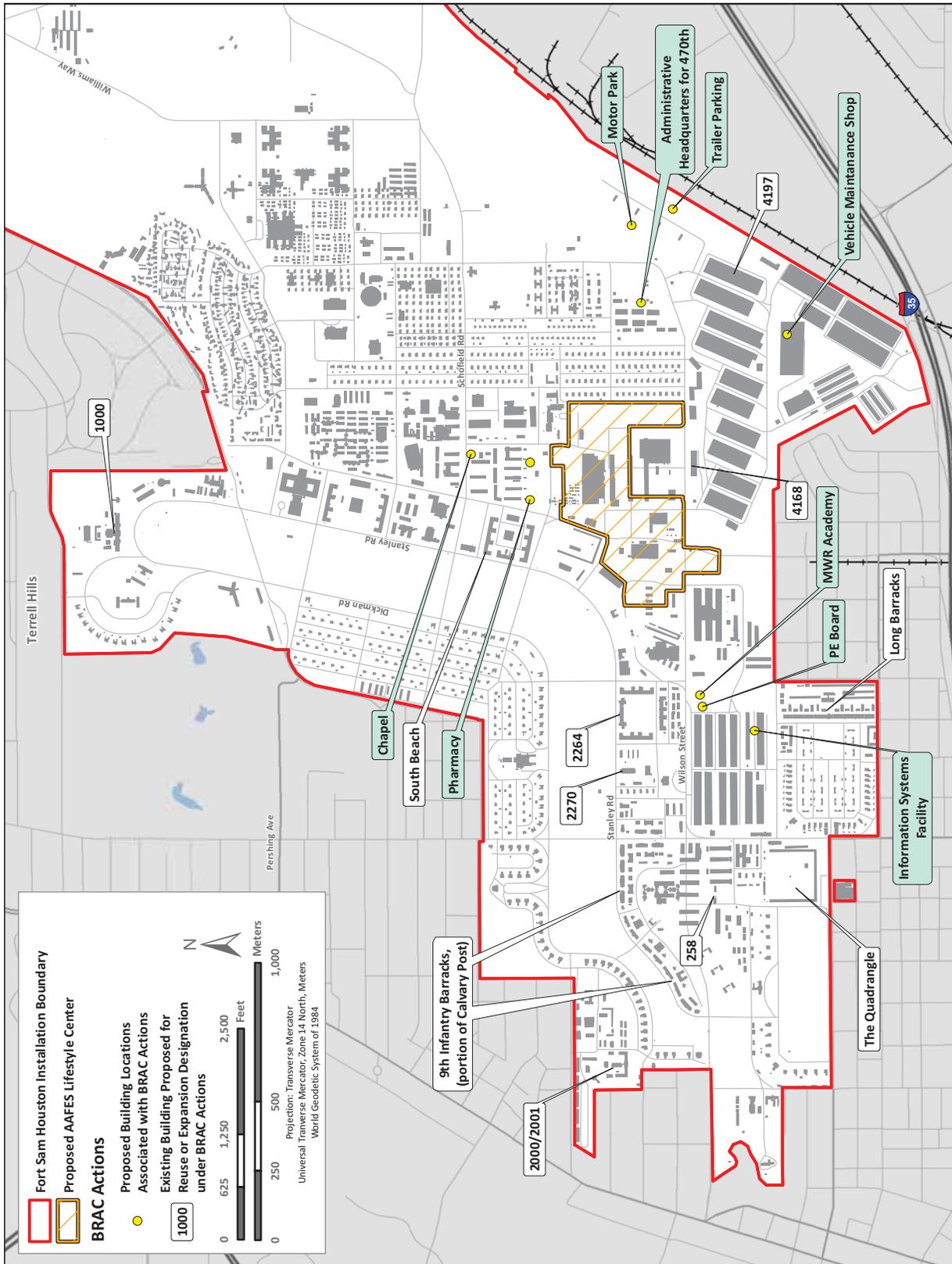
The scope of the cumulative effects analysis involves both timeframe and geographic extent in which effects could be expected to occur, as well as a description of what resources could potentially be cumulatively affected. For the purposes of this analysis, the temporal span of the Proposed Action is 5 years. For most resources, the spatial area for consideration of cumulative effects is the project area for the Lifestyle Center identified in **Figure 2-2**.

5.1.1 Projects Identified for Potential Cumulative Effects

2005 BRAC Actions at FSH. The Base Closure and Realignment Commission (BRAC Commission) recommended 17 realignment actions for FSH. The U.S. Army prepared the *Base Realignment and Closure (BRAC) Actions Final Environmental Impact Statement*, hereafter referred to as the “BRAC EIS,” in 2007 to address the BRAC Commission’s recommendations for realignments at FSH and Camp Bullis, Texas (FSH 2007a). A Record of Decision (ROD) for the BRAC recommendations at FSH and Camp Bullis was subsequently prepared and signed on May 17, 2007 (FSH 2007c). BRAC actions at FSH could result in cumulative effects in association with the Proposed Action, not only because of the magnitude of the BRAC actions but also because of temporal and spatial proximity.

Numerous military functions from across the country are being relocated to FSH. Consequently, approximately 10,150 additional personnel will be relocated to FSH, raising the installation’s average daily population to approximately 36,300 personnel. Construction or alteration of facilities at FSH will also be required to support incoming personnel and missions. Implementing BRAC actions at FSH will require alteration of 979,100 ft² of existing facility, construction of 7 million ft² of new facilities, and construction of approximately 375,400 ft² of vehicle parking and roads. Additionally, 501,800 ft² of demolition/deconstruction will also be required. **Figure 5-1** shows the BRAC projects in the vicinity of the proposed Lifestyle Center. Other BRAC projects will occur on FSH that are not shown in **Figure 5-1**, such as construction activities in the patient care; research, development, testing, and evaluation; and medical training areas of FSH. These areas of FSH are not close to the proposed Lifestyle Center.

1



Sources: Base Data: Fort Sam Houston 2009; Proposed AAFES Lifestyle Center Site: eTM, Inc. 2009; BRAC Actions: Adapted from Figure 3-3 of FSI 2007.

Figure 5-1. BRAC Projects in Vicinity of Proposed Lifestyle Center

2

3

1 The BRAC EIS (FSH 2007a) examined in detail potential impacts on land use, aesthetics and visual
2 resources, air quality, noise, geology and soils, water resources, biological resources, cultural resources,
3 socioeconomics and environmental justice, transportation, utilities, and hazardous materials and waste
4 management. BRAC projects at FSH are analyzed in detail for potential cumulative effects in this EA.

5 **2005 BRAC Actions and Other Development at DOD Installations in San Antonio Area.** The BRAC
6 Commission also recommended realignment at Camp Bullis (which is where many FSH training activities
7 occur), Randolph AFB, and Lackland AFB (BRAC Commission 2005). All of these DOD installations
8 are within the San Antonio area. BRAC recommendations include personnel increases, facility
9 construction, and facility demolition at Camp Bullis, Randolph AFB, and Lackland AFB. Additionally,
10 Randolph AFB will receive additional T-38 aircraft.

11 In the context of this EA, BRAC actions at other installations are not anticipated to result in significant
12 environmental effects when considered with the construction of the proposed Lifestyle Center at FSH.
13 Camp Bullis, Randolph AFB, and Lackland AFB are approximately 14 miles, 11 miles, and 11 miles,
14 respectively, from Fort Sam Houston. The environmental effects identified in this EA are generally
15 localized to FSH in the immediate area of construction. Therefore, potential cumulative effects associated
16 with BRAC actions and other development activities at DOD installations in the San Antonio area are not
17 considered in detail in this EA.

18 **Other Development in San Antonio Area.** The San Antonio area is a growing urban area. San Antonio
19 is the seventh largest city in the nation and one of the fastest growing cities in Texas. Population growth
20 in San Antonio is forecasted at approximately 27 percent between 2000 and 2020 (TAMU 2009). The
21 construction of the proposed Lifestyle Center on FSH is a negligible construction project in the context of
22 other large ongoing development activities. Therefore, potential cumulative effects associated with
23 development activities in the San Antonio area are not considered in detail in this EA.

24 **5.1.2 Potential Cumulative Effects**

25 Potential cumulative effects of implementing the proposed Lifestyle Center and the BRAC
26 recommendations at FSH are summarized in **Table 5-1**. No significant adverse cumulative effects were
27 identified in the cumulative effects analysis.

28 **5.2 Unavoidable Adverse Impacts**

29 Unavoidable adverse impacts would result from implementation of the Proposed Action. None of these
30 impacts would be significant.

31 **Geological Resources.** Under the Proposed Action, construction activities, such as grading, excavating,
32 and trenching of the ground, would result in some minor soil disturbance. Implementation of BMPs
33 during construction would limit environmental consequences resulting from construction activities.
34 Standard erosion-control means would also reduce environmental consequences related to these
35 characteristics. Although unavoidable, impacts on soils at the installation are not considered significant.

36 **Infrastructure.** Solid waste would be generated as a result of construction and demolition activities.
37 This is an unavoidable but minor adverse impact that can be mitigated to a certain extent by possible
38 recycling opportunities.

39

Table 5-1. Potential Cumulative Effects Summary

Resource Area	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
Noise	Ambient sound environment has been dominated by activities common to a military installation.	Ambient sound environment is affected mainly by vehicle traffic and surrounding land uses. Noise levels are comparable to a noisy urban residential area.	Short-term, minor, adverse effects would be expected from construction activities. Long-term, negligible to minor, adverse effects would be expected from increased vehicle traffic.	<i>BRAC:</i> Short-term, minor, adverse effects are expected from construction activities. Long-term, negligible, adverse effects are expected from increased medical evaluation helicopter flights.	Noise environment would continue to be comparable to a noisy urban area. No significant adverse cumulative effects expected.
Land Use	FSH has been used as a military installation at its current location since 1870. Surrounding area of San Antonio has been intensely developed as an urban area.	Current land use at proposed site is Community Support and surrounding land use types include Family Housing, Supply and Warehouse, Administration, and Equipment and Maintenance.	Short- and long-term, negligible effects would be expected. The Proposed Action would be contained entirely within the boundaries of FSH. Proposed land uses would be compatible with existing uses.	<i>BRAC:</i> Long-term, adverse effects are expected from altering historic facilities and siting plans for new facilities.	Land uses surrounding BRAC projects and the proposed Lifestyle Center would be compatible with existing and foreseeable future land uses. No significant adverse cumulative effects expected.
Air Quality	MSAI AQCR was in an EAC for the 8-hour O ₃ standard. It was designated as in attainment for all criteria pollutants in 2008.	FSH and surrounding areas are in attainment. Air emissions include criteria pollutants and HAP from vehicles and buildings.	Short-term, minor, adverse effects would be expected from construction activities.	<i>BRAC:</i> Short-term, minor, adverse effects are expected from construction activities. Long-term adverse effects are expected from increased mobile and stationary sources.	Air emissions associated with BRAC actions and the proposed Lifestyle Center would not be expected to result in violations of NAAQS or noticeably degrade ambient air quality. No significant adverse cumulative effects expected.
Geological Resources	Past activities have modified soils.	None.	Short term, negligible to minor, adverse effects would be expected from construction activities.	<i>BRAC:</i> Short-term, adverse effects are expected from construction activities. Long-term, adverse effects on soils are expected from increased impervious surfaces.	Soils on FSH are intensely modified by previous development activities. BRAC actions and proposed Lifestyle Center would further disturb soils. No significant adverse cumulative effects expected.

