FINAL

ENVIRONMENTAL ASSESSMENT

INSTALLATION DEVELOPMENT AT SHEPPARD AIR FORCE BASE, TEXAS

United States Air Force
Air Education and Training Command
Sheppard Air Force Base, Texas

May 2007

Report Documentation Page

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14. ABSTRACT

The 82nd Training Wing at Sheppard Air Force Base (AFB), Texas, proposes to implement installation development projects based on the current Capital Improvements Program (CIP) and the requirements of the Base Realignment and Closure (BRAC) program as it relates to Sheppard AFB. The components of the current CIP include new building construction and alteration, replacement of old buildings, and demolition of some existing facilities. The proposed action is necessary at this time because there is a lack of available adequate facilities on Sheppard AFB. The proposed action would provide the necessary facilities to accomplish the mission of the 82nd Training Wing. No construction or demolition is associated with the BRAC program-related projects. One action alternative is presented, which establishes and evaluates a potential development capability of Sheppard AFB. Implementation of this alternative would include developing Sheppard AFB facilities to the maximum capability of the installation increasing the number of assigned personnel to the base?s potential capability, and conducting flying operations at maximum sustainable levels. Resources considered in the impact analysis were noise, airspace management and air traffic control, land use, earth resources, water resources, hazardous materials and waste, biological resources, utilities and infrastructure, socioeconomics and environmental justice, air quality, and cultural resources.

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FINDING OF NO SIGNIFICANT IMPACT
AND
FINDING OF NO PRACTICABLE ALTERNATIVE FOR
INSTALLATION DEVELOPMENT AT
SHEPPARD AIR FORCE BASE, TEXAS

AGENCY: Department of the Air Force, 82nd Training Wing, Sheppard Air Force Base (AFB), Texas.

PROPOSED ACTION AND ALTERNATIVES: The proposed action includes completion of installation development projects and implementation of the Base Realignment and Closure Commission's (BRAC) final recommendations for Sheppard AFB. The proposed action includes realigning part of the current Introduction to Fighter Fundamentals flying training mission from Moody AFB, Georgia to Sheppard AFB. The components of the realignment include the beddown of additional T-38 aircraft and personnel actions. The additional aircraft would be incorporated into the current training activities, and there would be no changes to the current flight patterns, use of ranges, or Military Operations Areas. There would also be no increases to flying operations currently conducted on Falcon Range at Fort Sill, Oklahoma. BRAC-related personnel actions would result in the addition of 51 military and 2 civilian personnel, as well as the loss of 2,519 military and 158 civilian medical personnel due to the realignment of medical training from Sheppard AFB to Fort Sam Houston in San Antonio, Texas. The proposed action would include approximately 1.0 million square feet of building construction, 2.1 million square feet of pavement construction or upgrades, 1.1 million square feet of building demolition, and 1.7 million square feet of pavement demolition. The alternative action includes development of Sheppard AFB facilities to the maximum capability of the installation, increasing the number of assigned personnel, and conducting flying operations at maximum sustainable levels. Approximately 7.2 million square feet of buildings and 58 acres of pavement would be constructed, and an associated 4.3 million square feet of facilities would be demolished. The base population would increase by approximately 18,561 persons, to nearly 36,645. The alternative action includes the increase of T-38 and T-6 flight operations to increase total aircraft operations by 40 percent. The no action alternative consists of the continuing use of existing facilities at Sheppard AFB to conduct technical training and aircraft operations at current levels.

SUMMARY OF FINDINGS: Direct, indirect, and cumulative impacts regarding noise, airspace management and air traffic control, land use, earth resources, water resources, hazardous materials and waste, biological resources, utilities and infrastructure, socioeconomics and environmental justice, air quality, and cultural resources were analyzed for the proposed and alterative actions at Sheppard AFB.

Implementation of the proposed action would result in increases in impervious surfaces, infrastructure demand, and hazardous materials consumption and hazardous waste generation. However, best management practices would be employed to minimize erosion and impacts to water resources by the increased impervious surfaces, and the projected increase in demand on base infrastructure is not expected to create adverse impacts. Because hazardous materials and waste would be managed in accordance with existing protocols, impacts are expected to be minor. Anticipated increases in emissions are not expected to result in any meaningful long-term impacts to Wichita County or Air Quality Control Region 210 from the construction or increased aircraft operations. Land area and the number of persons located under the noise contours in the vicinity of Sheppard AFB would increase slightly over baseline conditions, but impacts are expected to be minor. The proposed action is not expected to contribute appreciably to cumulative environmental impacts when

considered in the context of other projects that have recently been completed, are currently under construction, or are anticipated to be implemented in the near future.

Implementation of the alternative action would result in similar impacts as the proposed action in all respects except noise. Land area and number of persons located under the noise contours in the vicinity of Sheppard AFB would increase. However, the increase is not expected to be significant. As with the proposed action, the alternative action is not expected to contribute appreciably to cumulative environmental impacts.

SUMMARY OF PUBLIC REVIEW AND INTERAGENCY COORDINATION: The Draft EA and Draft Finding of No Significant Impact and Finding of No Practicable Alternative were made available to the public as well as appropriate federal, state, and local agencies. Public notification of the 30-day comment period was placed in the *Wichita Falls Times Record News* on 13 Mar 07. The review period ended 12 Apr 07. There were no public comments. Five responses from government agencies were received but no comments required changes in the EA. Agency responses are provided in Appendix A.

FINDING OF NO PRACTICABLE ALTERNATIVE: Pursuant to Executive Order 11988, and considering all supporting information, I find that there is no practicable alternative to the proposed implementation of the Loop Road improvement project sited in a 100-year floodplain as described in section 4.3.5.3.2 of the attached EA. The attached EA identifies all practicable measures to minimize harm to the existing environment. Construction of the proposed facilities will increase impervious cover to the area within the floodplain; however, the resulting increase in total impervious cover will have a minimal impact on the total volume of stormwater runoff on Sheppard AFB. I have decided to defer a decision regarding the 80th Flying Training Wing (FTW) campus recreational, parking, and road improvement projects as described in section 4.3.5.3.2 of the attached EA pending further 82nd Training Wing review of potential alternative sites outside the floodplain.

Mark A. Pohlmeier — 30 Aug 07

MARK A. POHLMEIER, Colonel, USAF — **Date**
The Civil Engineer
Headquarters Air Education and Training Command

FINDING OF NO SIGNIFICANT IMPACT: Based on my review of the facts and analysis in the EA, I conclude that neither the proposed action nor the alternative action will have a significant impact either by itself or considering cumulative impacts. Accordingly, the requirements of the *National Environmental Policy Act*, the Council on Environmental Quality Regulations, and 32 *Code of Federal Regulations* 989 have been fulfilled, and an environmental impact statement is not required and will not be prepared. This decision does not include the proposed 80th FTW recreation, parking and road improvement projects described in Section 4.3.5.3.2 of the attached EA. A decision on the 80th FTW projects will be made following additional review.

5 NOV 2007

RICHARD T. DEVEREAUX, Brigadier General, USAF — **Date**
82nd Training Wing Commander

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ACRONYMS AND ABBREVIATIONS

%	percent
°F	degrees Fahrenheit
80 FTW	80th Flying Training Wing
82 TRW	82nd Training Wing
82 CES/CEV	82nd Civil Engineer Squadron/Environmental Flight
µg/m^3	micrograms per cubic meter
AAFES	Army and Air Force Exchange Service
ACAM	Air Conformity Applicability Model
ACM	asbestos-containing material
AETC	Air Education and Training Command
AFB	Air Force Base
AFI	Air Force Instruction
AGL	above ground level
AICUZ	Air Installation Compatible Use Zone
amsl	above mean sea level
APZ I	Accident Potential Zone 1
APZ II	Accident Potential Zone 2
AQCR	Air Quality Control Region
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
BCI	Board of Commerce and Industry
BHPO	Base Historic Preservation Officer
BMP	best management practice
BRAC	Base Realignment and Closure
CAA	*Clean Air Act*
CIP	Capital Improvements Program
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CO	carbon monoxide
CRMP	Cultural Resources Management Plan
CSA	Chemical Staging Area
CWA	*Clean Water Act*
dB	decibel
dBA	A-weighted decibel
DCE	dichloroethene
DoD	Department of Defense
DOT	Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
ENJJPT	Euro-North Atlantic Treaty Organization Joint Jet Pilot Training
EO	Executive Order
ESOH	Environmental, Safety, and Occupational Health
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIP	Federal Implementation Plan
FL	flight level
ft	feet
FY	fiscal year
gpm	gallon per minute
HAP	hazardous air pollutant
HAZMAT	Hazardous Material
hr	hour
Hz	hertz
HQ	Headquarters
IFF	Introduction to Fighter Fundamentals
IFR	Instrument Flight Rule
IRP	Installation Restoration Program
ISD	Independent School District
JP-4	jet propulsion fuel 4
kts	knots
L_{dn}	Day-Night Average Sound Level
L_{eq}	equivalent noise level
L_{max}	maximum sound level
lb	pound
LBP	lead-based paint
LOS	level of service

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FINAL

Environmental Assessment

Installation Development at
Sheppard Air Force Base, Texas

Department of the Air Force
82nd Training Wing
Sheppard Air Force Base, Texas

May 2007

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Cover Sheet

FINAL

COVER SHEET
ENVIRONMENTAL ASSESSMENT
INSTALLATION DEVELOPMENT
SHEPPARD AIR FORCE BASE, TEXAS

Responsible Agency: Department of the Air Force, Air Education and Training Command, 82nd Training Wing, Sheppard Air Force Base (AFB), Texas.

Proposed Action: Installation Development at Sheppard AFB, Texas.

Point of Contact: Mr. Timothy W. Hunter, 82nd Civil Engineer Squadron/ Environmental Flight, 231 9th Avenue, Sheppard AFB, Texas 76311, 940-676-5698.

Report Designation: Final Environmental Assessment

Abstract: The 82nd Training Wing at Sheppard Air Force Base (AFB), Texas, proposes to implement installation development projects based on the current Capital Improvements Program (CIP) and the requirements of the Base Realignment and Closure (BRAC) program as it relates to Sheppard AFB. The components of the current CIP include new building construction and alteration, replacement of old buildings, and demolition of some existing facilities. The proposed action is necessary at this time because there is a lack of available adequate facilities on Sheppard AFB. The proposed action would provide the necessary facilities to accomplish the mission of the 82nd Training Wing. No construction or demolition is associated with the BRAC program-related projects.

One action alternative is presented, which establishes and evaluates a potential development capability of Sheppard AFB. Implementation of this alternative would include developing Sheppard AFB facilities to the maximum capability of the installation, increasing the number of assigned personnel to the base's potential capability, and conducting flying operations at maximum sustainable levels. Resources considered in the impact analysis were noise, airspace management and air traffic control, land use, earth resources, water resources, hazardous materials and waste, biological resources, utilities and infrastructure, socioeconomics and environmental justice, air quality, and cultural resources.

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Chapter 1

Purpose of and Need for Action

CHAPTER 1

PURPOSE OF AND NEED FOR ACTION

The Commander of the 82nd Training Wing (82 TRW) proposes installation development activities based on the current Capital Improvements Program (CIP) and to implement the requirements of the Base Realignment and Closure (BRAC) program related to Sheppard Air Force Base (AFB). This Environmental Assessment (EA) consists of seven chapters covering the purpose and need for the proposed action, a detailed description of the proposed action and alternatives, a discussion of baseline environmental conditions, the environmental analysis, a list of individuals who prepared the EA, a list of agencies and individuals contacted during preparation of the EA, and a list of source documents for the EA. This chapter presents the purpose of and need for the action, a description of the location, a description of the scope of the environmental review, an overview of environmental requirements, an introduction to the organization of this document, and a summary of public involvement activities.

1.1 PURPOSE OF AND NEED FOR ACTION

The Air Force must maintain the highest level of quality education and training for its force structure. The Air Education and Training Command (AETC) is responsible for the training and education of Air Force personnel. Sheppard AFB, an AETC installation, is the largest of four technical training wings within AETC and has the most diversified training mission. Sheppard AFB conducts technical and healthcare training for the Air Force, United States (US) Army, US Navy, US Marine Corps, and several allied nations. The base receives major operational support from the 82nd Mission Support Group and the 82nd Medical Group.

The proposed action is necessary due to shortfalls in available facilities. The shortfalls require existing facilities be upgraded, replaced, or supplemented. Implementation of the proposed action would provide the necessary facilities for the 82 TRW to execute its continuously evolving training mission.

1.2 LOCATION

Sheppard AFB encompasses approximately 4,631 acres in north-central Texas, and is located within 15 minutes of the Texas/Oklahoma border. The base is adjacent to and north of the city of Wichita Falls, Wichita County, Texas (Figures 1-1 and 1-2). The western and southern portions of the base are located within the Wichita Falls city limits, and the remainder of the installation lies within unincorporated Wichita County. The city is located midway between Dallas, Texas, and Oklahoma City, Oklahoma, and can be reached by US Highways 82, 281, 287, and Interstate Highway 44.

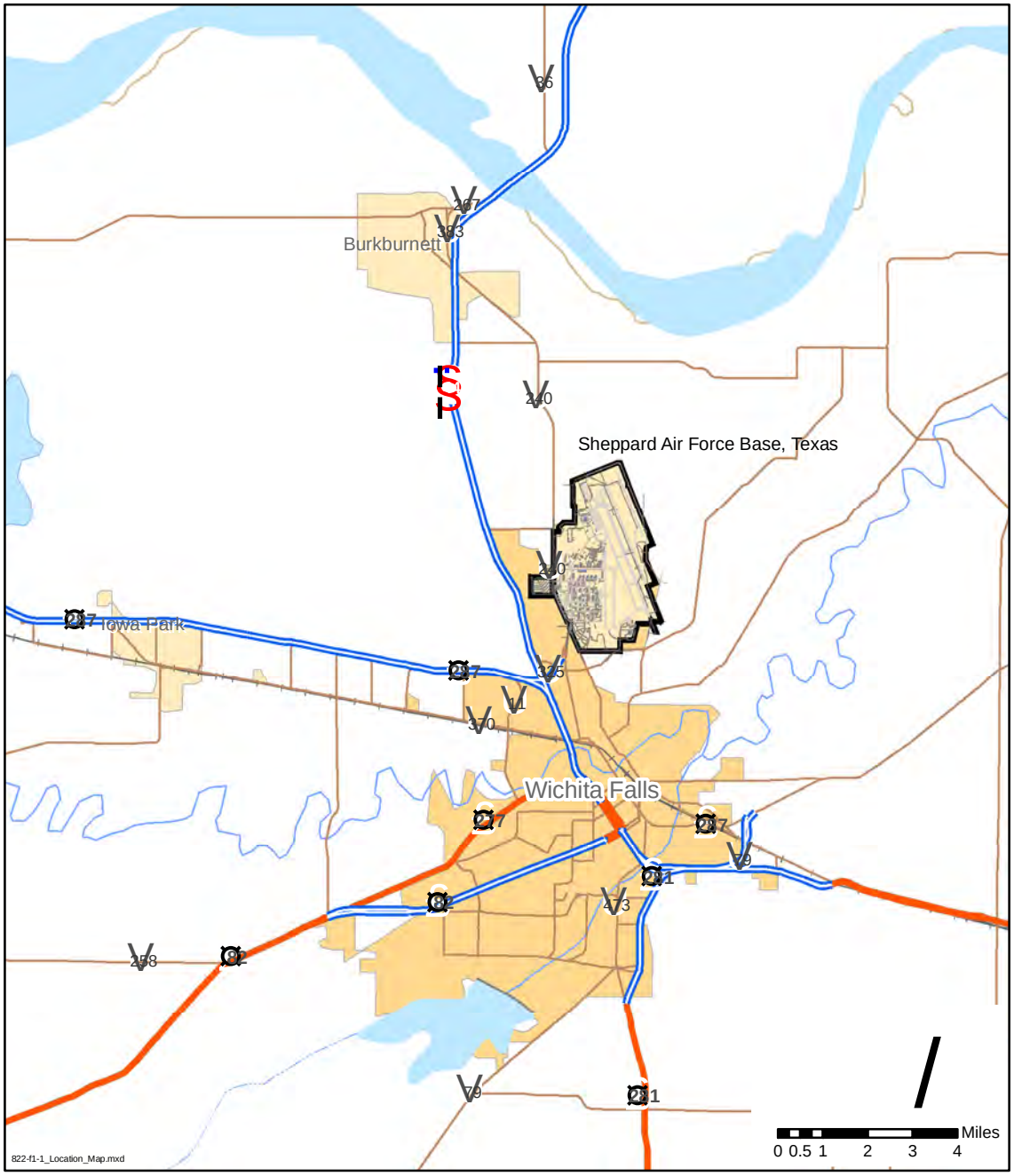

Figure 1-1 Site Location Map

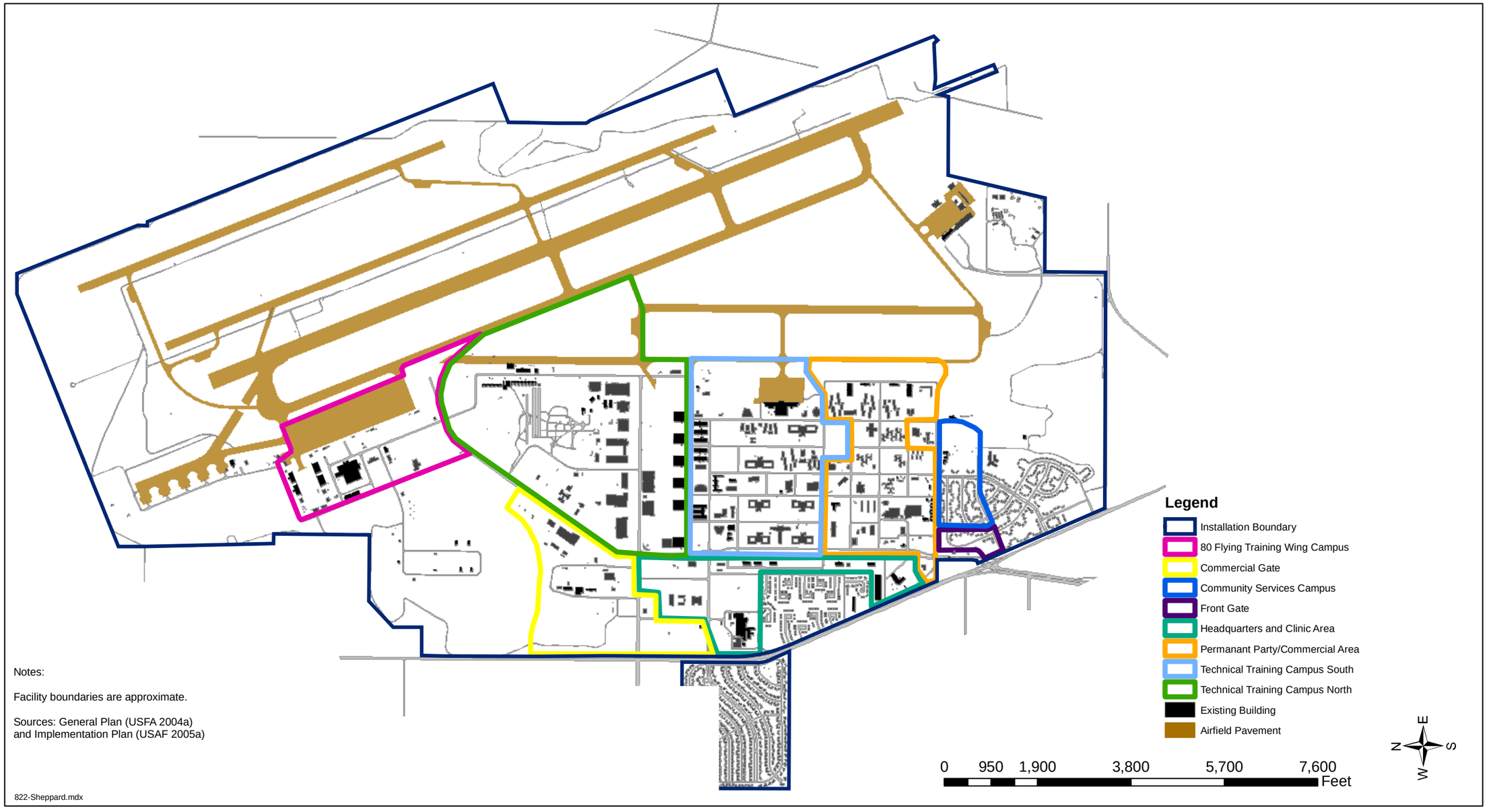

Figure 1-2 Sheppard Air Force Base, Texas

1.3 SCOPE OF THE ENVIRONMENTAL REVIEW

The *National Environmental Policy Act* of 1969 (NEPA), as amended, requires federal agencies to consider environmental consequences in the decision-making process. The President's Council on Environmental Quality (CEQ) issued regulations to implement NEPA that include provisions for both the content and procedural aspects of the required environmental analysis. The Air Force Environmental Impact Analysis Process is accomplished through adherence to the procedures set forth in CEQ regulations (40 *Code of Federal Regulations* [CFR] Parts 1500-1508) and 32 CFR 989, *Environmental Impact Analysis Process*. These federal regulations establish the administrative process and substantive scope of the environmental impact evaluation that are designed to ensure that deciding authorities have a proper understanding of the potential environmental consequences of a contemplated course of action. The CEQ regulations require that an EA:

- Provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact.
- Facilitate the preparation of an EIS when required.

This EA identifies, describes, and evaluates the potential environmental impacts that may result from implementation of the CIP and BRAC projects (the proposed action), implementation of the potential development alternative (the alternative action), and from the no action alternative. As appropriate, the affected environment and environmental consequences of the proposed action and alternatives are described in terms of site-specific descriptions or a regional overview. Finally, the EA identifies measures to reduce impacts or best management practices to prevent or minimize environmental impacts, if required.

The resources that could be impacted and are analyzed in the EA include noise, airspace management and air traffic control, land use, earth resources, water resources, hazardous materials and waste, biological resources, utilities and infrastructure, socioeconomics and environmental justice, air quality, and cultural resources. Assessment of safety and health impacts is not included in this document; all contractors would be responsible for compliance with applicable *Occupational Safety and Health Act* regulations concerning occupational hazards and specifying appropriate protective measures for all employees.

Other actions or potential actions that may be concurrent with the proposed action could contribute to cumulative impacts. The environmental impacts of these other actions are addressed in this EA only in the context of potential cumulative impacts. A cumulative impact, as defined by the CEQ (40 CFR 1508.7), is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

1.4 ENVIRONMENTAL JUSTICE

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued by the President on February 11, 1994. In the EO, the President instructed each federal agency to make ". . . achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations . . ." Adverse is defined by the Federal Interagency Working Group on Environmental Justice as ". . . having a deleterious effect on human health or the environment that is significant, unacceptable, or above generally accepted norms."

The existing conditions associated with the environmental justice analysis and the environmental justice analysis will be presented in Chapters 3 and 4 of this EA, as described in Section 1.6.

1.5 APPLICABLE REGULATORY REQUIREMENTS

Table 1-1 summarizes potentially applicable regulatory requirements for the proposed and alternative actions.

1.6 INTRODUCTION TO THE ORGANIZATION OF THE DOCUMENT

This EA is organized into seven chapters. Chapter 1 contains a statement of the purpose of and need for action, the location of the proposed action, a summary of the scope of the environmental review, discussion of environmental justice analysis requirements, identification of applicable regulatory requirements, an introduction to the organization of the EA, and a summary of public involvement activities.

Chapter 2 contains a brief introduction, a description of the history of the formulation of alternatives, describes the alternatives eliminated from further consideration, provides a detailed description of the proposed action, identifies other action alternatives, summarizes other known actions for Sheppard AFB, identifies the preferred alternative, identifies measures to reduce impacts (if required), and provides a comparison matrix of environmental effects for all alternatives.

Chapter 3 contains a general description of the biophysical resources that could potentially be affected by the proposed action or alternatives. Chapter 4 is an analysis of the environmental consequences. Chapter 5 lists preparers of this document. Chapter 6 lists persons and agencies consulted in the preparation of this EA. Chapter 7 is a list of source documents relevant to the preparation of this EA.

Appendix A contains copies of all interagency correspondence regarding the proposed action. The *Capability Analysis* on which the alternative action (potential development alternative) is based is included in Appendix B. Appendix C contains the socioeconomics impact calculations. Appendix D contains the Notice of Availability published in the *Wichita Falls Times Record News.*

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Table 1-1 Potentially Required Federal Permit, License, or Entitlement

Federal Permit, License, or Entitlement	Typical Activity, Facility, or Category of Persons Required to Obtain the Federal Permit, License, or Entitlement	Authority	Regulatory Agency
Title V permit under the CAA	Sources subject to the Title V permit program include: Any major source: (1) A stationary source that emits or has the potential to emit 100 tpy of any pollutant (major source threshold can be lower in nonattainment areas). (2) A major source of air toxics regulated under Section 112 of Title III (sources that emit or have the potential to emit 10 tpy or more of a hazardous air pollutant or 25 tpy or more of any combination of hazardous air pollutants). Any "affected source" as defined in Title IV (acid rain) of the CAA. Any source subject to New Source Performance Standards under Section 111 of the CAA. Sources required to have new source or modification permits under Parts C [Prevention of Significant Deterioration (attainment areas)] or D [New Source Review (nonattainment areas)] of Title I of the CAA. Any source subject to standards, limitations, or other requirements under Section 112 of the CAA. Other sources designated by USEPA in the regulations.	Title V of CAA, as amended by the 1990 CAA Amendments	USEPA; TCEQ
National Pollutant Discharge Elimination System permits	Discharge of pollutants from any point source into navigable waters of the United States, including applicable wastewater and storm water.	§402 of CWA; 33 USC, §1342	USEPA; TCEQ

CAA	*Clean Air Act*	USC	*United States Code*
CWA	*Clean Water Act*	USEPA	United States Environmental Protection Agency
TCEQ	Texas Commission on Environmental Quality	USFWS	Unites States Fish and Wildlife Service
tpy	tons per year		

Table 1-1, Continued

Federal Permit, License, or Entitlement	Typical Activity, Facility, or Category of Persons Required to Obtain the Federal Permit, License, or Entitlement	Authority	Regulatory Agency
Endangered Species Act §7 consultation	Taking endangered or threatened wildlife species; engaging in certain commercial trade of endangered or threatened plants or removing such plants on property subject to federal jurisdiction.	§7 of Endangered Species Act, 16 USC §1539; 50 *Code of Federal Regulations* 17 Subparts C, D, F, and G	USFWS, Texas Parks and Wildlife Department
National Historic Preservation Act consultation	Excavation and/or removal of archaeological resources from public lands or Indian lands and carrying out activities associated with such excavation and/or removal.	National Historic Preservation Act, § 106	Texas Historical Commission; State Historic Preservation Officer
CWA §404 permit	Actions to reduce the risk of flood loss to minimize the impact of floods on human safety, health, and welfare; to restore and preserve the natural and beneficial values served by floodplains; actions to minimize destruction, loss, or degradation of wetlands; and to preserve and enhance the natural and beneficial values of wetlands.	Executive Orders 11988 and 11990, §404 of CWA, 33 USC §1251	United States Army Corps of Engineers, USFWS

CAA	*Clean Air Act*	USC	*United States Code*
CWA	*Clean Water Act*	USEPA	United States Environmental Protection Agency
TCEQ	Texas Commission on Environmental Quality	USFWS	Unites States Fish and Wildlife Service
tpy	tons per year		

1.7 PUBLIC INVOLVEMENT SUMMARY

On October 11, 2006, copies of the description of proposed action and alternatives were sent to two governmental agencies (the state of Texas and city of Wichita Falls) with accompanying letters requesting their review and comments (Appendix A). No comments were received from the governmental agencies in response to that request for comments.

Public comments on this Environmental Assessment (EA) were requested pursuant to the *National Environmental Policy Act*, 42 *United States Code* 4321, et seq. The Draft EA and Draft Finding of No Significant Impact and Finding of No Practicable Alternative were made available at the Wichita Falls Public Library to provide public access to the document during the 30-day public comment period, which began on March 14, 2007 and ended on April 12, 2007. Notification of this 30-day comment period detailing the availability of the document for public review was placed in the *Wichita Falls Times Record News* (Appendix D). No comments were received from the public; therefore, no private address information has been compiled.

Copies of the Draft EA with letters requesting review and comment were also sent to eight governmental agencies (Appendix A). Five favorable responses were received from the governmental agencies in response to that request for comments (responses were not received from three agencies). Specifically, the Army Corps of Engineers, Federal Emergency Management Agency, Texas Historical Commission, and Nortex Regional Planning Commission expressed their favorable review of the environmental assessment in regards to the *Clean Water Act*, National Flood Insurance Program, Section 106 of the *National Historic Preservation Act*, and the Texas Review and Comment System, respectively. The Environmental Quality Division at Fort Sill, Oklahoma, evaluated the proposed and alternative actions with respect to IFF Mission T-38 operations at Falcon Range, Fort Sill, Oklahoma. Two Categorical Exclusions from 32 CFR 651, Appendix B were assigned because (1) flying activities associated with IFF Mission T-38 operations at Falcon Range fall under the Army's list of categorical exclusions, and (2) flight patterns/elevations have been addressed in a planning document that has been subject to NEPA public review. All written comments received during the comment period are being made available to the public as part of this Final EA (in Appendix A) and were considered during Final EA preparation.

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Chapter 2

Description of Proposed Action and Alternatives

CHAPTER 2

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This chapter is composed of eight sections: an introduction, a brief history of the formulation of alternatives, identification of alternatives eliminated from further consideration, a description of the no action alternative, a detailed description of the proposed action, a detailed description of other action alternatives, a general description of other projects that may have the potential to impact the region when cumulative effects are considered, and a comparison matrix that summarizes the environmental effects of each alternative.

2.2 HISTORY OF THE FORMULATION OF ALTERNATIVES

The alternatives developed for the proposed action at Sheppard AFB are designed to capture the range of possible development and activity levels at Sheppard AFB from the no action alternative to the alternative action (potential development alternative). The *Capability Analysis* (Appendix B) identified expansion potential of the current mission of Sheppard AFB for the planning period ending in fiscal year (FY) 2013 (the government FY begins on 1 October and ends on 30 September). For the purposes of this EA, all projects performed or planned from the baseline (FY2005) to the end of the planning period (FY2013) were included. Three viable alternatives were identified:

- No Action Alternative: continue use of existing facilities at Sheppard AFB and continue technical training and aircraft operations at the current level.
- Proposed Action: (1) implement construction to accomplish the CIP including demolition of facilities that are either dilapidated or in the footprint of proposed CIP construction, and (2) implement the BRAC program related to Sheppard AFB.
- Alternative Action (Potential Development Alternative): develop facilities and conduct technical and flying operations at potential levels as quantified in the *Capability Analysis* (Appendix B).

2.3 IDENTIFICATION OF ALTERNATIVES ELIMINATED FROM CONSIDERATION

No additional alternatives were considered because the three alternatives identified provide the full range of potential impacts: from no development (the no action alternative) to the implementation of the development potential of Sheppard AFB through the planning period ending in 2013 (the alternative action).

2.4 NO ACTION ALTERNATIVE

Under the no action alternative, there would be no increase in personnel or mission activity at Sheppard AFB. No construction or demolition would be accomplished in

support of the CIP or the BRAC program projects related to Sheppard AFB. The no action alternative would limit the base's ability to conduct its training mission successfully and to maintain wartime readiness.

2.5 DETAILED DESCRIPTION OF THE PROPOSED ACTION

Under the proposed action, the 82 TRW at Sheppard AFB would implement the proposed installation development activities based on the current CIP and BRAC-related projects. Components of the current CIP would include new building and pavement construction, building renovations, and demolition of selected existing facilities and associated pavements. BRAC-related projects would consist of vacating existing spaces, personnel actions, and the increase of aircraft and aircraft operations.

Implementation of the Sheppard AFB CIP would include the construction of 1,023,037 square feet of new building space, renovation of 24,750 square feet of existing facilities, construction of 417,300 square feet of recreational fields, and construction or upgrade of 2,055,189 square feet of pavements. Demolition of approximately 1,113,082 square feet of building space, 426,300 square feet of recreational fields, and 1,688,105 square feet of pavements would occur. The proposed action CIP projects are located in the Front Gate Entry Control Complex, Commercial Gate Entry Control Complex, Technical Training Campus, 80th Flying Training Wing (80 FTW) Campus, and Community Support Area.

The proposed action BRAC-related projects would include the addition of personnel from Moody AFB, Georgia to support the Introduction to Fighter Fundamentals (IFF) flying training mission at Sheppard AFB. A small increase in aircraft operations (on the order of two to three sorties per week) would be incorporated into the current ongoing training activities conducted at Sheppard AFB, at Falcon Range on Fort Sill, Oklahoma, and in Military Operations Areas (MOA). There will be no changes to the current flight patterns. As discussed previously in Section 1.7, the proposed and alternative actions have received Categorical Exclusions because (1) flying activities associated with IFF Mission T-38 operations at Falcon Range fall under the Army's list of categorical exclusions, and (2) flight patterns/elevations have been addressed in a planning document that has been subject to NEPA public review (IMSW-SIL-PWE 2007). Approximately 488,944 square feet of buildings would be vacated as a result of BRAC-related projects.

A portion of Sheppard AFB is located within the 100-year floodplain. The majority of the facilities addressed under the proposed action would not be located within the 100-year floodplain. An Outdoor Recreation and Seating Improvements project that includes multiple recreational and parking facilities is located within the floodplain area of the 80 FTW Campus to maximize land use. Two projects associated with road improvements are also located in the floodplain.

Implementation of the BRAC-related projects would result in the gain of 51 military and two civilian personnel associated with the IFF mission beddown and the loss of

2,519 military and 158 civilian personnel associated with the realignment of medical training to Fort Sam Houston in San Antonio, Texas.

Table 2-1 summarizes all programmed projects with identified locations (including major building construction, minor building construction, and pavement projects). Unless otherwise noted, the square foot values apply to building construction or building demolition. Figure 2-1 shows the project construction locations, and associated project demolition locations are shown on Figure 2-2.

2.6 POTENTIAL DEVELOPMENT ALTERNATIVE (ALTERNATIVE ACTION)

The alternative action consists of the development of Sheppard AFB to its potential for the planning period beginning in FY2005 and ending in FY2013. This alternative is based on the development potential quantified in the *Capability Analysis* (Appendix B).

The development potential of Sheppard AFB was determined in the *Capability Analysis* for the planning period ending in FY2013 as follows: (1) maximum available land was calculated, (2) basis for sustainable population growth through the end of the planning period was determined, (3) maximum developable land and sustainable populations were evaluated with respect to potentially limiting factors such as potable water resources and other utility system resources, and (4) the noise environment surrounding the Sheppard AFB airfield and training airspace to determine the growth potential for the flying mission was evaluated.

2.6.1 Sustainable Population

Sheppard AFB currently supports a baseline population of approximately 18,084 persons comprised of on-base resident military personnel and military dependents, on-base resident students, and off-base resident military personnel and civilian employees. Based on an analysis of on-base housing, it has been determined that the base has the potential to accommodate an additional population of 18,561 people (Appendix B).

2.6.2 Development Potential

A total of 153 developable and nondevelopable parcels were identified. Of these 153 parcels, 115 individual parcels (totaling 501 acres of land) were identified available for development after (1) analysis of existing and future land use plans and (2) the elimination of parcels associated with building constraints (Figure 2-3). Table 2-2 summarizes developable acreage per Air Force land use category.

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Table 2-1 Project List, Proposed Action

Project Number	Description/Location	Type of Project (CIP/BRAC)	Construction (square feet)	Demolition (square feet)	Summary
Front Gate Entry Control Complex					
1	Pass Control Center	CIP	4,118 (building) 47,187 (pavement)	2,535 (building)	Construct a new visitor's pass control facility with parking. Demolition of Buildings 1100 and 1127 would occur.
	Smart Gate Infrastructure	CIP	--	--	Install smart gate technology for pass control security.
Commercial Gate Entry Control Complex					
2	Army and Air Force Exchange Service Shoppette	CIP	15,500 (building) 38,800 (pavement)	2,900 (building)	Construct a new Army and Air Force Exchange Service Shoppette with gas station to replace the facility on Hospital Road (Building 1400) that would be demolished. A Unites States Army Corps of Engineers site mitigation consultation would be required for implementation of this project.
3	Loop Road Improvements (Technical Training Center North)	CIP	440,127 (pavement)	234,700 (pavement)	Construct loop road improvements around Technical Training Center. Connect Bridwell Road to Avenue K and Avenue K to Taxiway A and redesign intersection of Missile and Bridwell Roads. Redesign Avenue D as the principal alignment on the west side. Limited improvements to Fifth Avenue and demolition of existing section of Missile Road, Bridwell Road, and Avenues D and E would occur. A portion of this project would be sited in the floodplain.
Technical Training Campus					
4	Technical Training Support Facility	CIP	113,475 (building)	2,700 (building) 60,800 (pavement)	Construct a new training support facility collocated with in- and out-processing center activities. Project scope includes the possibility of a troop medical clinic as a fourth floor (if validated). This portion of the facility would serve daily student needs (e.g., muscular, skeletal, and dental-related injuries/illnesses) treatable by a medical technician. Demolition of Buildings 620 and 645, associated parking, and a portion of Avenue G would occur.
5	Training Maintenance and Development Facility	CIP	115,045 (building)	113,730 (building) 616,515 (pavement)	Construct a new maintenance/development training facility for the 982nd Training Group. This facility would replace Building 1360, which would be demolished (as would associated parking).
6	Civil Engineering Training Complex	CIP	250,000 (building) 113,000 (pavement)	114,220 (building)	Construct a new civil engineering training complex to replace existing facilities that have reached their useful economic life. Buildings 1921, 1927, 2012, 2013, 2014, 2001, 2002, 2010, 2031, 2030, and 2050 would be demolished. This facility is critical in the early stages of the 2030 Plan as a means to free up Buildings 1927 and 1921.