Resource Area	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
<p>Water Resources</p>	<p>Installation activities have led to the drawdown of the Edwards Aquifer. Other surface water features including Salado Creek and the San Antonio River (via the Alamo Ditch) have been affected by disturbances on-installation</p>	<p>The Proposed Lifestyle Center is not within the Salado Creek floodplain. Water usage on-installation contributes to drawdown of the Edwards Aquifer. Current development associated with BRAC activities increases impervious surfaces and can affect recharge of the Edwards Aquifer.</p>	<p>Short- to long-term, minor, adverse effects on surface and groundwater quality would be expected from construction activities.</p>	<p><i>BRAC:</i> Short-term, adverse effects are expected from construction activities. Long-term, adverse effects on soils are expected from increased impervious surfaces. Long-term, adverse effects on the Edwards Aquifer are expected due to increased water usage associated with increased personnel, but pumping limits would not be exceeded.</p>	<p>Water conservation measures are in place for the Edwards Aquifer. The Proposed Action would not significantly affect drawdown of the Edwards Aquifer when combined with BRAC associated activities. USFWS' 2008 Biological Opinion determined that BRAC activities would not significantly affect threatened and endangered species. Increases in impervious surfaces associated with the Proposed Action would be minor when compared to future actions at the installation.</p>
<p>Biological Resources</p>	<p>FSH is a largely developed installation with only 30 percent of the installation undeveloped. Species on-installation are relatively adapted to living in an urban environment. Few wetland areas exist on-installation</p>	<p>The proposed site location is predominantly developed with little native vegetation.</p>	<p>Short- to long-term, negligible to minor, direct and indirect, adverse effects on biological resources would be expected within or adjacent to FSH from negligible drawdown of Edwards Aquifer.</p>	<p><i>BRAC:</i> No significant effects are expected.</p>	<p>Projects related to BRAC actions at FSH when combined with the Proposed Lifestyle center would contribute to the drawdown of Edwards Aquifer and would likely have a long-term minor adverse impact.</p>

Resource Area	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
<p>Cultural and Architectural Resources</p>	<p>FSH became operational during the Mexican War and is one of the oldest military installations in the country. Consequently, FSH has many significant cultural resources.</p>	<p>Of the 1,427 architectural resources inventoried on FSH, 723 are NRHP-eligible. There are 13 NRHP-eligible historic landscapes. There are no known Traditional Cultural Properties or NRHP-eligible archeological resources.</p>	<p>One NRHP-eligible building remains within the APE (Building 372). There are 135 NRHP-eligible architectural resources within the visual APE. A large portion of the Proposed Action would occur within the New Post area, which is an NHCD- and NRHP-eligible landscape. Architecture of the Proposed Action would be designed to be compatible with the existing historic context of FSH.</p>	<p><i>BRAC:</i> Long-term, adverse effects are expected from demolition or alteration of NRHP-eligible facilities. Long-term, beneficial effects are also expected from enhancing and protecting historical qualities while modifying structures to have modern uses.</p>	<p>Cumulatively, construction and demolition associated with the BRAC actions and the proposed Lifestyle Center would affect cultural and architectural resources (and their viewsheds) at FSH. All construction, demolition, and renovation would be accomplished in accordance with the Installation Design Guide and standard operating procedures in the Historic Properties Component to minimize or mitigate potentially adverse changes to the historical character of FSH. No significant adverse cumulative effects are expected since all construction activities would be undertaken in accordance with existing protocols.</p>
<p>Socioeconomic Resources and Environmental Justice</p>	<p>Population of San Antonio MSA has grown substantially over the past 18 years. Population of FSH declined from 1990 to 2000.</p>	<p>The top employment industry for FSH, surrounding areas, and the San Antonio MSA is educational, health, and social services. Retail trade is the number two employment industry for FSH and the San Antonio MSA.</p>	<p>Short-term, minor, beneficial effects would be expected from construction expenditures. Long-term, minor, beneficial effects from job creation and tax revenue from sales.</p>	<p><i>BRAC:</i> Short-term, substantial, beneficial effects are expected from construction expenditures. Long-term, substantial, beneficial effects are expected from increased personnel.</p>	<p>Economic expenditures associated with BRAC actions and proposed Lifestyle Center would cumulatively have beneficial socioeconomic effects in the San Antonio MSA. No significant adverse cumulative effects expected.</p>

Resource Area	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
<p>Utilities, Infrastructure, and Transportation</p>	<p>Power supply, water supply, sewer and wastewater, natural gas, liquid fuel, and communications systems; solid waste management protocols; and transportation networks have been well-developed on FSH and in the surrounding urban area.</p> <p>Intersections within the central-south transportation section are operating at acceptable LOS, generally C or higher.</p>	<p>Most utilities and infrastructure systems are in good working condition, supporting the FSH population. The aging wastewater collection system requires some repairs and upgrades to continue to support the FSH population. The central-south section at FSH is the most heavily trafficked area within the installation. It is composed of an urban downtown grid pattern of roadways, generally at perpendicular intersections. The roads are two-lane, low-speed and relatively low-volume. At several intersections, traffic signals were removed and replaced with four- or two-way stop conditions representing a positive indicator of acceptable traffic flow (FSH 2007a).</p>	<p>No effects on power supply, water supply, natural gas, liquid fuel, and communications systems would be expected.</p> <p>Long-term, minor, adverse effects on sewer and wastewater systems could occur since this system is at or near capacity.</p> <p>Short- and long-term, minor, adverse effects would occur on solid waste management from generation of construction and demolition debris.</p> <p>Short-term, minor, adverse impacts on traffic circulation due to road and lane closures from construction and demolition activities would be anticipated. The Proposed Lifestyle Center would require delivery of materials to construction sites and removal of debris from demolition sites.</p>	<p><i>BRAC:</i></p> <p>Short-term, adverse effects are expected on transportation from construction activities.</p> <p>Long-term, adverse effects are expected on transportation as a result of increased personnel, though traffic is expected to stay within conventionally accepted ranges.</p> <p>No or negligible effects are expected on water, electrical, gas, and wastewater systems. The Walters Gate is currently undergoing improvements and the primary Harry Wurzbach-East (Scott) gate recently opened.</p>	<p>No cumulative effects on power supply, water supply, natural gas, liquid fuel, and communications are expected. Ongoing improvements to the wastewater collection system would ensure that the wastewater system can accommodate growth at FSH. BRAC actions and the proposed Lifestyle Center would be expected to increase traffic on FSH. With the addition of more than 10,000 personnel from BRAC actions; however, the proposed Lifestyle Center would have a negligible contribution to increased traffic. No significant adverse cumulative effects would be expected.</p> <p>Potential additional traffic associated with the Proposed Lifestyle center would likely be offset by ongoing improvements to Walters Gate and the surrounding road system. These improvements include additional capacity and lane improvements which would lessen any cumulative effect from an increase in traffic around Walters Gate.</p>

Resource Area	Past Actions	Current Background Activities	Proposed Action	Known Future Actions	Cumulative Effects
<p>Hazardous Wastes and Materials</p>	<p>Hazardous wastes and materials, ACM, LBP, pesticides, ASTs and USTs, compliance-related cleanup sites, IRP sites, ordnance, and MMRP sites occur at FSH as a result of historic use of FSH as a military installation.</p>	<p>Hazardous wastes and materials, ACM, LBP, pesticides, ASTs and USTs, compliance-related cleanup sites, IRP sites, ordnance, and MMRP sites are managed in accordance with U.S. Army and other applicable Federal regulations.</p>	<p>Short-term, minor, adverse effects during construction activities. Construction would require use of small quantities of hazardous materials. Demolition of older buildings could uncover ACM and LBP. Contamination from a former dry-cleaning facility is possible during ground-breaking, although soil has been remediated and no contaminated groundwater has been encountered in monitoring wells.</p>	<p><i>BRAC:</i> Long-term, beneficial effects are expected as a result of removal of ACM, LBP, and PCB. Medical wastes, biohazardous wastes, and radioactive wastes would increase but effects would not be significant.</p>	<p>Cumulatively, use of hazardous materials and generation of solid waste would increase with the BRAC actions and proposed Lifestyle Center at FSH. Handling and disposal of hazardous materials and wastes would be in accordance with U.S. Army and other applicable Federal regulations. No significant adverse cumulative effects expected.</p>

1 **Hazardous Wastes and Materials.** Products containing hazardous materials would be procured and used
2 during the proposed facilities construction projects. It is anticipated that the quantity of products
3 containing hazardous materials used during the construction activities would be minimal and their use
4 would be of short duration. Contractors would be responsible for the management of hazardous
5 materials, which would be handled in accordance with Federal and state regulations. Contractors must
6 report use of hazardous materials. It is anticipated that the quantity of hazardous wastes generated from
7 proposed construction activities would be negligible. Contractors would be responsible for the disposal
8 of hazardous wastes in accordance with Federal and state laws and regulations, as well as the Hazardous
9 Waste Management Plan. The potential for construction accidents or spills during fuel handling are
10 unavoidable risks associated with the Proposed Action.

11 **Energy Resources.** The Proposed Action would require the use of fossil fuels, a nonrenewable natural
12 resource. The use of nonrenewable resources in construction activities, and subsequently with the
13 operations of facilities and additional aircraft and helicopters, would be unavoidable. Relatively small
14 amounts of energy resources would be committed to the Proposed Action and are not considered
15 significant.

16 **5.3 Compatibility of the Proposed Action and Alternatives with the** 17 **Objectives of Federal, Regional, State, and Local Land Use** 18 **Plans, Polices, and Controls**

19 Impacts on the ground surface as a result of the Proposed Action would occur entirely within the
20 boundaries of FSH. The proposed construction activities would not result in any significant or
21 incompatible land use changes on or off the installation. The proposed projects have been sited according
22 to existing land use zones. Consequently, construction activities would not be in conflict with installation
23 land use policies or objectives. The Proposed Action would not conflict with any applicable off-
24 installation land use ordinances or designated clear zones.

25 **5.4 Relationship Between Short-term Use and Long-term** 26 **Productivity**

27 Short-term uses of the biophysical components of the human environment include direct impacts, usually
28 related to construction activities, that occur over a period of less than 5 years. Long-term uses of the
29 human environment include those impacts that occur over a period of more than 5 years, including
30 permanent resource loss.

31 This EA identifies potential short-term adverse effects on the natural environment as a result of
32 construction activities. These potential adverse effects include noise emissions, air emissions, soil
33 erosion, storm water runoff into surface water, and increased traffic. Redevelopment of the site for a new
34 Lifestyle Center would be expected to increase the long-term productivity of the site by removing old and
35 outdated facilities and replacing them with modern and efficient facilities.

36 **5.5 Irreversible and Irrecoverable Commitments of Resources**

37 An irreversible or irretrievable commitment of resources refers to impacts on or losses to resources that
38 cannot be reversed or recovered, even after an activity has ended and facilities have been
39 decommissioned. A commitment of resources is related to use or destruction of nonrenewable resources,
40 and effects that such a loss will have on future generations. For example, if prime farmland is developed
41 there would be a permanent loss of agricultural productivity. Construction of the proposed Lifestyle

1 Center involves the irreversible and irretrievable commitment of material resources and energy, land
2 resources, landfill space, and human resources. The impacts on these resources would be permanent.

3 **Material Resources.** Material resources irretrievably used for the Proposed Action include steel,
4 concrete, and other building materials. Such materials are not in short supply and would not be expected
5 limit other unrelated construction activities. The irretrievable use of material resources would not be
6 considered significant.

7 **Energy Resources.** Energy resources used for the Proposed Action would be irretrievably lost. These
8 include petroleum-based products (e.g., gasoline and diesel) and electricity. During construction,
9 gasoline and diesel fuel would be used for the operation of construction vehicles. Consumption of these
10 energy resources would not place a significant demand on their availability in the region. Therefore, no
11 significant impacts would be expected.

12 **Landfill Space.** The generation of construction and demolition debris and subsequent disposal of that
13 debris in a landfill would be an irretrievable adverse impact. Construction contractors would be expected
14 to recycle at least 40 percent of the debris that is generated. If a greater percentage is recycled, then
15 irretrievable impacts on landfills would be reduced. There are numerous rubble landfills and construction
16 and demolition processing facilities that could handle the waste generated. However, any waste that is
17 generated by the Proposed Action that is disposed of in a landfill would be considered an irretrievable
18 loss of that landfill space.

19 **Human Resources.** The use of human resources for construction is considered an irretrievable loss only
20 in that it would preclude such personnel from engaging in other work activities. However, the use of
21 human resources for the Proposed Action represents employment opportunities, and is considered
22 beneficial.

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APPENDIX A

APPLICABLE LAWS, REGULATIONS, POLICIES, AND PLANNING CRITERIA

1 **APPENDIX A**

2 **Applicable Laws, Regulations, Policies, and Planning Criteria**

3 When considering the affected environment, the various physical, biological, economic, and social
4 environmental factors must be considered. In addition to the National Environmental Policy Act (NEPA),
5 there are other environmental laws as well as Executive Orders (EOs) to be considered when preparing
6 environmental analyses. These laws are summarized below.

7 NOTE: This is not a complete list of all applicable laws, regulations, policies, and planning criteria
8 potentially applicable to documents, however, it does provide a general summary for use as a reference.

9 **Noise**

10 The *Noise Control Act* of 1972 established that Federal agencies should comply with Federal, state,
11 interstate, and local requirements requiring control and abatement of environmental noise to the same
12 extent as private entities. The *Safety and Noise Abatement Act* of 1979 requires a single system for
13 measuring noise, determining noise exposure, and identifying noise-compatible land use surrounding
14 airports.

15 **Land Use**

16 Land use guidelines established by the U.S. Department of Housing and Urban Development (HUD) and
17 based on findings of the Federal Interagency Committee on Noise (FICON) are used to recommend
18 acceptable levels of noise exposure for land use.