Table 2-1, Continued

Project Number	Description/Location	Type of Project (CIP/BRAC)	Construction (square feet)	Demolition (square feet)	Summary
Technical Training Campus (continued)					
7	Joint Strike Fighter Maintenance Training Complex	CIP	78,649 (building)	106,700 (building)	Construct a new Joint Strike Fighter aircraft maintenance training facility. The exact timing of the relocation of this mission to Sheppard AFB is not known; however, a three-bay facility similar to the F/A-22 trainer maintenance facility 7 has been shown over current hangar Buildings 1010 and 1012 (to be demolished).
8	Phase 12 Dormitory	CIP	90,000 (building) 68,500 (pavement)	204,700 (building) 59,500 (pavement)	Construct a new student dormitory. Demolition of Building 776 (and associated parking) would occur.
9	Phase 13 Dormitory	CIP	90,000 (building) 91,000 (pavement)	144,400 (building) 121,500 (pavement)	Construct a new student dormitory. Demolition of Buildings 589 and 596 (and associated parking) would occur.
10	Group Headquarters Facility	CIP	52,000 (building) 43,263 (pavement)	59,100 (building)	Construct a new headquarters facility to support the 82nd, 982nd, and 782nd Training Groups. Demolition of Building 843 would occur. The building is sited prominently, at the confluence of the new loop road and Missile Road, and would offer an opportunity to create a "place-making" architectural statement to visitors as they enter the base off State Highway 240.
11	Base Engineer and Morale, Welfare, and Recreation Warehouse	CIP	46,428 (building) 14,700 (pavement)	44,645 (building) 32,450 (pavement)	Relocate and reconstruct a new base engineer and Morale, Welfare, and Recreation supply facility to replace Buildings 2135 and 2140, which have reached their useful economic lives and would be demolished (as would associated parking).
12	Remote Parking of Technical Training Students (Parts 2 and 3)	CIP	81,144 (pavement)	42,300 (pavement)	Provide remote parking for the Technical Training Campus on the east side of the campus. Additional vehicle parking is required to serve students who have vehicles on base during training. These vehicles, however, should not be parked within the campus proper or too close to the dormitories. A remote lot is purposefully proposed to address the demand for parking and at the same time affect a more functional Technical Training Campus environment for pedestrians.
80th Flying Training Wing Campus					
13	Roadway and Vehicular Parking Infrastructure in 80th Flying Training Wing Campus	CIP	489,582 (pavement)	--	Construct new/renovate existing roadways to support the 80th Flying Training Wing Campus development, including the incorporation of Avenue H as the principal access way off the proposed loop road (Bridwell Road). Close Avenue J to through access from Bridwell Road and limit vehicle access to the flightline area. Construct new/renovate existing vehicle parking areas to support the 80th Flying Training Wing Campus development. A portion of this project would be sited in the floodplain.

Table 2-1, Continued

Project Number	Description/Location	Type of Project (CIP/BRAC)	Construction (square feet)	Demolition (square feet)	Summary
80th Flying Training Wing Campus (continued)					
14	Outdoor Recreation and Seating Area Improvements	CIP	59,000 (softball field) 17,200 (running track) 76,400 (soccer field) 248,800 (pavement)	139,400 (building) 258,300 (pavement)	Construct an outdoor athletic field that would include a softball field, soccer field, running track, and an outdoor seating area to support the 80th Flying Training Wing Campus development. Demolition of Building 2320 and associated parking would occur. This project is located within the 100-year floodplain.
Community Support Area					
15	Loop Road: South Side Alignment	CIP	74,961 (pavement)	27,340 (pavement)	Construct loop road improvements around the permanent party area/community support area. Redesign Avenue D as the principal alignment on the west side, Taxiway A as the principal alignment on the east side, and First Avenue as the principal alignment on the south side. Demolition of portions of Avenue K and First Avenue would occur.
16	Base Parade Ground	CIP	208,000 (field) 10,550 (building) 56,700 (running track)	282,600 (field) 36,900 (running track) 106,800 (baseball field)	Construct a new base parade field to allow continued training through impending dormitory construction. Locate field over existing one-third mile track and playing field south of Fifth Avenue. Partially close Fourth Avenue to accommodate the new facility and to improve parking in the area. Locate reviewing stands to face north. Relocate track to circle the new field. Place amphitheater on east side of the field to allow use of the field as a seating area for larger multipurpose venues. New basewide fields located in the Heritage Center area and in the old Wherry housing parcel would be redeveloped.
17	Training Operations Facility	CIP	24,750 (renovation)	41,850 (building)	Partially convert Building 450 (Solid Rock Cafe) for use by the training operations special activities team for equipment storage and practice areas (band, drill team, etc.). The east wing of the building is proposed for utilization. Demolition of Building 983 would occur.
18	Base Exchange	CIP	75,000 (building) 200,275 (pavement)	67,200 (building) 131,230 (pavement)	Reconstruct a larger Base Exchange with adequate parking. The current facility is inadequate for the base population. The new facility would more than double the current facility and offer an expanded Base Exchange, food court, bakery, beauty shop, optical shop, dry cleaners, candy shop, and photo shop. The facility would be collocated with the new commissary, relocated post office, and credit union/bank. It would be sited to allow for phasing of the project without displacing operations during construction and to allow the Burger King to remain operational. Demolition of Buildings 202 and 239 (and associated parking) would occur.

Table 2-1, Continued

Project Number	Description/Location	Type of Project (CIP/BRAC)	Construction (square feet)	Demolition (square feet)	Summary
Community Support Area (continued)					
19	Bank/Credit Union	CIP	8,675 (building) 21,150 (pavement)	17,400 (building) 42,220 (pavement)	Reconstruct a newer facility with a new Base Exchange/commissary complex to replace the existing facility that would be demolished to make way for the new Base Exchange. A separate drive-through automatic teller machine would be located off Avenue G. The bank and credit union would be designed as freestanding proposals, but designed to match and connect rooflines of the adjacent Base Exchange/commissary. Demolition of Buildings 101, 200, and 212 (and associated parking) would occur.
20	Post Office	CIP	6,800 (building)	--	This facility would be relocated from Building 551 within the Technical Training Campus to a location more appropriate to serve the entire base population within the Base Exchange/commissary complex. It would be designed as a freestanding proposal, but designed to match and connect rooflines of the adjacent Base Exchange/commissary.
21	Base Laundry	CIP	11,000 (building)	--	Construct a new base laundry and collocate with a relocated linen exchange facility.
22	Army and Air Force Exchange Service Shoppette and Gas Station	CIP	22,300 (building)	6,850 (building)	Replace Class VI Store (demolish Building 125) and combine with and expand the existing Army and Air Force Exchange Service gas station (Building 1105) into a shoppette/gas station/Class VI store. Scope would be validated by the Army and Air Force Exchange Service.
23	Collocated Community Club	CIP	12,239 (building)	3,252 (building)	Construct an addition to the existing club (Building 340) to create a collocated club and to eliminate the existing substandard enlisted club addition to Building 1108.
24	Child Development Center	CIP	21,258 (building) 82,700 (pavement)	41,500 (building) 61,250 (pavement)	Construct a new facility that would replace Building 195. This facility is sited west of the existing Youth Center (Building 196), which together with the Child Development Center offers a "kiddie campus." The 2030 Plan proposes the closure and demolition of Avenue I between First and Second Avenues to create a larger and safer activity area. This could include added recreational youth sports fields. Demolition of Buildings 160, 161, 162, 163, 164, and 165 (and associated parking) would also occur.

Table 2-1, Continued

Project Number	Description/Location	Type of Project (CIP/BRAC)	Construction (square feet)	Demolition (square feet)	Summary
Base Realignment and Closure Projects					
25	Establish San Antonio Regional Medical Center (losing mission)	BRAC	--	488,944 (vacating)	Medical enlisted basic training and specialty training would move to Fort Sam Houston to consolidate medical training at one site. Buildings 1900, 1917, 1918, 1919, 1920, 1922, 1923, and 1924 would be vacated.
26	Realign/Consolidate Department of Defense Undergraduate Pilot and Navigator Training (gaining mission)	BRAC	--	--	Portions of the specialized undergraduate pilot training and introduction to fighter fundamentals training would be realigned/moved from Moody Air Force Base, Georgia, and absorbed into the flying training program at Sheppard Air Force Base using existing facilities. Sheppard Air Force Base would gain five T-38 aircraft from Moody Air Force Base.
		Totals	1,023,037 (building) 24,750 (renovation) 417,300 (recreational) 2,055,189 (pavement)	1,113,082 (building) 488,944 (vacating) 426,300 (recreational) 1,688,105 (pavement)	

Note: Construction and demolition areas obtained from the Implementation Plan.

BRAC Base Realignment and Closure

CIP Capital Improvements Plan

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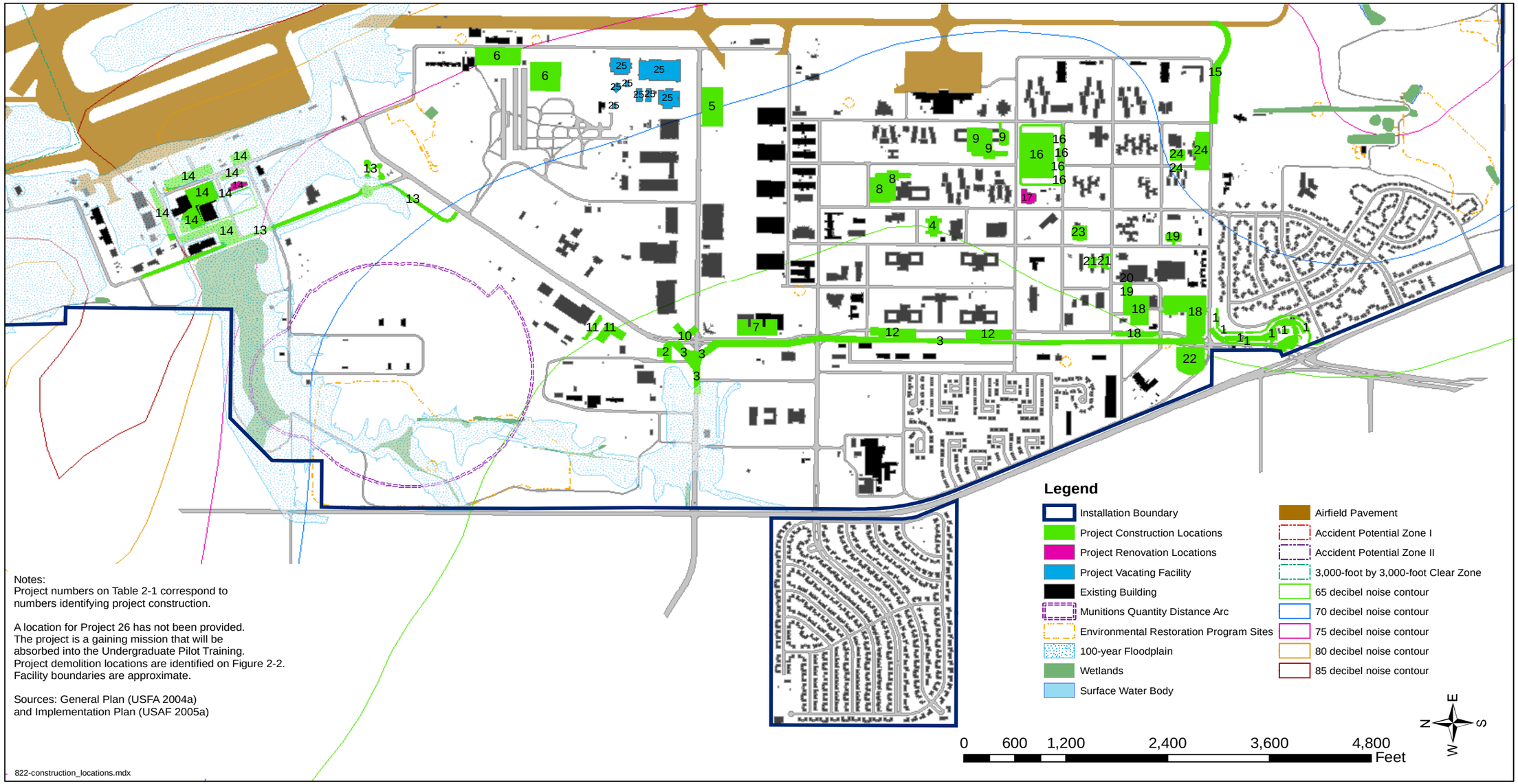

Figure 2-1 Locations of Proposed Action (Construction), Sheppard Air Force Base, Texas

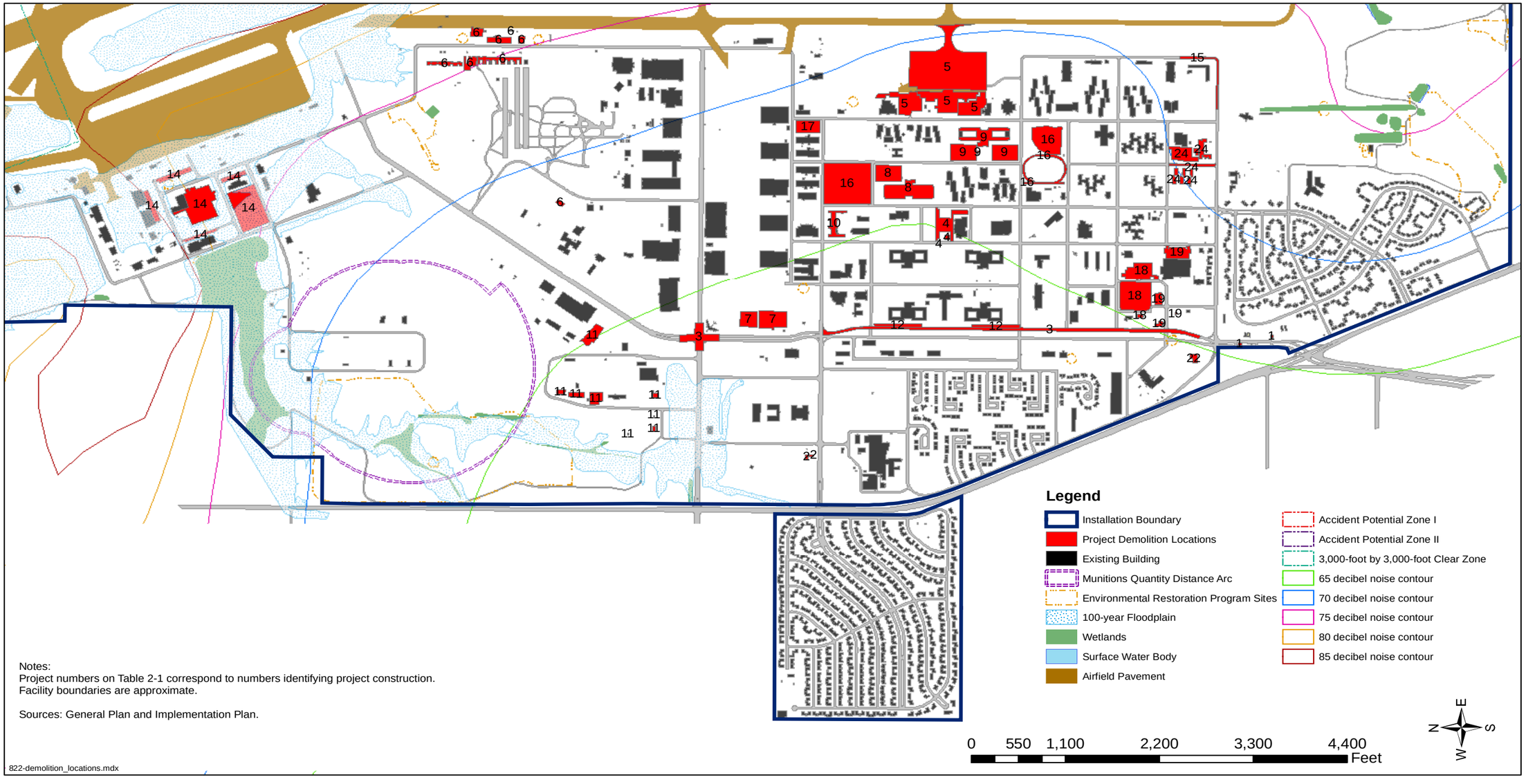

Figure 2-2 Locations of Demolition Associated with Proposed Action, Sheppard Air Force Base, Texas

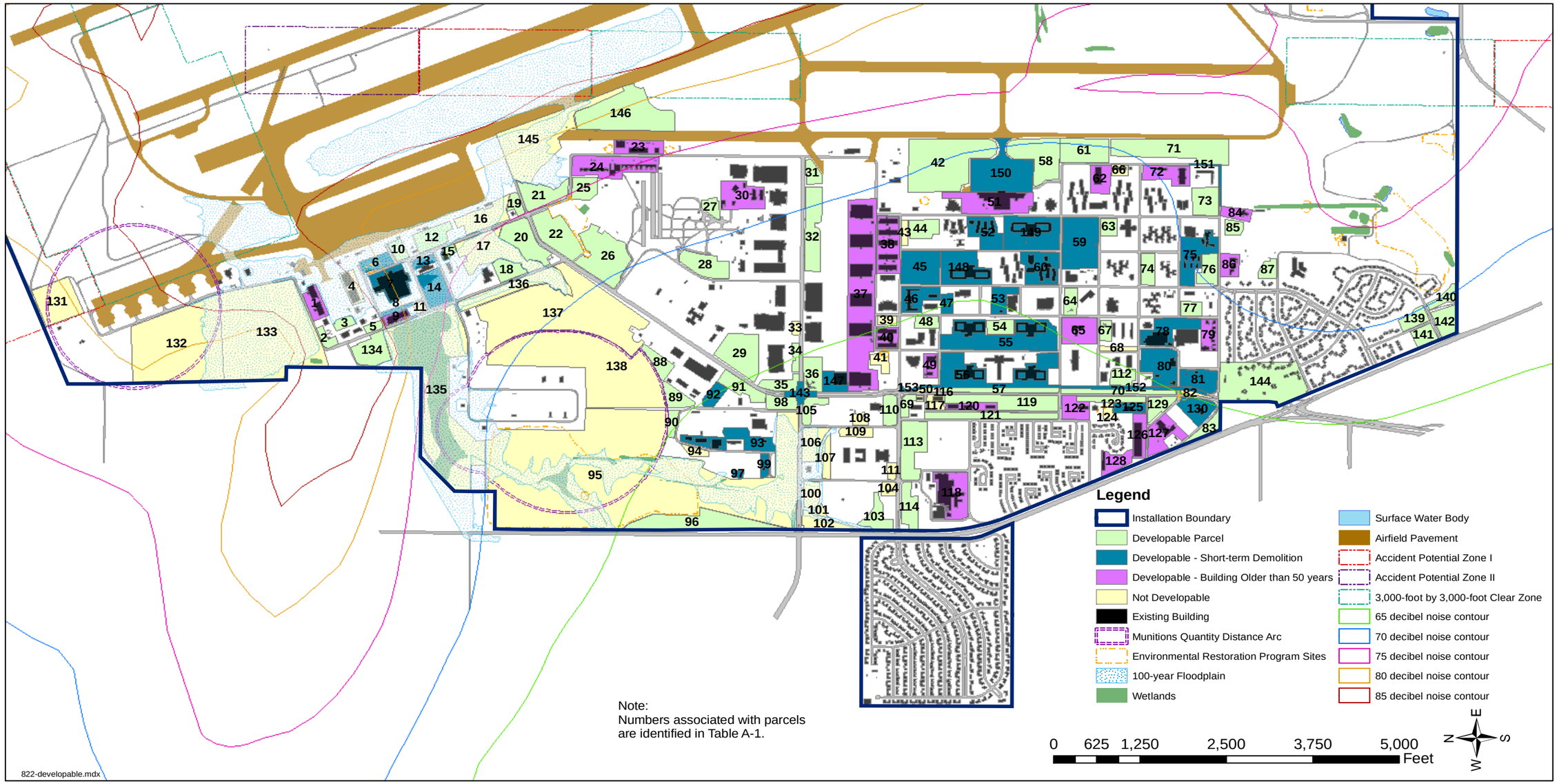

Figure 2-3 Potentially Developable Parcels, Sheppard Air Force Base, Texas

Table 2-2 Developable Acreage, Potential Development Alternative

Air Force Land Use Category	Total (acres)	Undevelopable Parcel (acres)	Developable Parcel (acres)
Aircraft Operation and Maintenance	14.18	4.98	9.2
Administrative	24.39	1.39	23.0
Airfield	0.00	0.00	0.00
Airfield Pavements	00.00	0.00	0.00
Community Commercial	29.52	4.02	25.5
Community Services	28.09	0.39	27.7
Housing Accompanied	19.7	0.00	19.7
Housing Unaccompanied	154.52	1.92	152.6
Industrial	20.9	4.20	16.7
Medical	12.3	0.00	12.3
Open Space	383.13	312.33	70.8
Outdoor Recreation	80.64	53.74	26.9
Training-Indoor	169.68	53.28	116.4
Total	**937.05**	**436.25**	**500.8**

Source: Appendix B

The development potential calculations in the *Capability Analysis* demonstrate that Sheppard AFB can accommodate an additional 7,198,171 square feet of new building space construction, greater than the 3,481,476 square feet of construction projects associated with the proposed action (Section 2.5). The demolition of existing building space associated with the potential development alternative is 4,291,425 square feet, and includes the 3,227,487 square feet of demolition associated with the proposed action. The net gain in building space would be 2,906,746 square feet, and the net gain in associated pavement (e.g., roadways, sidewalks, and parking areas) would be 58 acres. The net increase in impervious surfaces would be 186.6 acres. (Note that building space typically includes multiple floors and does not add directly to pavements for total impervious surfaces; impervious surfaces are calculated by finding the sum of the building footprints and the pavements surrounding them.) Cumulative actions excluded from the development potential developed in the *Capability Analysis* are further described in Section 2.7.

A portion of Sheppard AFB is located within the 100-year floodplain. The alternative action includes developable parcels associated with the proposed action projects located in the floodplain (Section 2.5 and Figure 2-3). These project sites are fully evaluated in Chapter 4 of the EA. No other developable parcels were identified in the floodplain at Sheppard AFB.

2.6.3 Sustainable Flying Mission Levels

Sheppard AFB currently supports approximately 410,500 military aviation operations annually (1,579 daily operations). To assess the potential for the expansion of operations at Sheppard AFB, noise levels of increased T-38 and T-6 flight operations were modeled. T-38 and T-6 operations were incrementally increased in the model, and the resulting noise levels evaluated at seven specific points (Appendix B). The results of the analysis identified the potential to increase based aircraft operations by 574,260 annual operations (2,209 daily operations). This represents a 40 percent increase in total based-aircraft operations over the current conditions (Appendix B).

2.7 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS IN THE REGION OF INFLUENCE

Cumulative impacts to environmental resources result from the incremental effects of proposed actions when combined with other past, present, and reasonably foreseeable future projects in the region of influence. Cumulative impacts can result from individually minor, but collectively substantial, actions undertaken over a period of time by various agencies (federal, state, or local) or individuals. In accordance with NEPA, a discussion of cumulative impacts resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the near future is required.

Specific projects that have the potential to cumulatively impact resources within the region of influence (ROI) are described in the list below. No past, current, or reasonably foreseeable future major off-base construction projects in the ROI were identified that would impact the same resources as the proposed or alternative actions.

- Revitalize North Fitness Center (Building 825). This project would modernize the existing fitness center (approximately 28,706 square feet of construction).
- Revitalize Temporary Lodging Facilities 160 through 165. The interiors of the six buildings would be renovated (approximately 19,979 square feet of construction).
- Demolish Warehouses 19 and 21. Two warehouse facilities would be demolished (approximately 18,730 square feet of demolition).
- Repair Visiting Officers' Quarters (Building 240). The interior of the building would be renovated (approximately 32,695 square feet of construction).
- Repair Runway 17/35. The surface of the runway would be milled and repaved (approximately 1,030,496 square feet of pavement construction and demolition).
- Repair Taxiways A, B, C, and E. The surface of the taxiways would be milled and repaved (approximately 1,275,495 square feet of pavement construction and demolition).

- Repair Temporary Lodging Facility (Building 1511). The interior of the building would be renovated (approximately 14,806 square feet of construction).
- Rebuild Runway 15 Center/33 Center and Taxiway F. The surface of the runway and taxiway would be milled and repaved (approximately 1,914,430 square feet of pavement construction and demolition).
- Install Additional Centralized Aircraft Support System on Aircraft Parking Rows G and H. The project would install a system of electrical rectifier units for aircraft starting (approximately 5,000 square feet of pavement construction and demolition).

A total of 96,186 square feet of facility space would be renovated/constructed; 18,730 square feet of facility space would be demolished; and 4,225,421 square feet of runway, taxiway, and aircraft parking area would be resurfaced. There would be a net reduction of 18,730 square feet of impervious cover as a result of these projects.

2.8 COMPARISON MATRIX OF ENVIRONMENTAL EFFECTS OF ALL ALTERNATIVES

Table 2-3 summarizes the impacts of the proposed and alternative actions.

Table 2-3 Summary of Environmental Effects

Resource	No Action Alternative	Proposed Action	Alternative Action
Noise	Same as baseline conditions presented in Section 3.3.1. Cumulative adverse impacts to sensitive receptors for the no action alternative and ongoing actions would not occur.	Acreage in the vicinity of Sheppard Air Force Base (AFB) exposed to a day-night average sound level of 65 A-weighted decibels or higher would not change. Cumulative adverse impacts to sensitive receptors for the proposed and ongoing actions are not expected.	About 1,944 acres of land exposed to elevated noise levels (greater than 65 A-weighted decibels) at Sheppard AFB would be added under the alternative action. Cumulative adverse impacts to sensitive receptors for the alternative and ongoing actions are not expected.
Aircraft Management and Air Traffic Control	Same as baseline conditions presented in Section 3.3.2. Cumulative adverse impacts to sensitive receptors for the no action alternative and ongoing actions would not occur.	Approximately 32 daily aircraft operations at Sheppard AFB would be added under the proposed action. No modifications or changes to the airspace structure around Sheppard AFB or to the existing air traffic control systems would occur. Cumulative adverse impacts to aircraft management and air traffic control for the proposed and ongoing actions are not expected.	About 630 daily aircraft operations at Sheppard AFB would be added under the alternative action. No modifications or changes to the airspace structure around Sheppard AFB or to the existing air traffic control systems would occur. Cumulative adverse impacts to aircraft management and air traffic control for the alternative and ongoing actions are not expected.
Land Use	Same as baseline conditions presented in Section 3.3.3. Cumulative adverse impacts to land use for the no action alternative and ongoing actions would not occur.	The land on which the projects currently occur would be recategorized (as necessary) to accommodate the new facilities based on the future land use plan. Cumulative adverse impacts to land use are not expected.	Impacts to land use would be the same as for the proposed action. Cumulative adverse impacts to land use are not expected.

Table 2-3, Continued

Resource	No Action Alternative	Proposed Action	Alternative Action
Earth Resources	Same as baseline conditions presented in Section 3.3.4. Cumulative adverse impacts to earth resources from the no action alternative and ongoing actions are not expected.	Soil disturbance impacts would be minimized through observance of Texas Pollutant Discharge Elimination System requirements. About 67 acres of impervious (impenetrable) cover would be added under the proposed action, which would not occur all at once, but over an extended period of time. Cumulative adverse impacts to earth resources from the proposed and ongoing actions are not expected.	Soil disturbance impacts would be minimized through observance of Texas Pollutant Discharge Elimination System requirements. About 98 acres of impervious cover would be added under the alternative action, which would not occur all at once, but over an extended period of time. Cumulative adverse impacts to earth resources from the alternative and ongoing actions are not expected.
Water Resources	Same as baseline conditions presented in Section 3.3.5. Cumulative adverse impacts to water resources from the no action alternative and ongoing actions are not expected.	The construction of the proposed facilities would add 67 acres of impervious cover at Sheppard AFB. This is expected to have a minimal impact on the total amount of impervious cover and on the total volume of storm water runoff. The construction associated with the proposed action and addition projects at Sheppard AFB ongoing actions are expected to cumulatively increase surface cover.	The construction of the proposed facilities would add 98 acres of impervious cover at Sheppard AFB. This is expected to have a minimal impact on the total amount of impervious cover and on the total volume of storm water runoff. The construction associated with the alternative action and addition projects at Sheppard AFB ongoing actions are expected to cumulatively increase surface cover.
Hazardous Materials and Waste	Same as baseline conditions presented in Section 3.3.6. Cumulative adverse impacts to hazardous materials and hazardous waste are not expected from the no action alternative and ongoing actions.	Hazardous materials consumption and hazardous waste generation would increase under the proposed action. Increased regulation would not occur. Lead-based paint and asbestos, if encountered, would be managed and disposed according to existing plans and procedures. Cumulative adverse impacts to hazardous materials, hazardous waste, asbestos, and lead-based paint are not expected from the proposed and ongoing actions.	Hazardous materials consumption and hazardous waste generation would increase under the alternative action. Increased regulation would not occur. Lead-based paint and asbestos, if encountered, would be managed and disposed according to existing plans and procedures. Cumulative adverse impacts to hazardous materials, hazardous waste, asbestos, and lead-based paint are not expected from the alternative and ongoing actions.

Table 2-3, Continued

Resource	No Action Alternative	Proposed Action	Alternative Action
Biological Resources	Same as baseline conditions presented in Section 3.3.7. Cumulative adverse impacts to biological resources from the no action alternative and ongoing actions are not expected.	No measurable impacts to vegetative or wildlife resources would occur. The proposed action would have no impact on federal listed threatened and endangered species because they are not known to occur on Sheppard AFB. The proposed action and ongoing actions would not have incremental effects on the vegetation and wildlife of Sheppard AFB or the local area.	Same as for the proposed action. The alternative action and ongoing actions would not have incremental effects on the vegetation and wildlife of Sheppard AFB or the local area.
Utilities and Infrastructure	Same as baseline conditions presented in Section 3.3.8. Cumulative adverse impacts to infrastructure and utilities from the no action alternative and ongoing actions are not expected.	The quantity of wastewater generated would decrease slightly, potable water consumption would decrease slightly, electricity and natural gas demand would decrease slightly, and no additional solid waste would be generated from the addition of personnel at Sheppard AFB. A one-time generation of approximately 245,436 tons of solid waste would result from construction and demolition activities. Additional vehicles would pass through the main gate each day; however, slight impacts to transportation would be expected. Cumulative adverse impacts to infrastructure and utilities are not expected from implementation of proposed and ongoing actions.	The quantity of wastewater generated would increase 100 percent, potable water consumption would increase by 100 percent, and electricity and natural gas demand would increase by 23 percent. A one-time generation of 386,940 tons of solid waste would result from construction activities. Cumulative adverse impacts to infrastructure and utilities are not expected from implementation of alternative and ongoing actions.

Table 2-3, Continued

Resource	No Action Alternative	Proposed Action	Alternative Action
Socioeconomics and Environmental Justice	Same as baseline conditions presented in Section 3.3.9. Cumulative adverse impacts to socioeconomics resulting from the no action alternative and ongoing actions are not expected.	The proposed construction activities would be in line with previous years' construction budgets and would generate an economic benefit for the local community. Slight benefits would result from the increased construction and demolition projects to the local economy. No disproportionate environmental justice impacts would occur, nor would there be any special health risks of safety risks to children. Cumulative adverse impacts to socioeconomics resulting from the implementation of the proposed action and ongoing actions are not expected. Slight benefits would result from the increased construction and demolition projects.	Same as for the proposed action. Cumulative adverse impacts to socioeconomics resulting from the implementation of the alternative and ongoing actions are not expected. Slight benefits would result from the increased construction and demolition projects.
Cultural Resources	Same as for baseline conditions as presented in Section 3.3.10. Cumulative adverse impacts to cultural resources are not expected from the no action alternative and ongoing actions.	No adverse impacts on cultural resources are expected. Consultation regarding Section 106 of the *National Historic Preservation Act* has been accomplished. Cumulative adverse impact to cultural resources resulting from the implementation of the proposed action and ongoing actions are not expected.	Same as for the proposed action. Cumulative adverse impact to cultural resources resulting from the implementation of the alternative action and ongoing actions are not expected.

Table 2-3, Continued

Resource	No Action Alternative	Proposed Action	Alternative Action
Air Quality	Same as baseline conditions presented in Section 3.3.11. The cumulative emissions of all pollutants would be less than 250 ton per year for all Air Quality Control Regions; therefore, the no action alternative would not impact air quality.	The emissions of all pollutants would be well below the 10 percent criterion for each pollutant in comparison to Wichita County's year 2002 National Emissions Inventory, a more restrictive criterion than required by the *General Conformity Rule*; therefore, the proposed action and ongoing actions would not impact air quality. The proposed action and ongoing actions would have minor incremental effects on the air quality of Sheppard AFB and the local area and would be well below the 10 percent criterion for each pollutant in comparison to Wichita County's year 2002 National Emissions Inventory, more restrictive criterion than required by the *General Conformity Rule.*	The emissions of all pollutants would be well below the 10 percent criterion for each pollutant in comparison to Wichita County's year 2002 National Emissions Inventory, a more restrictive criterion than required by the General Conformity Rule; therefore, the alternative action and ongoing actions would not impact air quality. The alternative action and ongoing actions would have minor incremental effects on the air quality of Sheppard AFB and the local area and would be well below the 10 percent criterion for each pollutant in comparison to Wichita County's year 2002 National Emissions Inventory, more restrictive criterion than required by the *General Conformity Rule*.

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Chapter 3

Affected Environment

CHAPTER 3

AFFECTED ENVIRONMENT

The affected environment is the baseline against which potential impacts caused by the proposed action and alternative actions (including the no action alternative) are assessed. This chapter focuses on the human environment that has the potential to be affected by the proposed implementation of the CIP and BRAC program projects related to Sheppard AFB and demolition of facilities that are either dilapidated or in the footprint of the proposed construction projects. As stated in 40 CFR 1508.14, the potentially affected human environment is interpreted comprehensively to include natural and physical resources and the relationship of people with the resources. The environmental baseline was defined by first identifying potential issues and concerns related to the proposed action, as discussed in Section 1.3. From this information, the relevant natural and physical resources were selected for description in this chapter.

3.1 INTRODUCTION

This chapter provides baseline data describing the man-made and natural environmental elements with the potential to be affected by the implementation of the proposed action or alternative action at Sheppard AFB. Information is presented in this section to the level of detail necessary to support the analysis of potential impacts in Chapter 4, Environmental Consequences.

3.2 INSTALLATION HISTORY AND CURRENT MISSION

Sheppard AFB is located at an elevation of approximately 1,015 feet above mean sea level (amsl). The installation's four runways have lengths of 6,000, 7,001, 10,000, and 13,100 feet. The 82 TRW conducts technical, medical, and field training providing "classroom" technical training for Non-Prior Service (NPS) Air Force personnel arriving directly from basic training and upgrade or crossover training for Prior Service Air Force personnel and civilians. The 80 FTW provides flying training for foreign and US officers under the Euro-North Atlantic Treaty Organization (NATO) Joint Jet Pilot Training (ENJJPT) program.

Sheppard AFB began as an Army Air Corps Training Center during World War II and was constructed adjacent to the Wichita Falls Municipal Airport (also called Kell Field) which began operations in 1928. In 1941, the city of Wichita Falls entered into a lease agreement with the War Department that gave the military the right to build and operate an installation adjacent to the existing municipal airport and use the airport's land, runways, and facilities. The installation was named Sheppard Field in honor of the late Senator Morris Sheppard. Construction began in May 1941, and the initial class of aviation mechanics began training in October 1941. With the establishment of the Air Force following World War II, Sheppard Field was redesignated Sheppard AFB. Since 1950, the base has been dedicated to training. In 1959, the base was established as a technical training center and the base was selected as the site for the ENJJPT program in 1980 (United States Air Force [USAF] 1993).

In the fall of 1945, the installation had a peak population of 46,340 for three months while serving as a separation center for troops being discharged after World War II. From 1965 through 1971, the Air Force undergraduate helicopter pilot training program was located at the installation. During the Cold War, a Strategic Air Command operational wing of B-52 bombers and KC-135 from 1960 to 1965, and a bombardment wing of B-52 aircraft from 1969 through 1975 were tenant organizations at the base (USAF 1998).

82nd Training Wing

The 82 TRW is the largest of four technical training wings in the AETC. It provides specialized technical, medical, and field training for officers, enlisted, and civilians of the Air Force, other Department of Defense (DoD) agencies, and foreign nationals.

The missions of the 82 TRW include:

- Efficiently providing high-quality graduates for worldwide customers. This is supported through course development, scheduling, and delivery; and instructor selection, training, and scheduling.
- Maintaining a high quality of life by providing a safe, environmentally sound installation, and a wellness-oriented, physically-fit workforce. This is accomplished through fitness, smoking cessation, safety, and environmental management programs; and services such as childcare, family support, judiciary, and education.
- Providing quality support to the 80 FTW. This support includes facility maintenance and construction, community activities, air traffic control, aircraft supply, aerospace physiology training, flight medicine support, and flight line security.

The 82 TRW consists of headquarters and staff; four training groups (82nd, 782nd, 882nd and 982nd Training Groups); the 82nd Support Group; the 82nd Logistics Group; and the 82nd Medical Group.

80th Flying Training Wing

The 80 FTW conducts the ENJJPT program sponsored by NATO. The 55-week program is designed to produce fighter pilots. The NATO program began in 1980, and Sheppard AFB was selected because of its good flying weather, adequate training airspace, existing facilities, and growth potential. The 80 FTW is actually a "contractor" organization. The Air Force, as an agency of the DoD, is the contracting host country for the ENJJPT program, and the 80 FTW executes this contract.

Eight participating nations currently have students and instructors in the program: Belgium, Denmark, Germany, Italy, the Netherlands, Norway, Turkey, and the US. Five others—Canada, Greece, Portugal, Spain, and the United Kingdom—contribute instructor pilots to the multinational staff. Approximately 50 percent of the student pilots and instructors are from the Air Force. In addition to undergraduate pilot training, the 80 FTW also conducts the Introduction to Fighter Fundamentals program and trains instructor pilots. The 80 FTW is

organized into three flying training squadrons (88th, 89th, and 90th Flying Training Squadrons) and the 80th Operations Support Squadron.

Tenant Units and Activities

In addition to the units of the 82 TRW and the 80 FTW, Sheppard AFB is home to a variety of other organizations. Personnel in these units and activities include contract employees, non-appropriated fund employees, postal, bank and credit union workers, and military and civilian employees from other Air Force major commands and branches of the armed services.

3.3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.3.1 Noise

3.3.1.1 Definition of the Resource

Noise is considered unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. It may be intermittent or continuous, steady or impulsive. It may be stationary or transient. Stationary sources are normally related to specific land uses, e.g., housing tracts or industrial plants. Transient noise sources move through the environment, either along relatively established paths (e.g., highways, railroads, and aircraft flight tracks around airfields and airports), or randomly. There is wide diversity in responses to noise that not only vary according to the type of noise and the characteristics of the sound source, but also according to the sensitivity and expectations of the receptor, the time of day, and the distance between the noise source (e.g., an aircraft) and the receptor (e.g., a person or animal).

The physical characteristics of noise (or sound) include its intensity, frequency, and duration. Sound is created by acoustic energy, which produces minute pressure waves that travel through a medium, like air, and are sensed by the eardrum. This may be likened to the ripples in water that would be produced when a stone is dropped into it. As the acoustic energy increases, the intensity, or amplitude of these pressure waves increases, and the ear senses louder noise. The unit used to measure the intensity of sound is the decibel (dB). Sound intensity varies widely (from a soft whisper to the sound of a jet engine) and is measured on a logarithmic scale to accommodate this wide range. The logarithm, and its use, is nothing more than a mathematical tool that simplifies dealing with very large and very small numbers. For example, the logarithm of the number 1,000,000 is 6, and the logarithm of the number 0.000001 is -6 (minus 6). Obviously, as more zeros are added before or after the decimal point, converting these numbers to their logarithms greatly simplifies calculations that use these numbers.