19 **Air Quality**

20 The Clean Air Act (CAA) of 1970, and Amendments of 1977 and 1990, recognizes that increases in air
21 pollution result in danger to public health and welfare. To protect and enhance the quality of the Nation's
22 air resources, the CAA authorizes the U.S. Environmental Protection Agency (USEPA) to set six National
23 Ambient Air Quality Standards (NAAQSs) which regulate carbon monoxide, lead, nitrogen dioxide,
24 ozone, sulfur dioxide, and particulate matter pollution emissions. The CAA seeks to reduce or eliminate
25 the creation of pollutants at their source, and designates this responsibility to state and local governments.
26 States are directed to utilize financial and technical assistance as well as leadership from the Federal
27 government to develop implementation plans to achieve NAAQS. Geographic areas are officially
28 designated by the USEPA as being in attainment or nonattainment to pollutants in relation to their
29 compliance with NAAQS. Geographic regions established for air quality planning purposes are
30 designated as Air Quality Control Regions (AQCR). Pollutant concentration levels are measured at
31 designated monitoring stations within the AQCR. An area with insufficient monitoring data is designated
32 as unclassifiable. Section 309 of the CAA authorizes USEPA to review and comment on impact
33 statements prepared by other agencies.

34 An agency should consider what effect an action might have on NAAQS due to short-term increases in air
35 pollution during construction as well as long-term increases resulting from changes in traffic patterns.
36 For actions in attainment areas, a Federal agency could also be subject to USEPA's PSD regulations.
37 These regulations apply to new major stationary sources and modifications to such sources. Although
38 few agency facilities will actually emit pollutants, increases in pollution can result from a change in
39 traffic patterns or volume. Section 118 of the CAA waives Federal immunity from complying with the
40 CAA and states all Federal agencies will comply with all Federal- and state-approved requirements.

1 The General Conformity Rule requires that any Federal action meet the requirements of a SIP or Federal
2 Implementation Plan. More specifically, CAA conformity is ensured when a Federal action does not
3 cause a new violation of the NAAQS, contribute to an increase in the frequency or severity of violations
4 of NAAQS, or delay the timely attainment of any NAAQS, interim progress milestones, or other
5 milestones toward achieving compliance with the NAAQS.

6 The General Conformity Rule applies only to actions in nonattainment or maintenance areas and
7 considers both direct and indirect emissions. The rule applies only to Federal actions that are considered
8 “regionally significant” or where the total emissions from the action meet or exceed the *de minimis*
9 thresholds presented in 40 Code of Federal Regulations (CFR) 93.153. An action is regionally significant
10 when the total nonattainment pollutant emissions exceed 10 percent of the AQCR’s total emissions
11 inventory for that nonattainment pollutant. If a Federal action does not meet or exceed the *de minimis*
12 thresholds and is not considered regionally significant, then a full Conformity Determination is not
13 required.

14 **Safety**

15 OSHA (29 U.S.C. 651) was passed in 1970 to ensure worker and workplace safety. Employers are to
16 provide a workplace free of safety and health hazards, such as exposure to toxic chemicals, excessive
17 noise levels, mechanical dangers, heat or cold stress, or unsanitary conditions. This is done through
18 establishing safety standards, inspections, training, and providing educational materials.

19 The AR 385-10, *The Army Safety Program*, implements OSHA requirements through prescribing policy,
20 responsibilities, and procedures to protect and preserve Army personnel and property against accidental
21 loss. It provides for safe and healthful workplaces, procedures, and equipment critical to Army operations
22 and activities.

23 **Geological Resources**

24 Recognizing that millions of acres per year of prime farmland are lost to development, Congress passed
25 the Farmland Protection Policy Act to minimize the extent to which Federal programs contribute to the
26 unnecessary and irreversible conversion of farmland (7 CFR Part 658). Prime farmland are soils that
27 have a combination of soil and landscape properties that make them highly suitable for cropland, such as
28 high inherent fertility, good water-holding capacity, deep or thick effective rooting zones, and are not
29 subject to periodic flooding. Under the Farmland Protection Policy Act, agencies are encouraged to
30 conserve prime or unique farmlands when alternatives are practicable. Some activities that are not subject
31 to the Farmland Protection Policy Act include Federal permitting and licensing, projects on land already
32 in urban development or used for water storage, construction for national defense purposes, or
33 construction of new minor secondary structures such as a garage or storage shed.

34 **Water Resources**

35 The Clean Water Act (CWA) of 1977 is an amendment to the Federal Water Pollution Control Act of
36 1972, is administered by USEPA, and sets the basic structure for regulating discharges of pollutants into
37 U.S. waters. The CWA requires USEPA to establish water quality standards for specified contaminants
38 in surface waters and forbids the discharge of pollutants from a point source into navigable waters without
39 a National Pollutant Discharge Elimination System (NPDES) permit. NPDES permits are issued by
40 USEPA or the appropriate state if it has assumed responsibility. Section 404 of the CWA establishes a
41 Federal program to regulate the discharge of dredge and fill material into waters of the United States.
42 Section 404 permits are issued by the U.S. Army Corps of Engineers (USACE). Waters of the United
43 States include interstate and intrastate lakes, rivers, streams, and wetlands that are used for commerce,

1 recreation, industry, sources of fish, and other purposes. The objective of the CWA is to restore and
2 maintain the chemical, physical, and biological integrity of the Nation's waters. Each agency should
3 consider the impact on water quality from actions such as the discharge of dredge or fill material into U.S.
4 waters from construction, or the discharge of pollutants as a result of facility occupation.

5 Section 303(d) of the CWA requires states and USEPA to identify waters not meeting state water-quality
6 standards and to develop Total Maximum Daily Loads (TMDLs). A TMDL is the maximum amount of a
7 pollutant that a waterbody can receive and still be in compliance with state water-quality standards. After
8 determining TMDLs for impaired waters, states are required to identify all point and nonpoint sources of
9 pollution in a watershed that are contributing to the impairment and to develop an implementation plan
10 that will allocate reductions to each source to meet the state standards. The TMDL program is currently
11 the Nation's most comprehensive attempt to restore and improve water quality. The TMDL program does
12 not explicitly require the protection of riparian areas. However, implementation of the TMDL plans
13 typically calls for restoration of riparian areas as one of the required management measures for achieving
14 reductions in nonpoint source pollutant loadings.

15 The Safe Drinking Water Act (SDWA) of 1974 establishes a Federal program to monitor and increase the
16 safety of all commercially and publicly supplied drinking water. Congress amended the SDWA in 1986,
17 mandating dramatic changes in nationwide safeguards for drinking water and establishing new Federal
18 enforcement responsibility on the part of USEPA. The 1986 amendments to the SDWA require USEPA
19 to establish Maximum Contaminant Levels (MCLs), Maximum Contaminant Level Goals (MCLGs), and
20 Best Available Technology (BAT) treatment techniques for organic, inorganic, radioactive, and microbial
21 contaminants; and turbidity. MCLGs are maximum concentrations below which no negative human
22 health effects are known to exist. The 1996 amendments set current Federal MCLs, MCLGs, and BATs
23 for organic, inorganic, microbiological, and radiological contaminants in public drinking water supplies.

24 EO 11988, *Floodplain Management* (May 24, 1977), directs agencies to consider alternatives to avoid
25 adverse effects and incompatible development in floodplains. An agency may locate a facility in a
26 floodplain if the head of the agency finds there is no practicable alternative. If it is found there is no
27 practicable alternative, the agency must minimize potential harm to the floodplain, and circulate a notice
28 explaining why the action is to be located in the floodplain prior to taking action. Finally, new
29 construction in a floodplain must apply accepted flood proofing and flood protection to include elevating
30 structures above the base flood level rather than filling in land.

31 **Biological Resources**

32 The Endangered Species Act (ESA) of 1973 establishes a Federal program to conserve, protect, and
33 restore threatened and endangered plants and animals and their habitats. The ESA specifically charges
34 Federal agencies with the responsibility of using their authority to conserve threatened and endangered
35 species. All Federal agencies must ensure any action they authorize, fund, or carry out is not likely to
36 jeopardize the continued existence of an endangered or threatened species or result in the destruction of
37 critical habitat for these species, unless the agency has been granted an exemption. The Secretary of the
38 Interior, using the best available scientific data, determines which species are officially endangered or
39 threatened, and the U.S. Fish and Wildlife Service (USFWS) maintains the list. A list of Federal
40 endangered species can be obtained from the Endangered Species Division, USFWS (703-358-2171).
41 States might also have their own lists of threatened and endangered species which can be obtained by
42 calling the appropriate State Fish and Wildlife office. Some species, such as the bald eagle, also have
43 laws specifically for their protection (e.g., Bald Eagle Protection Act).

44 The Migratory Bird Treaty Act (MBTA) of 1918, as amended, implements treaties and conventions
45 between the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of

1 migratory birds. Unless otherwise permitted by regulations, the MBTA makes it unlawful to pursue,
2 hunt, take, capture, or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase,
3 deliver, or cause to be shipped, exported, imported, transported, carried, or received any migratory bird,
4 part, nest, egg, or product, manufactured or not. The MBTA also makes it unlawful to ship, transport or
5 carry from one state, territory, or district to another, or through a foreign country, any bird, part, nest, or
6 egg that was captured, killed, taken, shipped, transported, or carried contrary to the laws from where it
7 was obtained; and import from Canada any bird, part, nest, or egg obtained contrary to the laws of the
8 province from which it was obtained. The U.S. Department of the Interior has authority to arrest, with or
9 without a warrant, a person violating the MBTA.

10 EO 11514, *Protection and Enhancement of Environmental Quality* (March 5, 1970), states that the
11 President, with assistance from the Council on Environmental Quality (CEQ), will lead a national effort
12 to provide leadership in protecting and enhancing the environment for the purpose of sustaining and
13 enriching human life. Federal agencies are directed to meet national environmental goals through their
14 policies, programs, and plans. Agencies should also continually monitor and evaluate their activities to
15 protect and enhance the quality of the environment. Consistent with NEPA, agencies are directed to share
16 information about existing or potential environmental problems with all interested parties, including the
17 public, in order to obtain their views.

18 EO 11990, *Protection of Wetlands* (May 24, 1977), directs agencies to consider alternatives to avoid
19 adverse effects and incompatible development in wetlands. Federal agencies are to avoid new
20 construction in wetlands, unless the agency finds there is no practicable alternative to construction in the
21 wetland, and the proposed construction incorporates all possible measures to limit harm to the wetland.
22 Agencies should use economic and environmental data, agency mission statements, and any other
23 pertinent information when deciding whether or not to build in wetlands. EO 11990 directs each agency
24 to provide for early public review of plans for construction in wetlands.

25 EO 13186, *Conservation of Migratory Birds* (January 10, 2001), creates a more comprehensive strategy
26 for the conservation of migratory birds by the Federal government. EO 13186 provides a specific
27 framework for the Federal government's compliance with its treaty obligations to Canada, Mexico,
28 Russia, and Japan. EO 13186 provides broad guidelines on conservation responsibilities and requires the
29 development of more detailed guidance in a Memorandum of Understanding (MOU). EO 13186 will be
30 coordinated and implemented by the USFWS. The MOU will outline how Federal agencies will promote
31 conservation of migratory birds. EO 13186 requires the support of various conservation planning efforts
32 already in progress; incorporation of bird conservation considerations into agency planning, including
33 NEPA analyses; and reporting annually on the level of take of migratory birds.

34 **Cultural Resources**

35 The National Historic Preservation Act (NHPA) of 1966 sets forth national policy to identify and preserve
36 properties of state, local, and national significance. The NHPA establishes the Advisory Council on
37 Historic Preservation (ACHP), State Historic Preservation Officers (SHPOs), and the National Register of
38 Historic Places (NRHP). ACHP advises the President, Congress, and Federal agencies on historic
39 preservation issues. Section 106 of the NHPA directs Federal agencies to take into account effects of
40 their undertakings (actions and authorizations) on properties included in or eligible for the NRHP.
41 Section 110 sets inventory, nomination, protection, and preservation responsibilities for federally owned
42 cultural properties. Section 106 of the act is implemented by regulations of the ACHP, 36 CFR Part 800.
43 Agencies should coordinate studies and documents prepared under Section 106 with NEPA where
44 appropriate. However, NEPA and NHPA are separate statutes and compliance with one does not
45 constitute compliance with the other. For example, actions which qualify for a categorical exclusion
46 under NEPA might still require Section 106 review under NHPA. It is the responsibility of the agency

1 official to identify properties in the APEs, and whether they are included or eligible for inclusion in the
2 NRHP. Section 110 of the NHPA requires Federal agencies to identify, evaluate, and nominate historic
3 property under agency control to the NRHP.

4 The Army Alternate Procedures (AAP) is a streamlined procedure U.S. Army installations can elect to
5 follow to satisfy the requirements of Section 106 of the NHPA set forth in 36 CFR Part 800. The AAP
6 approaches the installation's management of historic properties programmatically, instead of on a project-
7 by-project review as prescribed by the regulations of the ACHP. The AAP allows installations to
8 implement standard operating procedures for historic properties in their ICRMPs and to implement
9 actions for 5 years without formal project-by-project review.

10 The Archaeological Resource Protection Act (ARPA) of 1979 protects archaeological resources on public
11 and American Indian lands. It provides felony-level penalties for the unauthorized excavation, removal,
12 damage, alteration, or defacement of any archaeological resource, defined as material remains of past
13 human life or activities which are at least 100 years old. Before archaeological resources are excavated or
14 removed from public lands, the Federal land manager must issue a permit detailing the time, scope,
15 location, and specific purpose of the proposed work. ARPA also fosters the exchange of information
16 about archaeological resources between governmental agencies, the professional archaeological
17 community, and private individuals. ARPA is implemented by regulations found in 43 CFR Part 7.

18 The Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 establishes rights of
19 American Indian tribes to claim ownership of certain "cultural items," defined as Native American human
20 remains, funerary objects, sacred objects, and objects of cultural patrimony, held or controlled by Federal
21 agencies. Cultural items discovered on Federal or tribal lands are, in order of primacy, the property of
22 lineal descendants, if these can be determined, and then the tribe owning the land where the items were
23 discovered or the tribe with the closest cultural affiliation with the items. Discoveries of cultural items on
24 Federal or tribal land must be reported to the appropriate American Indian tribe and the Federal agency
25 with jurisdiction over the land. If the discovery is made as a result of a land use, activity in the area must
26 stop and the items must be protected pending the outcome of consultation with the affiliated tribe.

27 EO 11593, *Protection and Enhancement of the Cultural Environment* (May 13, 1971), directs the Federal
28 government to provide leadership in the preservation, restoration, and maintenance of the historic and
29 cultural environment. Federal agencies are required to locate and evaluate all Federal sites under their
30 jurisdiction or control which might qualify for listing on the NRHP. Agencies must allow the ACHP to
31 comment on the alteration, demolition, sale, or transfer of property which is likely to meet the criteria for
32 listing as determined by the Secretary of the Interior in consultation with the SHPO. Agencies must also
33 initiate procedures to maintain federally owned sites listed on the NRHP.

34 The American Indian Religious Freedom Act of 1978 and Amendments of 1994 recognize that freedom
35 of religion for all people is an inherent right, and traditional American Indian religions are an
36 indispensable and irreplaceable part of Indian life. It also recognized the lack of Federal policy on this
37 issue and made it the policy of the United States to protect and preserve the inherent right of religious
38 freedom for Native Americans. The 1994 Amendments provide clear legal protection for the religious
39 use of peyote cactus as a religious sacrament. Federal agencies are responsible for evaluating their
40 actions and policies to determine if changes should be made to protect and preserve the religious cultural
41 rights and practices of Native Americans. These evaluations must be made in consultation with native
42 traditional religious leaders.

43 EO 13007, *Indian Sacred Sites* (May 24, 1996), provides that agencies managing Federal lands, to the
44 extent practicable, permitted by law, and not inconsistent with agency functions, shall accommodate
45 American Indian religious practitioners' access to and ceremonial use of American Indian sacred sites,

1 shall avoid adversely affecting the physical integrity of such sites, and shall maintain the confidentiality
2 of such sites. Federal agencies are responsible for informing tribes of proposed actions that could restrict
3 future access to or ceremonial use of, or adversely affect the physical integrity of, sacred sites.

4 EO 13287, *Preserve America* (March 3, 2003), orders Federal agencies to take a leadership role in
5 protection, enhancement, and contemporary use of historic properties owned by the Federal government,
6 and promote intergovernmental cooperation and partnerships for preservation and use of historic
7 properties. EO 13287 established new accountability for agencies with respect to inventories and
8 stewardship.

9 **Socioeconomics and Environmental Justice**

10 EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income*
11 *Populations* (February 11, 1994), directs Federal agencies to make achieving environmental justice part
12 of their mission. Agencies must identify and address the adverse human health or environmental effects
13 that its activities have on minority and low-income populations and develop agency wide environmental
14 justice strategies. The strategy must list “programs, policies, planning and public participation processes,
15 enforcement, and/or rulemakings related to human health or the environment that should be revised to
16 promote enforcement of all health and environmental statutes in areas with minority populations and low-
17 income populations, ensure greater public participation, improve research and data collection relating to
18 the health of and environment of minority populations and low-income populations, and identify
19 differential patterns of consumption of natural resources among minority populations and low-income
20 populations.” A copy of the strategy and progress reports must be provided to the Federal Working
21 Group on Environmental Justice. Responsibility for compliance with EO 12898 is with each Federal
22 agency.

23 **Hazardous Materials and Waste**

24 The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980
25 authorizes USEPA to respond to spills and other releases of hazardous substances to the environment, and
26 authorizes the National Oil and Hazardous Substances Pollution Contingency Plan. CERCLA also
27 provides a Federal “Superfund” to respond to emergencies immediately. Although the “Superfund”
28 provides funds for cleanup of sites where potentially responsible parties cannot be identified, USEPA is
29 authorized to recover funds through damages collected from responsible parties. This funding process
30 places the economic burden for cleanup on polluters.

31 The Pollution Prevention Act (PPA) of 1990 encourages manufacturers to avoid the generation of
32 pollution by modifying equipment and processes, redesigning products, substituting raw materials, and
33 making improvements in management techniques, training, and inventory control. Consistent with
34 pollution prevention principles, EO 13423, *Strengthening Federal Environmental, Energy, and*
35 *Transportation Management* (January 24, 2007 [revoking EO 13148]) sets a goal for all Federal agencies
36 that promotes environmental practices, including acquisition of biobased, environmentally preferable,
37 energy-efficient, water-efficient, and recycled-content products, and use of paper of at least 30 percent
38 post-consumer fiber content. In addition, EO 13423 sets a goal that requires Federal agencies to ensure
39 that they reduce the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed
40 of, increase diversion of solid waste as appropriate, and maintain cost effective waste prevention and
41 recycling programs in their facilities. Additionally, in *Federal Register* Volume 58 Number 18 (January
42 29, 1993), CEQ provides guidance to Federal agencies on how to “incorporate pollution prevention
43 principles, techniques, and mechanisms into their planning and decision making processes and to evaluate
44 and report those efforts, as appropriate, in documents pursuant to NEPA.”

1 The Resource Conservation and Recovery Act (RCRA) of 1976 is an amendment to the Solid Waste
2 Disposal Act. RCRA authorizes USEPA to provide for “cradle-to-grave” management of hazardous
3 waste and sets a framework for the management of nonhazardous municipal solid waste. Under RCRA,
4 hazardous waste is controlled from generation to disposal through tracking and permitting systems, and
5 restrictions and controls on the placement of waste on or into the land. Under RCRA, a waste is defined
6 as hazardous if it is ignitable, corrosive, reactive, toxic, or listed by USEPA as being hazardous. With the
7 Hazardous and Solid Waste Amendments (HSWA) of 1984, Congress targeted stricter standards for waste
8 disposal and encouraged pollution prevention by prohibiting the land disposal of particular wastes. The
9 HSWA amendments strengthen control of both hazardous and nonhazardous waste and emphasize the
10 prevention of pollution of groundwater.

11 The Superfund Amendments and Reauthorization Act (SARA) of 1986 mandates strong clean-up
12 standards and authorizes USEPA to use a variety of incentives to encourage settlements. Title III of
13 SARA authorizes the Emergency Planning and Community Right to Know Act, which requires facility
14 operators with “hazardous substances” or “extremely hazardous substances” to prepare comprehensive
15 emergency plans and to report accidental releases. If a Federal agency acquires a contaminated site, it can
16 be held liable for cleanup as the property owner/operator. A Federal agency can also incur liability if it
17 leases a property, as the courts have found lessees liable as “owners.” However, if the agency exercises
18 due diligence by conducting a Phase I Environmental Site Assessment, it can claim the “innocent
19 purchaser” defense under CERCLA. According to Title 42 United States Code (U.S.C.) 9601(35), the
20 current owner/operator must show it undertook “all appropriate inquiry into the previous ownership and
21 uses of the property consistent with good commercial or customary practice” before buying the property
22 to use this defense.

23 The Toxic Substance Control Act (TSCA) of 1976 consists of four titles. Title I established requirements
24 and authorities to identify and control toxic chemical hazards to human health and the environment.
25 TSCA authorized USEPA to gather information on chemical risks, require companies to test chemicals
26 for toxic effects, and regulate chemicals with unreasonable risk. TSCA also singled out polychlorinated
27 biphenyls (PCBs) for regulation, and, as a result, PCBs are being phased out. PCBs are persistent when
28 released into the environment and accumulate in the tissues of living organisms. They have been shown
29 to cause adverse health effects on laboratory animals and could cause adverse health effects in humans.
30 TSCA and its regulations govern the manufacture, processing, distribution, use, marking, storage,
31 disposal, clean-up, and release reporting requirements for numerous chemicals like PCBs. TSCA Title II
32 provides statutory framework for “Asbestos Hazard Emergency Response,” which applies only to
33 schools. TSCA Title III, “Indoor Radon Abatement,” states indoor air in buildings of the United States
34 should be as free of radon as the outside ambient air. Federal agencies are required to conduct studies on
35 the extent of radon contamination in buildings they own. TSCA Title IV, “Lead Exposure Reduction,”
36 directs Federal agencies to “conduct a comprehensive program to promote safe, effective, and affordable
37 monitoring, detection, and abatement of lead-based paint and other lead exposure hazards.” Further, any
38 Federal agency having jurisdiction over a property or facility must comply with all Federal, state,
39 interstate, and local requirements concerning lead-based paint.

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APPENDIX B

PUBLIC INVOLVEMENT (RESERVED SPACE)

APPENDIX C

AIR QUALITY CALCULATIONS

Summary	Summarizes total emissions by calendar year.
Combustion	Estimates emissions from non-road equipment exhaust.
Fugitive	Estimates particulate emissions from construction activities including earthmoving, vehicle traffic, and windblown dust.
Grading	Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.
Construction Commuter	Estimates emissions for construction workers commuting to the site.
AQCR Tier Report	Summarizes total emissions for the Metropolitan San Antonio Intrastate Air Quality Control Region Tier report for 2002, to be used to compare the project to regional emissions.

Air Quality Emissions from Proposed Action

CY2011

	NO_x (ton)	VOC (ton)	CO (ton)	SO₂ (ton)	PM₁₀ (ton)	PM_{2.5} (ton)	CO₂ (ton)
Construction Combustion	23.606	1.400	9.332	0.472	1.428	1.385	2,749.101
Construction Fugitive Dust	-	-	-	-	8.326	0.833	-
Construction Commuter	0.425	0.540	5.909	0.018	0.228	0.062	87.822
TOTAL CY2011	24.03	1.94	15.24	0.49	9.98	2.28	2,836.92

Note: Total CY2011 PM_{10/2.5} fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO₂ emissions converted to metric tons = **2,573.09 metric tons**

CY2012

	NO_x (ton)	VOC (ton)	CO (ton)	SO₂ (ton)	PM₁₀ (ton)	PM_{2.5} (ton)	CO₂ (ton)
Construction Combustion	5.523	1.008	2.400	0.380	0.387	0.375	634.519
Construction Fugitive Dust	-	-	-	-	32.857	3.286	-
Construction Commuter	1.699	2.161	23.636	0.071	0.913	0.249	351.289
TOTAL CY2012	7.22	3.17	26.04	0.45	34.16	3.91	985.81

Note: Total CY2012 PM_{10/2.5} fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO₂ emissions converted to metric tons = **894.13 metric tons**

CY2013

	NO_x (ton)	VOC (ton)	CO (ton)	SO₂ (ton)	PM₁₀ (ton)	PM_{2.5} (ton)	CO₂ (ton)
Construction Combustion	4.594	0.587	1.902	0.161	0.294	0.285	553.996
Construction Fugitive Dust	-	-	-	-	20.079	2.008	-
Construction Commuter	0.425	0.540	5.909	0.018	0.228	0.062	87.822
TOTAL CY2013	5.02	1.13	7.81	0.18	20.60	2.36	641.82

Note: Total CY2013 PM_{10/2.5} fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO₂ emissions converted to metric tons = **582.13 metric tons**

Since future year budgets were not readily available, actual 2002 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

Metropolitan San Antonio Intrastate Air Quality Control Region

Year	Point and Area Sources Combined					
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
2002	113,510	101,692	568,948	54,950	193,580	26,667

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/geoseil.html>). Site visited on 08 June 2009.