The frequency of sound is measured in cycles per second, or hertz (Hz). This measurement reflects the number of times per second the air vibrates from the acoustic energy. Low frequency sounds are heard as rumbles or roars, and high frequency sounds are heard as screeches. Sound measurement is further refined through the use of "A-weighting." The normal human ear can detect sounds that range in frequency from approximately 20 Hz to 15,000 Hz. However, not all sounds throughout this range are heard equally well. Because the human ear is most sensitive to frequencies in the 1,000 to 4,000 Hz range, some sound meters are calibrated to emphasize

frequencies in this range. Sounds measured with these instruments are termed "A-weighted," and are indicated in terms of A-weighted decibels (dBA).

The duration of a noise event and the number of times noise events occur are also important considerations in assessing noise impacts. As a basis for comparison when considering noise levels, it is useful to note that at distances of about 3 feet, noise from normal human speech ranges from 63 to 65 dB, operating kitchen appliances range from about 83 to 88 dB, and rock bands approach 110 dB.

The word "metric" is used to describe a standard of measurement. Many different types of noise metrics have been developed by researchers attempting to represent the effects of environmental noise. Each metric used in environmental noise analysis has a different physical meaning or interpretation.

The metrics supporting the assessment of noise from aircraft operations around Sheppard AFB and construction activities associated with the proposed action and alternative action assessed in this document are the maximum sound level (L_{max}), the sound exposure level (SEL), and Time-Averaged Sound Levels. Each metric represents a "tier" for quantifying the noise environment, and is briefly discussed below.

Maximum Sound Level. The L_{max} metric defines peak noise levels. L_{max} is the highest sound level measured during a single noise event (e.g., an aircraft overflight), and is the sound actually heard by a person on the ground. For an observer, the noise level starts at the ambient noise level, rises up to the maximum level as the aircraft flies closest to the observer, and returns to the ambient level as the aircraft recedes into the distance. Maximum sound level is important in judging a noise event's interference with conversation, sleep, or other common activities.

This document considers noise from aircraft operating around airfields. Around airfields, the primary operational modes of aircraft are departures (take-offs) and arrivals (landings). Table 3-1 shows L_{max} values at various distances associated with typical military aircraft operating at Sheppard AFB.

Table 3-1 Representative Maximum Sound Levels

Aircraft/Type Power	L_{max} Values (in dBA) at Varying Distances (in feet) 500	1,000	2,000	5,000	10,000
Take-off/Departure Operations					
T-37	98.3	91.0	82.9	70.4	59.3
T-6	85.1	78.3	71.2	61.0	52.4
Landing/Arrival Operations					
T-37	91.5	84.2	76.3	64.1	53.4
T-6	82.8	75.8	68.6	58.0	48.8

L_{max} maximum sound level dBA A-weighted decibel

Source: OMEGA108

Sound Exposure Level. L_{max} alone may not represent how intrusive an aircraft noise event is because it does not consider the length of time that the noise persists. The SEL metric combines intensity and duration into a single measure. It is important to note, however, that SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the total exposure of the entire event. Its value represents all of the acoustic energy associated with the event, as though it was present for one second. Therefore, for sound events that last longer than one second, the SEL value will be higher than the L_{max} value. The SEL value is important because it is the value used to calculate other time-averaged noise metrics. Table 3-2 shows SEL values that correspond to the aircraft and power settings depicted in Table 3-1.

Table 3-2 Representative Sound Exposure Levels

Aircraft/Type Power	SEL Values (in dBA) at Varying Distances (in feet) 500	1,000	2,000	5,000	10,000
Take-off/Departure Operations					
T-37	103.2	97.7	91.4	81.4	72.1
T-6	97.9	92.9	87.6	79.8	73.0
Landing/Arrival Operations					
T-37	98.2	92.7	86.5	76.8	67.9
T-6	86.3	81.1	75.6	67.5	60.1

SEL sound exposure level dBA A-weighted decibel

Source: OMEGA108

Time-Averaged Cumulative Noise Metrics. The number of times noise events occur during given periods is also an important consideration in assessing noise impacts. The "cumulative" noise metrics that support the analysis of multiple time-varying noise events are the Day-Night Average Sound Level (L_{dn}), and the equivalent noise level (L_{eq}).

Day-Night Average Sound Level. This metric sums the individual noise events and averages the resulting level over a specified length of time. It is a composite metric that considers the maximum noise levels, the duration of the events, the number of events that occur, and the time of day during which they occur. This metric adds 10 dB to those events that occur between 10:00 p.m. and 7:00 a.m. to account for the increased intrusiveness of noise events that occur at night (when ambient noise levels are normally lower than during the daytime). This cumulative metric does not represent the variations in the sound level heard. Nevertheless, it does provide an excellent measure for comparing environmental noise exposures when there are multiple noise events to be considered.

Equivalent Noise Level. This metric also sums all individual noise events and averages them over a specified time period. Common averaging times are 8- and 24-hour periods [$L_{eq(8)}$ and $L_{eq(24)}$]. This metric assigns no penalty for the time at which the noise event occurs. Therefore, if no noise events occur at night, calculations of L_{dn} and L_{eq} would be identical.

Finally, it should be noted that ambient background noise is not considered in the noise calculations presented in this document. There are two reasons for this. First, ambient background noise, even in wilderness areas, varies widely, depending on location and other

conditions. For example, studies conducted in an open pine forest in the Sierra National Forest in California have measured up to a 10 dBA variance in sound levels simply due to an increase in wind velocity (Harrison 1973). Therefore, assigning a value to background noise would be arbitrary. Secondly, and probably most important, it is reasonable to assume that ambient background noise in the project's ROI would have little or no effect on the calculated L_{dn}. In calculating noise levels, louder sounds dominate the calculations, and overall, aircraft and other transportation-related noise would be expected to be the dominant noise sources characterizing the acoustic conditions in the region.

Using measured sound levels as a basis, the Air Force developed several computer programs to calculate noise levels resulting from aircraft operations. Sound levels calculated by these programs have been extensively validated against measured data, and have been proven highly accurate.

In this document, the sound levels calculated for aircraft operations in the airfield environment are all presented in terms of daily L_{dn}. L_{dn} metrics are the preferred noise metrics of the Department of Housing and Urban Development, the Department of Transportation, the Federal Aviation Administration, the United States Environmental Protection Agency (USEPA), and the Department of Veterans Affairs.

Ignoring the nighttime penalty for the moment, L_{dn} may be thought of as the continuous or cumulative A-weighted sound level that would be present if all variations in sound level that occur over the given period were smoothed out so as to contain the same total sound energy. While L_{dn} does provide a single measure of overall noise impact, it is fully recognized that it does not provide specific information about the number of noise events or the specific individual sound levels that occur. For example, an L_{dn} of 65 dB could result from very few noisy events, or a large number of quieter events. Although it does not represent the sound level heard at any one particular time, it does represent the total sound exposure. Scientific studies and social surveys have found the L_{dn} metric to be the best measure to assess levels of community annoyance associated with all types of environmental noise. Therefore, its use is endorsed by the scientific community and governmental agencies (American National Standards Institute 1983 and 1986, USEPA 1974, Federal Interagency Committee on Urban Noise 1980, Federal Interagency Committee on Noise 1992).

The ROI for the noise assessments is the area around Sheppard AFB exposed to elevated noise levels caused by aviation-related noise and other human activities in the region.

3.3.1.2 Existing Conditions

Public annoyance is the most common concern associated with exposure to elevated noise levels. When subjected to L_{dn} levels of 65 dBA, approximately 12 percent of the persons so exposed will be "highly annoyed" by the noise. At levels below 55 dBA, the percentage of annoyance is noticeably lower (less than three percent), and at levels above 70 dBA, it is noticeably higher (greater than 25 percent) (Finegold et al. 1994). Table 3-3 shows the percentage of the population expected to be highly annoyed at a range of noise levels. The flying units receive relatively few noise complaints.

Table 3-3 Percentage of Population Highly Annoyed by Elevated Noise Levels

Noise Exposure (L_{dn} in dBA)	Percent Highly Annoyed
< 65	< 12
65 – 70	12 – 21
70 – 75	22 – 36
75 – 80	37 – 53
80 – 85	54 – 70
> 85	> 71

L_{dn} Day-Night Average Sound Level dBA A-weighted decibel

Source: Finegold et al. 1994

3.3.1.3 Aircraft Activity at Sheppard Air Force Base

The following terms are defined to provide a better understanding of how data are developed for input to the various noise models used to calculate noise.

Around an airfield, aircraft operations are categorized as take-offs, landings, or closed patterns (which could include activities referred to as touch-and-gos or low approaches). Each take-off or landing constitutes one operation. A closed pattern occurs when the pilot of the aircraft approaches the runway as though planning to land, but then applies power to the aircraft and continues to fly as though taking off again. The pilot then flies a circular or rectangular track around the airfield, and again approaches for landing. In some cases, the pilot may actually land on the runway before applying power, or in other cases, the pilot simply approaches very close to the ground. In either event, although a closed pattern is entered into the noise model as a single event, because the operation essentially consists of a landing and a take-off, it is considered two operations.

The airfield includes runways, taxiways, aircraft parking area, ramps, an Air Traffic Control Tower, and the flight line, which includes surrounding grassed areas, and roads.

The Sheppard AFB complex is joint-use, supporting military training requirements and functioning as the Wichita Falls Municipal Airport (WFMA) servicing commercial and general aviation traffic (USAF 1996). There are three parallel runways oriented northwest to southeast that primarily support military operations, and one runway oriented north to south that primarily supports civil aviation activity.

Controlled airspace (Class D and E) has been established in the region to manage air traffic.

Under baseline conditions, Sheppard AFB supported approximately 410,500 military aviation operations (USAF 1998). This equates to approximately 1,579 daily operations. Considering all types of flight activities, a scenario representing an "average busy day's" operations was developed. The operations considered include arrivals (landings), departures (takeoffs), and closed patterns. Specific operations are shown in Table 3-4. Noise calculations consider the frequency of flight operations, runway utilization, and the flight tracks and flight profiles flown by each aircraft.

Table 3-4 Average Daily Operations at Sheppard Air Force Base

Aircraft	Arrivals		Departures		Closed Patterns		Totals
	Day	Night	Day	Night	Day	Night	
Based T-38	132.179	3.748	135.927	0.000	505.144	38.564	815.562
Based T-37/T-6	114.154	0.000	114.154	0.000	530.276	0.000	758.584
Transient	2.445	0.000	2.445	0.000	0.000	0.000	4.890
Total	**248.778**	**3.748**	**252.526**	**0.000**	**1,035.420**	**38.564**	**1,579.036**

Note: Daily operations are based on averages of annual operations; therefore, numbers do not round.

Source: USAF 2006a

These levels and types of activity are then combined with information on climatology, maintenance activities, and aircraft flight parameters, and processed through the Air Force's BASEOPS/NOISEMAP (Moulton 1990) computer models to calculate L_{dn}. Once noise levels are calculated, they are plotted on a background map in 5-decibel increments from 65 dBA to 85 dBA, as applicable. Baseline contours are shown in Figure 3-1. The land areas (in acres) encompassed by each contour for the current condition is shown in Table 3-5.

Table 3-5 Land Areas Exposed to Indicated Sound Levels

Sound Level (in L_{dn})	Acres of Land		Total
	On-base	Off-base	
65 – 70	721	4,853	5,574
70 – 75	547	2,301	2,848
75 – 80	871	1,206	2,077
80 – 85	814	220	1,034
> 85	1,031	24	1,055
Total > 65	**3,984**	**8,607**	**12,591**

L_{dn} Day-Night Average Sound Level

In order to further assess noise exposure from aviation activity, seven locations around the base were selected for specific analysis. These points of interest represent land use categories that could be potentially sensitive to elevated noise levels. Noise exposure at these points is shown in Table 3-6, and the location of the points of interest is depicted in Figure 3-1. As shown, with the exception of those points in immediate proximity to the runways, all other sensitive land uses are well below noise levels that would cause concern.

The points represent:

- BKES – Sheppard-Burkburnett School
- CGLN – Residential Area
- CLRK – On-base Area
- CTCB – Shasta Baptist Church
- HRHS – Residential Area
- SPSC – Hanes School
- WRFH – On-base Area

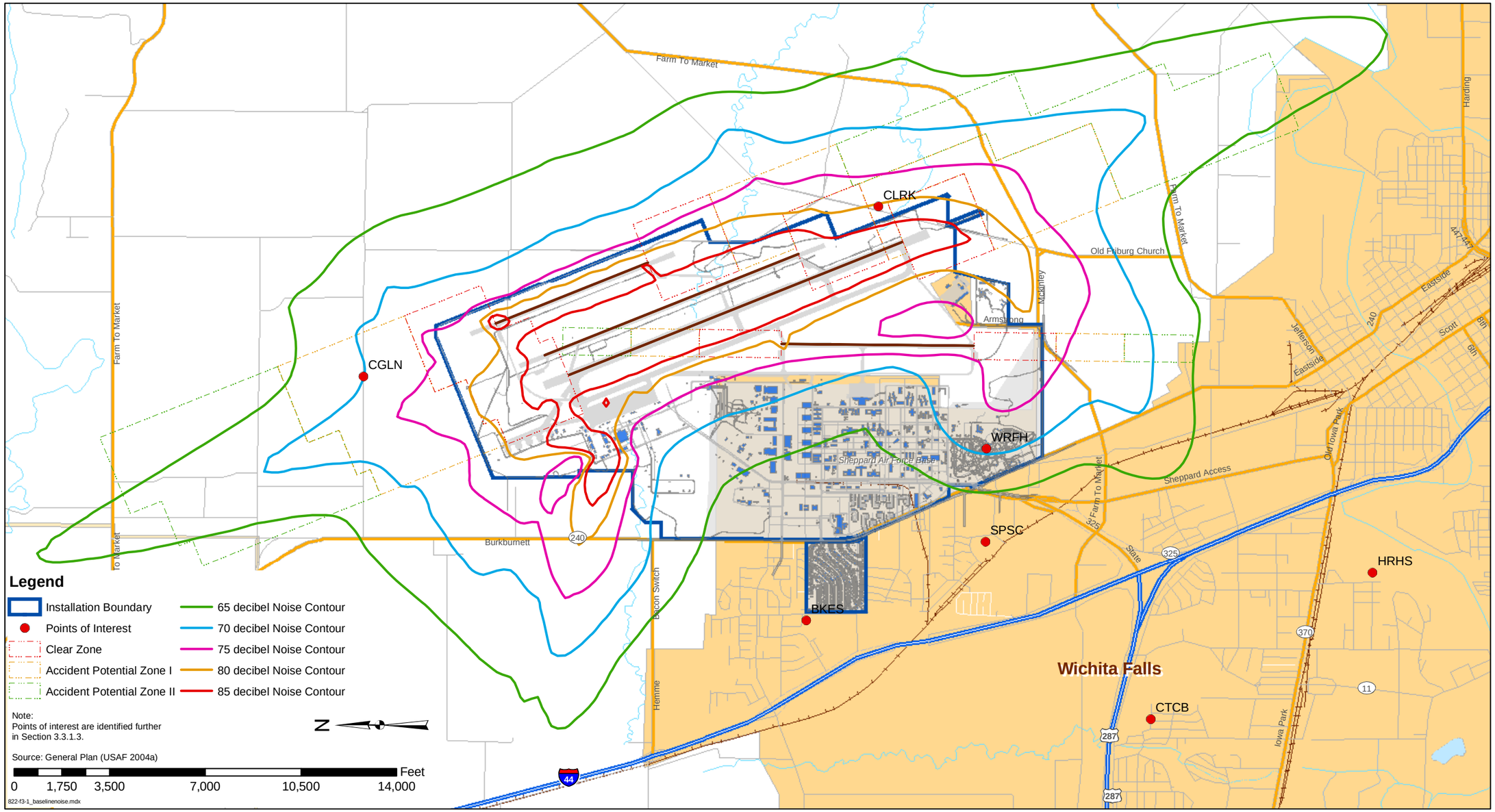

Figure 3-1 Baseline Noise Contours with Accident Potential Zones, Sheppard Air Force Base, Texas

Table 3-6 Specific Point Noise Levels Under Baseline Conditions

Point	Baseline L_{dn}
BKES-Sheppard-Burkburnett School	54.9
CGLN-Residential Area	69.9
CLRK-On-base Area	80.5
CTCB-Shasta Baptist Church	53.0
HRHS-Residential Area	50.1
SPSC-Hanes School	59.8
WRFH-On-base Area	70.7

L_{dn} Day-Night Average Sound Level

Source: Moulton 1990

Under the baseline condition, approximately 4,837 on-base residents are exposed to the 65 dB noise contour or greater. An estimated 567 off-base residents are exposed to the 65 dB noise contour or greater. Table 3-7 depicts the number of on-base and off-base residents exposed to an L_{dn} of 65 dB and greater for the baseline condition. The number of persons within the noise zones was determined by placing the noise contours over 2000 US Census Bureau data. Census block-groups surrounding Sheppard AFB were extracted from the most recent Topographically Integrated Geographic Encoding and Referencing files, while demographic data were extracted from the Summary File 1. The number of residents within each noise zone was then calculated for comparison purposes. Population and dwelling counts calculated with US Census Bureau data are estimates and are most useful in determining relative change in population impact between different noise zones.

Table 3-7 Affected Population (Baseline Condition)

Noise Zone (dB Interval)	On-base Number of People	Off-base Number of People	Total Number of People
65-70	2,717	485	3,202
70-75	1,879	64	1,943
75-80	239	17	256
80-85	1	1	2
>85	1	0	1
Total	**4,837**	**567**	**5,404**

Notes:

Population exposed is estimated based on census tract population data and the relative proportion of the tract encompassed by given noise contour levels.

Persons expected to be annoyed are estimated based on total population exposed and the average percentage of that population expected to be annoyed by the indicated noise level (see Table 3-3).

Data obtained from 2000 Census information and Geographical Information System data.

dB decibel

The off-base residential areas exposed to the 65 dB noise contour or greater occur primarily to the northwest, north, east, south, and southwest of the airfield. The area northwest of the airfield is used primarily for agriculture, with some scattered residences. Land use to the north is agricultural with small clusters of multiple residences. The area from the northeast to the southeast is used for agriculture with residences being primarily farmhouses. Land use to the south and southwest is agricultural, with scattered residences. The noise contours to the west of the airfield remain primarily within the base boundary.

3.3.1.4 Military Training Airspace Noise

Pilot training is supported by regional Special Use Airspace (SUA). There are six MOAs and a Restricted Area that supports air-to-ground training. The Sheppard 1 and Sheppard 2 MOAs are located north and east of the base, respectively. The Westover 1 and Westover 2 MOAs are located south-southwest of the base. The Hollis MOA is located northwest of the base. The Washita MOA is located north of the base. Most of these MOAs are subdivided into smaller areas, which facilitate scheduling. The Restricted Area (R-5601) is situated between the northern border of the Sheppard 1 MOA and the southern border of the Washita MOA (USAF 1998). Currently ongoing IFF flying training activities are also conducted at Falcon Range on Fort Sill, Oklahoma.

Noise levels in military training airspace resulting from flying operations conducted in T-37 and T-6 aircraft do not differ noticeably. As illustrated in Figure 3-2, noise created by T-6 aircraft is very similar to noise created by T-37 aircraft using power settings applicable to use of military training airspace. The noise profile for the T-6 aircraft was used to model T-37 aircraft noise based on guidance received from Headquarters (HQ) AETC.

3.3.1.5 Other Ground-based Activity

Operations, maintenance, and industrial activities on Sheppard AFB generate non-aircraft related noise. Noise sources include transportation noise from the operation of ground-support equipment. However, this noise is generally localized in industrial areas on or near the airfield, or on established lines of communication supporting traffic to and from the airfield. Noise is also generated from other commercial activities located near the airfield. Noise resulting from aircraft operations remains the dominant noise source in the airfield region.

3.3.2 Airspace Management and Air Traffic Control

3.3.2.1 Definition of Resource

Airspace management involves the direction, control, and handling of flight operations in the volume of air that overlies the geopolitical borders of the US and its territories. Airspace is a resource managed by the Federal Aviation Administration (FAA), with established policies, designations, and flight rules to protect aircraft in the airfield and en route; in SUA identified for military and other governmental activities; and in other military training airspace.

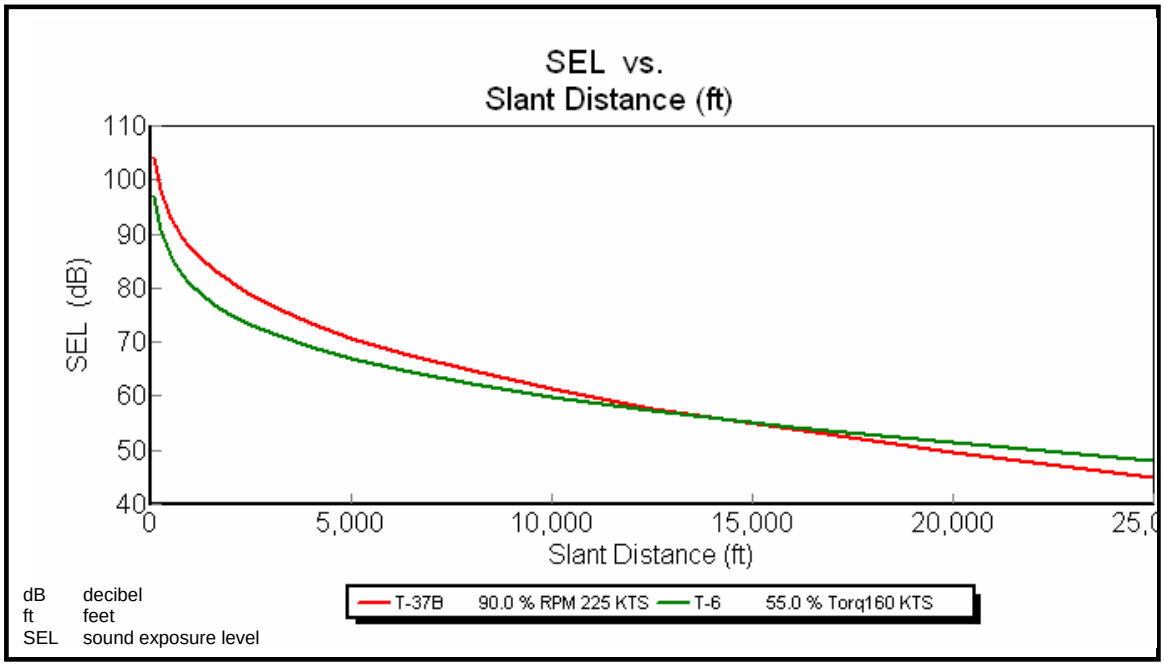

Figure 3-2 Sound Exposure Level Comparison

Management of this resource considers how airspace is designated, used, and administered to best accommodate the individual and common needs of military, commercial, and general aviation. Because of these multiple and sometimes competing demands, the FAA considers all aviation airspace requirements in relation to airport operations, Federal Airways, Jet Routes, military flight training activities, and other special needs to determine how the National Airspace System can best be structured to satisfy all user requirements.

The FAA has designated four types of airspace above the US. They are Controlled, Special Use, Other, and Uncontrolled airspace and are defined as follows:

Controlled Airspace

Controlled Airspace is categorized into five separate classes: Class A, B, C, D, and E airspace. These classes identify airspace that is controlled, airspace that supports airport operations, and designated airways affording en route transit from place to place. These classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace.

Controlled Airspace is defined by FAA by Order 7400.2. It is airspace of defined dimensions within which Air Traffic Control (ATC) service is provided to Instrument Flight Rule (IFR) flights and to Visual Flight Rule (VFR) flights in accordance with the airspace classification. For IFR operations in controlled airspace, a pilot must file an IFR flight plan and receive an appropriate ATC clearance.

Each Class B, C, and D airspace designated for an airport contains at least one primary airport around which the airspace is designated.

Class A Airspace

Class A airspace, generally, is that airspace from 18,000 feet amsl up to and including flight level (FL) 600. Flight level is described in terms of hundreds of feet amsl, using a standard altimeter setting. Thus, FL 600 is approximately 60,000 feet amsl. Class A airspace includes the airspace overlying the waters within 12 nautical miles (NM) of the coast of the 48 contiguous states and Alaska (Department of Transportation [DOT] 2001). It extends from 18,000 feet amsl up to and including 60,000 feet amsl (FAA 2004).

Class B Airspace

Class B airspace, generally, is that airspace from the surface to 10,000 feet amsl around the nation's busiest airports. The actual configuration of Class B airspace is individually tailored and consists of a surface area and two or more layers, and is designed to contain all published instrument procedures (DOT 2001).

Class C Airspace

Class C airspace, generally, is that airspace from the surface to 4,000 feet above the airport elevation (charted in amsl) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Although the actual configuration of Class C airspace is individually tailored, it usually consists of a surface area with a 5-NM radius, and an outer circle with a 10-NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation (DOT 2001).

Class D Airspace

Class D airspace, generally, is that airspace from the surface to 2,500 feet above the airport elevation (charted in amsl) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored and when instrument procedures are published, the airspace will normally be designed to contain the procedures. Arrival extensions for instrument approach procedures may be designated as Class D or Class E airspace (DOT 2001).

Class E Airspace

Class E airspace is controlled airspace that is not Class A, B, C, or D. There are seven types of Class E airspace, as described below.

- **Surface Area Designated for an Airport**. When so designated, the airspace will be configured to contain all instrument procedures.

- **Extension to a Surface Area.** There are Class E airspace areas that serve as extensions to Class B, C, and D surface areas designated for an airport. This airspace provides controlled airspace to contain standard instrument approach

procedures without imposing a communications requirement on pilots operating under VFR.

- **Airspace used for Transition.** There are Class E airspace areas beginning at either 700 or 1,200 feet above ground level used to transition to/from the terminal or en route environment.

- **En Route Domestic Airspace Areas.** These areas are Class E airspace areas that extend upward from a specified altitude to provide controlled airspace where there is a requirement for IFR en route ATC services, but where the Federal Airway system is inadequate.

- **Federal Airways.** Federal Airways (Victor Routes) are Class E airspace areas, and, unless otherwise specified, extend upward from 1,200 feet to, but not including, 18,000 feet amsl.

- **Other.** Unless designated at a lower altitude, Class E airspace begins at 14,500 feet amsl to, but not including 18,000 feet amsl overlying (a) the 48 contiguous states, including the waters within 12 miles from the coast of the 48 contiguous states; (b) the District of Columbia; (c) Alaska, including the waters within 12 miles from the coast of Alaska, and that airspace above FL 600, excluding the Alaska peninsula west of 160°00'00" west longitude; and (d) the airspace below 1,500 feet above the surface of the earth unless specifically so designated.

- **Offshore/Control Airspace Areas.** This includes airspace areas beyond 12 NM from the coast of the United States, wherein ATC services are provided (DOT 2001).

Uncontrolled Airspace

Airspace that has not been designated as Class A, B, C, D, or E airspace is Uncontrolled Airspace (Class G) (DOT 2001).

Special Use Airspace

An SUA includes MOA, Air Traffic Control Assigned Airspace (ATCAA), Warning Areas, and Restricted Areas.

Military Operations Area

A MOA is airspace of defined vertical and lateral limits established outside Class A airspace to separate and segregate certain non-hazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. Class A airspace covers the continental US and limited parts of Alaska, including the airspace overlying the water within 12 NM of the US coast. It extends from 18,000 feet amsl up to and including 60,000 feet amsl. MOAs are considered "joint use" airspace. Non-

participating aircraft operating under VFR are permitted to enter a MOA, even when the MOA is active for military use. Aircraft operating under IFR must remain clear of an active MOA unless approved by the responsible Air Route Traffic Control Center (ARTCC). Flight by both participating and VFR non-participating aircraft is conducted under the "see-and-avoid" concept, which stipulates that "when weather conditions permit, pilots operating IFR or VFR are required to observe and maneuver to avoid other aircraft. Right-of-way rules are contained in CFR Part 91 (FAA 2004). The responsible ARTCC provides separation service for aircraft operating under IFR and MOA participants. The "see-and-avoid" procedures mean that if a MOA were active during inclement weather, the general aviation pilot could not safely access the MOA airspace.

Air Traffic Control Assigned Airspace

An ATCAA is airspace of defined vertical and lateral limits, assigned by ATC, for the purpose of providing air traffic segregation between the specified activities being conducted within the assigned airspace and other IFR air traffic. This airspace, if not required for other purposes, may be made available for military use. ATCAAs are normally structured and used to extend the horizontal and/or vertical boundaries of SUA such as MOAs and Restricted Areas.

Restricted Areas

A Restricted Area is designated airspace that supports ground or flight activities that could be hazardous to non-participating aircraft. A Restricted Area is airspace designated under 14 CFR 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated "joint-use" and IFR/VFR operations in the area may be authorized by the controlling ATC facility when it is not being utilized by the using agency (FAA 2004).

Other Airspace

Other Airspace consists of advisory areas, areas that have specific flight limitations or designated prohibitions regarding use.

3.3.2.2 Existing Conditions

The airfield includes runways, taxiways, aircraft parking area, ramps, an Air Traffic Control Tower, and the flight line, which includes surrounding grassed areas, and roads.

The Sheppard AFB complex is joint-use, supporting both Sheppard AFB flying training requirements and functioning as the WFMA servicing commercial and general aviation traffic (USAF 1998). Controlled airspace (Class D and E) has been established in the region to manage air traffic.

Air traffic control at Sheppard AFB is supported by:

The Sheppard Radar Approach Control (RAPCON) which operates from 6:00 a.m. to 10:00 p.m. (15 hours) Monday through Friday, and from 12:00 p.m. to 5:00 p.m. (5 hours) on Sunday.

The Sheppard AFB ATC Tower which operates from 5:30 a.m. to 10:00 p.m. (15.5 hours) Monday through Friday, and from 9:00 a.m. to 5:00 p.m. (8 hours) on Saturday and Sunday (USAF 2003a).

The Sheppard AFB RAPCON manages air traffic in the airspace designated by Fort Worth ARTCC. The facility provides approach control services to Sheppard AFB/WFMA, Kickapoo Downtown Airport, and Wichita Valley Airport (USAF 2003a).

There are four runways at Sheppard AFB. Three are parallel, and primarily support military operations. The fourth, Runway 17/35, is located west of the three parallel runways and primarily supports civil and general aviation operations (WFMA).

The parallel runways are oriented in a generally southeast – northwest direction. The fourth is oriented north – south. Runway 15L/33R is 6,000 feet long and 150 feet wide. The center runway, 15C/33C, is 10,003 feet long and 150 feet wide. Runway 15R/33L is 13,101 feet long and 300 feet wide. Runway 17/35 is 7,021 feet long and 150 feet wide. Runways 15C/33C and 15R/33L are equipped with arresting gear.

Under normal conditions, Runway 15L/33R primarily supports T-6 operations. T-38s and other military aircraft operate from Runways 15C/33C and 15R/33L.

Pilot training is supported by regional SUA. There are six MOAs and a Restricted Area that supports air-to-ground training. The Sheppard 1 and Sheppard 2 MOAs are located north and east of the base, respectively. The Westover 1 and Westover 2 MOAs are located south-southwest of the base. The Hollis MOA is located northwest of the base. The Washita MOA is located north of the base. Most of these MOAs are subdivided into smaller areas, which facilitates scheduling. The Restricted Area (R-5601) is situated between the northern border of the Sheppard 1 MOA and the southern border of the Washita MOA (USAF 1998). These airspace elements are described in Table 3-8.

Table 3-8 Military Operations Area/Restricted Area Identification and Description

MOA/ Restricted Area	Altitudes		Hours of Use[1]		Controlling ARTCC
	Minimum	Maximum	From	To	
Sheppard 1	8,000 ft amsl	UTBNI FL 180	1 Hour Before Sunrise	1 Hour After Sunset	Fort Worth
Sheppard 2	8,000 ft amsl	UTBNI FL 180	1 Hour Before Sunrise	1 Hour After Sunset	Fort Worth
Westover 1	9,000 ft amsl	UTBNI FL 180	1 Hour Before Sunrise	1 Hour After Sunset	Fort Worth
Westover 2	10,000 ft amsl	UTBNI FL 180	1 Hour Before Sunrise	1 Hour After Sunset	Fort Worth
Hollis	11,000 ft amsl	UTBNI FL 180	1 Hour Before Sunrise	1 Hour After Sunset	Fort Worth
Washita	8,000 ft amsl	UTBNI FL 180	1 Hour Before Sunrise	1 Hour After Sunset	Fort Worth
R-5601A	Surface	40,000 ft amsl	Continuous		Fort Worth
R-5601B	Surface	40,000 ft amsl	Continuous		Fort Worth
R-5601C	Surface	40,000 ft amsl	Continuous		Fort Worth
R-5601D	500 ft AGL	FL 400	Sunrise	10:00 pm	Fort Worth
R-5601E	500 ft AGL	6,000 ft amsl	Sunrise	10:00 pm	Fort Worth

Note:
[1]Hours of use shown are published times. Other times may be scheduled by Notices to Airmen.
[2]FL = Flight Level. Described in terms of hundreds of feet amsl, using a standard altimeter setting. Thus, FL 500 is approximately 50,000 feet amsl.
UTBNI = Up to, but not including

MOA	Military Operations Area	ARTCC	Air Route Traffic Control Center
AGL	above ground level	FL	flight level
amsl	above mean sea level	Ft	feet

Source: DOT 2006

3.3.3 Land Use

3.3.3.1 Definition of the Resource

Land use comprises natural conditions or human-modified activities occurring at a particular location. Human-modified land use categories include residential, commercial, industrial, transportation, communications and utilities, agricultural, institutional, recreational, and other developed use areas. The attributes of land use considered in this analysis include general land use patterns, land ownership, land management plans, and special use areas. General land use patterns characterize the types of uses within a particular area including agricultural, residential, military, and recreational. Land ownership is a categorization of land according to type of owner. The major land ownership categories include private, federal, and state. Management plans and zoning regulations determine the type and extent of land use allowable in specific areas and are often intended to protect specially designated or environmentally sensitive areas.

Certain land use designations are particular to military installations and incompatible with residential areas. These include clear zones and accident potential zones. Areas at

the end of each runway typically delineate geographic areas around the airfield where historic aircraft mishap data have shown most aircraft accidents occur. Three zones were established based on these accident patterns: the clear zone, Accident Potential Zone 1 (APZ I), and Accident Potential Zone 2 (APZ II). The clear zone, the area closest to the runway end, is the most hazardous and must be clear of any development. Some development is allowed in APZs I and II, although this development is usually limited to light industrial, manufacturing, transportation, and similar land uses. However, uses that concentrate people in small areas are not considered acceptable.

Noise is another factor in determining appropriate land uses since elevated sound levels are incompatible with residential areas. Sound levels are typically measured in decibels using L_{dn} as the standard of measurement. Numerous studies have shown a relationship between L_{dn} and the percentage of the population likely to be highly annoyed. Residential areas are typically inconsistent with noise levels above L_{dn} 65 dB.

Visual resources are the natural and man-made features that give a particular environment its aesthetic qualities. In undeveloped areas, landforms, water surfaces, and vegetation, are the primary components that characterize the landscape. Man-made elements such as buildings, fences, and streets may also be visible. These may dominate the landscape or be relatively unnoticeable. In developed areas, the natural landscape is more likely to provide a background for more obvious man-made features. The size, forms, materials, and functions of buildings, structures, roadways, and infrastructure will generally define the visual character of the built environment. These features form the overall impression that an observer receives of an area or its landscape character. Attributes used to describe the visual resource value of an area include landscape character, perceived aesthetic value, and uniqueness.

The ROI for land use and visual resources includes Sheppard AFB and the area surrounding the base that may be affected by aircraft noise.

3.3.3.2 On-base Land Use

Sheppard AFB encompasses 4,631 acres and includes a variety of land use categories such as airfield and aircraft operation and maintenance, industrial, technical training, and housing. Table 3-9 presents the 13 land use categories (based on function of the activity within the category) that have been established for land management at the base within the Sheppard AFB *General Plan* (USAF 2004a). Excluding the airfield, indoor training is the base's largest category, accounting for 532 acres of the base's total acreage. The next two largest land use categories are outdoor recreation (335 acres) and open space (325 acres).

Table 3-9 Air Force Land Use Categories

Air Force Land Use Categories	Description
Aircraft Operations and Maintenance	Base operations, control tower, fire station, maintenance hangers, shops, and docks.
Administrative	Headquarters, civilian personnel, education center, law center, and security operations.
Airfield	Aircraft operating areas.
Airfield Pavement	Runways, taxiways, and aprons.
Community Commercial	Commissary, exchange, club, dining hall, recreation center, gym, and theater.
Community Service	Post office, library, chapel, childcare center, and education center.
Housing Accompanied	Family housing.
Housing Unaccompanied	Dormitories and visitors' housing.
Industrial	Base engineering, maintenance shops, storage, warehousing, and utilities.
Medical	Hospital, clinic, and medical storage.
Open Space	Conservation area, buffer space, and undeveloped land.
Outdoor Recreation	Swimming pool, outdoor courts and field, golf course, and marina.
Training-Indoor	Classroom buildings.

The existing land use pattern and Future Land Use Plan for Sheppard AFB provide the framework for land use planning decisions, focusing on the missions of the 82 TRW and the 80 FTW. In September 2004, Sheppard AFB completed a *General Plan* that details the installation's existing and future land use plans (USAF 2004a). There are 13 categories used to identify land use activities at Sheppard AFB, ranging from aircraft operations and maintenance to training. The base's training mission is carried out within designated areas of these land use categories. The Future Land Use Plan and a breakdown of land use categories at Sheppard AFB are included in the *Capacity Analysis* (Appendix B).

The Air Installation Compatible Use Zones (AICUZ) program is designed to promote compatible land uses in the areas surrounding military airfields. The AICUZ land use guidelines reflect land use recommendations for clear zones, APZs I and II, and four noise zones. These guidelines have been established on the basis of studies prepared and sponsored by several federal agencies, including the Department of Housing and Urban Development, USEPA, Air Force, and state and local agencies. The guidelines recommend land uses that are compatible with airfield operations while allowing maximum beneficial use of adjacent properties.

The most recent AICUZ study carried out at Sheppard AFB was completed in January 2003 as an amendment to the original study released in May 1992. Figure 3-1 depicts noise contours and APZs for the installation based on the most recent AICUZ study data (USAF 2004a).

The total area within the L_{dn} contour of 65 dB or greater from the 1992 AICUZ Study is 12,591 acres.

3.3.3.3 Off-base Land Use

The lands surrounding Sheppard AFB fall within the City of Wichita Falls, the City of Burkburnett, and unincorporated Wichita County. Urban development within the City of Wichita Falls flanks the base to the south, southwest, and west; additionally, portions of the base lie within the city limits. Neighboring city land uses affected by Sheppard AFB flight operations primarily consist of strip commercial development along major roads and intersections and single and multi-family residential activity, including several mobile home parks. These existing land uses are generally consistent with the underlying zoning.