Determination Significance (Significance Threshold = 10%)

CY2011

Regional Emissions CY2011 Emissions CY2011 %	Point and Area Sources Combined					
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
	113,510	101,692	568,948	54,950	193,580	26,667
	24.03	1.94	15.24	0.49	9.98	2.28
	0.0212%	0.0019%	0.0027%	0.0009%	0.0052%	0.0085%

CY2012

Regional Emissions CY2012 Emissions CY2012 %	Point and Area Sources Combined					
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
	113,510	101,692	568,948	54,950	193,580	26,667
	7.22	3.17	26.04	0.45	34.16	3.91
	0.0064%	0.0031%	0.0046%	0.0008%	0.0176%	0.0147%

CY2013

Regional Emissions CY2013 Emissions CY2013 %	Point and Area Sources Combined					
	NO _x (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
	113,510	101,692	568,948	54,950	193,580	26,667
	5.02	1.13	7.81	0.18	20.60	2.36
	0.0044%	0.0011%	0.0014%	0.0003%	0.0106%	0.0088%

2011 Combustion Emissions

Combustion Emissions of VOC, NO_x, SO₂, CO, PM_{2.5}, PM₁₀, and CO₂ due to Construction

2011 General Construction Activities

	2011 Area Disturbed	Total Project Area Disturbed
0% Construction of retail space	0 ft ²	651,000 ft ²
100% Demolition and removal of parking	760,000 ft ²	760,000 ft ²
100% Demolition and removal of roads	260,000 ft ²	260,000 ft ²
100% Demolition and removal of buildings	209,603 ft ²	209,603 ft ²
100% Demolition and removal of driveways	43,000 ft ²	43,000 ft ²
0% Elements required to tie the Lifestyle Center together	0 ft ²	435,600 ft ²

Sidewalks, pathways, courtyards, walking zones, and other elements.

2011 New Road Construction

0% Newly constructed roadway surface

1,464,750 ft² Includes total parking lot size, drive lanes, and access roads.

Total General Construction Area:	1,272,603 ft ²
	29.2 acres
Total New Road Construction Area:	0 ft ²
	0.0 acres
Total Disturbed Area:	1,272,603 ft ²
	29.2 acres
Construction Duration:	3 months
Annual Construction Activity:	57.5 days/yr

Assume total construction project duration is 18 months.
Assume annual construction activity based on 230 days/yr.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
 Emission factors are taken from the NONROAD model and were provided to eM by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007. Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Req. ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Buildozer	1	13.60	0.96	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Req. ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Req. ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment ^d	No. Req. ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd. ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

- a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO₂ emissions by more than a factor of two.
- d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO _x	VOC	CO	SO ₂ **	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	3	124.924	7.731	47.130	2.498	7.637	7.407	14824.579
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693	5623.957
Demolition Equipment	3	95.423	5.657	37.751	1.908	5.770	5.596	11109.221
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744	4464.512
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.251	0.309	0.300	359.773
Architectural Coating**			0.000					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO_x = (Total Grading NO_x per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft ²)	Total Area (acres)	Total Days
Grading:	1,272,603	29.21	6
Paving:	0	0.00	0
Demolition:	1,272,603	29.21	487
Building Construction:	0	0.00	0
Architectural Coating	0	0.00	0

(from "CY2011 Project Grading" worksheet)

(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

2011 Total Emissions by Activity (lbs)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	749.54	46.39	282.78	14.99	45.82	44.44	88,947
Paving	-	-	-	-	-	-	0
Demolition	46,462.83	2,754.26	18,381.70	929.26	2,809.29	2,725.01	5,409,255
Building Construction	-	-	-	-	-	-	0
Architectural Coatings	-	-	-	-	-	-	0
Total Emissions (lbs):	47,212.37	2,800.65	18,664.48	944.25	2,855.11	2,769.46	5,498,202

Results: 2011 Total Annual Emission Rates

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Total Project Emissions (lbs)	47,212.37	2,800.65	18,664.48	944.25	2,855.11	2,769.46	5,498,202
Total Project Emissions (tons)	23.61	1.40	9.33	0.47	1.43	1.38	2,749.10

2012 Combustion Emissions

Combustion Emissions of VOC, NO_x, SO₂, CO, PM_{2.5}, PM₁₀, and CO₂ due to Construction

2012 General Construction Activities

80% Construction of retail space	520,800 ft ²	Total Project Area Disturbed	651,000 ft ²
0% Demolition and removal of parking	0 ft ²		760,000 ft ²
0% Demolition and removal of roads	0 ft ²		260,000 ft ²
0% Demolition and removal of buildings	0 ft ²		209,603 ft ²
0% Demolition and removal of driveways	0 ft ²		43,000 ft ²
20% Elements required to tie the Lifestyle Center together	87,120 ft ²		435,600 ft ²

Sidewalks, pathways, courtyards, walking zones, and other elements.

2012 New Road Construction

20% Newly constructed roadway surface	292,950 ft ²		1,464,750 ft ²
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Includes total parking lot size, drive lanes, and access roads.

Total General Construction Area:

607,920 ft²
14.0 acres

Total New Road Construction Area:

292,950 ft²
6.7 acres

Total Disturbed Area:

900,870 ft²
20.7 acres

Construction Duration:

12 months

Annual Construction Activity:

230 days/yr

Assume total construction project duration is 18 months.
Assume annual construction activity based on 230 days/yr.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
 Emission factors are taken from the NONROAD model and were provided to eM by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007. Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Req ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Buildozer	1	13.60	0.96	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Req ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Req ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment ^d	No. Req ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd. ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

- a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO₂ emissions by more than a factor of two.
- d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO _x	VOC	CO	SO ₂ **	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	2	83.282	5.154	31.420	1.666	5.091	4.938	9883.053
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693	5623.957
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865	3703.074
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744	4464.512
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.251	0.309	0.300	359.773
Architectural Coating**			58.816					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO_x = (Total Grading NO_x per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft ²)	Total Area (acres)	Total Days
Grading:	900,870	20.68	5
Paving:	292,950	6.73	33
Demolition:	0	0.00	0
Building Construction:	520,800	11.96	230
Architectural Coating	520,800	11.96	20

(from "CY2012 Project Grading" worksheet)

(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

2012 Total Emissions by Activity (lbs)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	416.41	25.77	157.10	8.33	25.46	24.69	49,415
Paving	1,497.12	85.99	613.09	29.94	91.61	88.86	185,591
Demolition	-	-	-	-	-	-	0
Building Construction	9,061.15	719.86	3,997.93	716.76	650.68	631.16	1,026,838
Architectural Coatings	71.48	1,183.78	31.31	5.02	6.19	6.00	7,195
Total Emissions (lbs):	11,046.17	2,015.39	4,799.43	760.05	773.93	750.71	1,269,039

Results: 2012 Total Annual Emission Rates

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Total Project Emissions (lbs)	11,046.17	2,015.39	4,799.43	760.05	773.93	750.71	1,269,039
Total Project Emissions (tons)	5.52	1.01	2.40	0.38	0.39	0.38	634.52

2013 Combustion Emissions

Combustion Emissions of VOC, NO_x, SO₂, CO, PM_{2.5}, PM₁₀, and CO₂ due to Construction

2013 General Construction Activities

	2013 Area Disturbed	Total Project Area Disturbed
20% Construction of retail space	130,200 ft ²	651,000 ft ²
0% Demolition and removal of parking	0 ft ²	760,000 ft ²
0% Demolition and removal of roads	0 ft ²	260,000 ft ²
0% Demolition and removal of buildings	0 ft ²	209,603 ft ²
0% Demolition and removal of driveways	0 ft ²	43,000 ft ²
80% Elements required to tie the Lifestyle Center together	348,480 ft ²	435,600 ft ²

Sidewalks, pathways, courtyards, walking zones, and other elements.

2013 New Road Construction

80% Newly constructed roadway surface

1,171,800 ft² Includes total parking lot size, drive lanes, and access roads.

Total General Construction Area: 478,680 ft²

11.0 acres

Total New Road Construction Area: 1,171,800 ft²

26.9 acres

Total Disturbed Area: 1,650,480 ft²

37.9 acres

Construction Duration: 3 months

Annual Construction Activity: 57.5 days/yr

Assume total construction project duration is 18 months.
Assume annual construction activity based on 230 days/yr.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
 Emission factors are taken from the NONROAD model and were provided to eM by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007. Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Req ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Buildozer	1	13.60	0.96	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Req ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Req ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment ^d	No. Req ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c (lb/day)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd. ^a per 10 acres	NO _x (lb/day)	VOC ^b (lb/day)	CO (lb/day)	SO ₂ ^c	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	CO ₂ (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

- a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.
- b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.
- c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO₂ emissions by more than a factor of two.
- d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO _x	VOC	CO	SO ₂ **	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	4	166.565	10.308	62.840	3.331	10.182	9.877	19766.105
Paving Equipment	3	136.102	7.817	55.735	2.722	8.328	8.078	16871.871
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865	3703.074
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744	4464.512
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.251	0.309	0.300	359.773
Architectural Coating**			29,408					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NO_x = (Total Grading NO_x per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft ²)	Total Area (acres)	Total Days
Grading:	1,650,480	37.89	6
Paving:	1,171,800	26.90	43
Demolition:	0	0.00	0
Building Construction:	130,200	2.99	58
Architectural Coating	130,200	2.99	20

(from "CY2013 Prioject Grading" worksheet)

(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

2013 Total Emissions by Activity (lbs)

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Grading Equipment	999.39	61.85	377.04	19.99	61.09	59.26	118,597
Paving	5,852.38	336.14	2,396.62	117.05	358.12	347.37	725,490
Demolition	-	-	-	-	-	-	0
Building Construction	2,265.29	179.96	999.48	179.19	162.67	157.79	256,709
Architectural Coatings	71.48	595.62	31.31	5.02	6.19	6.00	7,195
Total Emissions (lbs):	9,188.54	1,173.57	3,804.45	321.25	588.07	570.42	1,107,992

Results: 2013 Total Annual Emission Rates

	NO _x	VOC	CO	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Total Project Emissions (lbs)	9,188.54	1,173.57	3,804.45	321.25	588.07	570.42	1,107,992
Total Project Emissions (tons)	4.59	0.59	1.90	0.16	0.29	0.29	554.00

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors for CY 2011

	Emission Factor	Units	Source
General Construction Activities	0.19 ton	PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42 ton	PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006

PM_{2.5} Emissions

PM_{2.5} Multiplier 0.10 (10% of PM₁₀ emissions assumed to be PM_{2.5}) EPA 2001; EPA 2006

Control Efficiency

0.50 (assume 50% control efficiency for PM₁₀ and PM_{2.5} emissions) EPA 2001; EPA 2006

Project Assumptions

New Road Construction (0.42 ton PM₁₀/acre-month)

Duration of Construction Project 0 months
Area 0 acres

Construction Activities (0.19 ton PM₁₀/acre-month)

Duration of Construction Project 3 months
Area 29.2 acres

	Project Emissions (tons/year)		
	PM₁₀ uncontrolled	PM₁₀ controlled	PM_{2.5} controlled
New Road Construction	0.00	0.00	0.00
Construction Activities	16.65	8.33	0.83
Total	16.65	8.33	0.83

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM₁₀/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM₁₀/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM₁₀/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM₁₀/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM₁₀/acre-month) and 75% of the average emission factor (0.11 ton PM₁₀/acre-month). The 0.19 ton PM₁₀/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM₁₀/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP), which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM₁₀ and PM_{2.5} in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM₁₀/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM₁₀/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM₁₀/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

PM_{2.5} Multiplier

PM_{2.5} emissions are estimated by applying a particle size multiplier of 0.10 to PM₁₀ emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM₁₀ and PM_{2.5}

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM₁₀ and PM_{2.5} in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors for CY 2012

	Emission Factor	Units	Source
General Construction Activities	0.19 ton	PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42 ton	PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006

PM_{2.5} Emissions

PM_{2.5} Multiplier 0.10 (10% of PM₁₀ emissions assumed to be PM_{2.5}) EPA 2001; EPA 2006

Control Efficiency

0.50 (assume 50% control efficiency for PM₁₀ and PM_{2.5} emissions) EPA 2001; EPA 2006

Project Assumptions

New Road Construction (0.42 ton PM₁₀/acre-month)

Duration of Construction Project 12 months
Area 6.7 acres

Construction Activities (0.19 ton PM₁₀/acre-month)

Duration of Construction Project 12 months
Area 14.0 acres

	Project Emissions (tons/year)		
	PM₁₀ uncontrolled	PM₁₀ controlled	PM_{2.5} controlled
New Road Construction	33.90	16.95	1.69
Construction Activities	31.82	15.91	1.59
Total	65.71	32.86	3.29

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM₁₀/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM₁₀/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM₁₀/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM₁₀/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM₁₀/acre-month) and 75% of the average emission factor (0.11 ton PM₁₀/acre-month). The 0.19 ton PM₁₀/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM₁₀/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP), which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM₁₀ and PM_{2.5} in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM₁₀/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM₁₀/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM₁₀/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