The City of Burkburnett lies approximately 10 miles northwest of Sheppard AFB. Land uses within Burkburnett that are potentially affected by the Sheppard AFB flight operations include rural residential development, agricultural and grazing lands, and oil fields. A very small portion of Runway 15R's APZ II extends into an undeveloped area within the southern corporate limits of Burkburnett.

A majority of the area adjacent to Sheppard AFB is within the jurisdiction of unincorporated Wichita County. Land uses surrounding the base in unincorporated Wichita County are predominantly agricultural activities and rural single-family residential development. The greatest residential density can be found north of the base in the large-lot Carriage Lane Estates development, which has an average lot size of two acres. Several auto salvage yards are located south of the base in the McKinley Road and Airport Drive vicinity.

Of the surrounding political entities, the City of Wichita Falls has taken the most pro-active approach to land use controls with respect to Air Force AICUZ guidelines. In 1982, the city adopted a zoning ordinance addressing encroachment protection of height obstructions and land use controls for incompatible development within the clear zone and APZ I for Runways 17/35, 15R/C/L, and 33R/C/L. The city's zoning ordinance does not permit mobile homes or manufactured residential construction within the L_{dn} 65 dB noise contour (USAF 2004a).

3.3.4 Earth Resources

3.3.4.1 Geology

The installation is located within the Central Rolling Red Plains of the Redbeds Plains unit of the Central Lowland physiographic province. The region is characterized by smooth, rolling plains, which have rounded slopes and relatively shallow and broad valleys. The red landscape was derived from Permian deposits. Drainage in Wichita County flows from west to east. The valley of Red River is located to the north of the installation, with the Wichita River located to the south of the base. Elevations on Sheppard AFB range from 1,030 feet amsl at the north end of the runways to 965 feet amsl on the east side of the installation along Bear Creek, a tributary of the Wichita River (USAF 2004a).

3.3.4.2 Topography

The relatively flat nature of the base and the surrounding countryside allows for the kind of training that is carried out at Sheppard AFB and is also attractive to other missions that might be candidates for future relocation. The lack of serious terrain deviations, such as mountains, eliminates obstacles and unpredictable weather patterns for pilot training.

3.3.4.3 Soils

Sheppard AFB is located on a broad east-west soil belt known as the Kamay-Bluegrove-Deandale Association. This association consists of loamy soils that formed in red-bed clay, shale or sandstone, or in old alluvium derived from red-bed clay and shale. It is about 32 percent Kamay, 12 percent Bluegrove, 10 percent Deandale, and 46 percent less extensive soils. Kamay soils have 10 inches of dark grayish-brown silt loam over very slow permeable clay. Bluegrove soils have less than 10 inches of brown loam over moderately slow permeable clay loam. Deandale soils have generally 12 inches of dark grayish brown silt loam over very slow permeable clay. The types of soils are important because of their environmental and construction potential (USAF 2004a).

Sheppard AFB soils are generally characterized as reddish-brown sandy loam underlain with red clay-to-clay loam. In certain areas, red-bed shale and sandstone are near the surface, a characteristic feature of the "Rolling Red Plains of Texas." The natural topsoil on the installation is thin sandy loams, highly susceptible to wind and water erosion. Adequate landscaping is required to maintain soil stability at the base; current landscaping policy requires low-maintenance native plant species (USAF 2004a).

3.3.5 Water Resources

3.3.5.1 Definition of the Resource

Water resources analyzed in this EA include descriptions of the qualitative and quantitative characteristics of water resources, including surface waters, groundwater, and floodplains. Surface waters include streams, rivers, bays, ponds, and lakes and are important for a variety of reasons including economic, ecological, recreational, and human health. Groundwater consists of the subsurface hydrologic resources of the physical environment and is an essential resource. Groundwater properties are often described in terms of depth to the aquifer or water table, water quality, and surrounding geologic composition. Groundwater is important as a water source for potable water, irrigation, and industrial purposes.

Other issues relevant to water resources include the downstream water and watershed areas affected by existing and potential runoff and hazards associated with the 100-year floodplain. Stormwater flows, which usually increase in volume and velocity with increases in impervious surfaces such as rooftops and paved areas, have the potential to impact surface water hydrology. The state of Texas has developed and retains primacy for surface water quality standards for all waters of the state in accordance with the provisions

of the *Clean Water Act*. The standards are set in an effort to maintain the quality of water in the state of Texas consistent with public health and enjoyment, protection of aquatic life, and the operation of existing industries and economic development of the state. Texas follows an anti-degradation policy that is intended to protect the water quality that existed at the time water quality standards were adopted and to enhance water quality when possible (Texas Commission on Environmental Quality [TCEQ] 2006).

Floodplains are defined by EO 11988, *Floodplain Management*, as "the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year" (that area inundated by a 100-year flood). Floodplain vegetation promotes bank stability, filters excess nutrients, pollutants, and sediments from the water, and moderates flooding by absorbing surface water runoff.

EO 11988 requires that federal agencies take action to reduce the risk of flood loss, minimize the impacts of floods on human health, safety, and welfare, and restore and preserve the natural and beneficial values of floodplains when managing federal lands. Areas identified as located within Special Flood Hazard Areas (SFHA) are those areas determined by the Federal Emergency Management Agency (FEMA) that would be inundated by a flood having a one percent chance of occurring in any given year. This area is designated the "100-year floodplain." Development may take place within the SFHA if the development is compliant with local floodplain management ordnances (which must meet minimum federal requirements).

3.3.5.2 Surface Water

There are seven major reservoirs with capacities ranging from 23,000 to 444,000 acre-feet in size within a 50-mile radius of the base. These reservoirs were constructed for flood control and water supply purposes. Lake Kemp, the largest of these reservoirs, is located on the Wichita River 30 miles southwest of the base. Lake Iowa Park, the smallest of these reservoirs, is located on the Wichita River approximately 10 miles west of the base. Lake Arrowhead and Lake Kickapoo are located approximately 10 and 20 miles south and southwest of Wichita Falls, respectively and provide high quality potable water for the Wichita Falls area (USAF 1997).

The golf course on Sheppard AFB has three man-made one-acre ponds. One pond is supplied with treated wastewater effluent, serves as a temporary storage and aeration basin, and is used for irrigation. The other two ponds are water hazards only.

Natural surface water features on Sheppard AFB include a stream known as Bear Creek and its tributaries. Flow to Bear Creek is augmented by treated wastewater effluent from the city of Wichita Falls Northside wastewater treatment plant. The Bear Creek watershed originates west of Sheppard AFB, is routed through underground drainage systems beneath the runways in a southeastward direction, and discharges into the Wichita River approximately 20 miles northeast of the base. South of the installation,

Plum Creek receives drainage from the southern portion of Sheppard AFB and is susceptible to flooding in off-base areas (USAF 1997).

Surface water quality of the Wichita River, its tributaries, and Lake Kemp contain high concentrations of total dissolved solids, chloride, and sulfate. Because of the natural salt spring in the upper reaches, the water is unsuitable for most uses the majority of the time. However, water impounded in Lake Kemp is utilized in part, for irrigation downstream and for power plant cooling operations.

The *Draft 2004 Water Quality Inventory* indicated water quality concerns associated with the Wichita River. Segment 0214, Wichita River below Lake Diversion, is listed as having an overall nutrient enrichment concern and a concern for excessive algal growth. This portion of the Wichita River meanders from the dam of Lake Diversion to its confluence with the Red River. The available data indicated elevated bacteria and nutrient levels and sediment contaminants. Specific parameters of concern for the Wichita River include excessive algal growth, ammonia, orthophosphorous, total phosphorous, and nickel in sediment (TCEQ 2005). The elevated bacteria levels, the nutrient enrichment, and the concerns for excessive algal growth that occur up and down the river are most likely a result of run-off from the more densely populated areas of the watershed. Possible sources include; a large fish hatchery, some mid-sized cattle ranching operations, five permitted dischargers, thousands of acres of farm land, and numerous septic tanks of undetermined age and condition which could leach and/or drain directly into the river (Red River Authority 2006).

There are approximately 4,640 acres associated with Sheppard AFB. Of this acreage, 1,143 acres are impervious (approximately 25 percent) leaving 3,497 acres of pervious surfaces. Sheppard AFB has submitted a Notice of Intent (NOI) that provides coverage under the TCEQ Multi-Sector General Permit for industrial activities associated with airport activities. This permit applies to stormwater discharges and requires preparation of a Stormwater Pollution Prevention Plan (SWPPP) for industrial activities and monitoring, if applicable to the type of activities conducted. Through its SWPPP, Sheppard AFB manages industrial activities, such as fuel handling and construction activities, to prevent stormwater pollution. In accordance with the permit requirements, the base has prepared an SWPPP (USAF 2005b).

3.3.5.3 Groundwater

The Texas Water Development Board (TWDB) has identified and characterized nine major and 20 minor aquifers in the state based on the quantity of water supplied by each. A major aquifer is generally defined as supplying large quantities of water in large areas of the state. Minor aquifers typically supply large quantities of water in small areas or relatively small quantities in large areas. The only major aquifer with an occurrence in Wichita County is the Seymour Aquifer adjacent to the Red and Wichita Rivers, possibly extending to the north side of Sheppard AFB from the Red River and to the south side of

the installation from the Wichita River (TWDB 1995). There are no minor aquifers as defined by the TWDB in Wichita County.

The Seymour Aquifer is a major aquifer that extends across north-central Texas. Water is contained in isolated patches of alluvium made up of discontinuous beds of poorly sorted gravel, conglomerate, sand, and silty clay. Water ranges from fresh to slightly saline, although natural salt pollution exists in localized areas. The aquifer is affected by excess nitrate throughout its extent, caused partly by natural processes and partly by human activities. The aquifer also contains excess chloride. Almost all of the groundwater pumped from the aquifer, 90 percent, is used for irrigation, with the remainder primarily used for municipal supply; primarily for the cities of Vernon, Burkburnett (north-northwest of Sheppard AFB along the Red River), Electra, and Seymour. No noticeable water level declines have affected the aquifer (TWDB 2006).

Aquifer thickness is generally less than 100 feet. Yields of wells completed in the alluvium range from less than 100 to as much as 1,300 gallons per minute and average about 300 gallons per minute (TWDB 2006).

Shallow groundwater has been documented at various locations underneath Sheppard AFB. Groundwater is found in limited quantities and is typically found associated with perched aquifers. The top elevations of shallow groundwater range from 970 feet amsl on the south side of the base to 1,020 feet amsl on the west side of the base (USAF 1996). Ground surface elevations on Sheppard AFB at these locations range from 970 feet amsl on the south in a tributary of Plum Creek to 1,050 feet amsl on the west side of the base. Groundwater in the northern portion of the base flows northeastward towards the Bear Creek drainage and away from a topographic high near the base hospital on the west. Groundwater in the southern portion of the installation flows south and east towards the Wichita River (USAF 1996). The shallow groundwater under the installation is not used as a source of domestic potable water.

3.3.5.4 Floodplains

EO 11988, *Floodplain Management*, directs federal agencies to provide leadership and take action to reduce risk of flood loss; to minimize the impact of floods on human safety, health, and welfare; and to restore, preserve, and enhance the natural and beneficial values served by floodplains. The EO requires that an agency shall avoid undertaking or providing assistance for new construction located in floodplains and that if the head of the agency finds that there is no practicable alternative to such construction, the proposed action must include all practicable measures to minimize harm to floodplains that may result from such use.

The National Flood Insurance Program (NFIP), administered by FEMA, was created in 1968 to provide flood insurance to people who live in areas with the greatest risk of flooding, called SFHAs (see Section 3.3.5.1). Generally, the SFHAs are those portions of participating communities within the 100-year floodplain. The NFIP is effective only for participating communities. Both Wichita County and the city of Wichita Falls are

participants. In participating communities, the extent of SFHAs are determined and published in Flood Insurance Rate Maps by FEMA.

The northern one-third of Sheppard AFB is bisected by a generally crescent shaped 100-year floodplain associated with the drainage of Bear Creek (USAF 2004a). The floodplain affects the 80 FTW area and a portion of Runway 15R/33L. Bear Creek has permanent flow because of upstream wastewater discharge. Figure 3-3 shows the 100-year floodplain at Sheppard AFB.

Building site modifications (several feet of additional fill) have been made to accommodate floodplain issues in the 80 FTW area. Planning efforts have been considered to mitigate the floodplain by providing retention capability along the western base boundary; however, the base floodplain study found that 386 acre-feet of water retention would be required to effectively mitigate the 100-year floodplain impact on the base (USAF 2003a). This would be a very large area, something not available on base. One option to completely mitigate the 100-year floodplain through retention areas would be to look at acquiring off-base drainage easements beyond the Perimeter Road and the base boundary. The feasibility and cost; however, makes this option problematic.

3.3.6 Hazardous Materials and Waste

Hazardous materials are those substances defined by *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) (42 USC Section 9601, *et seq*.), as amended by the Superfund Amendments and Reauthorization Act (40 CFR 300-372), and the *Toxic Substances Control Act* (15 USC Section 2601, *et seq*.). *The Solid Waste Disposal Act* as amended by the *Resource Conservation and Recovery Act* (RCRA) (42 USC 6901, *et seq*.), that was further amended by the Hazardous and Solid Waste Amendments, defines hazardous wastes. In general, both hazardous materials and wastes include substances that, because of their quantity, concentration, physical, chemical, or infectious characteristics, may present substantial danger to public health or welfare or to the environment when released or otherwise improperly managed.

3.3.6.1 Hazardous Materials

Hazardous materials management at Air Force installations is established primarily by Air Force Instruction (AFI) 32-7086, *Hazardous Materials Management.* The AFI incorporates the requirements of all federal regulations, other AFIs, and DoD Directives, for reduction of hazardous material uses and purchases.

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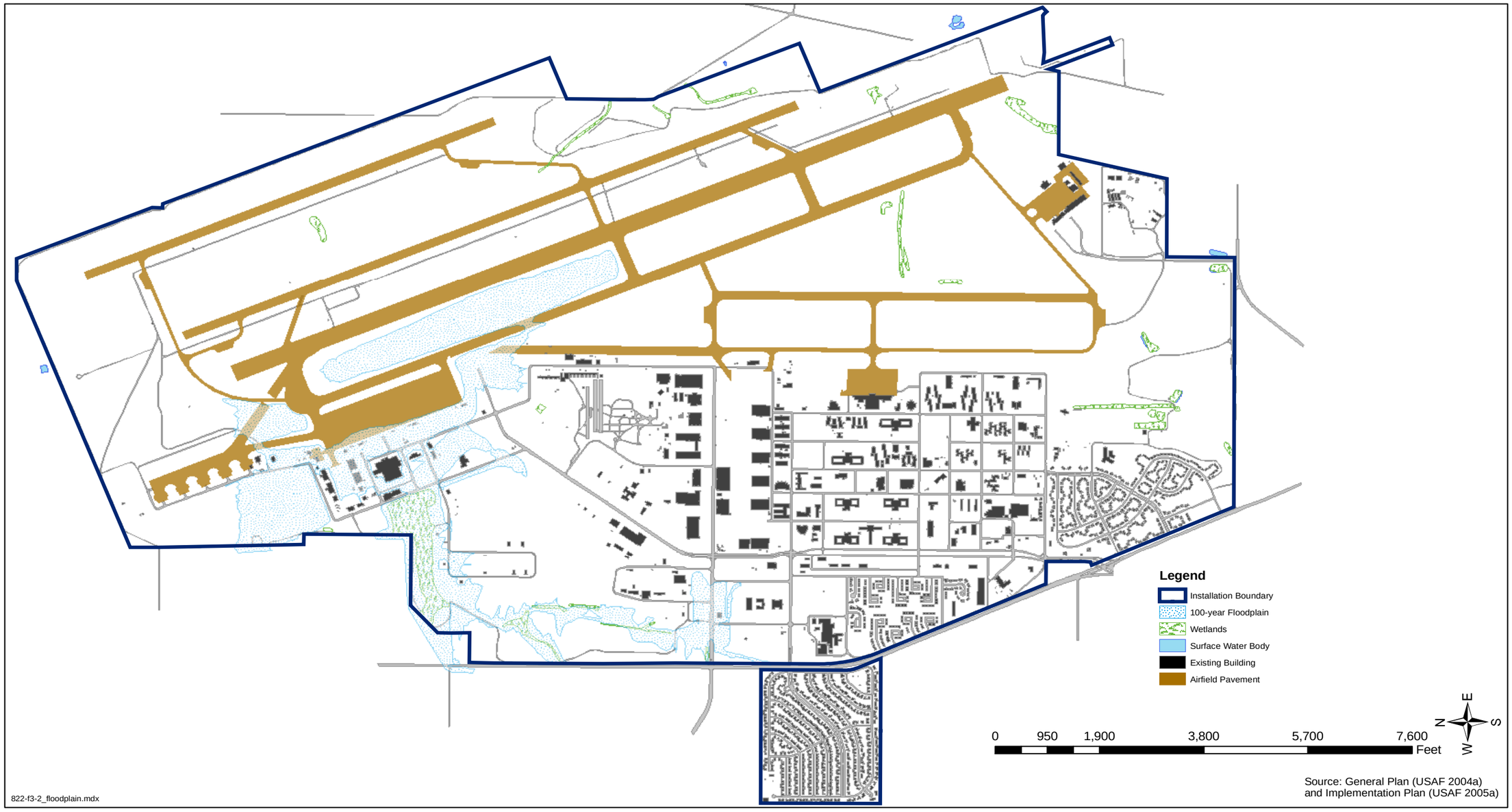

Figure 3-3 100-Year Floodplain Contour, Sheppard Air Force Base, Texas

The purchase and use of hazardous materials on Sheppard AFB must be authorized by the *Installation Hazardous Materials Management Instruction 32-7001*, established by AFI 32-7086. As part of this program, the base operates a hazardous materials pharmacy, Building 2116 and 5 additional Chemical Staging Areas (CSA). The CSAs provide the facilities to minimize, track, and control the ordering, storage, distribution, use, and disposal of hazardous materials. All hazardous materials enter the base through one of the CSAs. Base functions request the hazardous material and quantity through a CSA and the material is delivered to, or picked up by, the requesting function. Absolutely no hazardous material will be brought onto Sheppard AFB until it is entered into the standard Air Force Hazardous Materials tracking system and approved for use by the Environmental, Safety, and Occupational Health (ESOH) Team, in a specific process or application and all other requirements for its possession, storage, use and disposal are met. Office of primary responsibility for the authorization process is the 82nd Civil Engineer Squadron/Environmental Flight 82 CES/CEV (USAF 2004a).

Residents of the Sheppard AFB housing areas may purchase cleaning supplies and other chemicals for personal use that contain constituents that are classified as hazardous materials. However, the base does not track these purchases and the quantity of these materials is unknown. Small quantities of residential-type hazardous and non-hazardous substances (e.g., gasoline, maintenance and cleaning products, commercially available pesticides) likely are present in the housing units (USAF 2005c).

3.3.6.2 Hazardous Waste

Unless otherwise exempted by CERCLA regulations, RCRA Subtitle C (40 CFR Parts 260 through 270 and 280) regulations are administered by the USEPA and are applicable to the management of hazardous wastes. Hazardous waste must be handled, stored, transported, disposed, or recycled in accordance with these regulations.

Sheppard AFB has a *Hazardous Waste Management Plan* to assist in compliance with these regulations (USAF 2004b). The plan, which also applies to contractors, fulfills requirements in 40 CFR 260-270 and Texas statutes, which establish procedures to achieve and maintain regulatory compliance regarding accumulation, transportation, and disposal of hazardous waste. The base does not have a hazardous waste collection and disposal process for Military Family Housing (MFH) wastes and considers it residential waste exempted by RCRA (USAF 2005c).

Hazardous waste generated at the installation include antifreeze, paint, stripping elements, acids, batteries, oils, contaminated fuels, spent solvents, and a variety of other waste materials. The majority of waste is generated by maintenance and training activities.

Most of the hazardous waste is stored within buildings. Satellite storage sites can contain no more than 55 gallons of waste for an unlimited amount of time; 90-day storage sites can contain any amount for 90 days. Emergency spill cleanup equipment and materials are located at the Fire Department, Buildings 1093 and 10049.

3.3.6.3 Installation Restoration Program

The Installation Restoration Program (IRP) is an Air Force program to identify, quantify, and mitigate hazardous waste sites on all installations. Old landfills, fire training areas, disposal areas, and abandoned underground storage tanks are common target areas for IRP investigation and remediation efforts. Most of the installation's IRP sites are designated as finished. A few of the sites are designated as open, which indicates an investigation or that remedial action is ongoing. Land development in areas designated as open or finished is discouraged until a designation of "site closure" has been assigned. The closed designation indicates that the TCEQ agrees with the Air Force that no further remedial action is needed at that site. Upon site closure, if long-term monitoring is not required, the land may be developed. Figure 3-4 illustrates the location of IRP sites. There are currently no Records of Decision, RCRA sites, or Superfund sites at Sheppard AFB (USAF 2004a).

There are 18 IRP sites at Sheppard AFB (Table 3-10 and Figure 3-4). Decision documents for closure have been obtained for 16 of these sites, leaving only two sites in active stages of remediation: Sites LF-04 and DP-10 (USAF 2006b).

3.3.6.4 Polychlorinated Biphenyls

Polychlorinated biphenyls (PCB) are chemicals that persist in the environment, accumulate in organisms, and concentrate in the food chain. Exposure to PCBs and their by-products have been linked to chloracne (a skin disorder), bleeding and neurological disorders, liver damage, human embryo deformation, cancer, and death. PCB items consist of any containers or equipment components that contain PCBs in a concentration equal to or greater than 50 parts per million (ppm). The USEPA, under the *Toxic Substances Control Act*, regulates the removal and disposal of all PCB items. Commercial PCBs are used in electrical systems such as transformers, capacitors, and voltage regulators because they are electrically non-conductive and stable at high temperatures. Currently, no PCB-contaminated transformers remain on the installation. All pre-1978 fluorescent ballasts are corrected and disposed of as PCB devices (USAF 2004a).

3.3.6.5 Lead-based Paint and Asbestos

A prior asbestos survey of the installation reported that asbestos containing building materials were identified in most of the buildings and were present in a variety of conditions. There were no imminently dangerous situations encountered during the survey. The majority of the asbestos building materials are found in non-friable form. Lead-based paint has also been identified in buildings 147, 164, 195, 810, 1200, 1658 and approximately 66 percent of base housing (USAF 2004a).

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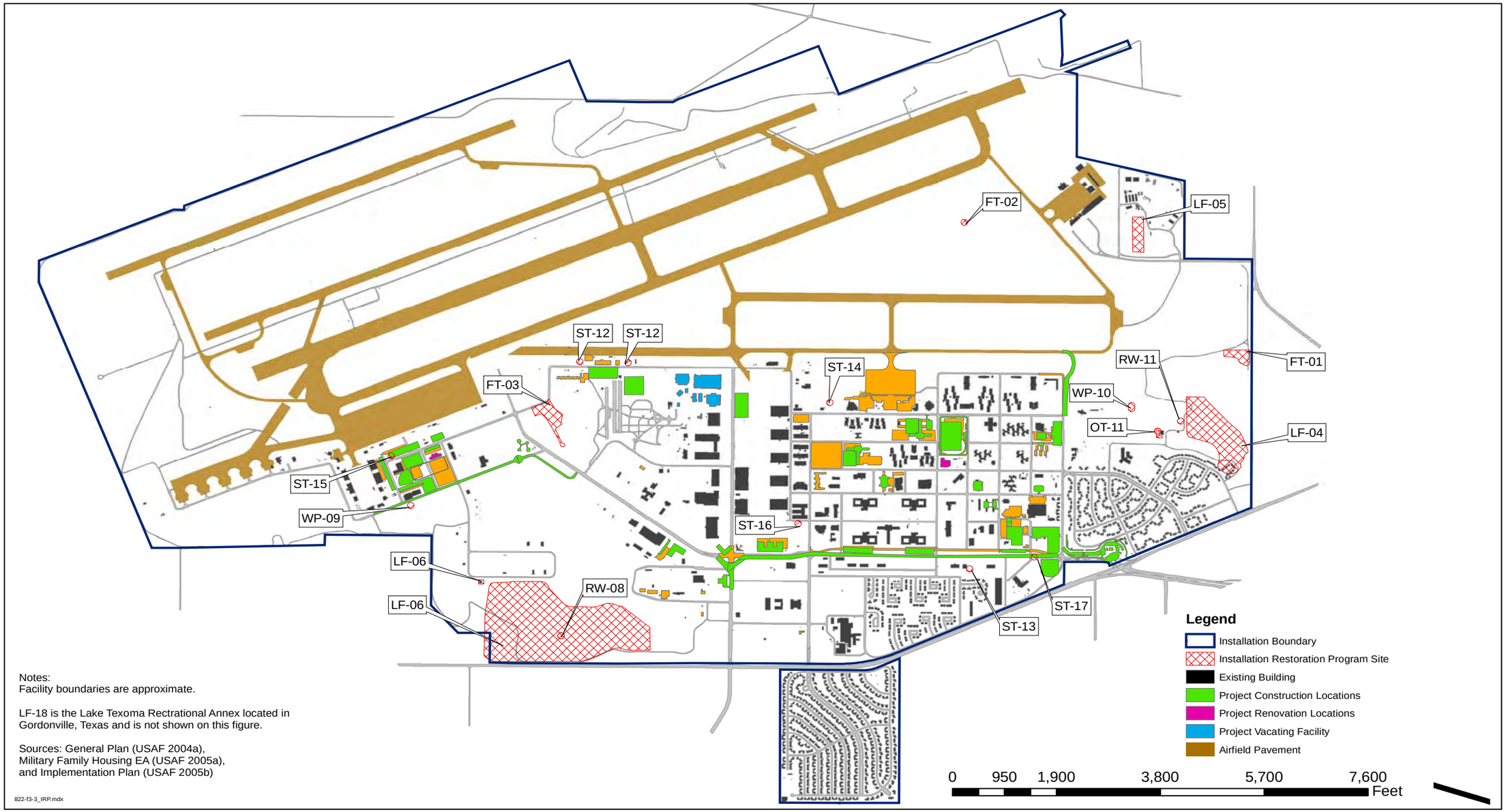

Figure 3-4 Installation Restoration Program Sites, Sheppard Air Force Base, Texas

Table 3-10 Installation Restoration Program Sites at Sheppard Air Force Base

Site Number	Site Description/Period of Use	Type of Waste(s)	Status
FT-01	Fire Protection Training Area I/ 1941 through 1957	Contaminated oil, fuel, waste solvents	Closed
FT-02	Fire Protection Training Area 2/ 1968 through 1976	Oil, fuel, solvents	Closed
FT-03	Fire Protection Training Area 3/ 1957 – 1993	Oil, fuel, solvents	Closed
LF-04	Landfill I/1941 – 1957	Base refuse, incinerator ash, WWTP, sludge, and hard fill	Closed
LF-05	Landfill 2/1960s	Base domestic refuse	Closed
LF-06	Landfill 3/1957 – 1972	Base refuse, WWTP sludge, waste oil, construction rubble, incinerator ash	Closed
RW-07	Low Level Radioactive Waste Disposal Site I/ 1950s – 1957	Hospital X-ray waste	Closed
RW-08	Low Level Radioactive Waste Disposal Site/ 1950 – 1960	Radioactive tool-single source	Closed
WP-09	Waste Pits/1966 – 1970	Solvents, PCE, TCE, DCE	Closed
WP-10	Industrial Waste Pit/1950s	Waste oil, waste fuel	Finished
OT-11	Pesticide Spray Area/ Unknown – Present	Pesticides	Closed
ST-12	Buildings 2000 & 2003 Abandoned Underground Storage Tanks/ 1954 – 1982	Diesel fuel, JP-4 jet fuel	Closed
ST-13	Former Underground Storage Tank Site/ 1932 – 1972	Diesel fuel and gasoline	Closed
ST-14	Building 990 Abandoned Underground Storage Tank/ 1949 – 1984	Diesel fuel	Closed
ST-15	Building 2540 Abandoned Underground Storage Tanks/ 1955 – 1980	JP-4 jet fuel, slop tank	Closed
ST-16	Building 920 Abandoned Underground Storage Tanks/ 1964 – 1984	Aviation fuel	Closed
ST-17	Army and Air Force Exchange Service Station/ 1953 – 1990	Waste oils, unleaded gasoline, regular gasoline	Closed
LF-18	Lake Texoma Recreational Annex/ 1956 – 1990	General refuse, oil, paints, PCE	Closure Pending

DCE	dichloroethene	TCE	trichloroethene
JP	jet propulsion fuel 4	WWTP	wastewater treatment plant
PCE	tetrachloroethene		

Source: USAF 2001

3.3.7 Biological Resources

Biological resources are defined as vegetation, wildlife, and the habitats (including wetlands) in which they occur. The ROI for biological resources at Sheppard AFB is the installation itself. Sheppard AFB is an urbanized installation, the majority of which is developed and occupied by roads, buildings, and runways. Open areas consist primarily of mowed lawns or semi-wooded lots between buildings. The base supports two state-protected species that are candidates for federal listing (USAF 2003a, Hunter 2006).

3.3.7.1 Vegetation and Wildlife

The Sheppard AFB area is typical of the rolling plains of Texas. Native woodlands of post oak and blackjack grow on sandy soils of the cross-timbers 25 to 30 miles southeast of Wichita Falls. Native trees on the upland are mesquite with elm and cottonwood in the draws or stream channels. The Natural Resource Conservation Service classifies approximately 90 percent of the area as being in the "Deep Hardland and Shallow Red Land Range Site." The natural climax vegetation includes sideoats grama, Arizona cottontop, silver bluestem, buffalo grass, and Texas wintergrass. Native trees on the upland are mesquite with elm and cottonwood in the draws or stream channels. Much of the land at Sheppard AFB is characterized as semi-improved or improved; these areas have been planted with vegetation specified on approved planting lists that are maintained for grasses, trees, evergreen shrubs, and groundcovers and vines (USAF 2003a). Representative mammal species occurring in the geographical area include white-tailed deer, raccoon, striped skunk, opossum, and coyote. Other small mammals common to the area include Eastern cottontail, black-tailed jackrabbit, and Mexican ground squirrel. Amphibians and reptiles observed on the base include red-eared slider, snapping turtle, ribbon snake, bullsnake, and bullfrog. Representative avian species occurring in the geographical region include predatory species, such as northern harriers, red-tailed hawks, and burrowing owls. Game birds observed locally include northern bobwhite, mourning dove, and wild turkey. Numerous urbanized bird species including mockingbird, rock dove, house sparrow, and northern cardinal have established resident populations in the region and on the base. Sheppard AFB is located within the migratory flight path of many bird species and sightings of listed species at the base include bald eagle, peregrine falcon, piping plover, and interior least tern (USAF 2003a, USAF 2005c, Hunter 2006).

3.3.7.2 Threatened and Endangered Species

Two state-protected species have been observed on Sheppard AFB: the Texas horned lizard (*Phrynosoma cornutum*) and loggerhead shrike (*Lanius ludovicianu*s). Although these two species are currently candidates for the federal threatened species list, at this time no federally listed threatened or endangered species are present on the installation. These species have both been sighted in the northwest corner of the base in an area already constrained by the jurisdictional wetland and IRP Site LF-06. Sheppard AFB does not have a Biological Opinion on these species, and no critical habitat has been identified (USAF 2006b, USAF 2006c).

3.3.7.3 Wetlands

Wetlands are those areas inundated or saturated by surface or groundwater at a frequency and for a duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. The characteristics of hydrophytic vegetation, hydric soils, and wetland hydrology were the criteria for determining the presence of wetland area. The overall management objective for this resource, as required by Section 404 of the *Clean Water Act* and the EO on Wetlands (EO 11990), is that there be "no net loss of wetlands." A wetland inventory was

completed for Sheppard AFB by the US Fish and Wildlife Service (USFWS) in July 1993. The installation has 41.82 acres of wetlands, of which 20.66 acres is classified as jurisdictional wetlands. Wetlands associated with Sheppard AFB are depicted in Figure 3-5 (USAF 2004a).

3.3.8 Utilities and Infrastructure

Infrastructure consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure is wholly human-made with a high correlation between the type and extent of infrastructure and to the degree to which an area is characterized as "urban" or developed. The availability of infrastructure and its capacity to support growth are generally regarded as essential to economic growth of an area. As projects on Sheppard AFB are conceptualized and planned, project engineers incorporate into those designs the infrastructure and utility specifications that would be required as part of the project.

3.3.8.1 Electricity and Natural Gas

Sheppard AFB purchases all of its electricity from the Texas Utilities Company. There is one main substation on base and no secondary substation. The base owns the substation and the distribution system it supplies, but not the feed lines. Two feeds from the Texas Utilities Company supply the installation, each with 69 kilovolts (USAF 2004a). Either feeder is sufficient to feed the base alone, but both feeders are normally maintained open for redundancy. The distribution system includes about 23 miles of primary overhead lines, 41 miles of secondary overhead lines, 24 miles of primary underground lines, and 8 miles of secondary underground lines. Consumption data collected between 2003 and 2005 indicate a peak load between 27,869 kilowatts and 29,901 kilowatts (Appendix B).

Atmos Gas supplies natural gas to Sheppard AFB. Natural gas is supplied to the base with a 1.25-inch pipeline, which is distributed to the base at approximately 20 pounds per square inch gauge. The contract based guaranteed supply is 5,520 thousand cubic feet per day (Mcf/d) and approximately 400,000 thousand cubic feet annually. The rated capacity of the gas supply line is approximately 10,024 Mcf/d (USAF 2006d). Thirty percent of the distribution system is metal pipe, and the remainder is polyethylene piping. Most of the system is looped with only some dead branches, and these will be looped if possible. The goal is to replace all metal pipes with polyethylene piping.

Annual consumption data was collected between 2003 and 2005 indicated an annual consumption between 446,565,000 cubic feet and 408,445,000 cubic feet. The corresponding peak load information estimated from the same data indicates a peak load condition of 1,862,000 cubic feet a day, which corresponds to an estimated average rate of 78,583 cubic feet an hour (Appendix B).

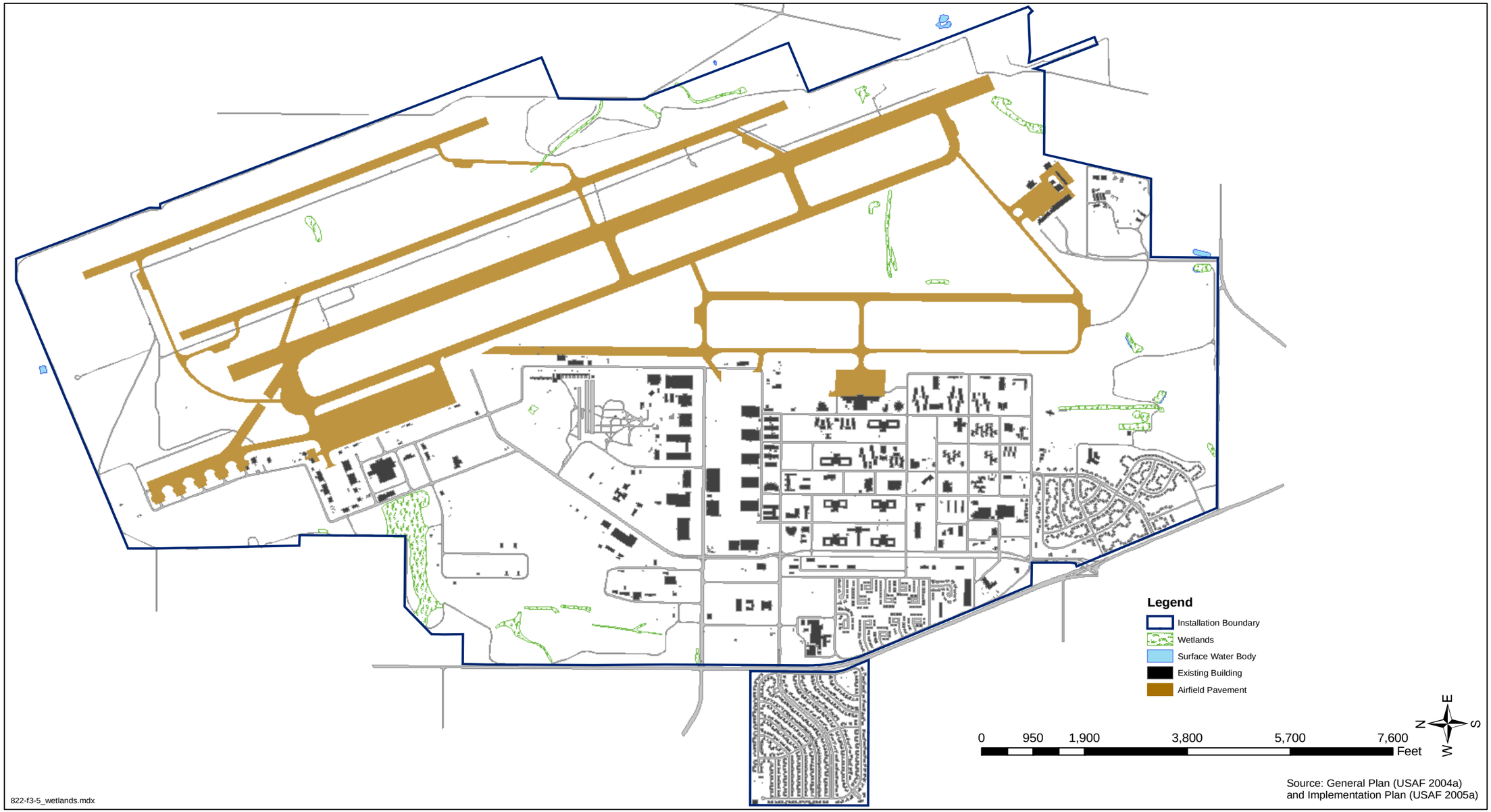

Figure 3-5 Wetlands Areas, Sheppard Air Force Base, Texas

3.3.8.2 Potable Water

The installation purchases all of its potable water from the City of Wichita Falls, Texas. The sources of this water are Lake Arrowhead and Lake Kickapoo. Potable water is delivered from the city-owned Puckett water tower to the Capehart housing area and to the Building 140 area and is connected into the base system (USAF 2004a).

The Sheppard AFB potable water system was designed to supply 6.552 million gallons per day (mgd), based on infrastructure analysis provided in the *Resource Capability* report (USAF 2006b). The City of Wichita Falls' potable water supply capability was recently increased from 54 mgd to 64 mgd and is anticipated to reach 76 mgd upon the finalization of improvements scheduled for completion by the end of 2006 (Taylor 2004). Potable water consumption at Sheppard AFB in FY2005 averaged approximately 1.24 mgd; the maximum daily consumption was estimated as 1.82 mgd based on monthly consumption reported for July 2005 (USAF 2006d).

3.3.8.3 Solid Waste Management

Municipal solid waste at Sheppard AFB is managed in accordance with the guidelines specified in AFI 32-7042, *Solid and Hazardous Waste Compliance*. The instruction incorporates by reference the requirements of Subtitle D, 40 CFR Parts 240 through 244, 257, and 258, and other applicable federal regulations, AFIs and DoD Directives. In general, AFI 32-7042 establishes the requirement for installations to have a solid waste management program to incorporate the following: a solid waste management plan; procedures for handling, storage, collection, and disposal of solid waste; record keeping and reporting; and pollution prevention.

Non-hazardous municipal solid waste at Sheppard AFB is collected by a private contractor and disposed off base at the Buffalo Creek Landfill (formerly the Iowa Park Landfill), a Type I landfill operated under TCEQ Permit Number 1571. The landfill currently receives 202,197 tons of waste per year (648 tons per day average, 312 days per year) based on 2004 data (TCEQ 2006a). The landfill is anticipated to remain open for another 100 years with the current reported data (USAF 2004a).

Installation refuse is collected from base housing and industrial and work areas by a contractor and then disposed of off site. Organic (food) waste from the dining facilities on the installation is also collected by the refuse contractor and transported to the city of Wichita Falls' regional compost facility. There are no on-base landfills in operation. No limiting development factors have been reported. Morale, Welfare, and Recreation began a recycling program in 1989. The Civil Engineering Squadron took over the program in 1995, changing its main focus to meet the installation's solid waste reduction goals. The recycling program includes collection of base administration, training and industrial office waste paper, plastics, aluminum cans, newspapers and cardboard, and collection of scrap metal through curbside collection in the housing area by the Housing Privatization Contractor. Sheppard AFB supports a large amount of community involvement related to the base recycling program, by serving as a mentor to other agencies locally and instituting recycling programs in base housing (USAF 2004a).

3.3.8.4 Wastewater

Sheppard AFB discharges its wastewater to the City of Wichita Falls' wastewater collection system. Approximately 80 percent of the base's wastewater is discharged to the River Road Wastewater Treatment Plant south of the base. The remaining 20 percent flows to the North Side Wastewater Treatment Plant. The installation tests the wastewater biannually. Both city-owned treatment plants discharge to the impaired 303(d)-listed Segment Number 0214 of the Wichita River. However, the impairment does not affect the base's discharge requirements or limitations (Appendix B).

The FY2005 annual wastewater discharge was 277,572,000 gallons with an average daily wastewater effluent of 0.76 mgd. The November 2004 estimated maximum daily flow was 1.10 mgd. Estimated maximum daily flows from historical peak flow months were 1.46 mgd in August 2001, 1.22 mgd in July 2002, and 1.24 mgd in September 2003 (USAF 2006d).

A cross-flow/cross-connection study in 1993 identified some deterioration problems in the wastewater collection system. These are being addressed as part of ongoing system maintenance. Although many portions are aged and subject to failure, Sheppard AFB's wastewater collection system is structurally adequate to handle the current mission needs (USAF 2004a). The historical peak average daily flows are less than 32 percent of the average daily rate estimated from the annual contracted amount and less than 32 percent of the design capacity of the base wastewater collection system. No overall capacity limitations regarding the long-range development plan are anticipated.

3.3.8.5 Transportation

Sheppard AFB is located adjacent to and north of the city of Wichita Falls, Wichita County, Texas. Access to the base is off State Highway 240 (Burkburnett Road), which is the main north-south thoroughfare paralleling the west side of the installation. The closest interstate to Sheppard AFB is Interstate 44. Missile Road and the Highway 325 Spur connect Interstate 44 and Burkburnett Road in the vicinity of the base.

Sheppard AFB has three entrance gates off Burkburnett Road. The Front Gate and Visitors Center is located on the south side of the base. This entrance leads into the intersection of First Avenue and Avenues D and E. The Hospital Gate is located about one mile north of the Front Gate on the west side of the base in direct line with the entrance to the Capehart housing area. Its access into the base is Ninth Avenue. Missile Road Gate is located slightly north of the Hospital Gate at Missile Road. The current gate system is functional but has insufficient capacity to process current and anticipated future demands during peak hours without lines forming onto public roads and delays caused to gate users (USAF 2004a).

The existing road network at Sheppard AFB consists of approximately 32 miles of roads and streets, primarily constructed of asphalt pavement (Figure 3-6). The base road network is a grid-type pattern, except for one diagonal road (Bridwell Road) that was formerly Kell Field runway. Ninth Avenue divides the built-up area of the base into two distinctive north and south portions. The primary roads in the northern portion of the base are Avenues D and E, Bridwell Road, and Missile Road to Avenues D and E. Secondary roads are Avenue H, Avenue J, Tenth Avenue, Missile Road east of Avenues D and E, and 21st Avenue. The primary roads in the southern portion of the base are Avenues D and E, Avenue J, First Avenue, and Ninth Avenue. Secondary roads that serve the southern portion of the base are Nehls Boulevard through the Wherry housing area, Falcon Boulevard through the Capehart housing area, and Avenue H.

Parking at Sheppard AFB is currently constrained by anti-terrorism/force protection measures, which require a large portion of parking lots to be reduced or blocked off entirely. The base also does not presently have a good network of troop walks, bike paths, or walkways. Troop walks currently use existing sidewalks, roadways, and aircraft pavement areas.

3.3.8.6 Stormwater Drainage

The stormwater drainage system supports drainage to sustain normal surface runoff and prevent flooding. Sheppard AFB has three designated stormwater drainage outfalls. Table 3-11 summarizes drainage area characteristics for the three drainage areas. Figure 3-7 shows the on-base portions of the drainage areas and their respective outfalls at Sheppard AFB. Four major subsurface piping systems convey runoff east toward Bear Creek and south toward Plum Creek, both of which eventually drain to the Wichita River (USAF 1997).

Table 3-11 Baseline Drainage Area Conditions

Drainage Area	Total Drained Area (acres)	Impervious Area (acres)	Pervious Area (acres)	Percent Impervious
1	2,880	643	2,237	22
2	1,033	217	816	21
3	727	283	444	39
Totals	**4,640**	**1,143**	**3,497**	**25**

Note: Basin drainage area calculated from information provided in the *Stormwater Pollution Prevention Plan* (USAF 2005b). Drainage area only includes on-base area. Impervious cover determined from most current Geographical Information System layer provided by the base.

Installation stormwater, managed under the *Sheppard AFB Stormwater Pollution Prevention Plan*, discharges through three outfalls into three tributaries, one of which flows into the Wichita River and then into the Red River. The base collects stormwater samples quarterly during significant rain periods for analysis of ammonia, chemical oxygen demand, biochemical oxygen demand, and pH. Annual stormwater sampling is also conducted and samples are analyzed for arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, and zinc.

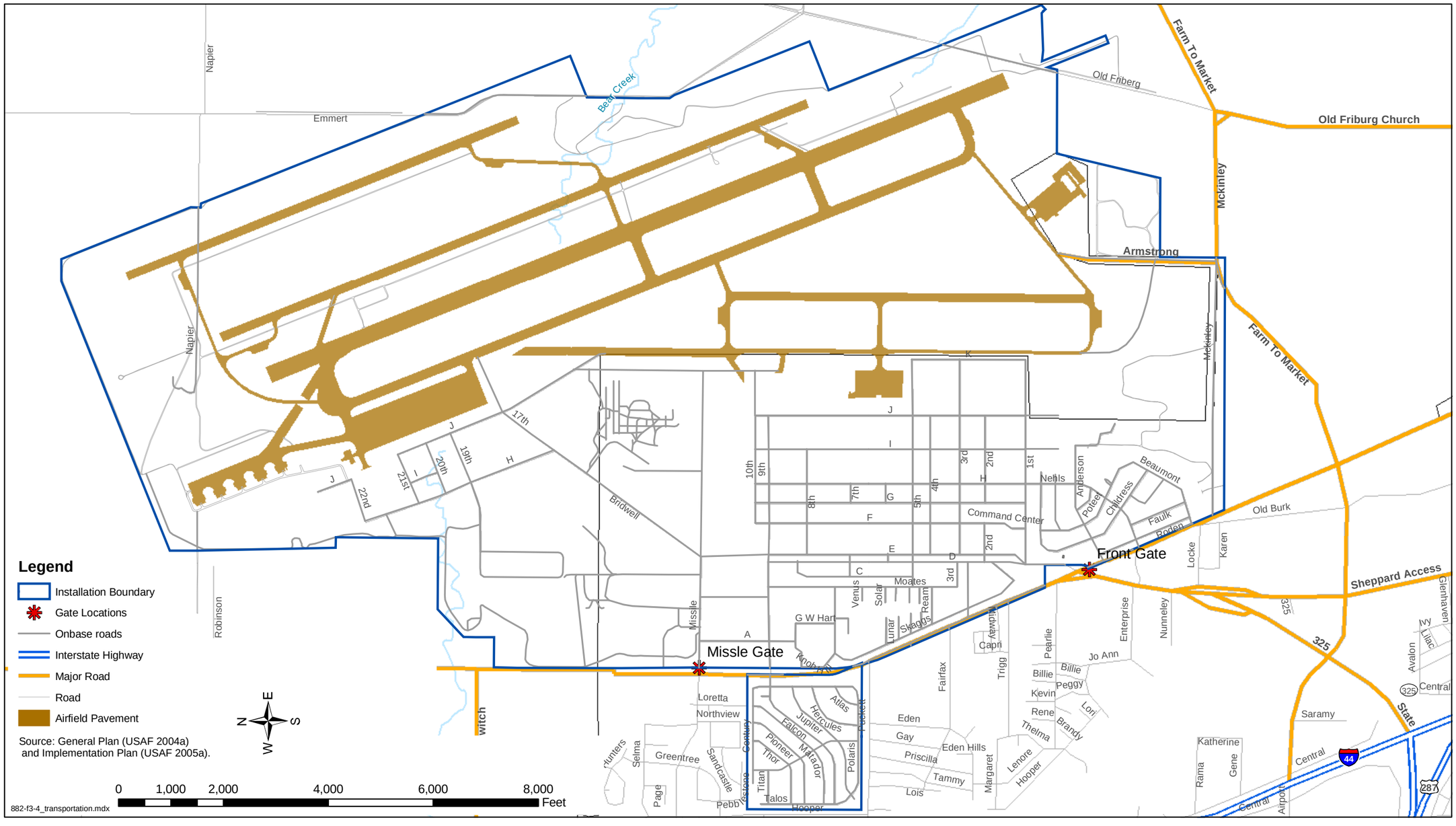

Figure 3-6 Transportation System, Sheppard Air Force Base, Texas

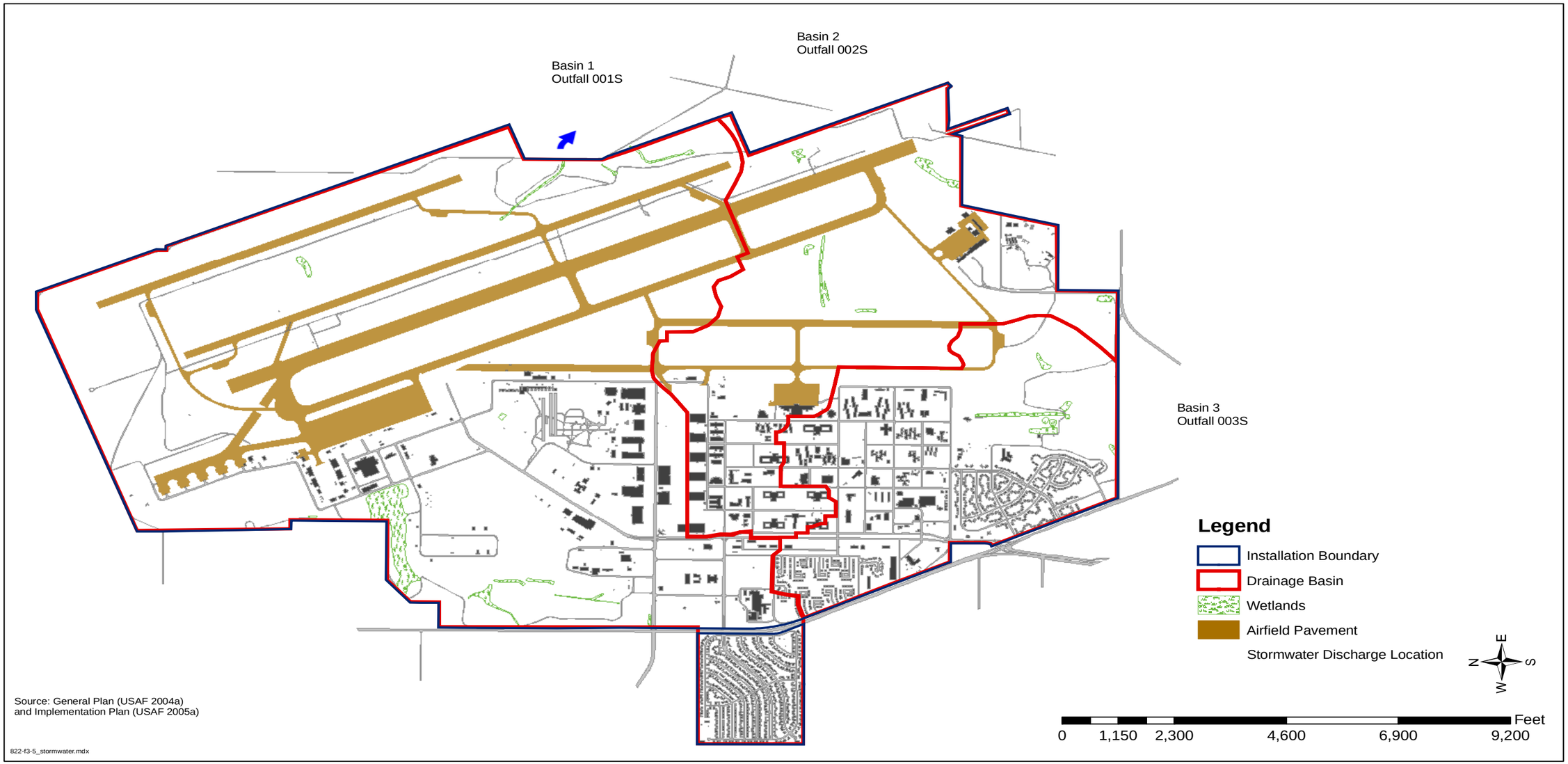

Figure 3-7 Stormwater Drainage Basins, Sheppard Air Force Base, Texas

3.3.9 Socioeconomics and Environmental Justice

Socioeconomic resources are defined as the basic attributes associated with the human environment, generally including factors associated with population, housing, education, and the economy. Direct impacts to any of these factors may generate secondary effects on other factors, resulting in a series of potential socioeconomic ramifications within the affected area.

Concern that certain disadvantaged communities may bear a disproportionate share of adverse health and environmental effects compared to the general population led to the enactment in 1994 of EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This executive order directs federal agencies to address disproportionate environmental and human health effects in minority and low-income communities. EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, was enacted in 1997, directing federal agencies to identify and assess environmental health and safety risks to children, coordinate research priorities on children's health, and ensure that their standards take into account special risks to children.

Environmental justice analysis applies to adverse environmental impacts. Potential disproportionate impacts to minority or low-income populations are assessed only when adverse environmental consequences to the human population are anticipated, otherwise no analysis is required. The same is true for analysis of special risks to children, which would be driven by adverse environmental impacts. If adverse impacts are not anticipated, no special risk to children analysis is required.

3.3.9.1 Population

The baseline population associated with Sheppard AFB is 20,787 persons, including 3,548 military personnel, 5,966 average student population, 6,321 military dependents, 3,963 civilian personnel, and 989 transient personnel (see Table 3-12). The baseline population in this section differs from the baseline data presented in Appendix B in that the socioeconomic analysis includes off-base military dependents. An estimated 51 percent of the Sheppard AFB population resides on base, including 6,918 personnel and 3,618 dependents. The remaining 49 percent reside off base, comprised of 7,548 personnel and 2,703 dependents. The base population constitutes 19.9 percent and 13.7 percent of the City of Wichita Falls and the Wichita Falls MSA populations, respectively.

The Wichita Falls MSA experienced moderate population growth between 1990 and 2000, increasing by 8.0 percent between 1990 and 2000. By comparison, the Texas population increased by 22.8 percent during the prior decade, reaching a 2005 population of 22,859,968 persons (US Bureau of the Census [USBC] 2006a, USBC 2006b). Since 2000, the MSA has declined in population, decreasing 3.4 percent between 2000 and 2005. The 2005-estimated population of the Wichita Falls MSA was 146,276 persons, down from 151,524 persons in 2000. The City of Wichita Falls, which comprises about 70 percent of the MSA, has experienced similar population trends, decreasing 1.8 percent from 104,197 persons in 2000 to an estimated 2003 population of 102,340 persons.

Table 3-12 Sheppard Air Force Base Baseline Population

	Living on Base	Living off Base	Total
Military Personnel	1,687	1,861	3,548
Student Personnel	4,242	1,724	5,966
Military Dependents	3,618	2,703	6,321
Civilian Personnel	0	3,963	3,963
Transient Personnel	989	0	989
Total Baseline Population	**10,536**	**7,548**	**20,787**

Source: Appendix B

Table 3-13 identifies total population and percentage disadvantaged and youth populations in the City of Wichita Falls, the three counties comprising the Wichita Falls MSA, the State of Texas, and the United States. The proportion of minority residents in the region associated with the proposed action and alternatives is lower than for the state overall. Minority persons as a percentage of the total population represent a range of 6.7 percent in Clay County to 28.3 percent in Wichita County, and comprise 31.5 percent of the City of Wichita Falls population. In the State of Texas, minorities comprise 50.2 percent of the population. Persons of Hispanic or Latino origin represent the predominant minority group in each jurisdiction, followed closely by Black persons and Asian persons.

Table 3-13 Total Population and Populations of Concern (2005)

	Total Population	Percent Minority	Percent Low-Income	Percent Youth
City of Wichita Falls[1]	102,340	31.5%	14.3%	27.0%
Archer County	9,095	7.7%	9.1%	24.9%
Clay County	11,287	6.7%	11.1%	22.3%
Wichita County	125,894	28.3%	15.6%	25.4%
Wichita Falls MSA	146,276	24.5%	12.0%	26.5%
State of Texas	22,859,968	50.2%	16.2%	27.9%
United States	281,421,906	30.9%	12.4%	25.7%

Note: City of Wichita Falls population is for calendar year 2003. Ratios for population of concern are calendar year 2005 estimates.

% percent MSA Metropolitan Statistical Area

USBC US Bureau of the Census

Source: USBC 2006a and 2006b

The incidence of poverty in the affected region is somewhat below the state average, which is 16.2 percent. Individuals living below the poverty level account for 14.3 and 12.0 percent of the population in the City of Wichita Falls and the MSA, respectively, and between 9.1 percent and 15.6 percent in the three MSA counties. The demographic data indicate that minority and low-income groups do not represent a disproportionate number of the ROI population.

The youth population, comprised of children under the age of 18 years, is relatively consistent throughout the region, with no known concentrated areas of concern where youth might experience special health or safety risks. Children constitute 26.5 percent of the population in the Wichita Falls MSA overall, comparable to the state youth population of 27.9 percent.

3.3.9.2 Housing

The MFH inventory at Sheppard AFB includes 1,210 units in the Capehart, Wherry, and Bunker Hill Housing Areas (USAF 2006e). Unaccompanied housing at Sheppard AFB consists of 588 total units, including 192 Officers' Quarters and 396 Enlisted Quarters. There are presently 6,610 bed spaces for student use in NPS dormitories. Housing for transient use includes 248 Visiting Officers' Quarters, 929 Visiting Airmen's Quarters, 54 Visiting Quarters, and 77 temporary lodging facility spaces. The utilization rate in non-MFH housing units is 67 percent. MFH units are generally fully occupied.

According to the Census, there were a total of 63,829 housing units in the Wichita Falls MSA in 2005 (USBC 2006b). The vacancy rate was 13.1 percent, and the homeownership rate was 58.1 percent. The City of Wichita Falls had 41,916 housing units, of which 13.2 percent were vacant and 52.8 were owner-occupied. The median value of owner-occupied homes in the MSA was $74,000. There were 37,970 households in the City of Wichita Falls, with an average household size of 2.46 persons.

3.3.9.3 Education

There are four independent school districts (ISD) serving the population surrounding Sheppard AFB, with an estimated total enrollment of 21,571 students in the 2005-2006 school year (see Table 3-14). Military dependents residing in the Capehart and parts of Bunker Hill Housing Areas attend Burkburnett ISD schools. School-age dependents in the Wherry and the remainder of Bunker Hill Housing Areas attend schools in the Wichita Falls ISD. The Wichita Falls ISD is the largest of the four districts, with over 15,000 students enrolled in the district's 33 schools. Student-teacher ratios in the Burkburnett and Wichita Falls ISD are 13.7 to one and 13.9 to one, respectively.

Table 3-14 Wichita County Public School Enrollment (2004-2005)

	Enrollment	Teachers	Student-Teacher Ratio
Burkburnett Independent School District	3,546	259	13.7
City View Independent School District	1,082	77	14.1
Iowa Park Independent School District	1,905	124	15.4
Wichita Falls Independent School District	15,038	1,082	13.9
Total	**21,571**	**1,542**	**14.0**

Source: Texas Education Agency 2006a and 2006b

3.3.9.4 Economy

The civilian labor force in the Wichita Falls MSA included 66,177 persons in 2005, of which 62,132 were employed (USBC 2006b). The unemployment rate in 2005 was 6.1 percent. Median household income was $40,397 and persons below the poverty level represent 12.0 percent of the population. In the City of Wichita Falls, 38,135 persons were employed, and the unemployment rate in 2005 was 7.5 percent.

In addition to the traditional northern Texas industries of agriculture and oil/gas production, economic activity in the Wichita Falls region has diversified to include manufacturing, military, health care, and education. The greater Wichita Falls area is home to over 180 manufacturing firms, accounting for 14 percent of regional employment and $300 million in annual payroll (Wichita Falls Board of Commerce and Industry [BCI] 2006). Local farming and ranch operations, by incorporating new technology and contemporary methods, continue to represent an important part of the economy.

Sheppard AFB is by far the largest single employer in the region with 14,466 total personnel, and is considered a primary economic driver in the Wichita Falls region (Wichita Falls BCI 2006). Annual payroll is $380 million. The estimated annual economic impact of the base on the surrounding region is $680 million. The base enjoys a supportive relationship with the Wichita Falls community. Other large employers in Wichita Falls are presented in Table 3-15.

Table 3-15 Wichita Falls Top Ten Employers

	Product	Employees
Sheppard Air Force Base	Military	14,466
Wichita Fall Independent School District	Public School System	2,023
North Texas State Hospital	Health Care	2,016
United Regional Healthcare System	Health Care	1,871
James V. Allred Unit	State Maximum Security Prison	1,120
City of Wichita Falls	City Government	1,096
Howmet Corporation—WF Casting Division	Gas Turbines/Engine Components	988
Vetrotex America—Division of Saint-Gobain	Fiberglass Reinforcements	888
Cryovac Division—Sealed Air Corporation	Flexible Packaging	750
Cingular Wireless	Customer Service	787

Source: Wichita Falls Bureau of Commerce and Industry 2006

3.3.10 Cultural Resources

3.3.10.1 Definition of the Resource

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, and any other physical evidence of human activity considered important to a culture or community for scientific, traditional, religious, or other reasons. They include archaeological resources (both prehistoric and historic), historic architectural resources,

and American Indian sacred sites and traditional cultural properties. Under 36 CFR 800, federal agencies must take into consideration the potential effect of an undertaking on "historic properties," which refers to cultural resources listed in, or eligible for inclusion in, the *National Historic Preservation Act* (NHPA) of 1966, as amended.

Numerous laws and regulations require that possible effects to cultural resources be considered during the planning and execution of federal undertakings. These laws and regulations stipulate a process of compliance, define the responsibilities of the federal agency proposing the action, and prescribe the relationship among other involved agencies (e.g., the State Historic Preservation Officer [SHPO] and the Advisory Council on Historic Preservation). In addition to the NEPA, the primary laws that pertain to the treatment of cultural resources during environmental analysis are the NHPA (especially Sections 106 and 110), the *Archaeological Resources Protection Act*, the *American Indian Religious Freedom Act*, and the *Native American Graves Protection and Repatriation Act*.

Cultural resources determined to be potentially significant under the given legislation are subject to protection from adverse impacts resulting from an undertaking. To be considered significant, cultural resources must meet one or more of the criteria established by the National Park Service that would make that resource eligible for inclusion in the National Register of Historic Places (NRHP). The term "eligible for inclusion in the National Register" includes both properties formally determined as such by the Secretary of the Interior and all other properties that meet National Register listing criteria, which are specified in Department of Interior regulations (36 CFR 60.4). Therefore, sites not yet evaluated may be considered potentially eligible to the NRHP and afforded the same regulatory consideration as nominated properties.

Cultural resource management at Air Force installations is established in AFI 32-7065, *Cultural Resources Management*. AFI 32-7065 details compliance requirements for protecting cultural resources including the preparation of a Cultural Resources Management Plan (CRMP). The CRMP must include an inventory and evaluation of all known cultural resources; identification of the likely presence of other significant cultural resources; description of installation strategies for maintaining cultural resources and complying with related resource statutes, regulations, policies, and procedures; standard operating procedures and action plans that include budget, staffing and scheduling activities; clear identification and resolution of the mission impact on cultural resources; and conformance with local, state, and federal preservation programs (USAF 1994). Sheppard AFB completed a CRMP in 2003 (USAF 2002b).

3.3.10.2 Existing Conditions

Sheppard AFB is required to consider the effects of its undertakings on historic properties listed, or eligible for listing, in the National Register. NHPA obligations to a federal agency are independent from NEPA and must be complied with even when an environmental document is not required. In accordance with AFI 32-7065 Sections 3.3.1 and 3.3.2 and 36 CFR 800.8, Sheppard AFB incorporates NHPA Section 106 review into

the NEPA process or substitutes the NEPA process for a separate NHPA Section 106 review of alternatives.

For ease of discussion, cultural resources have been divided into two categories: (1) archaeological resources (prehistoric, historic, and traditional) and (2) historical resources (historic buildings and structures including architectural significance).

Archaeological Resources

The National Park Service conducted a Cultural Resource Assessment of Sheppard in 1993 (USAF 1993). During this investigation, the potential for archaeological sites was assessed and buildings, structures and other facilities approaching or older than 50 years were identified. This assessment noted that extensive surface disturbance at Sheppard AFB, primarily from prior airfield construction and other development activity, would have most likely exposed and disturbed any archaeological sites that may have been of historical significance. The study found that there was little potential for intact archaeological resources and recommended that no additional investigations be conducted.

Nine archaeological sites have been recorded in Wichita County; however, no archaeological sites within Sheppard AFB boundaries have been recorded. No archaeological sites within Sheppard AFB boundaries have been listed on the NRHP, and no archaeological sites have been listed as State Archaeological Landmarks (USAF 1993).

Historical Resources

Aviation at the site of Sheppard AFB began in the 1920s. C.W. Cahoon, Jr., Joe B. Carrigan, and Charles I. Francis, former Army Signal Corps pilots, felt the need for a public air terminal in Wichita Falls. They acquired 238 acres of land about six miles north of the city and began construction on the spot on May 4, 1928. The airport was named Kell Field in honor of Frank Kell. The first building completed at the airport was a large steel hangar on the southwest portion of the field. Shortly after, the Kell Field Air Terminal (Building 2130) was constructed to house the airport's administrative offices.

The National Park Service conducted an investigation of Sheppard AFB in 1993 that resulted in the *Cultural Resource Assessment* (USAF 1993). During this investigation, the potential for archaeological sites was assessed and buildings, structures and other facilities approaching or older than 50 years were identified. The study found that there was little potential for intact archaeological resources and recommended that no additional investigations be conducted. The study also recommended that the installation initiate an historic structure inventory and evaluation of the 73 buildings and structures and the 18 auxiliary facilities identified as dating between 1928 and 1950.

A *Cold War-Era Buildings and Structures Inventory and Assessment* was conducted in 2002 (USAF 2002a). It determined which facilities were eligible for listing on the NRHP. The B-52 alert pads, Building 2560, and Building 2130 have been determined by the Texas Historical Commission as having historical significance. Building 2130, also known as the Little Adobe, was built circa 1928 and was dedicated as a recorded Texas Historical Landmark in November 1981. The Little Adobe is currently used as a historical museum (Heritage Center). The building is constructed of cement blocks covered with stucco, in a style that is typical of service buildings of the late 1920s (USAF 1993). Building 2560, which is positioned next to the B-52 alert pads, was used during the Cold War as the Strategic Air Command alert building.

In addition to the Little Adobe, six buildings are apparently associated with Kell Field. Fifteen permanent and 48 semi-permanent facilities were constructed during World War II, with four additional permanent structures constructed in 1948 and 1949. The CRMP has indicated that an historic structures inventory project for the identification and evaluation of these facilities is warranted (USAF 2002b).

3.3.11 Air Quality

This section discusses air quality considerations and conditions in the area around Sheppard AFB, Texas. It addresses air quality standards and describes current air quality conditions in the region.

3.3.11.1 Definition of the Resource

3.3.11.1.1 Federal Air Quality Standards

Air quality in a given location is described by the concentration of various pollutants in the atmosphere, generally expressed in units of ppm or micrograms per cubic meter (µg/m3). Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The significance of a pollutant concentration is determined by comparing it to federal and state ambient air quality standards. These standards represent the maximum allowable atmospheric concentration that may occur and still protect public health and welfare, with a reasonable margin of safety. The national ambient air quality standards (NAAQS) are established by the USEPA.

In order to protect public health and welfare, the USEPA has developed numerical concentration-based standards or NAAQS for six "criteria" pollutants (based on health related criteria) under the provisions of the Clean Air Act (CAA Amendments of 1970). There are two kinds of NAAQS: primary and secondary standards. Primary standards prescribe the maximum permissible concentration in the ambient air to protect public health including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards prescribe the maximum concentration or level of air quality required to protect public welfare including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

National ambient air quality standards have been established for: (1) ozone (O_3); (2) nitrogen dioxide (NO_2); (3) carbon monoxide (CO); (4) sulfur oxides (sulfur oxide measured in terms of sulfur dioxide [SO_2]); (5) lead; and (6) particulate matter. Particulate matter standards incorporate two particulate size classes: (1) particulate matter with an aerodynamic diameter (diameter of a spherical particle having a density of 1 gm/cm^3 that has the same inertial properties (terminal settling velocity) in the gas as the particle of interest) less than or equal to 10 microns (PM_{10}), (2) and particulate matter with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$). The NAAQS are the cornerstone of the CAA. Although not directly enforceable, they are the benchmark for the establishment of emission limitations by the states for the pollutants that USEPA determines may endanger public health or welfare. The federal ambient air quality standards are presented in Table 3-16.

Table 3-16 National Ambient Air Quality Standards

Pollutant	Primary Standards	Averaging Times	Secondary Standards
Carbon Monoxide (CO)	9 ppm (10 mg/m^3)	8-hour[1]	None
	35 ppm (40 mg/m^3)	1-hr[1]	None
Lead (Pb)	1.5 µg/m^3	Quarterly Average	Same as Primary
Nitrogen Dioxide (NO_X)	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary
Particulate Matter (PM_{10})	Revoked[2]	-	-
	150 µg/m^3	24-hr[3]	-
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual[4] (Arithmetic Mean)	Same as Primary
	35 µg/m^3	24-hr[5]	-
Ozone (O_3)	0.08 ppm	8-hr[6]	Same as Primary
	0.12 ppm	1-hr[7] (Applies in limited areas)	Same as Primary
Sulfur Oxides	0.03	Annual (Arithmetic Mean)	-
	0.14	24-hr[1]	-
	-	3-hr[1]	0.5 ppm (1300 µg/m^3)

Note:

[1]Not to be exceeded more than once per year.

[2]Due to lack of evidence linking health problems to long-term exposure to coarse particulate pollution, USEPA revoked the annual PM_{10} standard in 2006. Effective on December 18, 2006.

[3]Not to be exceeded more than once per year on average over 3 years

[4]To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.

[5]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/m^3 (the previous standard was 65 µg/m^3). Effective on December 18, 2006.

[6]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.

[7](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 fourteen 8-hour ozone nonattainment Early Action Compact Areas. The one hour standard applies to three areas in Texas: (1) Austin-San Marcos Area, (2) Northeast Texas Area (Longview-Tyler Area), and (3) San Antonio Area.

mg/m^3	milligrams per cubic meter	hr	hour
µg/m^3	micrograms per cubic meter	ppm	parts per million
CFR	*Code of Federal Regulations*	USEPA	United States Environmental Protection Agency
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to 2.5 microns		
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to 10 microns		

Source: 40 CFR 50

O_3 (ground-level O_3), a major component of "smog", is not directly emitted into the atmosphere but is formed in the atmosphere through the reactions of previously emitted pollutants or precursors (volatile organic compounds [VOC] and nitrogen oxides [NO_X]) in the presence of sunlight. Large spatial and temporal separation can exist between the emission sources of VOCs and NO_X and the formation of O_3. Since VOCs and NO_X participate in atmospheric photochemical reactions that produce O_3, the attempt is made to control O_3 through the control of VOCs and NO_X. For this reason, VOCs and NO_X emissions are calculated and reported in emissions inventories.

The fundamental method by which the USEPA tracks compliance with the NAAQS is the designation of a particular region as "attainment," "nonattainment," or "unclassifiable." Areas meeting or having better air quality than the NAAQS are said to be in attainment. Areas that exceed the NAAQS are said to be in nonattainment. Areas that cannot be classified on the basis of available information as attainment or nonattainment are defined as unclassifiable and are treated as attainment areas. Attainment areas can be further classified as maintenance areas. Maintenance areas are areas that were previously nonattainment but have reduced pollutant concentrations below the standard and must maintain some of the nonattainment area plans (maintenance plans) to stay in compliance.

3.3.11.1.1.1 State Air Quality Standards

The CAA gives states the authority to establish air quality rules and regulations. These rules and regulations must be equivalent to, or more stringent than, the federal program. The TCEQ has adopted the primary and secondary NAAQS as duly promulgated by the USEPA.

3.3.11.1.1.2 State Implementation Plan

The states have primary responsibility to implement the CAA; the primary vehicle for this implementation is the state implementation plan (SIP). A SIP is an enforceable plan developed by the state that explains how the state will comply with air quality standards and other according to the federal CAA. It is essentially a collection of regulations that explain how a state will clean up polluted areas under the CAA.

Each state is required to develop a SIP that sets forth how CAA provisions will be imposed within the state. The SIP is the primary means for the implementation, maintenance, and enforcement of the measures needed to attain and maintain the NAAQS within each state and includes control measures, emissions limitations, and other provisions required to attain and maintain the ambient air quality standards. The purpose of the SIP is twofold. First, it must provide a control strategy that will result in the attainment and maintenance of the NAAQS. Second, it must demonstrate that progress is being made in attaining the standards in each nonattainment area. TCEQ has a federally approved SIP for designated nonattainment areas and it is embodied in Title 30 Texas Administrative Code Chapters 106, 111-119, and 122.

3.3.11.1.1.3 Prevention of Significant Deterioration

Section 160 of the CAA establishes the Prevention of Significant Deterioration (PSD) program. PSD applies to new major sources or major modifications at existing sources for pollutants where the area the source is located in is in attainment or unclassifiable with the NAAQS. Major sources are defined as any stationary pollutant source with potential to emit more than 100 tons per year (tpy). In PSD areas, the cutoff level may be either 100 or 250 tons, depending upon the type of source. A major modification is a modification of a major stationary source of emissions with respect to PSD.

The goal of the program is to: (1) protect public health and welfare from any adverse effects which might occur even at pollutant levels better than the NAAQS; (2) insure economic growth while preserving existing air quality; (3) preserve, protect, and enhance the air quality in areas of special natural recreational, scenic, or historic value, such as national parks and wilderness areas; and (4) assure that emissions from any source in a state will not interfere with any portion of the applicable SIP to prevent significant deterioration of air quality. Sources subject to PSD review are required by the CAA to obtain a permit before commencing construction. The permit process requires an extensive review of all other major sources within a 50-mile radius and of all Class I areas within a 62-mile radius of the facility. Emissions from any new or modified source must be controlled using Best Available Control Technology (an emissions limitation that is based on the maximum degree of control that can be achieved).

Section 162 of the CAA further established the goal of PSD of air quality in all international parks; national parks which exceeded 6,000 acres; and national wilderness areas and memorial parks which exceeded 5,000 acres if these areas were in existence on August 7, 1977. These areas were defined as mandatory Class I areas, while all other attainment or unclassifiable areas were defined as Class II areas. National parks and wilderness areas are designated as Class I areas, where any appreciable deterioration in air quality is considered significant. Class II areas are those where moderate, well-controlled industrial growth could be permitted. Class III areas allow for greater industrial development. Currently there are no designated Class III areas in the United States. There are two Class I areas within the state: (1) Big Bend National Park and (2) Guadalupe Mountains National Park. These areas are on the borders of Mexico and New Mexico respectively. All other areas within the state are Class II areas. The closest Class I area to Sheppard AFB is the Wichita Mountains National Wildlife Refuge located approximately 50 miles to the northwest in Okalahoma.

3.3.11.1.1.4 Visibility

The national visibility goal was established in section 169A of the 1977 CAA as “the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I areas which impairment results from manmade air pollution.’ There are 156 mandatory Federal Class I areas identified for visibility protection under this provision. The term visibility refers to the clarity with which scenic vistas and landscape

features are perceived at great distances. Visibility impairment, quantified as light extinction, is caused by the scattering and absorption of light by particles and gases in the atmosphere. Without the effects of human-caused air pollution, a natural visual range is estimated to be about 140 miles in the western US and 90 miles in the eastern US (USEPA 2001).

Under the 1990 CAA Amendments, the USEPA promulgated the Regional Haze Rule to protect visibility in the 156 mandatory Federal Class I areas (Regional Haze Regulations, Final Rule, 1999). The rule requires the states, in coordination with the Environmental Protection Agency, the National Park Service, USFWS, the U.S. Forest Service, and other interested parties, to develop and implement air quality protection plans to reduce the pollution that causes visibility impairment. Emission levels are used to qualitatively assess potential impairment to visibility in PSD Class I areas. Decreased visibility may potentially result from elevated concentrations of PM_{10} and SO_2 in the lower atmosphere.

3.3.11.1.2 General Conformity

The DoD, like all federal agencies, is subject to the general conformity determination as specified in Section 176(c) of the CAA, codified at 42 USC §7506(c). The conformity determination is made in accordance with USEPA's final rule, Determining Conformity of General Federal Actions to state or federal implementation plan, as published in the Federal Register on November 30, 1993 and codified at 40 CFR 51 Subpart W. The specific purpose of Section 176(c) is to make emissions from federal activities consistent with the air quality planning goals of the CAA. The conformity rule applies only in those air basins or parts of air basins designated as nonattainment for one or more of the NAAQS or attainment areas subject to maintenance plans (maintenance area). A maintenance plan establishes measures and procedures to control emissions to ensure that the air quality standard is maintained in areas that have been redesignated from a previous nonattainment status to attainment. Federal actions occurring in areas that are in attainment with the NAAQS are not subject to the conformity rule.