PM_{2.5} Multiplier

PM_{2.5} emissions are estimated by applying a particle size multiplier of 0.10 to PM₁₀ emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM₁₀ and PM_{2.5}

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM₁₀ and PM_{2.5} in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors for CY 2013

	Emission Factor	Units	Source
General Construction Activities	0.19 ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006	
New Road Construction	0.42 ton PM ₁₀ /acre-month	MRI 1996; EPA 2001; EPA 2006	

PM_{2.5} Emissions

PM_{2.5} Multiplier 0.10 (10% of PM₁₀ emissions assumed to be PM_{2.5}) EPA 2001; EPA 2006

Control Efficiency

0.50 (assume 50% control efficiency for PM₁₀ and PM_{2.5} emissions) EPA 2001; EPA 2006

Project Assumptions

New Road Construction (0.42 ton PM₁₀/acre-month)

Duration of Construction Project 3 months
Area 26.9 acres

Construction Activities (0.19 ton PM₁₀/acre-month)

Duration of Construction Project 3 months
Area 11.0 acres

	Project Emissions (tons/year)		
	PM₁₀ uncontrolled	PM₁₀ controlled	PM_{2.5} controlled
New Road Construction	33.90	16.95	1.69
Construction Activities	6.26	3.13	0.31
Total	40.16	20.08	2.01

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM₁₀/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM₁₀/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM₁₀/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM₁₀/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM₁₀/acre-month) and 75% of the average emission factor (0.11 ton PM₁₀/acre-month). The 0.19 ton PM₁₀/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM₁₀/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP), which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM₁₀ and PM_{2.5} in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM₁₀/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM₁₀/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM₁₀/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

PM_{2.5} Multiplier

PM_{2.5} emissions are estimated by applying a particle size multiplier of 0.10 to PM₁₀ emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM₁₀ and PM_{2.5}

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM₁₀ and PM_{2.5} in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999*. EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants*. Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Grading Schedule for CY 2011

Estimate of time required to grade a specified area.

Input Parameters
 Construction area: 29.2 acres/yr (from Combustion Worksheet)
 Qty Equipment: 9.0 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
 Terrain is mostly flat.
 An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
 200 hp bulldozers are used for site clearing.
 300 hp bulldozers are used for stripping, excavation, and backfill.
 Vibratory drum rollers are used for compacting.
 Stripping, Excavation, Backfill and Compaction require an average of two passes each.
 Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	29.21	3.65
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	29.21	14.28
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	14.61	14.73
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	14.61	6.04
2315 310 5020	Compaction	Vibrating roller, 6" lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	29.21	10.25
TOTAL								48.95

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 48.95
 Qty Equipment: 9.00
 Grading days/yr: 5.44

Grading Schedule for CY 2012

Estimate of time required to grade a specified area.

Input Parameters
 Construction area: 20.7 acres/yr (from Combustion Worksheet)
 Qty Equipment: 7.0 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
 Terrain is mostly flat.
 An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
 200 hp bulldozers are used for site clearing.
 300 hp bulldozers are used for stripping, excavation, and backfill.
 Vibratory drum rollers are used for compacting.
 Stripping, Excavation, Backfill and Compaction require an average of two passes each.
 Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	20.68	2.59
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	20.68	10.11
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	10.34	10.43
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	10.34	4.28
2315 310 5020	Compaction	Vibrating roller, 6" lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	20.68	7.25
TOTAL								34.65

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 34.65
 Qty Equipment: 7.00
 Grading days/yr: 4.95

Grading Schedule for CY 2013

Estimate of time required to grade a specified area.

Input Parameters
 Construction area: 37.9 acres/yr (from Combustion Worksheet)
 Qty Equipment: 12.0 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
 Terrain is mostly flat.
 An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
 200 hp bulldozers are used for site clearing.
 300 hp bulldozers are used for stripping, excavation, and backfill.
 Vibratory drum rollers are used for compacting.
 Stripping, Excavation, Backfill and Compaction require an average of two passes each.
 Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	37.89	4.74
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	37.89	18.52
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	18.94	19.10
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	18.94	7.84
2315 310 5020	Compaction	Vibrating roller, 6" lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	37.89	13.29
TOTAL								63.49

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 63.49
 Qty Equipment: 12.00
 Grading days/yr: 5.29

Construction Commuter Emissions for CY 2011

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.
 Emission Estimation Method: United States Air Force (USAF) Institute for Environment, Safety and Occupational Health Risk Analysis (IERA) Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations (Revised December 2003).

Assumptions:

Passenger vehicle emission factors for scenario year 2010 are used.

Passenger vehicle model year 2000 is used.

The average roundtrip commute for a construction worker = 60 miles

Number of construction days = 57.5 days

Number of construction workers (daily) = 50 people

Riders per vehicle = 1 person

Number of vehicles (daily) = 50 vehicles

Average On-Road Vehicle Emission Factors (grams/mile)

Vehicle Type Category	NO _x	VOC	CO	SO _x	PM ₁₀	PM _{2.5}	CO ₂
LDGV	2.10	2.90	33.10	0.072	0.71	0.20	391.97
LDGT1	2.20	3.10	35.20	0.096	1.08	0.29	526.04
LDGT2	2.50	3.40	38.60	0.098	2.58	0.66	535.24
HdGV	3.40	2.90	20.50	0.154	5.51	1.42	843.56
LDDV	1.20	0.60	1.70	0.116	0.80	0.28	373.70
LDDT	1.50	1.00	1.90	0.157	1.59	0.48	505.90
HDDV	6.50	2.00	11.80	0.512	7.73	2.01	1645.60
MC	0.90	5.70	22.50	0.032	0.08	0.03	177.48

Light Duty Gasoline Vehicles
 Light SUVs and Pickups
 Heavy SUVs and Pickups
 Heavy Duty Gasoline Vehicles
 Light Duty Diesel Vehicles
 Light Duty Diesel Trucks
 Heavy Duty Diesel Vehicles
 Motorcycles

Notes:

Emission factors for all pollutants except CO₂ are from USAF IERA 2003.

Emission factors for PM, PM₁₀, SO_x are from Table 4-50 (USAF IERA 2003).

Emission factors for VOC, CO, and NO_x are from Tables 4-2 through 4-49 for the 2010 calendar year, 2000 model year (USAF IERA 2003).

It is assumed that the average vehicle will produce 19.564 pounds of CO₂ per gallon of gas used and 22.384 pounds of CO₂ per gallon

of diesel used (<http://www.eia.doe.gov/oiaf/1605/coefficients.html>).

Using the default fuel economy for the vehicle type categories in USAF IERA Table 4-51, the CO₂ emission factor was estimated.

HDDV CO₂ emission factor = 22.384 lbs CO₂/gallon diesel * gallon diesel/6.17 miles * 453.6 g/lb = 1645.60 g/mile

Default Fuel Economies for On-Road Vehicles

Vehicle Type Category	Default Fuel Economy (mpg)
LDGV	22.64
LDGT1	16.87
LDGT2	16.58
HdGV	10.52
LDDV	27.17
LDDT	20.07
HDDV	6.17
MC	50

Notes:

Values from Table 4-51 (USAF IERA 2003).

On-Road Vehicle Emissions for CY 2011

Vehicle Type Category	NO _x	VOC	CO	SO _x	PM ₁₀	PM _{2.5}	CO ₂
LDGV	550.24	759.86	8672.88	18.87	186.03	52.40	102704.52
LDGT1	95.38	134.39	1526.03	4.16	46.82	12.57	22805.34
LDGT2	80.81	109.90	1247.73	3.17	83.40	21.33	17301.40
HdGV	19.39	16.54	116.94	0.88	31.43	8.10	4811.96
LDDV	17.80	8.90	25.21	1.72	11.87	4.15	5542.45
LDDT	10.84	7.23	13.73	1.13	11.49	3.47	3655.38
HDDV	71.68	22.06	130.14	5.65	85.25	22.17	18148.45
MC	3.42	21.68	85.57	0.12	0.30	0.11	674.96
Total (lbs)	849.57	1080.56	11818.23	35.70	456.59	124.31	175644.46
Total (tons)	0.42	0.54	5.91	0.02	0.23	0.06	87.82

Vehicle Type Category	Average On-Road Vehicle Mix (%)
LDGV	68.9
LDGT1	11.4
LDGT2	8.5
HdGV	1.5
LDDV	3.9
LDDT	1.9
HDDV	2.9
MC	1

Notes:

Vehicle mix is from Table 6-1 (USAF IERA 2003).

Example Calculation: NO_x emissions (lbs) = 50 vehicles * percent of vehicle mix /100 * NO_x emission factor (g/mile) * 60 miles/day * number of construction days * lb/453.6 g

Construction Commuter Emissions for CY 2012

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.
 Emission Estimation Method: United States Air Force (USAF) Institute for Environment, Safety and Occupational Health Risk Analysis (IERA) Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations (Revised December 2003).

Assumptions:

- Passenger vehicle emission factors for scenario year 2010 are used.
- Passenger vehicle model year 2000 is used.
- The average roundtrip commute for a construction worker = 60 miles
- Number of construction days = 230 days
- Number of construction workers (daily) = 50 people
- Riders per vehicle = 1 person
- Number of vehicles (daily) = 50 vehicles

Average On-Road Vehicle Emission Factors (grams/mile)

Vehicle Type Category	NO _x	VOC	CO	SO _x	PM ₁₀	PM _{2.5}	CO ₂
LDGV	2.10	2.90	33.10	0.072	0.71	0.20	391.97
LDGT1	2.20	3.10	35.20	0.096	1.08	0.29	526.04
LDGT2	2.50	3.40	38.60	0.098	2.58	0.66	535.24
HdGV	3.40	2.90	20.50	0.154	5.51	1.42	843.56
LDDV	1.20	0.60	1.70	0.116	0.80	0.28	373.70
LDDT	1.50	1.00	1.90	0.157	1.59	0.48	505.90
HDDV	6.50	2.00	11.80	0.512	7.73	2.01	1645.60
MC	0.90	5.70	22.50	0.032	0.08	0.03	177.48

Light Duty Gasoline Vehicles
 Light SUVs and Pickups
 Heavy SUVs and Pickups
 Heavy Duty Gasoline Vehicles
 Light Duty Diesel Vehicles
 Light Duty Diesel Trucks
 Heavy Duty Diesel Vehicles
 Motorcycles

Default Fuel Economies for On-Road Vehicles

Vehicle Type Category	Default Fuel Economy (mpg)
LDGV	22.64
LDGT1	16.87
LDGT2	16.58
HdGV	10.52
LDDV	27.17
LDDT	20.07
HDDV	6.17
MC	50

Notes:

Values from Table 4-51 (USAF IERA 2003).

Emission factors for all pollutants except CO₂ are from USAF IERA 2003.

Emission factors for PM₁₀, SO_x are from Table 4-50 (USAF IERA 2003).

Emission factors for VOC, CO, and NO_x are from Tables 4-2 through 4-49 for the 2010 calendar year, 2000 model year (USAF IERA 2003).

It is assumed that the average vehicle will produce 19,564 pounds of CO₂ per gallon of gas used and 22,384 pounds of CO₂ per gallon of diesel used (<http://www.eia.doe.gov/oiaf/1605/coefficients.html>).

Using the default fuel economy for the vehicle type categories in USAF IERA Table 4-51, the CO₂ emission factor was estimated.

HDDV CO₂ emission factor = 22,384 lbs CO₂/gallon diesel * gallon diesel/6.17 miles * 453.6 g/lb = 1645.60 g/mile

On-Road Vehicle Emissions for CY 2012

Vehicle Type Category	NO _x	VOC	CO	SO _x	PM ₁₀	PM _{2.5}	CO ₂
LDGV	2200.97	3039.44	34691.51	75.46	744.14	209.62	410818.08
LDGT1	381.51	537.58	6104.13	16.65	187.29	50.29	91221.35
LDGT2	323.25	439.62	4990.94	12.67	333.59	85.34	69205.59
HdGV	77.58	66.17	467.76	3.51	125.72	32.40	19247.85
LDDV	71.19	35.60	100.85	6.88	47.46	16.61	22169.80
LDDT	43.35	28.90	54.91	4.54	45.95	13.87	14621.54
HDDV	286.74	88.23	520.54	22.59	341.00	88.67	72593.82
MC	13.69	86.71	342.26	0.49	1.22	0.46	2699.83
Total (lbs)	3398.28	4322.24	47272.91	142.79	1826.37	497.25	702577.85
Total (tons)	1.70	2.16	23.64	0.07	0.91	0.25	351.29

Vehicle Type Category	Average On-Road Vehicle Mix (%)
LDGV	68.9
LDGT1	11.4
LDGT2	8.5
HdGV	1.5
LDDV	3.9
LDDT	1.9
HDDV	2.9
MC	1

Notes:

Vehicle mix is from Table 6-1 (USAF IERA 2003).