Conformity, as determined under the general conformity rule, prohibits a federal agency from implementing, approving, or supporting any activity that fails to conform to an approved SIP or USEPA-promulgated federal implementation plan (FIP). The statute provides that conforming to a SIP or FIP means that the activity will not:

- Cause or contribute to any new violation of the NAAQS for any criteria air pollutant.
- Increase the frequency or severity of any existing violation of any standard in the area.
- Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The intent of the conformity rule is to encourage long range planning by evaluating the air quality impacts from federal actions before the project are undertaken. If the emissions from a federal action proposed in a nonattainment area exceed annual thresholds identified in the rule, a conformity determination is required for that action. The thresholds become more restrictive as the severity of the nonattainment status of the region increases.

Sheppard AFB is not subject to the General Conformity Rule since it is located in an attainment area.

3.3.11.1.3 Stationary Source Operating Permits

Permits are legal documents that the emissions source must follow. They specify what construction is allowed, what emission limits must be met, how the source must be operated, and the reporting requirements that must be followed. They may contain conditions to make sure that the source is built to match parameters in the application that the permit agency relied on in their analysis. For example, the permit may specify stack heights that the permit agency used in their analysis of the source. Some limits in the permit may be there at the request of the source to keep them out of other requirements. To assure that sources follow the permit requirements, permits also contain monitoring, recordkeeping, and reporting requirements.

The federal operating permit program (Title V permit, often called part 70 permits because the regulations that establish minimum standards for state permit programs are found in 40 CFR 70) requires that major industrial sources and certain other sources obtain a permit that consolidates all of the applicable requirements for the facility into one document. The purpose of Title V permits is to reduce violations of air pollution laws and improve enforcement of those laws. Operating permits are legally enforceable documents that permitting authorities (USEPA, state, local) issue to air pollution sources after the source has begun to operate. Major is a term used to determine the applicability of permitting regulations to specific sources. What constitutes a major source varies according to what type of permit is involved, the pollutant(s) being emitted, and the attainment designation of the area where the source is located. In general, a source is major if its emissions exceed certain thresholds that are defined in terms of tpy. For example, under Title V of the CAA, any source that emits or has the potential to emit 100 tpy or more of any criteria air pollutant, 25 tpy total hazardous air pollutants (HAP), or 10 tpy of any individual HAP is a major source and must obtain a Title V operating permit.

The Air Permits Division within TCEQ's Office of Permitting, Remediation, and Registration is responsible for implementing the federal and state laws and regulations governing all aspects of permitting for the air, water, and waste programs.

Sheppard AFB is classified as a synthetic minor source and, therefore, does not operate under a Title V operating permit.

3.3.11.2 Existing Conditions

3.3.11.2.1 Climate

The Gulf of Mexico (400 miles southeast) is a major factor with regards to local weather patterns and acts as a source of both low-level moisture and warm air. The Red River is the largest river in the area but its effect of local weather is uncertain. Five lakes (Lake Kemp, Lake Arrowhead, Lake Diversion, Possum Kingdom, and Lake Wichita) all lying within 10 to 65 miles of Sheppard AFB are important in that thunderstorms frequently form near them and move towards the base.

Sheppard AFB is located on the southwestern edge of "Tornado Alley" (a favored development area for tornadoes) and is subject to extremely severe thunderstorms. Heavy rain, winds greater than 60 knots, large hail, and tornados can accompany these severe storms during March through May. Funnel clouds are most commonly sighted during April through June. Historical meteorological data indicates that Sheppard AFB can expect a tornado within 5 miles approximately every 2 years.

In winter, Sheppard AFB can be subject to surface winds gusting from 35-45 knots and low-level wind shear. With the passage of cold fronts during fall and winter, temperatures can drop from 20-30 degrees Fahrenheit (ºF) in an hour. Snowfalls occur on an average of 4 days a year and one major ice storm can be expected each year (TFRN 1988).

Average temperatures range from 42 ºF in January to 85 ºF during July and August. Average annual precipitation is 27.9 inches, with May being the wettest month with 4.2 inches and January the driest with 1.1 inches. Average annual snowfall is 6.1 inches with January having the greatest amount with 2.2 inches and March having the least with 0.9 inches. Winds are predominantly from the south during March through December, and from the north during January and February. Wind velocity at Sheppard AFB averages 10 knots (Operational Climatic Data Summary 2004).

Wind direction helps to locate a single source or multi-source area affecting a specific location. From an air pollution perspective, low wind speeds are conducive to poor pollutant dilution and are therefore associated with higher ambient pollutant concentrations. During stable atmospheric conditions, the wind is often light or calm. When stable conditions persist, the natural ambient conditions that effectively disperse pollutants are suppressed and ambient pollutant concentrations are higher near sources or source areas.

The characteristic patterns of local air movement in the Sheppard AFB area are illustrated by the annual wind rose shown in Figure 3-8. The wind rose provides a graphical description of the prevailing winds giving the frequency of occurrence of the wind speed and direction. The wind rose is a quantitative graphical summary of the wind direction and speed over a given time period. It shows the number of wind speed and direction observations, expressed as a percentage, which had a particular direction and speed during the summary period.

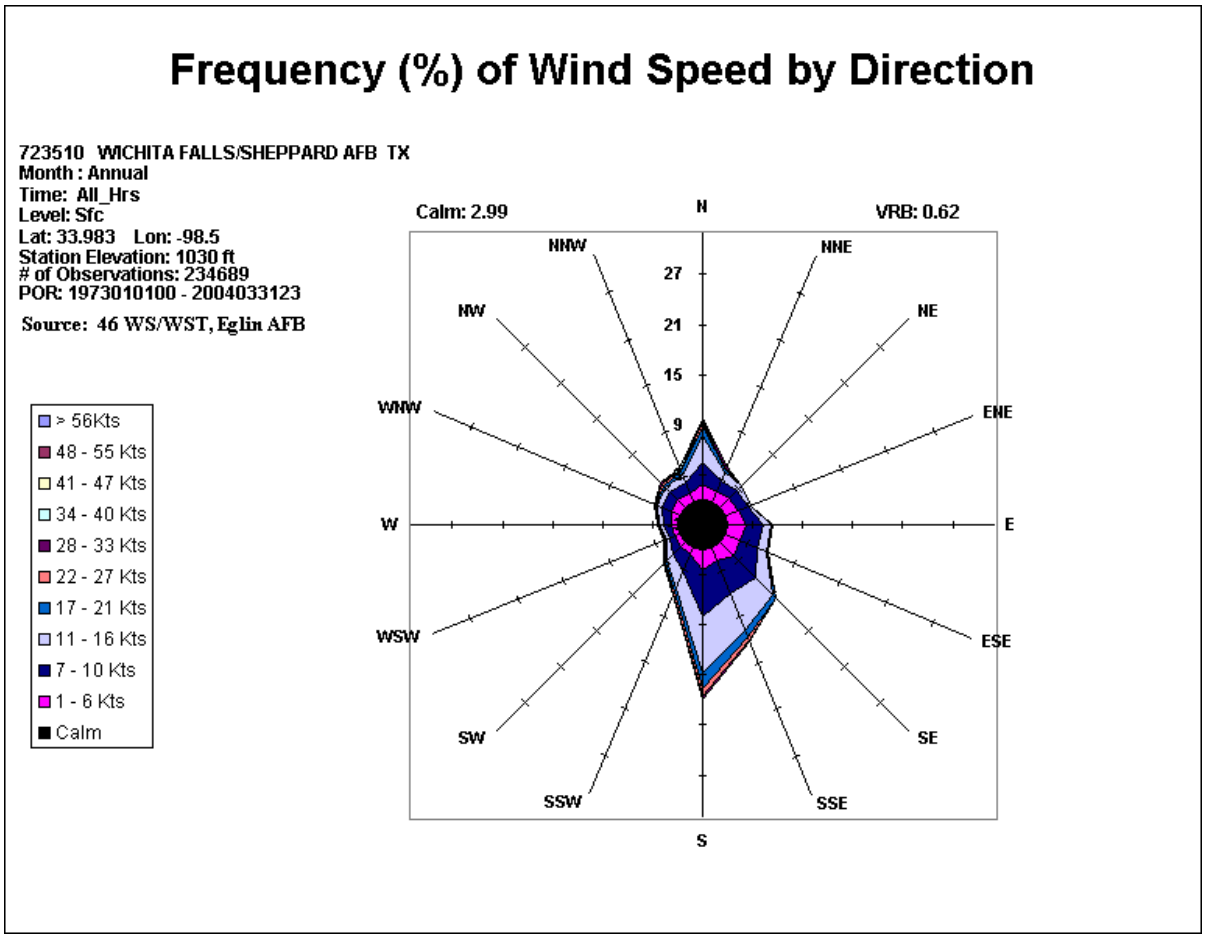

Figure 3-8 Annual Wind Rose for Sheppard Air Force Base

The "spokes" on the wind rose graph represent 16 points of the compass. The percentage of time the wind blew from a given direction (without regard to speed) can be determined from a percent scale located on the wind rose. For a particular wind direction, the length of each segment of a spoke represents the percentage of time the wind was within a particular wind speed interval. If a specific wind speed interval were summed for all wind directions, the result would be the percentage of all hours the wind speed was measured within that particular interval. The percentage of time during which the wind was light and/or calm is provided separately on the rose.

3.3.11.2.2 Regional Air Quality

Sheppard is located in the Abilene-Wichita Falls Intrastate Air Quality Control Region (AQCR 210). AQCR 210 consists of the territorial area encompassed by the boundaries of the following jurisdiction as described in 40 CFR 81.132:

Archer County, Baylor County, Brown County, Callahan County, Clay County, Coleman County, Comanche County, Cottle County, Eastland County, Fisher County, Foard County, Hardeman County, Haskell County, Jack County, Jones County, Kent County, Knox County, Mitchell County, Montague County, Nolan County, Runnels County, Scurry County, Shackelford County, Stephens County, Stonewall County, Taylor County, Throckmorton County, **Wichita County**, Wilbarger County, Young County.

Collection and analysis of air quality data is a basic need of any effective air pollution control program. During 2005, TCEQ operated a network of sophisticated continuous air analyzers and 24-hour samplers for the purpose of measuring ambient air levels of O_3, PM, SO_2, CO, NO_X, and HAPs.

This monitoring network serves many purposes including:

- Determines attainment and nonattainment areas for ground-level O_3 and PM.
- Generates data to assist in determining methods to reduce visibility obscuration.
- Supports ozone reduction programs and hazardous air pollutant programs.
- Determines general air quality trends.

Under the statewide air monitoring site network, TCEQ maintains monitoring sites in Taylor County (Abilene) and Wichita County (Wichita Falls) in AQCR 210. In Abilene, TCEQ maintains one visibility-related site (measures extinction coefficient – visibility measurements are derived from the extinction coefficient). In Wichita County, TCEQ maintains one site housing two instruments to measure visibility (nephelometer – directly measures visibility) and one $PM_{2.5}$ monitor.

USEPA has designated the counties in AQCR 210 as unclassifiable/attainment for all criteria pollutants.

3.3.11.2.3 Current Air Emissions

An air emission inventory is an effort to qualitatively and quantitatively describe the amount of emissions from a facility or within an area. Inventories are designed to locate pollution sources, define the type and size of emission sources, define and characterize emissions from each source, determine relative contributions to air pollution problems by classes of sources and by individual sources, and determine the adequacy of regulations. The air emissions inventory is an estimate of total mass emissions of pollutants generated from a source or sources over a period of time, normally a year. Accurate inventories are needed for estimating the interrelationship between emission sources and air quality and for determining whether an emission source requires an operating permit based on actual emissions or the potential to emit.

Every three years, USEPA prepares a national database of air emissions referred to as the National Emissions Inventory (NEI). The NEI is compiled using information from numerous State and local air agencies, from tribes, and from industry. This database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors. There are three classes of sources in the inventory: (1) point sources (stationary sources of emissions, such as an electric power plant, that can be identified by name and location); (2) area sources (small point sources such as a home or office building, or a diffuse stationary source, such as wildfires or agricultural tilling); and (3) mobile sources (any kind of vehicle or equipment with a gasoline or diesel engine; airplane; or ship). The latest finalized version is for calendar year 2002. The calendar year 2002 NEI emissions inventory data for Wichita County Texas is presented in Table 3-17.

Table 3-17 Baseline Emissions for Wichita County and Sheppard Air Force Base

Source Category	Pollutants (tons per year)				
	CO	NO_X	SO_2	PM_{10}	VOCs
Wichita County (2002 NEI)	34,253	10,954	866	9,502	10,026
Sheppard AFB					
Stationary Sources	22.08	20.20	0.60	4.64	26.61
Mobile Sources (Aircraft)	1,907.74	131.91	28.67	49.08	154.33
Percent of Wichita County	5.63	1.39	3.38	0.57	1.80

Note: VOC is not a criteria pollutant. However, VOC is reported because, as an O_3 precursor, it is a controlled pollutant.

AFB	Air Force Base	O_3	ozone
AEI	air emissions inventory	PM_{10}	particulate matter with an aerodynamic diameter less than or equal to 10 microns
CO	carbon dioxide	SO_2	sulfur dioxide
NEI	National Emissions Inventory	VOC	volatile organic compound
NO_X	nitrogen oxide		

Source: Air Education and Training Command Summary – AETC 2005 AEI Data, HQ AETC/A7CVQ

The latest air emissions inventory for Sheppard AFB was accomplished in order to: (1) comply with applicable federal, state, and local pollution control standards, including the CAA; and (2) meet Title V permitting requirements of the CAA. The inventory quantifies emissions from stationary sources based on 2005 calendar year activity (AETC 2006). The inventory does not indicate that Sheppard AFB is a major source under Title V. The Sheppard AFB emissions inventory is presented in Table 3-17 along with the Wichita County inventory, also for comparison purposes.

Chapter 4

Environmental Consequences

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter describes potential impacts that could occur if the proposed action or the alternative action is implemented at Sheppard AFB. Additionally, potential impacts are addressed for the no action alternative and cumulative impacts are analyzed for the additional actions proposed on or around Sheppard AFB. Significance criteria used to evaluate potential impacts are discussed at the beginning of each resource area.

4.2 CHANGE IN CURRENT MISSION

The primary missions of Sheppard AFB would continue. However, implementation of the proposed action would allow Sheppard AFB to meet mission and security requirements more effectively.

4.3 DESCRIPTION OF THE EFFECTS OF ALL ALTERNATIVES ON THE AFFECTED ENVIRONMENT

4.3.1 Noise

In this section, noise levels associated with proposed construction activities and aircraft operations at Sheppard AFB are evaluated, and compared with current conditions to assess potential impacts. Data developed during this process also supports analyses in other resource areas.

Based on numerous sociological surveys and recommendations of federal interagency councils, the most commonly used benchmark for noise is an L_{dn} of 65 dBA. This threshold is often used to determine residential land use compatibility around airports and airfields, highways, or other transportation corridors. Two other average noise levels are also useful:

- An L_{dn} of 55 dBA has been identified by the USEPA as a level ". . . requisite to protect the public health and welfare with an adequate margin of safety" (USEPA 1974). Noise may be heard, but there is no risk to public health or welfare.
- An L_{dn} of 75 dBA is a threshold above which effects other than annoyance may occur. It is 10 to 15 dBA below levels at which hearing damage is a known risk (Occupational Safety and Health Administration 1983). However, it is also a level above which some adverse health effects cannot be categorically discounted.

Public annoyance is the most common impact associated with exposure to elevated noise levels. When subjected to L_{dn} of 65 dBA, approximately 12 percent of persons so exposed will be "highly annoyed" by the noise. At levels below 55 dBA, the percentage of annoyance is correspondingly lower (less than three percent). The percentage of people annoyed by noise never drops to zero (some people are always annoyed), but at levels below 55 dBA it is reduced enough to be essentially negligible.

4.3.1.1 No Action Alternative

Under the no action alternative, no proposed construction activities would occur, and no additional aircraft operations would occur at Sheppard AFB. Since no construction would occur, the noise associated with such activities would not result. Since no changes to aircraft operations or other transportation activities would result from this alternative, noise levels at Sheppard AFB would remain as described in Section 3.3.1. In previous years, noise complaints concerning operations at Sheppard have been minimal. Noise issues associated with ongoing aircraft operations would be considered minimal.

4.3.1.2 Proposed Action

Under the proposed action, Sheppard AFB would accomplish those construction and related demolition activities necessary to implement the General Plan. Additionally, some small increases in aviation operations would occur as a result of implementing BRAC recommendations. These proposals have the potential to create noise impacts in the ROI.

Construction Noise

Construction would most likely occur over an extended time frame (i.e., five years), and only a relatively small number of projects would be expected to be ongoing simultaneously. Therefore, noise associated with active construction sites would be expected to be intermittent and of relatively limited duration. A hypothetical scenario was developed to assess potential noise associated with construction activities on a construction site. Primary noise sources during such activity would be expected to be heavy vehicles and earth moving equipment. Table 4-1 shows sound levels associated with typical heavy construction equipment under varying modes of operation.

Table 4-1 Typical Sound Levels of Construction Equipment

Equipment	Sound Level (in dBA) under Indicated Operational Model[1]		
	Idle Power	Full Power	Moving under Load
Forklift	63	69	91
Backhoe	62	71	77
Dozer	63	74	81
Front-end Loader	60	62	68
Dump Truck	70	71	74

[1]Measured at 125 feet from source.
dBA A-weighted decibel

For the assessment of construction noise, a hypothetical "construction area" was designated that approximated the estimated area that would be involved in supporting a major project under the proposal.

The first step in the analysis was to estimate equipment usage and calculate the total acoustic energy that would be expected to be generated on the site. These data also provided information on each piece of equipment's relative contribution to the total amount of acoustic energy generated on the site. Next, the equipment was spatially distributed throughout the construction zone considering "most likely" areas of operation. This yielded an equipment-weighted contribution to total site acoustic energy at different points throughout the site. With this spatial distribution, it was then possible to calculate a mean and standard deviation for the distribution along an axis running through the site.

These data were then used to normally distribute the total site energy throughout the site. Finally, the normally distributed energy from multiple source points throughout the site was aggregated at a range of points at varying distances from the site edge. This allowed a determination at those points of the total acoustic energy that had emanated off-site.

Calculations based on this conservative scenario indicate an equivalent noise level over an $L_{eq(8)}$ of 67 dBA at a distance of 500 feet from the edge of the site. This is then normalized to an equivalent noise level over an $L_{eq(24)}$ of 62 dBA. Since no construction activity would be expected to occur at night, this would be equivalent to L_{dn} 62 dBA. At a distance of 1,000 feet from the site, noise levels are $L_{eq(8)}$ 62 dBA and $L_{eq(24)}$ 58 dBA. Due to the conservative nature of the scenario, and the fact that sound attenuation only due to spherical spreading was considered, actual levels emanating off-site would be expected to be lower.

It should be noted that the areas involving construction are situated within areas already exposed to elevated noise from airfield operations. Many of these areas are well within the L_{dn} 65 contour created by aircraft noise. Construction noise emanating off-site would probably be noticeable in the immediate site vicinity, but would not be expected to create adverse impacts, or alter noise contours associated with aircraft operations. Furthermore, construction-related noise is intermittent and transitory, ceasing at the completion of construction. The long-term acoustic environment on Sheppard AFB would not be expected to be impacted by construction activities.

Aircraft Noise

Under the proposed action, Sheppard AFB would operate an additional five T-38 Talons to support the ongoing IFF flying training mission. The addition of these aircraft would result in a slight increase in aircraft operations at Sheppard AFB, Falcon Range on Fort Sill, Oklahoma, and related MOAs. Table 4-2 illustrates the anticipated increase in daily operations with the additional aircraft.

Table 4-2 Average Daily Operations at Sheppard Air Force Base, Proposed Action

Aircraft	Arrivals		Departures		Closed Patterns		Totals
	Day	Night	Day	Night	Day	Night	
Based T-38	137.374	3.896	141.278	0.000	525.032	40.082	847.661
Based T-37/T-6	114.154	0.000	114.154	0.000	530.276	0.000	758.584
Transient	2.445	0.000	2.445	0.000	0.000	0.000	4.890
Total	**253.973**	**3.896**	**257.877**	**0.000**	**1,055.308**	**40.082**	**1,611.135**

Note: Daily operations are based on averages of annual operations; therefore, numbers do not round.

Source: USAF 2006a

Based on the operations presented in Table 4-2, daily operations at Sheppard AFB would increase by 2.0 percent, or by 32 operations from baseline conditions Noise contours associated with the proposed action increased operations would be slightly greater than the baseline conditions (Figure 3-1), but well below the alternative action noise contours described in Section 4.3.1.3. Land area and population exposed to the elevated noise levels associated with the proposed action are only slightly greater than the baseline conditions (Tables 3-5 and 3-7). Increases in noise levels as a result of the proposed action increased aircraft operations are expected to be minimal.

Some additional operations would also occur in the military training airspace. These added operations would be minimal, and estimates of increased noise levels range from 0.1 to 0.2 dB. These changes would not be noticeable.

4.3.1.3 Alternative Action

Under the alternative action, the same activities described under the proposed action would be accomplished. In addition, physical facilities would be developed to the maximum extent supportable by the geographic area available on the installation. Aviation operations conducted by Sheppard AFB-based prime mission aircraft would be increased to the maximum extent practicable, as limited either by the throughput capability of the airfield or by increased noise levels. As determined in the *Capability Analysis* (Appendix B), noise level increases are the limiting factor to the expansion of aircraft operations. The maximum increase was reached when "primary mission-based" aircraft operations were increased by 40 percent.

Construction Noise

Under this alternative, the scope of facility construction, renovation, and demolition would be greater than under the proposed action. However, the accomplishment of these activities would be as described for the proposed action. The only difference that would be expected would be that construction activities would be expected to occur over an extended period. During any one period, noise associated with these activities would be expected to be more or less as described for the proposed action.

Aircraft Noise

The increase in aviation operations around the airfield would result in increased noise levels. Table 4-3 reflects this increase in daily operations. Average daily operations at Sheppard AFB would increase from the current level of approximately 1,579 operations per day to approximately 2,209 operations per day.

Table 4-3 Average Daily Operations at Sheppard Air Force Base, Alternative Action

Aircraft	Arrivals		Departures		Closed Patterns		Totals
	Day	Night	Day	Night	Day	Night	
Based T-38	185.051	5.247	190.298	0.000	707.202	53.990	1,141.788
Based T-37/ T-6	159.816	0.000	159.816	0.000	742.386	0.000	1,062.018
Transient	2.445	0.000	2.445	0.000	0.000	0.000	4.890
Total	**347.312**	**5.247**	**352.559**	**0.000**	**1,449.588**	**53.990**	**2,208.696**

Note: Daily operations are based on averages of annual operations; therefore, numbers do not round.

Source: Appendix B

Noise contours associated with the increased level of aircraft operations are shown in Figure 4-1. Land areas exposed to the elevated noise levels associated with the alternative action are compared with current conditions in Table 4-4, and changes in noise levels at specific points of interest in sensitive land use categories are compared in Table 4-5. As shown, higher noise levels are expected at points located both on and off base. As indicated, at Point CGLN (a residential area), an already incompatible land use becomes more incompatible (See Appendix B).

Table 4-4 Land Area Exposed to Elevated Noise, Alternative Action

Sound Level (in L_{dn})	Acres of Land		Net Change (acres)	Percent Change
	Baseline	Alternative Action		
On-base				
65 – 70	721	704	17	2.4%
70 – 75	547	620	73	13.3%
75 – 80	871	871	0	0.0%
80 – 85	814	675	139	17.1%
> 85	1,031	1,301	270	26.2%
Total > 65	**3,984**	**4,171**	**187**	**4.7%**
Off-base				
65 – 70	4,853	5,467	614	12.7%
70 – 75	2,301	3,034	733	31.9%
75 – 80	1,206	1,364	158	13.1%
80 – 85	220	394	174	79.1%
> 85	24	105	81	337.5%
Total > 65	**8,607**	**10,364**	**1,757**	**20.4%**
Total Land Area				
65 – 70	5,574	6,171	597	10.7%
70 – 75	2,848	3,654	806	28.3%
75 – 80	2,077	2,235	158	7.6%
80 – 85	1,034	1,069	35	3.4%
> 85	1,058	1,406	348	32.9%
Total > 65	**12,591**	**14,535**	**1,944**	**15.4%**

L_{dn} Day-Night Average Sound Level % percent

Source: Determined from noise contours using Geographic Information System

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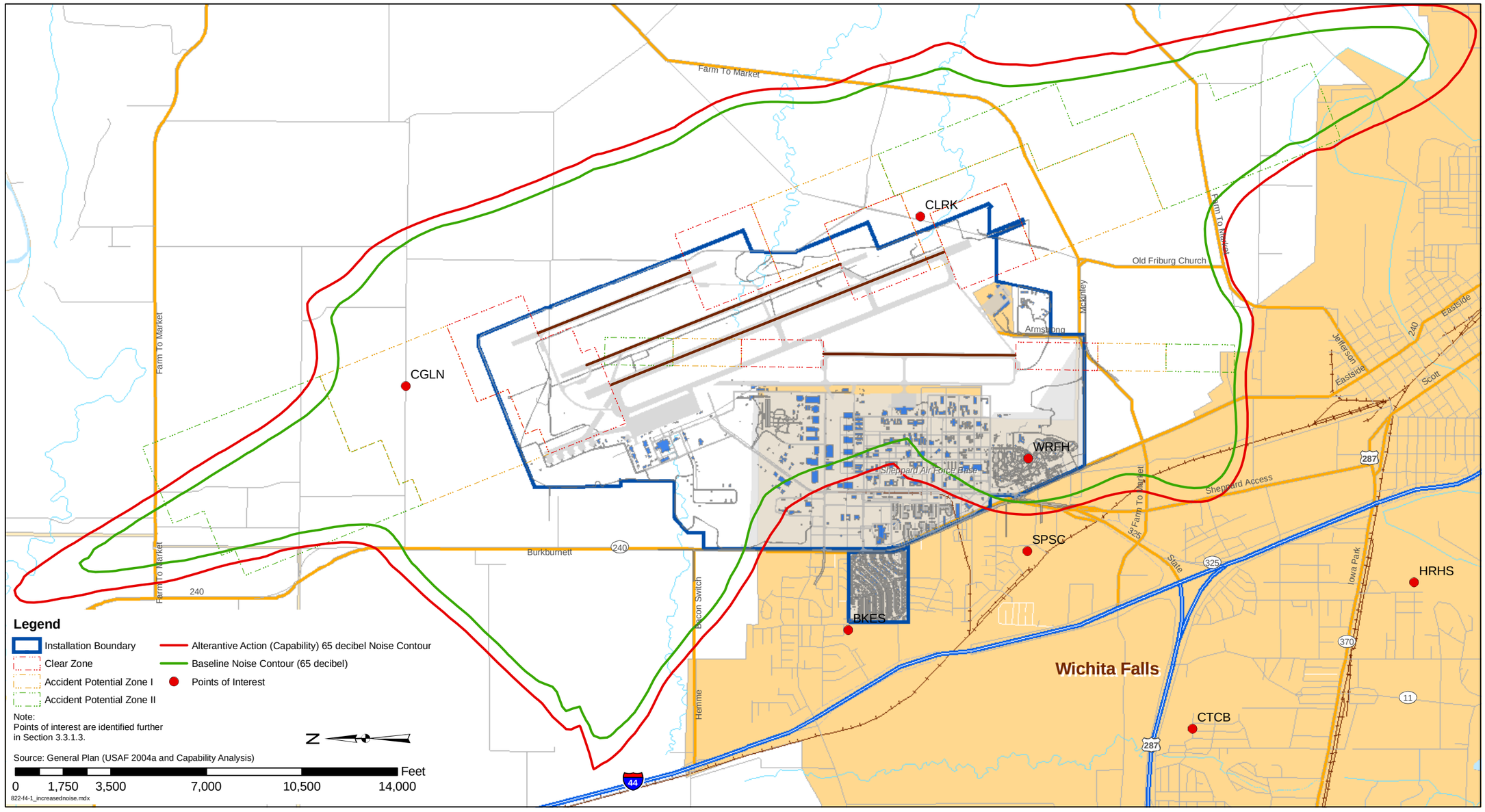

Figure 4-1 Baseline Noise Contours versus Increased Capability (Alternative Action) Noise Contours, Sheppard Air Force Base, Texas

Table 4-5 Specific Point Noise Exposure, Alternative Action

Point	Baseline (L_{dn})	Alternative Action (L_{dn})	Remarks
BKES	54.9	56.4	
CGLN	69.9	71.4	Residential Area increases 1.5 dB
CLRK	80.5	81.6	
CTCB	53.0	54.4	
HRHS	50.1	51.4	
SPSC	59.8	61.3	
WRFH	70.7	72.2	

L_{dn} Day-Night Average Sound Level
dB decibel

A further consideration involves the potential 40 percent expansion of operations conducted by Sheppard AFB-based military aircraft. This may be assessed by considering any given noise level, and calculating the impact of a 40 percent increase in operations.

Since noise levels are expressed in logarithmic terms, they cannot be directly calculated arithmetically. They must first be converted to units of energy. This is done by raising 10 to the power of the noise level divided by 10. For example, if a noise level of 50 L_{dn} is considered, the conversion would be solved by $10^{50/10}$, or 10^{5}, which results in 100,000. Then a 40 percent increase may be calculated by 100,000 x 1.4, or 140,000. Finally, the process is reversed by taking 10 times the logarithm of the energy (in this case, 140,000). This yields a noise level of 51.5 L_{dn}, or an increase of 1.5 dB. This change would hardly be noticeable.

Table 4-6 shows the approximate people affected by increased aircraft noise due to the alternative action. The numbers of persons were determined by using the methodology described in Section 3.3.1.3. The number of off-base people exposed to the 65 dB noise contour or greater would increase by 4,178 persons from the baseline condition. The number of on-base persons exposed to the 65 dB noise contour or greater would increase by 842 persons from the baseline conditions. This increase in people exposed to the 65 dB noise contour or greater would be due to the increase in average daily operations.

Table 4-6 Alternative Action Affected Population

Noise Zone (dB) Interval	On-base		Off-base		Total	
	Number of People	Change from Baseline	Number of People	Change from Baseline	Number of People	Change from Baseline
65-70	2,800	83	3,865	3,380	6,665	3,463
70-75	2,227	348	796	732	3,023	1,080
75-80	599	360	81	64	680	424
80-85	52	51	3	2	55	53
>85	1	0	0	0	1	0
Total	5,679	842	4,745	4,178	10,424	5,020

Notes:

Population exposed is estimated based on census tract population data and the relative proportion of the tract encompassed by given noise contour levels.

Persons expected to be annoyed are estimated based on total population exposed and the average percentage of that population expected to be annoyed by the indicated noise level (see Table 3-3).

dB decibel

Source: Data obtained from 2000 Census information and Geographical Information System data.

Very few aircraft operations would be anticipated at the airfield from 10:00 p.m. to 7:00 a.m. Sheppard AFB would schedule flying training for this period infrequently. Civil aircraft would occasionally arrive or depart during this period.

4.3.1.4 Cumulative Impacts

Other past, proposed, and/or ongoing activities within the ROI that involve routine urban construction and business development activity would be expected to generate construction and traffic noise over the duration of each project. These projects are dispersed throughout the region and are not atypical sources of noise in the community. Construction noise emanating offsite as a result of the proposed and/or alternative actions and the activities in the region would probably be noticeable only in the immediate construction site vicinity, but would not be expected to create adverse impacts. In addition, aircraft noise associated with the proposed and alternative actions would similarly not be expected to create adverse impacts. Cumulative impacts from noise would be expected to be minimal.

4.3.1.5 Measures to Reduce Impacts

Since major construction activities are planned to be conducted only during the day, potential impacts at night (when community ambient noise levels are normally lower) would be minimized.

4.3.2 Airspace Management and Air Traffic Control

The potential effects of the proposed and alternative actions on the existing airspace environment were assessed by considering the changes in airspace utilization that could result from the proposals.

The type, size, shape, and configuration of individual airspace elements in a region are based upon, and are intended to satisfy, competing aviation requirements. Potential impacts could occur if air traffic in the region and/or the ATC systems were encumbered by changed flight activities associated with the proposed action or an alternative. Impacts could result if such changes adversely affected (1) ATC systems and/or facilities; (2) movement of other air traffic in the area; or (3) airspace already designated and used for other purposes supporting military, commercial, or general aviation.

4.3.2.1 No Action Alternative

Under the no action alternative, no additional aircraft activity would occur at Sheppard AFB. Operations at the airfield and in the military training airspace would continue at the same levels as under current conditions.

4.3.2.2 Proposed Action

Under the proposed action, which would implement the CIP and recommendations of the BRAC (now Public Law 101.510), new construction and facility renovation activities would occur. Overall flight activity conducted by Sheppard AFB-based aircraft would increase slightly. These proposals do not involve any modifications or changes to the airspace structure around Sheppard AFB, or to the existing ATC systems. The Sheppard AFB airfield and its infrastructure are physically capable of handling this level of aviation activity (Appendix B). Aviation operations would continue to be controlled and managed as under current conditions. No adverse impacts to the airspace around Sheppard AFB or the existing ATC systems would be anticipated.

Within the MTA, the control, use, and management of these airspace elements would continue to implement the scheduling and coordination processes and procedures currently used. The minimal increase in operations would not stress these processes and procedures; no adverse impacts would be anticipated.

4.3.2.3 Alternative Action

Under the alternative action, which could result in an expansion of Sheppard AFB's flying activity, based-aircraft operations could increase by 40 percent. Assuming a linear expansion, daily operations at the airfield would increase from approximately 1,579 to 2,209. Based on throughput capacity models developed by the FAA, an airfield such as Sheppard AFB's is capable of handling these operational levels, even under adverse weather conditions (refer to Appendix B for additional details). No adverse impacts to the airspace around Sheppard AFB or the existing ATC systems would be anticipated.

No modifications to controlled airspace, SUA, or ATC systems are associated with, or would be required by implementation of the alternative action.

4.3.2.4 Cumulative Impacts

There are no known aviation-related projects in the ROI that would have the potential to impact airspace availability or air traffic control.

4.3.2.5 Measures to Reduce Impacts

Since impacts that would result from the implementation of the alternative action are essentially non-existent, no specific measures for minimization of impacts would be recommended.

4.3.3 Land Use

Land use impacts can result if an action displaces an existing use or reduces the suitability of an area for its current, designated, or formally planned use. In addition, a proposed activity may be incompatible with local plans and regulations that provide for orderly development to protect the general welfare of the public, or may conflict with management objectives of a federal or state agency for an affected area. The methodology to assess impacts on individual land uses requires identifying those uses, as well as affected land use planning and control policies and regulations and determining the degree to which they would be affected by the proposal.

To assess impacts to visual resources, areas that have high visual value or low tolerance for visible modification or have prescribed guidelines are identified. Visual impacts are assessed by determining how, and to what extent, a proposed action would alter the overall visual character of the area.

4.3.3.1 No Action Alternative

Under the no action alternative, there would be no change from the baseline conditions described in section 3.3.3. All of the existing facilities would remain, and no new facilities would be constructed. No impacts to land use or visual resources are expected. Sheppard AFB would continue to manage on-base development activity according to the *General Plan* and established planning, architectural, landscaping, and civil guidelines. Coordinating with local communities, affected by over flight activity would continue with the AICUZ program.

4.3.3.2 Proposed Action

Sheppard AFB has identified the need for construction, demolition, and renovation of facilities for 27 projects. The future land use areas identified in the *General Plan* that surround each of the proposed action locations have been evaluated, and the proposed action would be consistent with land use concerns defined for the installation by base planners. No additional land would be needed to accommodate the activities associated with the proposed action.

The extent of new construction, renovation, and demolition would somewhat alter the overall visual character of the area. Any development activity undertaken on Sheppard AFB would be consistent with established planning, architectural, landscaping, and civil guidelines to ensure that the base character and aesthetic qualities are retained.

Under the proposed action, there would be no modification to current aircraft operations.

4.3.3.3 Alternative Action

Under the alternative action, no direct effect on land use resources is anticipated. This alternative would reduce the amount of open space on the installation, although acreage constrained by environmental factors (e.g., wetlands, floodplain, safety easements, etc.) would remain open. Development that would occur as a result of the alternative action would be consistent with land use concepts as defined in the *General Plan* and established planning, architectural, landscaping, and civil guidelines. No additional land would be needed to accommodate the activities associated with the proposed action.

The extent of development associated with the alternative action would somewhat alter the overall visual character of the area. Any development activity undertaken on Sheppard AFB would be consistent with established planning, architectural, landscaping, and civil guidelines to ensure that the base character and aesthetic qualities are retained.

The modification to aircraft operations, including an increase in flying operations, does not appreciably increase the noise contours. Figure 4-1 and Table 4-3 present the new contours and affected acreage. There are no sensitive land use categories underlying these contours. In fact, the majority of the off-base exposure from 65 dB to 75 dB L_{dn} is over water. However, there are residential areas currently exposed to aircraft overflight that would continue to be affected. Land use patterns, ownership, and management plans would not be expected to change based on the modification of aircraft operations.

4.3.3.4 Cumulative Impacts

Other proposed and/or ongoing activities within the ROI, as described in Section 2.7, are not expected to substantially modify or render existing land uses incompatible either at Sheppard AFB or in the general ROI. The long-term objective at Sheppard AFB is to combine like activities spatially, and the projects described in this analysis would work toward that end. There would be a general overall positive result from implementation of these projects. As a result, there would not be any cumulative adverse impacts to land use as a result of the proposed action or alternative.

4.3.3.5 Measures to Reduce Impacts

Land use impacts would not be anticipated at Sheppard AFB for the proposed action or the alternative action. Therefore, no formal mitigation measures would be required as a result of the implementation of the proposed action or alternative actions and the no action alternative.

4.3.4 Earth Resources

Protection of unique geologic features, minimization of soil erosion, and existing facilities in relation to potential geologic hazards, soil limitations, and sharp topological features are considered when evaluating impacts to earth resources. Generally, impacts can be avoided or minimized if proper construction techniques, erosion control measures, and structural engineering designs are incorporated into project development.

Analysis of potential impacts to geologic resources typically includes identification and description of resources that could potentially be affected, examination of the potential effects that an action may have on the resource, and provision of mitigating measures, if necessary. Analysis of impacts to soil resources resulting from proposed activities examines the suitability of locations for proposed operations and activities. Impacts to soil resources can result from earth disturbance that would expose soil to wind or water erosion.

4.3.4.1 No Action Alternative

Under the no action alternative, the 82 TRW would maintain their existing facilities, and would not build new facilities. Similarly, there would be no facility demolitions. No impacts to earth resources would occur as a result of the no action alternative. Conditions would remain as described in Section 3.3.4.

4.3.4.2 Proposed Action

Under the proposed action, the physiography, underlying geology, and the topography of the area would not change; however, the soil would be disturbed by construction activities. Under this alternative, approximately 80.5 acres would be disturbed with 67 acres rendered impervious as a result of the new building footprints and associated pavements. Approximately 57 acres of demolition would also occur. Well-maintained silt fences, wetting of the construction site, daily site inspections, and other best management practices (BMP) would be used to limit or eliminate soil movement, stabilize runoff, and control sedimentation. Following construction efforts, disturbed areas not covered with impervious surfaces would be reestablished with appropriate vegetation and managed for future erosion prevention efforts. Given the relatively small area disturbed at any given time, and the employment of engineering practices that would minimize potential erosion, impacts to the earth resources as a result of the proposed action are expected to be minimal.

4.3.4.3 Alternative Action

Under the alternative action, the physiography, underlying geology, and topography of the area would no change. It is estimated that a total of approximately 118 acres would be disturbed and approximately 98 acres would be rendered impervious as a result of construction and paving activities. While this area may be larger (or smaller) than the proposed action, impervious cover and three times the land disturbance that then proposed action, it is clear that the construction activity would not occur at the same time. Construction would occur only as the need arose and as funds become available. It is unlikely that more that 10 percent (10 acres) of construction activity would occur at any

given time. Well-maintained silt fences, wetting of the construction site, daily site inspections, and other BMPs would be used to limit or eliminate soil movement, stabilize runoff, and control sedimentation. Following construction, disturbed areas not covered with impervious surfaces would be reestablished with appropriate vegetation and managed to prevent erosion. Given the relatively small potentially disturbed area at one given time and the employment of engineering practices to minimize potential erosion, impacts to earth resources are expected to be minimal.

Under this alternative, impacts to soils would be similar as those described under the proposed action.

4.3.4.4 Cumulative Impacts

Ground-disturbing activities within the ROI currently underway or planned in the short-term (Section 2.7) have the potential to generate demolition and construction debris. It is likely that the Air Force would maintain silt fences, wetting of the construction site, perform daily site inspections, and implement other BMPs to limit or eliminate soil movement, stabilize runoff, and control sedimentation. These activities, along with the reestablishment of appropriate vegetation on the sites to ensure rapid soil stabilization, would minimize potential erosion during construction activities for future projects. Cumulative impacts to earth resources are expected to be minor.

4.3.4.5 Measures to Reduce Impacts

The potential for impacts to earth resources from construction and demolition activities is expected to be minimal. The control of on-site erosion, off-site water runoff, and measures to contain sediment are essential components of Texas Pollutant Discharge Elimination System (TPDES) permitting and SWPPP requirements. While specific requirements would not be determined until the permitted process is completed, the list of BMPs for controlling erosion during or after construction activities is extensive. A few typical BMPs for soil erosion that are likely to be required include: recondition damaged soils, stabilize slope soils, transport runoff within non-erosive water conveyance systems, intercept and diffuse the erosive energy of runoff at predetermined intervals, and transition water flows to non-erosive discharge points.

4.3.5 Water Resources

Criteria for evaluating impacts related to water resources are water availability, water quality, and adherence to applicable regulations. Impacts are measured by the potential to reduce water availability to existing users, endanger public health or safety by creating or worsening health hazards or safety conditions, or violate laws or regulations adopted to protect or manage water resources.

Water availability impacts are assessed by determining the potential increases in use that may affect availability of water resources. Floodplain and surface water impact analyses were conducted by first identifying floodplain areas associated with water bodies at Sheppard AFB and their proximity to potential development sites. Next, analyses were

done using relevant literature to calculate the potential and the extent of all impacts in the affected areas.

4.3.5.1 Surface Water

4.3.5.1.1 No Action Alternative

Under the no action alternative, surface water resources would remain comparable to baseline conditions as described in Section 3.3.5.2.

4.3.5.1.2 Proposed Action

Under the proposed action, several facilities would be constructed and demolished at Sheppard AFB. Table 2-1 details the total area associated with each project (including multi-story facilities). Building space typically includes multiple floors and does not add directly to pavements to provide impervious surfaces. Impervious surfaces are determined by building footprints and the pavements surrounding them. Based on analysis of the project list, approximately 67.1 acres of new construction and 56.6 acres of associated demolition would occur. The proposed construction and demolition would result in a net increase of 7.5 acres of impervious cover to the installation. Table 2-1 describes additional details on individual projects listed in the proposed action.

The programmed construction and demolition projects would cause a slight net increase in the current impervious cover for the base outfall drainage areas. The distribution of facilities in the three drainage areas would change (thus changing the amount of impervious cover), actually causing a flow increase in one drainage area and a flow decrease in another. Analysis showed a 0.23 percent increase in runoff (for a 25-year rainfall event with a 1-hour duration) since the demolished facility footprints were approximately the same as the new facility footprints. Table 4-7 shows the changes that would occur for each drainage area.

The proposed action would add to the impervious surfaces associated with Sheppard AFB. In general, increases in impervious surfaces act to increase peak discharge volume and speed delivery of water to nearby streams and waterways, which ultimately increases the likelihood of flooding. In undeveloped land, rainfall collects and is stored in vegetation, in the soil column, or in topographic depressions. Water is then utilized by plants and is respired, or it moves slowly into groundwater and/or eventually to surface water bodies where it slowly moves through the hydrologic cycle. Removal of vegetation decreases infiltration into the soil column and thereby increases the quantity and timing of runoff. Replacement of vegetation with an impervious surface eliminates any potential for infiltration and speeds up delivery of the water to nearby drainage and stream channels. With less storage capacity in the soil column and vegetation, urban streams rise more quickly during storm events and have higher peak discharge rates, which both increase the potential for flooding.

Table 4-7 Runoff Effects, Proposed Action

Drainage Area[1]	Net Change in Impervious Area (acres)	Percent Increase in Impervious Area[2]	Percent Increase in Runoff	Increase in Runoff (acre-feet)
1	18.6	2.9%	0.93%	10.0
2	-17.5	-8.0%	-2.57%	-9.4
3	6.4	1.05%	1.00%	3.4
Overall	**7.5**	**0.66%**	**0.23%**	**4.03**

Note:

[1]Basin drainage area calculated from information provided in the *Stormwater Pollution Prevention Plan* (USAF 2005b). Drainage area only includes on-base area. Impervious cover determined from Geographical Information System layer data provided by the base in June 2006.

[2][(0.95)*(1,143+7.5 impervious acres)+(0.30)*(4,640-1,143-7.5 vegetated acres)] divided by 4,640 total acres is equivalent to 0.4612, which indicates a 0.23 percent increase in runoff, or 4.03 acre-feet of water in a 24 hour period for a 25-year storm (6.8 inches per day with an intensity of 1.39 inches per hour, assuming a 20-minute time of concentration [National Oceanic and Atmospheric Association 2006]).

% percent

Stormwater drainage systems would be incorporated into base construction projects. The drainage system would be designed in accordance with applicable local area criteria to minimize impacts from localized flooding and assure that downstream areas are not adversely affected by increased flows. Curbs and gutters installed during any street and off-street parking construction would be connected to the existing stormwater system. An additional 4.03 acre-feet of site wide stormwater detention capacity would be a consideration for mitigating any perceived off-site impacts, which would be minimal.

The construction associated with the proposed action would increase impervious surfaces on Sheppard AFB. During large rainfall events, impervious surfaces increase the speed at which water flows into receiving surface water bodies by removing natural barriers and reducing infiltration into the ground. The potential for stormwater to carry contaminants that could flow directly into surface waters is also a concern when impervious areas increase. In accordance with the installation's SWPPP, BMPs (including techniques such as berms, sediment traps, and silt fences) would be implemented to minimize any runoff and subsequent degradation of surface water quality. Additionally, the contractor shall be required to develop an SWPPP for the project. Erosion control techniques would also be incorporated through contractual requirements to minimize erosion during construction. Therefore, water quality would not be adversely impacted by the proposed action.

4.3.5.1.3 Alternative Action

Approximately 118 acres of land would be temporarily disturbed for the alternative action, resulting in a net increase of approximately 98 acres of impervious surfaces. The alternative action would cause a net increase in the current impervious cover for the base outfall drainage areas. Analysis showed a 2.9 percent increase in runoff (for a 25-year rainfall event with a 1-hour duration). Table 4-8 shows the changes that would occur for each drainage area.

Table 4-8 Runoff Effects, Alternative Action

Drainage Area[1]	Net Change in Impervious Area (acres)	Percent Increase in Impervious Area	Percent Increase in Runoff[2]	Increase in Runoff (acre-feet)
1	26.7	4.2%	1.3%	14.4
2	39.7	18.3%	5.4%	21.4
3	31.6	11.2%	4.9%	17.0
Overall	**98**	**8.6%**	**2.9%**	**52.8**

Note:

[1]Basin drainage area calculated from information provided in the *Stormwater Pollution Prevention Plan* (USAF 2005b). Drainage area only includes on-base area. Impervious cover determined from Geographical Information System layer data provided by the base in June 2006.

[2][(0.95)*(1,143+98 impervious acres)+(0.30)*(4,640-1,143-98 vegetated acres)] divided by 4,640 total acres is equivalent to 0.4739, which indicates a 2.9 percent increase in runoff, or 52.8 acre-feet of water in a 24 hour period for a 25-year storm (6.8 inches per day with an intensity of 1.39 inches per hour, assuming a 20-minute time of concentration [National Oceanic and Atmospheric Association 2006]).

% percent

Stormwater drainage systems would be incorporated into base construction projects. The drainage system would be designed in accordance with applicable local area criteria to minimize impacts from localized flooding and assure that downstream areas are not adversely affected by increased flows. Curbs and gutters installed during any street and off-street parking construction would be connected to the existing stormwater system. An additional 52.8 acre-feet of site wide stormwater detention capacity would be a consideration to reduce any perceived off-site impacts, which would be minimal.

The contractor shall be required to develop an SWPPP for each construction project. Erosion control techniques would also be incorporated through contractual requirements to minimize erosion during construction. Therefore, water quality would not be adversely impacted by the alternative action.

4.3.5.1.4 Cumulative Impacts

The proposed and alternative actions, when considered with respect to other ongoing actions, would have a minimal net cumulative impact on surface water at Sheppard AFB when compared to the whole installation. There would be minor adverse impacts on surface water quality due to construction and demolition. The proposed and ongoing actions would result in an increase of 7.85 acres of impervious surfaces while the alternative and ongoing action would result in an increase of 98.35 acres of impervious surfaces. The proposed and cumulative actions would increase impervious cover by 0.69 percent and 8.6 percent for the alternative and cumulative actions. Total runoff for the proposed and cumulative actions would increase by 0.24 percent (4.2 acre-feet of additional runoff in 24 hours) and 2.91 percent (52.9 acre-feet of additional runoff in 24 hours) for the alternative and cumulative actions. Similar impacts might be expected from other construction activities as loose soil is exposed to runoff during rain events. The net cumulative effect on Sheppard AFB and areas within the ROI due to the proposed or alternative activities would be minimal when compared to the ROI. Sediment erosion

would be controlled using BMPs during construction and demolition, negating large-scale adverse effects on surface waters. Therefore, minor cumulative impacts would be expected on surface water.

4.3.5.1.5 Measures to Reduce Impacts

The proposed action and alternative action construction and demolition activities have the potential to affect the quality of stormwater runoff through a potential increase in soil erosion at each site. Impacts on surface water resources from the proposed action and alternative actions would be minimal when compared to the whole installation. However, BMPs would be used to reduce or eliminate runoff or contamination into surface water bodies or the groundwater. Site-specific sediment and erosion control plans with detailed BMPs to prevent soil disturbance, capture and contain loose soil, and slow the movement of stormwater during heavy rains would be included in the project development. No other measures to reduce impacts would be required to ensure surface water quality.

4.3.5.2 Groundwater

4.3.5.2.1 No Action Alternative

Under the no action alternative, there would be no change from the baseline conditions described in Section 3.3.5.3

4.3.5.2.2 Proposed Action

There would be negligible effect on groundwater from implementation of the proposed action. The proposed action would not result in increased use of the aquifer located under Sheppard AFB because there would be a negligible increase in aircraft operations and a net loss of base personnel (military and civilian personnel) associated with the proposed action. The proposed action would not reduce water availability to existing users, nor degrade or worsen groundwater quality of the aquifer located under Sheppard AFB. Surface water sources provide potable water for the installation.

None of the activities associated with the proposed action would involve installation of materials or equipment that would degrade groundwater quality. Standard BMPs to reduce runoff (such as revegetation of disturbed areas or sediment fencing) would minimize adverse impacts to shallow groundwater quality. Though construction would create more impervious surfaces, the increase would not likely affect the quality of the aquifer located under Sheppard AFB. The proposed action is not expected to appreciably contribute to impacts associated with groundwater.

4.3.5.2.3 Alternative Action

There would be negligible effect on groundwater from implementation of the alternative action. Surface water sources provide potable water for the installation. Approximately 90 percent of the withdrawal from the Seymour aquifer is used for irrigation, with the remainder primarily used for municipal supply (primarily for the cities

of Vernon, Burkburnett, Electra, and Seymour. Under the alternative action, impacts would be similar to those described for the proposed action. Therefore, the alternative action is not expected to contribute appreciably to impacts associated with groundwater.

4.3.5.2.4 Cumulative Impacts

The proposed action or alternative actions, when combined with the other actions proposed in the area, would result in a negligible effect on use of groundwater. Demand for water will continue to increase in the future as both population and industry increase in the region. The usage of the aquifer is monitored and evaluated by the TCEQ. Minor adverse cumulative impacts from the proposed action and alternative actions would be expected as a result of increased use of the Seymour aquifer located under Sheppard AFB.

4.3.5.2.5 Measures to Reduce Impacts

Should the proposed or alternative actions be implemented, measures to protect human health and welfare would not be required. However, BMPs would be used to reduce or eliminate runoff or contamination into the groundwater. Site-specific sediment and erosion control plans with detailed BMPs to prevent soil disturbance, capture and contain loose soil, and slow the movement of stormwater during heavy rains would be included in the project development. Continued good stewardship of the amount of groundwater withdrawal would help to alleviate potential regional groundwater supply problems.

4.3.5.3 Floodplains

As defined in 44 CFR 9.4, natural values of floodplains include natural moderation of floods, water quality maintenance, groundwater recharge, habitats, open space, and recreation, among others. By incorporating stormwater BMPs and other engineering controls, adverse impacts to floodplains would be minimized. Any project constructed in the floodplain would conform to City of Wichita Falls building code requirements regarding construction in a floodplain or flood hazard area.

4.3.5.3.1 No Action Alternative

Under the no action alternative, there would be no change from the baseline conditions described in Section 3.3.5.4.

4.3.5.3.2 Proposed Action

This EA uses the 100-year floodplain established during the floodplain survey conducted at Sheppard AFB in 2003 for areas potentially impacted by floodwaters (USAF 2003c). Three projects associated with the proposed action (projects 3, 13, and 14) would be located in areas designated as part of the 100-year floodplain:

Loop Road Improvements

This project includes the construction of road improvements at the intersection of Missile Road and Bridwell Road. A small portion of the project would be located within the 100-year floodplain. Figure 4-2 shows the location of the proposed roadways. The roadway improvements would be needed to connect the future Commercial Gate Entry Complex to the training campuses and is designed to reduce the traffic and connection within the on-base training campuses.

Approximately 38,800 square feet of pavements and 30,000 square feet of pavement demolition are associated with the Loop Road Improvement project. Approximately 7,500 square feet of this roadway construction and 3,050 square feet of this roadway demolition would occur within the floodplain. Approximately 0.1 acres of net impervious surfaces would be added to the floodplain due to the project. The improvements would be located along Missile Road, which is currently located in the floodplain. Improvements include expansion of the current roadway to provide an increased number of lanes to meet traffic flow requirements.

Increases in impervious surfaces act to increase discharge volume and speed of delivery of stormwater to nearby waterways. Replacement of vegetation with an impervious surface eliminates most potential for infiltration and also speeds up delivery of the stormwater to nearby drainage and stream channels in the absence of standard stormwater controls. An addition of approximately 0.1 acres of impervious surface to the floodplain would act to increase peak discharge volume and speed delivery of stormwater. The estimated increase in runoff volume using the Rational Method for a 24-hour period based on a 25-year 24-hour storm (USAF 1983) with a rainfall intensity of 6.8 inches per hour (National Oceanic and Atmospheric Association [NOAA] 2006) is approximately 0.05 acre-feet.

BMPs would be implemented to structurally moderate the volume and slow the discharge of stormwater associated with the new impervious cover. Landscaping would be installed in strategic locations to increase infiltration capability. A TPDES General Construction Permit and associated SWPPP with BMPs would be required for the project, and would include structural and programmatic controls to eliminate pollution from construction- and operational-related runoff. During the clearing, grading, and construction of facilities, erosion control BMPs would be employed to minimize erosion into nearby waterways on the site. These measures would include installation of silt fences or berms between waterways and the ongoing construction processes. Minimal adverse effects would be expected by construction of the road improvements in the floodplain due to the implementation of structural stormwater BMPs during the design and construction.

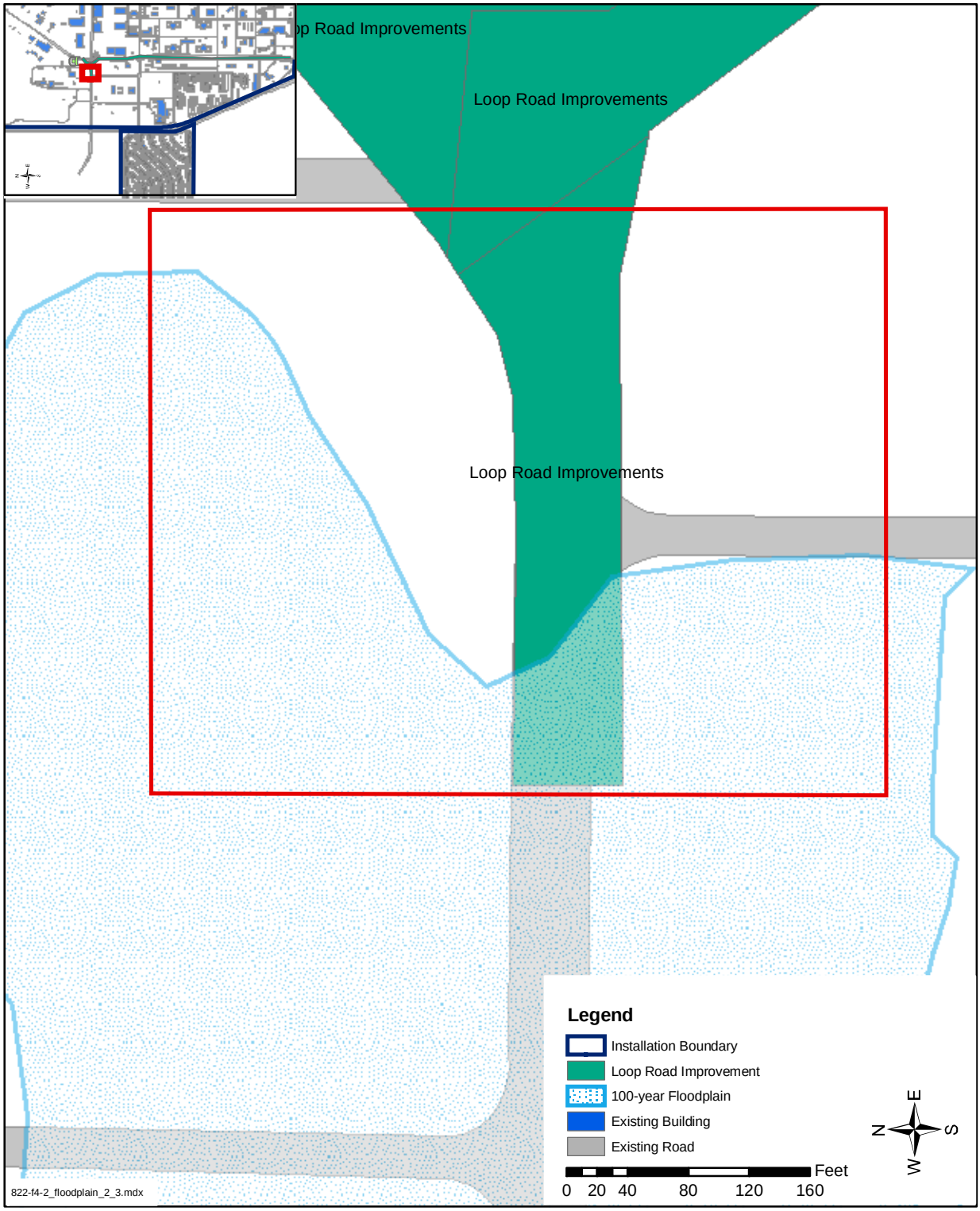

Figure 4-2 Loop Road Improvement Project

80th Flying Training Wing Campus Recreational, Parking, and Road Improvements

This project includes the construction of a recreational area and parking and road improvements for the 80 FTW campus. Portions of both projects would be located within the 100-year floodplain. Figure 4-3 shows the location of the new recreational facilities, parking areas, and roadways. The 80 FTW campus is located in the northwestern portion of Sheppard AFB and was designed to integrate flying training, logistic support function, training facilities, and quality of life resources to provide an optimal flying training campus. This area is located almost entirely within the floodplain as shown on Figure 3-2.

Currently the closest recreational facilities are located approximately 2 miles from the 80 FTW campus. The recreational facilities are needed within the 80 FTW to provide adequate training areas and fitness facilities for the students. Traveling from the 80 FTW campus to the fitness facilities across base impacts the training schedule through reduced training time. Within the 80 FTW campus, open areas outside of the floodplain are located to the southeast and southwest of the main part of the campus. The area to the southwest is used for parachute egress training by the 80 FTW and would not be available for development. The area to the southeast is sited as the location for the new Flying Operations Group Headquarters facility. Alternative areas for the 80 FTW recreational area are not available within the campus.

The recreational area includes a softball field, soccer field, running track, and an outdoor seating area to support the 80 FTW campus development. Demolition of Building 2320 (located outside the floodplain) and associated parking would also occur. Parking areas associated with the recreational area would be located within the floodplain. Additionally, the roadway leading to the 80 FTW campus would be renovated/constructed to incorporate basewide roadway improvements and provide more efficient access to the 80 FTW campus and the rest of the base. Parking improvements and airplane displays to support the 80 FTW would also be included as part of the projects. Portions of the roadway improvement, parking areas, and airplane displays would be located within the floodplain.

Approximately 152,600 square feet of recreational fields and 738,400 square feet of pavements are associated with the two projects with 397,700 square feet of impervious surfaces demolition for a net increase of 7.8 acres of impervious surfaces. Within the floodplain, 5.68 acres of parking and 1.09 acres of roadway would be constructed along with the demolition of approximately 5.6 acres of parking and 0.6 acres of roadway. Therefore, the net increase in impervious surfaces within the floodplain would be approximately 0.57 acres. The proposed projects within the 80 FTW campus include several recreational fields, which would be constructed over pervious surfaces.

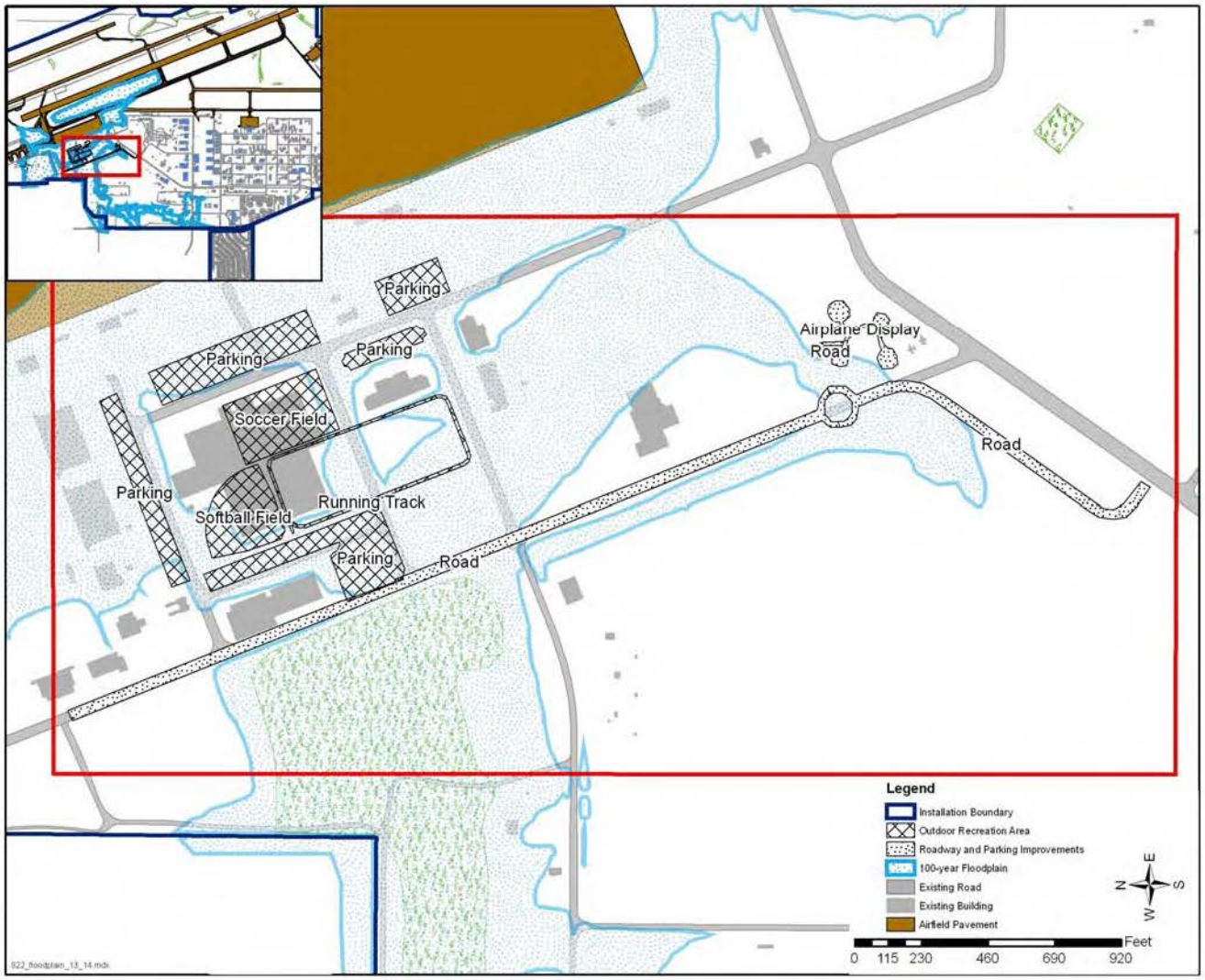

Figure 4-3 80th Flying Training Wing Campus Recreational, Parking, and Road Improvement Projects

Increases in impervious surfaces act to increase discharge volume and speed of delivery of stormwater to nearby waterways. Replacement of vegetation with an impervious surface eliminates most potential for infiltration and also speeds up delivery of the stormwater to nearby drainage and stream channels in the absence of standard stormwater controls. A net increase of approximately 0.57 acres of impervious surface to the area within the floodplain would act to increase peak discharge volume and speed delivery of stormwater. The estimated increase in runoff volume using the Rational Method for a 24-hour period based on a 25-year 24-hour storm (USAF 1983) with a rainfall intensity of 6.8 inches per hour (NOAA 2006) is approximately 0.31 acre-feet.

There would be no displacement of floodwaters and flow of surface water would not be affected, as the parking lots and roadways would be constructed at the ground level and vertical structures would not be constructed to impede flow. BMPs would be implemented to structurally moderate the volume and slow the discharge of stormwater associated with the new impervious cover. Landscaping would be installed in strategic locations to increase infiltration capability. A TPDES General Construction Permit and associated SWPPP with BMPs would be required for the project, and would include structural and programmatic controls to eliminate pollution from construction- and operational-related runoff. During the clearing, grading, and construction of facilities, erosion control BMPs would be employed to minimize erosion into nearby waterways on the site. These measures would include installation of silt fences or berms between waterways and the ongoing construction processes. Minimal adverse effects would be expected by construction of the recreational area, parking, displays, and roadways improvements in the floodplain due to the implementation of structural stormwater BMPs during the design and installation of the facilities.

4.3.5.3.3 Alternative Action

Impacts to the floodplain would be the similar to those described for the proposed action. No additional construction within the floodplain besides the four projects listed under the proposed action was identified in the alternative action. Therefore, impacts to the floodplain would be similar to those presented for the proposed action. Minimal adverse effects would be expected by the implementation of the alternative action.

4.3.5.3.4 Cumulative Impacts

As part of the ongoing actions on base, none of the projects is located within the 100-year floodplain. During construction of ongoing projects both on and off base, appropriate construction BMPs would be employed to minimize potential runoff and sedimentation during construction activities and appropriate vegetation would be re-established. The increase in impervious surfaces as a result of the ongoing actions would require that the stormwater management systems be monitored and updated, as necessary, to accommodate increased runoff. Cumulative impacts to floodplains are

expected to be minor given the implementation of standard stormwater BMPs during the design and installation of the facilities.

4.3.5.3.5 Measures to Reduce Impacts

A majority of the construction and demolition of facilities within the floodplain would be within previously disturbed areas. The design of projects would require all floodplain issues be addressed in accordance with U.S. Army Corps of Engineers floodplain mitigation and development protocol. The projects would also conform to city of Wichita Falls building code requirements regarding construction in a floodplain or flood hazard area and standard floodplain management guidance.

In order to minimize the potential impact of the floodplain on structures, vertical facilities would be sited outside the floodplain to the extent possible and finished floor elevations would be set at least 1.5 feet above the established 100-year water surface elevation and the base of the foundation would be protected from erosion with appropriate margins of safety implemented. Pedestrian access to the facilities would also be located above the 100-year floodplain. BMPs would also be implemented to structurally moderate the volume and slow the discharge of stormwater runoff into the floodplain area. Landscaping would be installed strategically in the proposed action project areas to increase infiltration capability. Possible modifications or additions to the current volume of stormwater retention structures incorporated into the active and passive recreational areas would be evaluated as part of the final designs for each project. Using gravel where possible would also minimize the impact of impervious surfaces to the floodplain by slowing the rate of discharge of stormwater and allowing more time for infiltration into the soil.

Since construction and demolition activities would require the disturbance of more than one acre, a TPDES Construction Stormwater Permit and SWPPP would be required for each project grouping and include structural and programmatic controls to eliminate pollution from construction and operational-related runoff. During clearing, grading, and construction of facilities, erosion control BMPs would be employed to minimize erosion into nearby waterways on the site. These measures would include installation of silt fences or berms between waterways and the ongoing construction processes and would help to reduce any potential to impact floodplain areas during construction of the facilities.

4.3.6 Hazardous Materials and Waste

CIP construction projects and BRAC demolition projects would be performed utilizing normal construction methods, which would limit the use, to the extent possible, of hazardous materials. Petroleum, oil, and lubricant (POL) products and other hazardous materials (e.g., paints) would be used during construction/renovation/demolition activities. These materials would be stored in the proper containers, employing secondary containment as necessary to prevent/limit accidental spills. All spills and accidental discharges of POLs, hazardous materials, or hazardous waste would be reported.

The purchase and use of hazardous materials on Sheppard AFB must be authorized by the base's ESOH Team established by AFI 32-7086, *Hazardous Materials Management*. As part of this program, the base operates six CSAs. All hazardous materials enter the base through a CSA, even those used in contractor operations. Absolutely no hazardous material will be brought on to Sheppard AFB until it is entered into the standard Air Force HAZMAT tracking system and approved for use by the ESOH Team in a specific process or application, and all other requirements for its possession, storage, use and disposal are met. The office of primary responsibility for the authorization process is the 82 CES/CEV.

Unless otherwise exempted by CERCLA regulations, the USEPA and TCEQ administer RCRA Subtitle C (40 CFR Parts 260 through 270) regulations applicable to the management of hazardous wastes. Hazardous waste must be handled, stored, transported, disposed, or recycled in accordance with these regulations. There would be impacts to hazardous waste management if federal action resulted in noncompliance with applicable federal and Texas regulations or caused waste generation that could not be accommodated by current Sheppard AFB waste management capacities. Applicable spill response procedures are also detailed in the Sheppard AFB *Hazardous Waste Management Plan.*

No impacts from hazardous materials and hazardous wastes are expected, as the Air Force and developers would adhere to respective requirements and there would be no increase in the quantity of hazardous waste generated at Sheppard AFB as a result of the alternatives.

4.3.6.1 No Action Alternative

No adverse impacts associated with hazardous material/waste, IRP sites, asbestos-containing material (ACM), lead-based paint (LBP), PCBs, or solid waste are anticipated under the no action alternative, as standard operating procedures would be implemented as described in section 4.3.6.

4.3.6.2 Proposed Action

No adverse impacts associated with hazardous material/waste, IRP sites, ACM, LBP, PCBs, or solid waste are anticipated under the proposed action, as standard operating procedures would be implemented as described in section 4.3.6.

4.3.6.3 Alternative Action

No adverse impacts associated with hazardous material/waste, IRP sites, ACM, LBP, PCBs, or solid waste are anticipated under the alternative action, as standard operating procedures would be implemented as described in section 4.3.6.

4.3.6.4 Cumulative Impacts

No adverse impacts associated with hazardous material/waste, IRP sites, ACM, LBP, PCBs, or solid waste are anticipated under any of the action alternatives when considered cumulatively with other actions that may take place in the ROI, as standard operating procedures would be implemented as described in section 4.3.6.

4.3.6.5 Measures to Reduce Impacts

The following actions, as part of Sheppard AFB standard operating procedures, would be implemented as part of the alternatives to ensure that there are no impacts related to potential issues discussed above:

- 82 CES/CEV would be contacted immediately if any unusual odor or color is observed in soil or groundwater during any construction or demolition activities.
- 82 CES/CEV would review all construction project programming documents, designs, and contracts. Project designs would require appropriate abatement and disposal requirements for ACM/LBP.
- A certified contractor would be required for the removal and disposal of any ACM.
- In the event that PCBs are discovered, they would be turned into the Defense Reutilization and Marketing Office for proper disposal.
- Contractors would be required to properly dispose of all hazardous materials, including fluorescent light ballasts, in accordance with 40 CFR 261 and TCEQ requirements.
- All spills and accidental discharges of POL, hazardous materials, or hazardous waste on Sheppard AFB, regardless of quantity, would be reported to 82 CES/CEV and mitigated.
- The Air Force and contractors would coordinate with all local landfill operators prior to demolition or construction activities to minimize any potential impacts associated with disposal of construction and demolition debris.

4.3.7 Biological Resources

4.3.7.1 Vegetation and Wildlife

4.3.7.1.1 No Action Alternative

No construction, renovation, or demolition activities would occur under the no action alternative. Therefore, no adverse impacts to vegetation and wildlife are expected under this alternative.

4.3.7.1.2 Proposed Action

Activities under the proposed action would occur within largely developed, maintained urban and suburban areas with a disturbed landscape; therefore, impacts to vegetation and wildlife occurring on Sheppard AFB would be minimal. Because the proposed action activities would occur on previously disturbed areas, the proposed action would have no potential to impact the continued existence of state listed species occurring on Sheppard AFB. Use of BMPs during construction would minimize the potential for adverse effects to vegetation at and near construction sites, and there would be minimal impacts to native vegetation outside the developed regions of Sheppard AFB. Since projects would occur in essentially urban or suburban areas, there would be no or minimal impacts to wildlife, with the exception of birds that associate with and nest on or in man-made structures.

4.3.7.1.3 Alternative Action

Potential impacts associated with the alternative action would be the same as those described in Section 4.3.7.1.2. The Air Force expects only negligible impacts to vegetation given the disturbed nature of the project landscape and the use of BMPs during construction Since projects would occur in essentially urban or suburban areas, there would be no or minimal impacts to wildlife, with the exception of birds that associate with and nest on or in man-made structures.

4.3.7.1.4 Cumulative Impacts

Localized loss of habitat or direct impacts to species can have a cumulative impact when viewed on a regional scale if that loss or impact is compounded by other events with the same end result. However, there would be no net loss of critical habitats at or around Sheppard AFB, because projects for the proposed and alternative action would occur within developed areas of the base. The proposed or alternative actions would not have incremental effects on the vegetation and wildlife of Sheppard AFB or the local area.

4.3.7.1.5 Measures to Reduce Impacts

No impacts to vegetation and wildlife are expected under the proposed or alternative actions. Therefore, no specific measures to reduce impacts on vegetation and wildlife would be required. However, for the proposed and alterative action, trees and shrubs would be retained to the greatest extent possible. Use of BMPs during construction would minimize the potential for adverse effects to vegetation at and near the construction sites.

4.3.7.2 Wetlands

Sheppard AFB has delineated the boundaries of the 41.82 acres of wetlands on the base. Implementation of the proposed action would not require dredge or fill of wetlands. Wetlands will continue to be inspected annually, and any decision-making involving

wetlands will follow the procedures outlined in AFIs 32-7062 and 32-9003 and EOs 11988 and 11990.

4.3.7.2.1 No Action Alternative

No construction, renovation, or demolition activities would occur under the no action alternative. Therefore, no adverse impacts to wetlands are expected under this alternative.

4.3.7.2.2 Proposed Action

Sheppard AFB would continue with the existing policy to conserve and protect the wetland habitat adjacent to the installation by (1) including all practicable measures to avoid and minimize impacts to wetlands caused by fill required by the proposed construction projects (pipelines and electrical cable trenching, building construction, and similar activities); (2) continuing to implement and enforce strict control of spills of hazardous materials; and (3) effectively managing stormwater runoff that might affect wetlands by updating and implementing various plans such as the Spill Prevention Control and Countermeasures (SPCC), SWPPP, and Hazardous Material (HAZMAT) management plans.

4.3.7.2.3 Alternative Action

Potential impacts associated with the alternative action would be the same as those described in Section 4.3.7.2.2.

4.3.7.2.4 Cumulative Impacts

When considered in the context of other ongoing actions in the ROI, the proposed action or alternatives (to include the no action alternative) would not have cumulative effects on these wetlands.

4.3.7.2.5 Measures to Reduce Impacts

No adverse impacts to wetlands are expected; however, Sheppard AFB would continue good stewardship of wetland habitat by (1) including all practicable measures to avoid and minimize impacts to wetlands caused by fill required by the proposed construction projects (pipelines and electrical cable trenching, building construction, and similar activities); (2) continuing to implement and enforce strict control of spills of hazardous materials; (3) effectively managing stormwater runoff that might affect wetlands by updating and implementing various plans such as the SPCC, SWPPP, and HAZMAT management plans; and (4) continuing to control encroachment of invasive species.

4.3.8 Utilities and Infrastructure

In evaluating impacts on infrastructure and utilities, several items were examined, including: (1) the degree to which a utility service would have to alter operating practices and personnel requirements; (2) the degree to which the change in demands from implementation of the proposed action and alternatives would impact system's capacity;

(3) the degree to which a transportation system would have to alter operating practices and personnel requirements to support the action; (4) the capacity required from new or revised transportation systems; (5) the degree to which the increased demands from the proposed program would reduce the reliability of transportation systems, or aggravate already existing adverse conditions on the base; and (6) the degree to which the proposed action and alternative change surface water runoff characteristics and erosion characteristics. For the evaluation of potential impacts, the ROI for the infrastructure and utilities resource area encompasses Sheppard AFB.