Example Calculation: NO_x emissions (lbs) = 50 vehicles * percent of vehicle mix /100 * NO_x emission factor (g/mile) * 60 miles/day * number of construction days * lb/453.6 g

Construction Commuter Emissions for CY 2013

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.
 Emission Estimation Method: United States Air Force (USAF) Institute for Environment, Safety and Occupational Health Risk Analysis (IERA) Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations (Revised December 2003).

Assumptions:

Passenger vehicle emission factors for scenario year 2010 are used.

Passenger vehicle model year 2000 is used.

The average roundtrip commute for a construction worker =

60 miles

57.5 days

50 people

1 person

50 vehicles

Number of construction days =

Number of construction workers (daily) =

Riders per vehicle =

Number of vehicles (daily) =

Average On-Road Vehicle Emission Factors (grams/mile)

Vehicle Type Category	NO _x	VOC	CO	SO _x	PM ₁₀	PM _{2.5}	CO ₂
LDGV	2.10	2.90	33.10	0.072	0.71	0.20	391.97
LDGT1	2.20	3.10	35.20	0.096	1.08	0.29	526.04
LDGT2	2.50	3.40	38.60	0.098	2.58	0.66	535.24
HdGV	3.40	2.90	20.50	0.154	0.51	1.42	843.56
LDDV	1.20	0.60	1.70	0.116	0.80	0.28	373.70
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HDDV	6.50	2.00	11.80	0.512	7.73	2.01	1645.60
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 Motorcycles

Notes:

Emission factors for all pollutants except CO₂ are from USAF IERA 2003.

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It is assumed that the average vehicle will produce 19,564 pounds of CO₂ per gallon of gas used and 22,384 pounds of CO₂ per gallon of diesel used (<http://www.eia.doe.gov/oiia/f1605/coefficients.html>).

Using the default fuel economy for the vehicle type categories in USAF IERA Table 4-51, the CO₂ emission factor was estimated.

HDDV CO₂ emission factor = 22,384 lbs CO₂/gallon diesel * gallon diesel/6.17 miles * 453.6 g/lb = 1645.60 g/mile

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Vehicle Type Category	NO _x	VOC	CO	SO _x	PM ₁₀	PM _{2.5}	CO ₂
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LDGT2	80.81	109.90	1247.73	3.17	83.40	21.33	17301.40
HdGV	19.39	16.54	116.94	0.88	31.43	8.10	4811.96
LDDV	17.80	8.90	25.21	1.72	11.87	4.15	5542.45
LDDT	10.84	7.23	13.73	1.13	11.49	3.47	3655.38
HDDV	71.68	22.06	130.14	5.65	85.25	22.17	18148.45
MC	3.42	21.68	85.57	0.12	0.30	0.11	674.96
Total (lbs)	849.57	1080.56	11818.23	35.70	456.59	124.31	175644.46
Total (tons)	0.42	0.54	5.91	0.02	0.23	0.06	87.82

Vehicle Type Category	Average On-Road Vehicle Mix (%)
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LDGT2	8.5
HdGV	1.5
LDDV	3.9
LDDT	1.9
HDDV	2.9
MC	1

Notes:

Vehicle mix is from Table 6-1 (USAF IERA 2003).

Example Calculation: NO_x emissions (lbs) = 50 vehicles * percent of vehicle mix /100 * NO_x emission factor (g/mile) * 60 miles/day * number of construction days * lb/453.6 g

Metropolitan San Antonio Intrastate Air Quality Control Region

Row #	State	County	Point Source Emissions							Area Source Emissions (Non-Point and Mobile Sources)						
			CO	NOx	PM10	PM2.5	SO2	VOC	CO	NOx	PM10	PM2.5	SO2	VOC		
1	TX	Atascosa Co	1,271	7,379	585	430	14,705	87.6	13,679	2,716	9,323	1,161	162	3,495		
2	TX	Bandera Co	785	1,050	1.62	1.62	0.13	13.9	4,972	448	5,465	681	36.9	1,148		
3	TX	Bexar Co	4,756	17,519	2,394	567	28,430	1,473	373,133	47,470	68,876	9,613	7,349	58,346		
4	TX	Comal Co	2,508	4,169	569	193	250	126	32,555	4,551	9,527	1,433	771	4,899		
5	TX	Dimmit Co	228	177	2.89	2.89	12.5	36.3	3,088	550	2,715	329	24.3	1,407		
6	TX	Edwards Co	0	0	0	0	0	0	1,637	956	1,607	235	356	844		
7	TX	Frio Co	111	144	1.1	1.06	35	17.4	7,480	1,534	2,959	400	71	1,532		
8	TX	Gillespie Co	0	0	0	0	0	0	6,599	860	6,017	747	97	1,280		
9	TX	Guadalupe Co	835	1,032	455	405	319	183	30,493	5,608	18,379	2,344	958	6,548		
10	TX	Karnes Co	140	315	0.41	0.41	0.41	99.1	3,877	966	4,147	534	54.9	935		
11	TX	Kendall Co	0.02	0.05	0	0	0	1.56	10,917	1,307	6,113	797	152	2,746		
12	TX	Kerr Co	0	0	0	0	0	0	13,411	1,425	9,618	1,122	176	2,562		
13	TX	Kinney Co	0	0	0	0	0	0	1,526	648	1,858	244	33	214		
14	TX	La Salle Co	0	0	0	0	0	0	5,537	1,723	1,371	205	63	1,257		
15	TX	Maverick Co	7.87	42.5	0	0	7.01	13.8	7,369	1,486	8,263	925	181	2,173		
16	TX	Medina Co	0	0	1.06	0.41	9.22	0	12,641	2,780	10,173	1,286	198	3,348		
17	TX	Real Co	0	0	0	0	0	0	1,203	138	1,675	226	11	247		
18	TX	Uvalde Co	0	0	0	0	0	0	8,131	1,812	5,634	790	191	1,706		
19	TX	Val Verde Co	0	0	0	0	0	25.2	9,795	2,794	3,390	460	128	2,416		
20	TX	Wilson Co	0	0	0	0	0	0	7,487	1,281	9,781	1,181	98	1,626		
21	TX	Zavala Co	0	0	0	0	0	0	2,777	629	2,679	354	70.2	887		
Grand Total			10,642	31,829	4,010	1,602	43,769	2,076	558,306	81,681	189,570	25,065	11,181	99,616		

SOURCE:
<http://www.epa.gov/air/data/geosel.html>
 USEPA - AirData NET Tier Report
 *Net Air pollution sources (area and point) in tons per year (2002)
 Site visited on 08 June 2009.

Metropolitan San Antonio Intrastate Air Quality Control Region (40 CFR 81.100)

	CO	NOx	PM10	PM2.5	SO2	VOC
Bexar	377,889	64,989	71,270	10,180	35,779	59,819
Total	568,948	113,510	193,580	26,667	54,950	101,692

APPENDIX D

HISTORIC PROPERTIES WITHIN THE AREA OF POTENTIAL AFFECT

Table D-1. Historic Properties within APE for Proposed AAFES Lifestyle Center

Bldg #	Historic Use	Date of Const.	Property Type	NRHP Status
325	Cold storage plant	1945	Storage and supply	Eligible – Significant A (Conservation Dist)
372	Commissary	1934	Service and support	Eligible – Significant A & C (Conservation Dist)
843B	Detached 1-car garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
751B	Detached 2-car garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
755B	Detached 2-car garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
759B	Detached 2-car garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
763B	Detached 2-car garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
767B	Detached 2-car garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
773B	Detached 2-car garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
775B	Detached 2-car garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
779B	Detached 2-car garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
783B	Detached 2-car garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
837B	Detached 2-car garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
841B	Detached 2-car garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
847B	Detached 2-car garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
851B	Detached garage	1935	Housing	Eligible – Significant A & C (Conservation Dist)
2371	Hospital facility	1931	Base operations support	Eligible – Significant A & C (Conservation Dist)
2372	Hospital facility	1931	Base operations support	Eligible – Significant A & C (Conservation Dist)
4168	Maintenance shop	1934	Shops	Eligible – Significant A & C (Conservation Dist)

Bldg #	Historic Use	Date of Const.	Property Type	NRHP Status
2376	Morgue	1931	Base operations support	Eligible – Significant A & C (Conservation Dist)
700	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
701	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
702	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
703	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
704	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
705	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
706	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
707	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
708	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
709	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
710	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
711	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
712	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
713	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
714	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
715	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
716	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
717	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
718	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)

Bldg #	Historic Use	Date of Const.	Property Type	NRHP Status
719	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
720	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
721	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
722	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
723	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
724	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
725	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
726	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
727	NCO family housing	1931	Housing	Eligible – Significant A & C (Conservation Dist)
728	NCO family housing	1933	Housing	Eligible – Significant A & C (Conservation Dist)
729	NCO family housing	1933	Housing	Eligible – Significant A & C (Conservation Dist)
730	NCO family housing	1933	Housing	Eligible – Significant A & C (Conservation Dist)
731	NCO family housing	1933	Housing	Eligible – Significant A & C (Conservation Dist)
732	NCO family housing	1933	Housing	Eligible – Significant A & C (Conservation Dist)
733	NCO family housing	1933	Housing	Eligible – Significant A & C (Conservation Dist)
734	NCO family housing	1933	Housing	Eligible – Significant A & C (Conservation Dist)
735	NCO family housing	1933	Housing	Eligible – Significant A & C (Conservation Dist)
750	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
751	NCO family housing	1935	Housing	Eligible – Significant A & C (Conservation Dist)
752	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)

Bldg #	Historic Use	Date of Const.	Property Type	NRHP Status
753	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
754	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
755	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
756	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
757	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
758	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
759	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
760	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
761	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
762	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
763	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
764	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
765	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
766	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
767	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
768	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
769	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
770	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
771	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
772	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)

Bldg #	Historic Use	Date of Const.	Property Type	NRHP Status
773	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
774	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
775	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
776	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
777	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
778	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
779	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
780	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
781	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
782	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
783	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
784	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
785	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
786	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
788	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
790	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
792	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
794	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
808	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
809	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)

Bldg #	Historic Use	Date of Const.	Property Type	NRHP Status
810	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
811	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
812	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
813	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
814	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
815	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
816	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
837	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
838	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
839	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
840	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
841	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
842	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
843	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
844	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
845	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
846	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
847	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
848	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
849	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)

Bldg #	Historic Use	Date of Const.	Property Type	NRHP Status
850	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
851	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
852	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
853	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
854	NCO family housing	1934	Housing	Eligible – Significant A & C (Conservation Dist)
368	Post office	1937	Base operations support	Eligible – Significant A (Conservation Dist)
369	Post prison	1934	Base operations support	Eligible – Significant A (Conservation Dist)
2382	Repair shops, motor vehicle facilities	1934	Shops	Eligible – Significant A (Conservation Dist)
366	Retail services	1934	Base operations support	Eligible – Significant A & C (Conservation Dist)
367	Retail services	1934	Base operations support	Eligible – Significant A & C (Conservation Dist)
4188	Warehouse	1941	Storage and supply	Eligible – Significant A
4189	Warehouse	1941	Storage and supply	Eligible – Significant A
4190	Warehouse	1941	Storage and supply	Eligible – Significant A
4191	Warehouse	1941	Storage and supply	Eligible – Significant A
4192	Warehouse	1941	Storage and supply	Eligible – Significant A
4193	Warehouse	1941	Storage and supply	Eligible – Significant A

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APPENDIX E

THREATENED AND ENDANGERED SPECIES AND CRITICAL HABITAT IN BEXAR COUNTY

Table E-1. State and Federally Threatened and Endangered Species and Critical Habitat found in Bexar County, Texas

Common Species Name/ Critical Habitat Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Reason for No Effect/Effect	Habitat and Life history
Arachnids						
Robber Baron Cave Meshweaver	<i>Cicurina baronia</i>	Endangered	n/a	No Effect	The species or its habitat does not occur on or near FSH.	Small, eyeless, or essentially eyeless spider; karst features in north and northwest Bexar County.
Robber Baron Cave Meshweaver Critical Habitat	—	Critical Habitat	n/a	No Effect	Critical habitat is not located on or near FSH.	Robber Baron Cave in Alamo Heights, 2 miles northwest of Fort Sam Houston. The cave is relatively large and the land over and around the cave is heavily urbanized
Madla's Cave Meshweaver	<i>Cicurina madla</i>	Endangered	n/a	No Effect	The species or its habitat does not occur on or near FSH.	Small, eyeless, or essentially eyeless spider; karst features in north and northwest Bexar County.
Madla Cave Meshweaver Critical Habitat	—	Critical Habitat	n/a	No Effect	Critical habitat is not located on or near FSH	Known from eight caves in or near Government Canyon, Helotes, and University of Texas at San Antonio (UTSA).
Bracken Bat Cave meshweaver	<i>Cicurina venii</i>	Endangered	n/a	No Effect	The species or its habitat does not occur on or near FSH.	Small, eyeless, or essentially eyeless spider; karst features in north and northwest Bexar County.

Common Species Name/ Critical Habitat Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Reason for No Effect/Effect	Habitat and Life history
Arachnids (continued)						
Bracken Bat Cave meshweaver Critical Habitat	—	Critical Habitat	n/a	No Effect	Critical habitat is not located on or near FSH	Known only from Bracken Bat Cave in northwest Bexar county. The cave entrance was filled during construction of a home in 1990. Without re-excavating the cave, it is difficult to determine what effect this had on the species. There may still be some surface nutrients introduced from a reported small side passage
Government Canyon Bat Cave meshweaver	<i>Cicurina vespera</i>	Endangered	n/a	No Effect	The species or its habitat does not occur on or near FSH.	Small, eyeless, or essentially eyeless spider; karst features in north and northwest Bexar County.
Government Canyon Bat Cave meshweaver - Critical Habitat	—	Critical Habitat	n/a	No Effect	Critical habitat is not located on or near FSH	Known from Government Canyon Bat Cave in the Government Canyon State Natural Area. As of 2004, only one specimen has ever been collected. At one time, a second cave northeast of Helotes was thought to contain the species but it was later found the individual in the Helotes cave represented a new species.

Common Species Name/Critical Habitat Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Reason for No Effect/Effect	Habitat and Life history
Arachnids (continued)						
Government Canyon Bat Cave spider	<i>Neoleptoneta microps</i>	Endangered	n/a	No Effect	The species or its habitat does not occur on or near FSH.	Small, eyeless, or essentially eyeless spider; karst features in north and northwest Bexar County.
Government Canyon Bat Cave spider Critical Habitat	—	Critical Habitat	n/a	No Effect	Critical habitat is not located on or near FSH	Known from two caves in Government Canyon State Natural Area.
Cokendolpher Cave harvestman	<i>Texella cokendolpheri</i>	Endangered	n/a	No Effect	The species or its habitat does not occur on or near FSH.	Small, eyeless harvestman; karst features in north and northwest Bexar County.
Cokendolpher Cave harvestman Critical Habitat	—	Critical Habitat	n/a	No Effect	Critical habitat is not located on or near FSH	Robber Baron Cave in Alamo Heights, 2 miles northwest of Fort Sam Housotn. The cave is relatively large and the land over and around the cave is heavily urbanized
Insects						
Helotes mold beetle	<i>Batrissodes ventyivi</i>	Endangered	n/a	No Effect	The species or its habitat does not occur on or near FSH.	small, eyeless mold beetle; karst features in northwestern Bexar County and northeastern Medina County
Helotes mold beetle Critical Habitat	—	Critical Habitat	n/a	No Effect	Critical habitat is not located on or near FSH	Known to inhabit eight caves near Helotes, Texas. There have been three known collections of adult specimens.

Insects (continued)						
Common Species Name/ Critical Habitat Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Reason for No Effect/Effect	Habitat and Life history
A ground beetle	<i>Rhadine exilis</i>	Endangered	n/a	No Effect	The species or its habitat does not occur on or near FSH.	small, essentially eyeless ground beetle; karst features in north and northwest Bexar County
A ground beetle Critical Habitat	—	Critical Habitat	n/a	No Effect	Critical habitat is not located on or near FSH	Known to inhabit 50 caves in north and northwest Bexar county. Many are located on Camp Bullis in the Stone Oak karst region; with others located in the Helotes, University of Texas at San Antonio (UTSA), and Stone Oak karst regions.
Ground beetle (unnamed)	<i>Rhadine infernalis</i>	Endangered	n/a	No Effect	The species or its habitat does not occur on or near FSH.	small, essentially eyeless ground beetle; karst features in north and northwest Bexar County
Ground beetle (unnamed) Critical Habitat	—	Critical Habitat	n/a	No Effect	Critical habitat is not located on or near FSH	The species may be occasionally abundant with ten or more individuals seen in a limited area. At other times, however, it appears to be absent or is extremely rare. Known to inhabit 36 caves in north and northwest Bexar county.

Common Species Name/ Critical Habitat Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Reason for No Effect/Effect	Habitat and Life history
Amphibians						
Cascade Caverns salamander	<i>Eurycea latitans complex</i>	n/a	Threatened	Not likely to adversely affect	Species may be affected by decreased water levels within their subterranean aquatic habitats. Water levels may decrease as a result of increase water withdrawal.	Endemic; subaquatic; springs and caves in northern Bexar county watersheds, within Edwards Aquifer area.
Texas Salamander	<i>Eurycea neotenes</i>	n/a	Threatened	Not likely to adversely affect	Species may be affected by decreased water levels within their subterranean aquatic habitats. Water levels may decrease as a result of increase water withdrawal.	Endemic; troglotic; springs, seeps, cave streams, and creek headwaters; often hides under rocks and leaves in water; restricted to Helotes and Leon Creek drainages in North Bexar county.
Comal blind salamander	<i>Eurycea tridentifera</i>	n/a	Threatened	Not likely to adversely affect	Species may be affected by decreased water levels within their subterranean aquatic habitats. Water levels may decrease as a result of increase water withdrawal.	Endemic; semi-troglotic; found in springs and waters of caves in northern Bexar county.

Common Species Name/ Critical Habitat Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Reason for No Effect/Effect	Habitat and Life history
Reptiles						
Timber/Canebrake rattlesnake	<i>Crotalus horridus</i>	n/a	Threatened	No Effect	Species does not occur on the installation. Species in not associated with the Edwards Aquifer.	Swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e. grapevines or palmetto
Indigo snake	<i>Drymarchon corais</i>	n/a	Threatened	No Effect	Species does not occur on the installation. Species in not associated with the Edwards Aquifer.	Thornbush-chaparral woodlands of south Texas, in particular dense riparian corridors; can do well in suburban and irrigated croplands if not molested or indirectly poisoned; requires moist microhabitats, such as rodent burrows, for shelter
Texas tortoise	<i>Gopherus berlandieri</i>	n/a	Threatened	No Effect	Species does not occur on the installation. Species in not associated with the Edwards Aquifer.	: Open brush with a grass understory is preferred; open grass and bare ground are avoided; when inactive occupies shallow depressions at base of bush or cactus, sometimes in underground burrows or under objects;; active March-November; breeds April-November

Common Species Name/ Critical Habitat Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Reason for No Effect/Effect	Habitat and Life history
Reptiles (continued)						
Texas horned lizard	<i>Phrynosoma cornutum</i>	n/a	Threatened	No Effect	Species does not occur on the installation. Species in not associated with the Edwards Aquifer.	Open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September
Birds						
Zone-tailed hawk	<i>Buteo albonotatus</i>	n/a	Threatened	No Effect	Occurrence of this species on the installation has not been documented. Installation does not have the required habitat. Species is not associated with the Edwards Aquifer.	Arid open country, including open deciduous or pine-oak woodland, mesa or mountain county, often near watercourses, and wooded canyons and tree-lined rivers along middle-slopes of desert mountains; nests in various habitats and sites, ranging from small trees in lower desert, giant cottonwoods in riparian areas, to mature conifers in high mountain regions

Common Species Name/ Critical Habitat Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Reason for No Effect/Effect	Habitat and Life history
Birds (continued)						
Golden-cheeked warbler	<i>Dendroica chrysoparia</i>	Endangered	Endangered	No Effect	Occurrence of this species on the installation has not been documented. Installation does not have the required habitat. Species is not associated with the Edwards Aquifer.	Juniper-oak woodlands; dependent on mature ashe juniper for nest construction. Nests are placed in various trees other than Ashe juniper. Forage for insects in broad-leaved trees and shrubs. Habitat predominantly in North Bexar County
American peregrine falcon	<i>Falco peregrines anatum</i>	Delisted	Threatened	Not likely to adversely affect	Occurrence of this species on the installation has not been documented. Species is not associated with the Edwards Aquifer.	year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.

Common Species Name/ Critical Habitat Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Reason for No Effect/Effect	Habitat and Life history
Birds (continued)						
Arctic peregrine falcon	<i>Falco peregrine tundrius</i>	Delisted	n/a	Not likely to adversely affect	Occurrence of this species on the installation has not been documented. Species in not associated with the Edwards Aquifer.	migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.
Whooping crane	<i>Grus americana</i>	Endangered	Endangered	Not likely to adversely affect	Occurrence of this species on the installation has not been documented. Species in not associated with the Edwards Aquifer.	Potential migrant via plains throughout most of state to coast; winters in coastal marshes of East Texas. The only self-sustaining wild population is one that winters on the marshes and salt flats in the Aransas National Wildlife Refuge, on the Texas coast, and nests primarily within the Wood Buffalo National Park in Canada.

Common Species Name/ Critical Habitat Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Reason for No Effect/Effect	Habitat and Life history
Birds (continued)						
Wood stork	<i>Mycteria americana</i>	n/a	Threatened	No Effect	Occurrence of this species on the installation has not been documented. Installation does not have the required habitat. Species in not associated with the Edwards Aquifer.	forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water. Breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands.. Formerly nested in Texas, but no breeding records since 1960
White-faced ibis	<i>Plegadis chihhi</i>	n/a	Threatened	No Effect	Occurrence of this species on the installation has not been documented. Installation does not have the required habitat. Species in not associated with the Edwards Aquifer.	Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.
Interior least tern	<i>Aterna antillarum athalassos</i>	Endangered	Endangered	No Effect	Occurrence of this species on the installation has not been documented. Installation does not have the required habitat. Species in not associated with the Edwards Aquifer.	Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony.

Common Species Name/ Critical Habitat Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Reason for No Effect/Effect	Habitat and Life history
Birds (continued)						
Black-capped vireo	<i>Vireo atricapilla</i>	Endangered	Endangered	No Effect	Occurrence of this species on the installation has not been documented. Installation does not have the required habitat. Species in not associated with the Edwards Aquifer.	oak-juniper woodlands with distinctive patchy, two-layered aspect; shrub and tree layer with open, grassy spaces; requires foliage reaching to ground level for nesting cover; return to same territory, or one nearby, year after year; deciduous and broad-leaved shrubs and trees provide insects for feeding; species composition less important than presence of adequate broad-leaved shrubs, foliage to ground level, and required structure; nesting season March-late summer
Fishes						
Widemouth blindcat	<i>Satan eurystomus</i>	n/a	Threatened	Not likely to adversely affect	Species may be affected by decreased water levels within their subtterraneous aquatic habitats. Water levels may decrease as a result of increase water withdrawal.	troglobitic, blind catfish endemic to the San Antonio Pool of the Edward's Aquifer. Found in the five deep artesian Edwards Aquifer in Bexar County in the south and eastern part of San Antonio. May be present near FSH.

Common Species Name/ Critical Habitat Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Reason for No Effect/Effect	Habitat and Life history
Fishes (continued)						
Toothless blindcat	<i>Trogloglanis pattersoni</i>	n/a	Threatened	Not likely to adversely affect	Species may be affected by decreased water levels within their subterranean aquatic habitats. Water levels may decrease as a result of increase water withdrawal.	troglobitic, blind catfish endemic to the San Antonio Pool of the Edward's Aquifer. Found in the five deep artesian Edwards Aquifer in Bexar County in the south and eastern part of San Antonio. May be present near FSH.
Mammals						
Gray wolf	<i>Canis lupus</i>	Endangered	Endangered	No Effect	Occurrence of this species on the installation has not been documented. Installation does not have the required habitat. Species in not associated with the Edwards Aquifer.	Extirpated; formerly known throughout the western two-thirds of the state in forests, brushlands, or grasslands.
Red wolf	<i>Canis rufus</i>	Endangered	Endangered	No Effect	Occurrence of this species on the installation has not been documented. Installation does not have the required habitat. Species in not associated with the Edwards Aquifer.	Extirpated; formerly known throughout eastern half of Texas in brushy and forested areas, as well as coastal prairies.

Common Species Name/ Critical Habitat Name	Scientific Name	Federal Listing	State Listing	Effect Determination	Reason for No Effect/Effect	Habitat and Life history
Mammals (continued)						
Louisiana black bear	<i>Ursus americanus luteolus</i>	Threatened	Threatened	No Effect	Occurrence of this species on the installation has not been documented. Installation does not have the required habitat. Species in not associated with the Edwards Aquifer.	Bottomland hardwoods and large tracts of inaccessible forested areas; due to field characteristics similar to the state and federally threatened Louisiana Black Bear, treat all east Texas black bears as federal and state listed Threatened

Sources: USFWS 2009, TPWD 2009a, TPWD 2007b, Eckhardt 2009b, Campbell 2003

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