4.3.8.1 Electricity and Natural Gas

4.3.8.1.1 No Action Alternative

Under the no action alternative, there would be no demolition, construction or mission related changes in activities. Therefore, there would be no effect on electricity and natural gas described in section 3.3.8.1.

4.3.8.1.2 Proposed Action

The proposed action would reduce the interior building space by 90,045 square feet due to CIP and BRAC actions. Population changes associated with the proposed action would result in a loss of 2,468 military personnel, 156 civilian personnel, and an estimated 1,302 dependent on-base residents. The reduction in personnel, dependents, and interior building space would result in a slight gain in surplus capacity for the utility systems supporting the base. Localized temporary service disruptions may occur during construction of new facilities, but would not constitute a permanent decrease in level of service (LOS).

4.3.8.1.3 Alternative Action

The alternative action would increase the interior building space by approximately 2,909,746 square feet and would add approximately 18,561 people. The increase in effective population is 12,953 24-hour equivalents. The increase in building space represents an increase of approximately 23 percent over the current value of 9,806,571 square feet (Appendix B). As further described in Appendix B, a 23 percent increase in habitable building space is directly related to a similar increase in the demand for electrical and natural gas utilities serving those buildings.

The utility systems supporting the electrical and natural gas services are capable of supporting a 23 percent increase in demand (Appendix B). Localized temporary service disruptions may occur during construction of new facilities, but would not constitute a permanent decrease in LOS.

4.3.8.1.4 Cumulative Impacts

The efforts described in Section 2.7 are negligible in comparison to either the proposed or the alternative actions with respect to net changes in building space and

population and therefore the cumulative impacts to the existing electricity supply and natural gas distribution systems would be similar to those already described for the proposed and alternative actions. As further described in Appendix B, the existing utility supplies can manage anticipated demands associated with the proposed consumption increases. However, upgrades to individual electrical subsystems would be anticipated to coincide with implementation of the alternative action projects.

4.3.8.1.5 Measures to Reduce Impacts

Mitigation measures for increased energy requirements would not be required for the proposed actions and electrical subsystem replacements would be incorporated into the alternative actions, as required.

4.3.8.2 Potable Water

4.3.8.2.1 No Action Alternative

Under the no action alternative, there would be no demolition, construction, or mission related change in activities. Therefore, there would be no effect on the potable water system as described in section 3.3.8.2.

4.3.8.2.2 Proposed Action

The proposed action would reduce the interior building space by 90,045 square feet due to CIP and BRAC actions. Population changes associated with the proposed action would result in a loss of 2,468 military personnel, 156 civilian personnel, and an estimated 1,302 dependent on-base residents. The reduction in personnel, dependents, and interior building space would result in a slight gain in surplus capacity for the utility systems supporting the base. Localized temporary service disruptions may occur during construction of new facilities, but would not constitute a permanent decrease in LOS.

4.3.8.2.3 Alternative Action

The alternative action would increase the interior building space by approximately 2,909,746 square feet and would add approximately 18,561 people. The increase in effective population is 12,953 24-hour equivalents. The 24-hour equivalent effective population increase of 12,953 people is approximately 100 percent of the baseline effective population of 13,052 described in Appendix B. The increase in building space represents an increase in approximately 23 percent over the current value of 9,806,571 square feet (Appendix B).

The utility systems supporting the potable water services are capable of supporting a 100 percent increase in demand (Appendix B). Localized temporary service disruptions may occur during construction of new facilities, but would not constitute a permanent decrease in LOS.

4.3.8.2.4 Cumulative Impacts

The efforts described in Section 2.7 are negligible in comparison to either the proposed or the alternative actions with respect to net changes in building space and population and therefore the cumulative impacts to the existing potable water supply systems would be similar to those already described for the proposed and alternative actions. As further described in Appendix B, the existing potable water supplies can manage anticipated demands associated with the proposed consumption increases. However, upgrades to localized distribution system components would be anticipated to coincide with implementation of the alternative action projects.

4.3.8.2.5 Measures to Reduce Impacts

Mitigation measures to protect health and welfare would not be required for the proposed action or alternative. The available potable water supplies are capable of meeting the projected demand associated with the proposed action or alternative (Appendix B).

4.3.8.3 Solid Waste Management

There are several items considered in analyzing solid waste impacts. These items include evaluating the degree to which the proposed construction projects and demolition projects could affect the existing solid waste management program and capacities of the area landfills. Solid waste generated from the proposed construction activities would consist of building materials such as solid pieces of concrete, metals (conduit, piping, and wiring), and lumber. Analysis of the cumulative impacts associated with implementation of the proposed action and other actions is based on the following assumptions:

- Non-residential construction waste generation is 4.02 pounds (lbs) per square foot.
- Non-residential demolition waste generation is 173 lbs per square foot.
- Approximately 1 lb of construction debris is generated for each square foot of paving.
- Approximately 3.0 pounds per day of solid waste is generated per person (Murphy and Chatterjee 1976).

It is important to note that any cut vegetation would not be added to the solid waste stream, but instead would be taken to the city of Wichita Falls' regional composting facility. Sheppard AFB participates in the city of Wichita Falls' regional composting program. During 1999, Sheppard AFB composted approximately 134 tons of solid waste. To the greatest extent possible, construction and demolition debris would be recycled, especially wood, scrap metal, and wiring (USAF 1999).

Coordination between Sheppard AFB, disposal contractors, developers, and local landfill operators prior to demolition or construction would minimize any potential impacts associated with disposal of construction and demolition debris.

4.3.8.3.1 No Action Alternative

Under the no action alternative, there would be no demolition, construction or mission related changes in activities. Therefore, there would be no effect on solid waste disposal resources as described in Section 3.3.8.3.

4.3.8.3.2 Proposed Action

The proposed action involves the construction of 1,047,787 square feet if building space construction, and 2,055,189 square feet of pavement construction. This action also involves the demolition of 2,801,187 square feet of building space. The estimated quantity of construction and demolition debris that would be generated as a result of these activities is estimated in Table 4-9.

Table 4-9 Estimated Construction and Demolition Debris Generation, Proposed Action

Project Year	Construction*			Demolition		Total Debris (tons)
	Debris (square feet)	Pavements (square feet)	Debris (tons)	Debris (square feet)	Debris (tons)	
1	209,557	403,278	623	560,237	48,461	49,083
2	209,557	403,278	623	560,237	48,461	49,083
3	209,557	403,278	623	560,237	48,461	49,083
4	209,557	403,278	623	560,237	48,461	49,083
5	209,557	403,278	623	560,237	48,461	49,083
Total	**1,047,787**	**2,055,189**	**3,134**	**2,801,187**	**242,303**	**245,436**

Note:
Non-residential construction waste generates approximately 4.02 pounds per square foot.
Approximately 1 pound of construction debris waste is generated per square foot of paving.
Multiply each column total above by the related factor and then divide by 2000 to get the debris total in tons.
*Construction and demolition debris for recreational fields are not included in these calculations.

During the life cycle of the proposed action, construction and demolition debris would reduce the life expectancy of the primary landfill by only two years. It is unlikely that the construction and demolition debris would be disposed at one landfill. Distribution of the debris between the two available landfills would diminish the combined capacity of both landfills by only 0.6 years (Table 4-10).

Table 4-10 Estimated Increase in Construction and Demolition Debris at Local Landfills, Proposed Action

Landfill Sites	2004 Waste Received (tons/year)	2004 Landfill Life (years)	2004 Total Capacity (tons)	Total Construction and Demolition Debris for Proposed Action	Total Landfill Capacity Remaining (tons)	Landfill Life Remaining after Proposed Action (years)
City of Wichita Falls Landfill	187,972	198	37,128,338	245,417	36,882,921	196.2
IESI Buffalo Creek Landfill	202,197	100	20,193,622	245,417	19,948,205	98.7
Combined Landfills	**390,169**	**146.9**	**57,321,960**	**245,417**	**57,076,543**	**146.3**

Note:
Construction and demolition debris will likely be distributed among all landfill sites. The table illustrates what would happen if one site received all the construction and demolition debris over the course of 5 years.
NA indicates that it is not applicable to report negative values in this instance because the waste will be sent to more than one landfill.

4.3.8.3.3 Alternative Action

The alternative action involves the construction of 7,198,171 square feet of building space construction and 2,526,480 square feet of pavement construction. This action also involves the demolition of 4,291,425 square feet of building space. The quantity of construction and demolition debris that would be generated as a result of these activities is estimated in the Table 4-11. The alternative action would add approximately 18,651 people for an effective population of 12,953. The increase in recurring generation of solid waste would be 7,092 tons per year.

Table 4-11 Estimated Construction and Demolition Debris Generation, Alternative Action

Project Year	Construction			Demolition		Total Debris (tons)
	Debris (square feet)	Pavements (square feet)	Debris (tons)	Debris (square feet)	Debris (tons)	
1	1,439,634	505,296	3,146	858,285	74,242	77,388
2	1,439,634	505,296	3,146	858,285	74,242	77,388
3	1,439,634	505,296	3,146	858,285	74,242	77,388
4	1,439,634	505,296	3,146	858,285	74,242	77,388
5	1,439,634	505,296	3,146	858,285	74,242	77,388
Totals	**7,198,171**	**2,526,480**	**3,146**	**4,291,425**	**371,208**	**386,940**

Note:
Non-residential construction waste generates approximately 4.02 pounds per square foot.
Approximately 1 pound of construction debris waste is generated per square foot of paving.
Multiply each column total above by the related factor and then divide by 2000 to get the debris total in tons.
Construction and demolition debris for recreational fields are not included in these calculations.

Over the five-year period of the alternative action, it is estimated that the total quantity of the debris generated from construction and demolition activities would be 386,940 tons. The annual quantity of debris generated during construction, renovation, and demolition under the cumulative action was compared to the average annual amount of waste received at regional landfills that accept construction and demolition waste, as shown in Table 4-12 (recycling by Sheppard AFB would reduce the total amount of construction and demolition debris.)

Table 4-12 Estimated Increase in Construction and Demolition Debris at Local Landfills, Alternative Action

Landfill Sites	2004 Waste Received (tons/year)	2004 Landfill Life (years)	2004 Total Capacity (tons)	Total Construction and Demolition Debris for Alternative Action	Total Landfill Capacity Remaining (tons)	Landfill Life Remaining after Alternative Action (years)
City of Wichita Falls Landfill	187,972	198	37,128,338	386,940	36,741,398	195.5
IESI Buffalo Creek Landfill	202,197	100	20,193,622	386,940	19,806,682	98.0
Combined Landfills	**390,169**	**146.9**	**57,321,960**	**386,940**	**57,012,408**	**146.0**

Note:
Construction and demolition debris will likely be distributed among all landfill sites. The table illustrates what would happen if one site received all the construction and demolition debris over the course of 5 years.

4.3.8.3.4 Cumulative Impacts

Cumulative impacts associated with projects within the ROI involve the construction of 96,186 square feet of building space and 4,225,421 square feet of pavement and the demolition of 4,244,151 square feet of building space. The quantity of construction and demolition debris that would be generated as a result of these activities is estimated in the Table 4-13.

Over a five-year period, it is estimated that the total quantity of the debris generated from construction and demolition activities associated with projects within the ROI would be 369,425 tons. The annual quantity of debris generated during construction, renovation, and demolition associated with the cumulative impacts was compared to the average annual amount of waste received at regional landfills that accept construction and demolition waste, as shown in Table 4-14 (recycling by Sheppard AFB would reduce the total amount of construction and demolition debris.)

Table 4-13 Estimated Construction and Demolition Debris Generation, Cumulative Impacts

Project Year	Construction			Demolition		Total Debris (tons)
	Debris (square feet)	Pavements (square feet)	Debris (tons)	Debris (square feet)	Debris (tons)	
1	19,237	845,084.2	461	848,830	73,424	73,885
2	19,237	845,084.2	461	848,830	73,424	73,885
3	19,237	845,084.2	461	848,830	73,424	73,885
4	19,237	845,084.2	461	848,830	73,424	73,885
5	19,237	845,084.2	461	848,830	73,424	73,885
Totals	**96,186**	**4,225,421**	**2,306**	**4,244,151**	**367,119**	**369,425**

Note:
Non-residential construction waste generates approximately 4.02 pounds per square foot.
Approximately 1 pound of construction debris waste is generated per square foot of paving.
Multiply each column total above by the related factor and then divide by 2000 to get the debris total in tons.
Construction and demolition debris for recreational fields are not included in these calculations.

Table 4-14 Estimated Increase in Construction and Demolition Debris at Local Landfills, Cumulative Impacts

Landfill Sites	2004 Waste Received (tons/year)	2004 Landfill Life (years)	2004 Total Capacity (tons)	Total Construction and Demolition Debris for Cumulative Action	Total Landfill Capacity Remaining (tons)	Landfill Life Remaining after Cumulative Action (years)
City of Wichita Falls Landfill	187,972	198	37,128,338	369,425	36,758,913	196
IESI Buffalo Creek Landfill	202,197	100	20,193,622	369,425	19,824,197	98
Combined Landfills	**390,169**	**146.9**	**57,321,960**	**369,425**	**57,026,420**	**146.1**

Note:
Construction and demolition debris would likely be distributed among all landfill sites. The table illustrates what would happen if one site received all the construction and demolition debris over the course of 5 years.

If all construction and demolition debris were landfilled at the City of Wichita Falls Landfill (Sheppard AFB's primary construction and demolition debris recipient), the life of the landfill reported in 2004 would be reduced by 2 years. It is unlikely that all the construction and demolition debris would enter only one landfill. Distribution of construction and demolition debris to the IESI Buffalo Creek landfill would minimize the potential for adverse impacts on an individual landfill.

4.3.8.3.5 Measures to Reduce Impacts

The following BMPs would limit any adverse/cumulative impacts to local landfills resulting from the implementation of the proposed action or alternatives: recycling and reuse of construction and demolition debris (to the extent practicable), and distribution of construction and demolition debris among the local landfills.

4.3.8.4 Wastewater

4.3.8.4.1 No Action Alternative

Under the no action alternative, there would be no demolition, construction or mission related changes in activities. Therefore, there would be no effect on wastewater as described in section 3.3.8.4.

4.3.8.4.2 Proposed Action

The proposed action would reduce the interior building space by 90,045 square feet due to CIP and BRAC actions. Population changes associated with the proposed action would result in a loss of 2,468 military personnel, 156 civilian personnel, and an estimated 1,302 on-base resident military dependents. The reduction in military and civilian personnel, military dependents, and interior building space would result in a slight gain in surplus capacity for the utility systems supporting the base. Localized temporary service disruptions may occur during construction of new facilities, but would not constitute a permanent decrease in LOS.

4.3.8.4.3 Alternative Action

The alternative action would increase the interior building space by approximately 2,909,746 square feet and would add approximately 18,561 people. The increase in effective population is 12,953 24-hour equivalents. The 24-hour equivalent effective population increase of 12,953 people is approximately 100 percent of the baseline effective population of 13,052 described in Appendix B. The increase in building space represents an increase of approximately 23 percent over the current value of 9,806,571 square feet (Appendix B).

The wastewater services are capable of supporting a 100 percent increase in demand (Appendix B). Localized temporary service disruptions may occur during construction of new facilities, but would not constitute a permanent decrease in LOS.

4.3.8.4.4 Cumulative Impacts

The efforts described in Section 2.7 are negligible in comparison to either the proposed or the alternative actions with respect to net changes in building space and population and therefore the cumulative impacts to the existing wastewater distribution systems would be similar to those already described for the proposed and alternative actions. As further described in Appendix B, the existing wastewater systems can manage

anticipated demands associated with the proposed consumption increases. However, upgrades to individual wastewater collection and distribution system components would be anticipated to coincide with implementation of the alternative action projects.

4.3.8.4.5 Measures to Reduce Impacts

Mitigation measures for increased wastewater requirements would not be required for the proposed actions. The available wastewater services provided by the city of Wichita are capable of meeting the projected demand associated with the proposed action or alternative (Appendix B).

4.3.8.5 Transportation

4.3.8.5.1 No Action Alternative

Under the no action alternative, there would be no increase in personnel or mission activity at Sheppard AFB and there would be no construction or demolition accomplished in support of the CIP or the BRAC program for the base. Consequently, baseline transportation conditions as described in Section 3.3.8.5 would remain unchanged and no transportation impacts would occur beyond those associated with ongoing activities and approved actions.

4.3.8.5.2 Proposed Action

Under the proposed action, BRAC-related projects would result in a loss of military personnel and civilian personnel from Sheppard AFB. Therefore, no additional traffic would be created and conditions would remain close to the current baseline.

Implementation of the proposed action would require delivery of materials to and removal of construction-related debris from construction and demolition sites. This could result in minor to moderate traffic congestion on and off base. However, construction traffic would make up only a small portion of the total existing traffic volume in the area and at the base. Increased traffic during construction could contribute to increased congestion at gates and in the processing of access passes. The potential for short-term increases in traffic are not likely to affect commute times substantially. This congestion would be short-term, and would cease upon completion of the projects. No long-term impacts to on- or off-base transportation systems would result.

Overall, the grid pattern of streets and development at Sheppard AFB is an asset since it provides easy access to buildings and sites. It also provides multiple means of access and avoids moving too much traffic onto a few collector roads at high speed. However, because of the extent and nature of the technical student training at Sheppard, easy accessibility of vehicles within a campus area is not optimal and can create conflicts. Several projects under the proposed action include roadway and parking improvements as elements of the project that would help to eliminate or reduce potential pedestrian and vehicle conflicts. When completed, these projects would have a positive impact to the

transportation infrastructure at Sheppard AFB. The projects and their potential benefits are presented below.

Front Gate Entry Control Complex

The construction of the new visitor's pass control facility and the installation of smart gate technology would enhance the existing safety, security and capacity issues at the Front Gate. Part of the construction would tie the new entrance road into First Avenue (Loop Road) as a continuous collector and Avenue D would tee into First Avenue. This should help to improve safety and the current traffic flow coming on to the base through the Front Gate.

Loop Road Improvements

This project would involve improvements to the Loop Road development around the entire Technical Training Center North area by connecting Bridwell Road to Avenue K and Avenue K to Taxiway A. The intersection of Missile and Bridwell Roads would also be redesigned. Avenue D would be redesigned as the principal alignment on the west side. Limited improvements would also be made to Fifth Avenue. These improvements would also require the demolition of existing sections of Missile Road, Bridwell Road, and Avenues D and E. The improvements would also tie into the planned Commercial Gate Entry Control Complex. The closure of a portion of Missile Road would provide greater privately owned vehicle parking and minimize student/vehicle interaction. Loop Road, when completed, would provide relatively unimpeded traffic with a cross section that would allow for speeds that would improve accessibility, safety, and traffic flow around the base.

80th Flying Training Wing Campus

The construction/renovation of existing roadways to support the development of the 80 FTW Campus would greatly simplify and improve vehicular access in that portion of the base. Campus area access would be from the new loop road (Bridwell Road) at H Avenue. Avenue H would be the main collector road in the campus. Avenue J would be closed to through access off Bridwell Road. These improvements would help to improve safety for the pedestrians and vehicles accessing the area.

Community Support Area

Construction associated with the Community Support Area project would improve the Loop Road around the permanent party area/community support area. The principle construction associated with this would be the redesigned alignment of First Avenue on the south side. This along with the other Loop Road projects described above would complete the basic redesign and alignment for the Loop Road. This would improve the capacity, safety, and flow of traffic on and around the major developed portions of the base. When completed Avenue D would be the principal alignment on the west side, Taxiway A would be the principal alignment on the east side, and First Avenue would be the principal alignment on the south side.

Other Projects

Construction activities associated with several of the other CIP/BRAC projects included in the proposed action would help to address parking problems on the base. The additional parking would help serve students and permanent base personnel who bring personal vehicles on base. In some cases, the parking would be remote and some would be located directly adjacent to many of the on-base buildings. Some of the proposed improvements would result in a campus with a loop road around a vehicle-restricted area and parking provided along the edges, which are accessible from the Loop Road or in remote lots. These realignments could also help to facilitate the creation of a dedicated system of troop walks.

4.3.8.5.3 Alternative Action

A comprehensive transportation study has not been conducted recently at Sheppard AFB recently and only limited transportation data is available. Some actual data is available from a study conducted in 2003 (Gannett-Fleming 2003). As a result, assumptions were made to project the potential impacts to traffic that would be associated with the alternative action. For the purposes of analysis, traffic is assumed to increase proportionally with the increase in base population associated with the alternative action. Based on this assumption, there would only be a very small increase in traffic over baseline conditions since it has been determined that the base only has the potential to accommodate about 500 additional people. As a result of this minor population increase, more people would be required to access Sheppard AFB on a routine basis. This could result in a small increase in the amount of congestion that generally occurs at the gates during the morning and evening workday rush hours and have a minor impact on daily traffic.

In addition to the increase in base population, the alternative action would include construction and demolition projects similar to those described for the proposed action. Therefore, potential construction related transportation impacts would be similar to those described in Section 4.3.8.5.2.

4.3.8.5.4 Cumulative Impacts

Transportation within the ROI may experience slight, localized short-term negative impacts during the proposed construction and demolition activities from the increase in heavy equipment and contractor vehicles. However, impacts would be minimized by the short operating period associated with each project.

Cumulative impacts to transportation as a result of the proposed or alternative action in combination with other projects in the area would be expected to be positive over the long-term because they would enhance the flow of traffic on, to, and off the base. Any projects that would have an impact to State Highway 240 would need to be coordinated with the city and the Texas DOT.

4.3.8.5.5 Measures to Reduce Impacts

Interim measures to minimize any short-term impacts have been defined as part of the proposed action and alternative action. Therefore, no other measures to reduce impacts would be required.

4.3.8.6 Stormwater Drainage

4.3.8.6.1 No Action Alternative

Under the no action alternative, there would be no demolition or construction projects; therefore, there would be no effect on stormwater drainage as described in Section 3.3.8.6.

4.3.8.6.2 Proposed Action

Under the proposed action, several facilities would be constructed and demolished at Sheppard AFB. Based on analysis of the project list, approximately 67.1 acres of new construction and 56.6 acres of associated demolition would occur. A total of 7.5 acres of impervious cover would be added to the installation. As detailed in Section 4.3.5.1.2, this is expected to have a minimal impact on the total amount of impervious cover (0.66 percent increase) and on the total volume of stormwater runoff (0.23 percent or 4.03 acre-feet additional runoff in 24 hours) and would not impact existing capacity of the stormwater drainage systems. Additionally, new site-specific stormwater drainage would be designed, engineered, and implemented at each project location to move stormwater efficiently into the overall drainage system.

In accordance with the installation's SWPPP, BMPs (including techniques such as berms, sediment traps, and silt fences) would be implemented to minimize any runoff and subsequent degradation of surface water quality. The SWPPP would address all the elements of the proposed action before initiating activities. The plan would include erosion and sediment control techniques that would be used during demolition and construction to minimize erosion. In addition, the TPDES program requires that an NOI be filed under the TCEQ Multi-Sector General Permit. Adequate control of runoff and erosion must also be demonstrated at each site. Therefore, water quality would not be adversely impacted by the proposed action.

4.3.8.6.3 Alternative Action

Under the alternative action, a total of 98 acres of new impervious cover would be added to the installation. As detailed in Section 4.3.5.1.3, this is expected to have a minimal impact on the total amount of impervious cover (8.6 percent increase) and on the total volume of stormwater runoff (2.9 percent or 52.8 acre-feet of additional runoff in 24 hours) and would not impact the existing capacity of the stormwater drainage systems. The kind and duration of construction activities associated with the alternative action would be similar to those identified under the proposed action. The construction and demolition activities would be conducted consistent with the requirements of the TPDES

stormwater program, as described in Section 4.3.8.6.2. Therefore, adverse water quality impacts are anticipated to be minimal for the alternative action.

4.3.8.6.4 Cumulative Impacts

The proposed and alternative actions, when considered with respect to other ongoing actions, would have a minimal net cumulative impact on stormwater at Sheppard AFB when compared to the whole installation. The proposed and cumulative actions would increase impervious cover by 0.69 percent (7.85 acres) and 8.6 percent (98.35 acres) for the alternative and cumulative actions. Total runoff for the proposed and cumulative actions would increase by 0.24 percent (4.2 acre-feet of additional runoff in 24 hours) and 2.91 percent (52.9 acre-feet of additional runoff in 24 hours) for the alternative and cumulative actions. Sediment erosion would be controlled using BMPs during construction and demolition, negating large-scale adverse effects on surface waters. Therefore, minor cumulative impacts would be expected on stormwater resources.

4.3.8.6.5 Measures to Reduce Impacts

Impacts on stormwater resources from the proposed action and alternative actions are minimal when compared to the whole installation. Implementation of the SWPPP and BMPs should be used to reduce or eliminate runoff or contamination into stormwater conveyances (USAF 2005b). Site-specific sediment and erosion control plans with detailed BMPs to prevent soil disturbance, capture and contain loose soil, and slow the movement of stormwater during heavy rains should be included in the project development. The cumulative addition of approximately 52.9 acre-feet of stormwater detention facilities across Sheppard AFB may be considered as a stormwater management BMP for good stewardship of the common watersheds shared with neighboring facilities and residences.

4.3.9 Socioeconomics and Environmental Justice

In order to assess the potential socioeconomic impacts of the proposed action, demographic and economics characteristics at Sheppard AFB, the City of Wichita Falls, and the Wichita Falls MSA were analyzed, as presented in Section 3.3.9. Potential socioeconomic consequences were assessed in terms of effects of the proposed alternatives on the local economy, typically driven by changes in project personnel or expenditure levels. Economic multipliers, migration ratios, and other factors are utilized to determine the total economic effect of project-related changes on regional socioeconomic attributes.

For this environmental assessment, potential socioeconomic impacts are evaluated for factors associated with the installation development proposal at Sheppard AFB, including facility modifications and personnel changes. Personnel changes associated with the action alternatives generate population changes in the region, and related changes in housing and service demand, induced employment and income. Construction activity associated with facility modifications on base often generates temporary economic benefits

to the region in terms of employment and income, however lasting only for the duration of the construction period.

4.3.9.1 No Action Alternative

Under the no action alternative, there would be no change in personnel or mission activity at Sheppard AFB, and no facility modifications in support of Installation Development. Population on base and in the ROI would not be affected. In addition, construction-related employment and earnings impacts associated with the action alternatives would not occur. No impacts to socioeconomic resources would occur under implementation of the no action alternative.

4.3.9.2 Proposed Action

Construction-Related Consequences

Under the proposed action, Sheppard AFB would implement CIP projects involving construction of new building space, renovation of existing facilities, construction of recreational field, and construction or upgrade of paved areas (see Section 2.5). As stated in the methodology section above, construction activities associated with facility development under the proposed action would generate a number of jobs during the construction period, and contribute to local earnings and induced spending. These effects would be temporary, however, only occurring for the duration of the construction period.

Operations-Related Consequences

Under the proposed action, personnel levels at Sheppard AFB would decrease by a total of 2,624 personnel, including 2,468 military personnel and 156 civilians, representing a decrease of 18.1 percent to the existing base employment of 14,466 personnel, and 6.8 percent to the existing Wichita Falls employment of 38,135. Based on existing family size ratios at Sheppard AFB, it is anticipated that 4,005 military dependents would accompany the incoming military personnel, yielding a direct population decline of 6,629 persons (see Table 4-15). A decrease of this size would reduce the Sheppard AFB population to 14,158 persons, representing a decrease of 31.9 percent in the base population. A population decline of this magnitude would represent a loss of 6.5 percent in the Wichita Falls city population and 4.5 percent of the MSA population. The population decreases associated with the proposed action would compound the modest population declines experienced in the Wichita Falls region since 2000 (see Section 3.3.9.1).

For the purposes of this analysis, it is assumed that off-base housing would be vacated prior to on-base housing (i.e., on-base MFH housing would be occupied at capacity). Consequently, the anticipated decrease in personnel under the proposed action, and the resulting out-migration of their households, could result in an increase in the Wichita Falls MSA vacancy rate from 13.1 percent to 17.2 percent of all housing units. Similarly, the out-migration of military—and potentially civilian—families would decrease school enrollments in the Burkburnett and Wichita Falls ISDs. Based on military dependent ratios

for Sheppard AFB, it is estimated that school enrollments may decline by approximately 974 students, representing a decrease in enrollment of 4.5 percent.

Table 4-15 Sheppard Air Force Base Population, Baseline Conditions and Proposed Action

	Living on Base	Living off Base	Total
BASELINE SHEPPARD AFB POPULATION			
Military Personnel	1,687	1,861	3,548
Student Personnel	4,242	1,724	5,966
Military Dependents	3,618	2,703	6,321
Civilian Personnel	0	3,963	3,963
Transient Personnel	989	0	989
Total Baseline Population	**10,536**	**7,548**	**20,787**
PROPOSED ACTION			
Military Personnel	-607	-1,861	-2,468
Student Personnel	0	0	0
Military Dependents	-1,302	-2,703	-4,005
Civilian Personnel	0	-156	-156
Transient Personnel	0	0	0
Total Population Change	**-1,909**	**-4,720**	**-6,629**
PROPOSED SHEPPARD AFB POPULATION			
Military Personnel	1,080	0	1,080
Student Personnel	4,242	1,724	5,966
Military Dependents	2,316	0	2,316
Civilian Personnel	0	3,807	3,807
Transient Personnel	989	0	989
Total Projected Population	**8,627**	**5,531**	**14,158**

Note: Population impacts in this socioeconomic analysis differ from those presented in Appendix B in that the number of military dependents living off base are estimated and included. This number is estimated by applying current military-to-civilian personnel ratios and military dependent ratios.

Source: Appendix B

Environmental Justice Concerns

The potential for environmental justice concerns exists only if adverse environmental impacts are anticipated and disadvantaged groups represent a disproportionate segment of the affected population. As presented in Section 3.3.9.1, minority and low-income populations do not represent a disproportionate share of the total population when compared with regional and state levels. In addition, there are no known concentrated areas of concern where children might be subject to special health or safety risks. In order to address the possibility of environmental justice concerns, potential health and safety factors were analyzed to determine whether any disproportionately high or adverse human health or environmental impacts could affect the human population. In addition, potential environmental health or safety hazards were examined to assess potential special risks to

children. These environmental analyses indicate that no adverse environmental impacts to the human population are anticipated under the proposed action. As a result, no disproportionate environmental justice impacts would occur, nor would there be any special health or safety risks to children.

4.3.9.3 Alternative Action

Construction-Related Consequences

Under the alternative action, Sheppard AFB would be developed to the maximum potential identified in the Sheppard AFB *Capability Analysis* (see Appendix B). It is estimated that the base could accommodate an additional 4 million square feet of new building construction, including the recovery and CIP projects described under the proposed action. The net gain in building space under the alternative action would be 1.5 million square feet involving a net increase of 62.4 acres of impervious surfaces. Construction activities associated with facility development would be similar to those described under the proposed action, although somewhat greater in magnitude due to the increased development capacity proposed. As stated in the methodology section, construction activities associated with facility development under the alternative action would generate a number of jobs during the construction period, and contribute to local earnings and induced spending. These effects would be temporary, however, only occurring for the duration of the construction period.

Operations-Related Consequences

Under the alternative action, if Sheppard AFB were developed to maximum capacity the base could accommodate an additional 4,377 military and civilian personnel, 14,309 students, 4,650 military dependents, and 772 transient personnel, resulting in a total increase in direct population of 24,108 persons. This level of growth represents an increase of 116 percent over the baseline Sheppard AFB population of 20,787 persons to the projected maximum sustainable population of 44,895 persons (see note in Table 4-16). A population increase of this magnitude constitutes 23.5 percent of the Wichita Falls city population and 16.5 percent of the MSA population. The potential population increase associated with the alternative action would offset the population declines experienced in the region since 2000 (see Section 3.3.9.1).

Movement of additional military personnel to Sheppard AFB to the maximum sustainable capacity could affect the housing market and public services, particularly in the area immediately surrounding the base. While growth of this magnitude is not inconsequential, the Wichita Falls region has a certain amount of under-utilized housing and service capacity already existing due to population decline in recent years. In addition, the region has a supportive relationship with Sheppard AFB and promotes economic growth (Wichita Falls BCI 2006).

Table 4-16 Sheppard Air Force Base Population, Baseline Conditions and Alternative Action

	Living on Base	Living off Base	Total
BASELINE SHEPPARD AFB POPULATION			
Military Personnel	1,687	1,861	3,548
Student Personnel	4,242	1,724	5,966
Military Dependents	3,618	2,703	6,321
Civilian Personnel	0	3,963	3,963
Transient Personnel	989	0	989
Total Baseline Population	**10,536**	**7,548**	**20,787**
ALTERNATIVE ACTION			
Military Personnel	1,241	1,369	2,610
Student Personnel	10,174	4,135	14,309
Military Dependents	-897	5,547	4,650
Civilian Personnel	0	1,767	1,767
Transient Personnel	-369	1,141	772
Total Population Change	**10,149**	**13,959**	**24,108**
ALTERNATIVE SHEPPARD AFB POPULATION			
Military Personnel	2,928	3,230	6,158
Student Personnel	14,416	5,859	20,275
Military Dependents	2,721	8,250	10,971
Civilian Personnel	0	5,730	5,730
Transient Personnel	620	1,141	1,761
Total Projected Population	**20,685**	**24,210**	**44,895**

Note: Population impacts in this socioeconomic analysis differ from those presented in Appendix B in that the number of military dependents living off base are estimated and included. This number is estimated by applying current military-to-civilian personnel ratios and military dependent ratios.

Source: Appendix B

For the purposes of this analysis, it is assumed that on-base MFH housing would be occupied at capacity at all times, however the number of MFH units is expected to decrease from 1,210 to 910 units as a result of privatization efforts. Consequently, the anticipated increase in military and civilian personnel under the alternative action, and the resulting in-migration of their households, could result in an increase in demand for 4,307 housing units in the Wichita Falls MSA. Based on the current MSA vacancy rate of 13.1 percent, there are 8,362 housing units available in the region, which on the surface appears sufficient to accommodate anticipated growth. Similarly, the in-migration of military and civilian families would increase school enrollments in the Burkburnett and Wichita Falls ISDs. Based on military dependent ratios for Sheppard AFB, it is estimated that school enrollments could increase by approximately 1,440 students, representing growth in enrollment of 6.7 percent.

Environmental Justice Concerns

The potential for environmental justice concerns exists only if adverse environmental impacts are anticipated and disadvantaged groups represent a disproportionate segment of the affected population. As presented in Section 3.3.9.1, minority and low-income populations do not represent a disproportionate share of the total population when compared with regional and state levels. In addition, there are no known concentrated areas of concern where children might be subject to special health or safety risks. In order to address the possibility of environmental justice concerns, potential health and safety factors were analyzed to determine whether any disproportionately high or adverse human health or environmental impacts could affect the human population. In addition, potential environmental health or safety hazards were examined to assess potential special risks to children. These environmental analyses indicate that no adverse environmental impacts to the human population are anticipated under the alternative action. As a result, no disproportionate environmental justice impacts would occur, nor would there be any special health or safety risks to children.

4.3.9.4 Cumulative Impacts

Although there are beneficial economic effects from planned construction projects under both action alternatives, in the short-term demand for skilled laborers and building supplies in the region could exceed available capacity. With regard to the cumulative effect of operational activities, under the proposed action population declines would exacerbate losses experienced in the region in recent years. Under the alternative action, population increase would offset recent losses, tapped under-utilized housing and service capacity, and prompt economic growth in the region. It is possible, however, the level of population growth anticipated could create short-term challenges in accommodating the housing, school, and service needs of the incoming base population.

4.3.9.5 Measures to Reduce Impacts

Potential socioeconomic impacts associated with implementation of the proposed action are related to added pressure on the construction industry. While these impacts are not insignificant, they would not change the nature of the economic conditions communities generally face during periods of growth. As a result, no specific mitigations are identified under the proposed action.

Under implementation of both the proposed action and the alternative action, the anticipated change in the number of personnel and dependents in the region—both positive and negative—could affect local housing markets and community services. Coordination with the City of Wichita Falls and area school districts would help ensure housing and school capacity is available to accommodate projected incoming population.

4.3.10 Cultural Resources

Potential impacts of the proposed action were assessed by (1) identifying the nature and potential significance of cultural resources in potentially affected areas and

(2) identifying activities that could directly affect cultural resources classified as historic properties. Under Section 106 of the NHPA, when a federal action meets the definition of an undertaking, the federal agency must consult with the SHPO and other identified consulting parties. The federal agency is responsible for determining whether any historic properties are located in the area, assessing whether the proposed undertaking would adversely impact the resources, and notifying the SHPO of any adverse impacts.

Direct adverse impacts to archaeological sites eligible for listing on the NRHP could result from construction or demolition activities in the area of the archaeological site including clearing, grading, paving, utility installation, and earth moving. Indirect effects can occur from increased use of areas near or adjacent to archaeological sites resulting in vandalism, erosion, and other adverse effects.

4.3.10.1 No Action Alternative

Under the no action alternative, there would be no change from the baseline condition. Therefore, no archaeological or historic resources would be affected by the no action alternative.

4.3.10.2 Proposed Action

No archaeological sites have been identified on Sheppard AFB and there is an extremely low potential for intact archaeological resources due to the extensive land disturbance that has occurred previously with the development of Sheppard AFB (USAF 1993). If archaeological materials were uncovered during the course of construction of the proposed action, the Base Historic Preservation Officer (BHPO) would be contacted and would inform appropriate federal, state, and local government officials and other public groups.

Based on the locations of cultural resources (Buildings 2130 and 2560) on Sheppard AFB, as summarized in the current CRMP, the proposed action would have no adverse impacts on archeological or historical resources (USAF 2002b).

4.3.10.3 Alternative Action

Impacts for the alternative action are the same as those for the proposed action since no additional archaeological or historical resources would be affected.

4.3.10.4 Cumulative Impacts

When considered with respect to other ongoing actions, neither the proposed nor the alternative actions are expected to have cumulative impacts on cultural resources in or around Sheppard AFB.

4.3.10.5 Measures to Reduce Impacts

None of the structures the proposed or alternative action would affect are historically significant. As specified in the Sheppard AFB CRMP, if archaeological materials are uncovered during the course of construction, the BHPO would be contacted and would

inform appropriate federal, state, and local government officials and other public groups. These would include the SHPO and the four tribal groups identified as occupying the Sheppard AFB vicinity: the Comanche, Wichita, Kiowa, and Kiowa Apache tribes (USAF 2002b).

4.3.11 Air Quality

4.3.11.1 Methodology

Project generated air emissions were analyzed to determine if:

- There would be a violation of a NAAQS.
- Emissions would contribute to an existing or projected air quality violation.
- Sensitive receptors would be exposed to substantial pollutant concentrations.
- There would be an increase of 10 percent or more in Wichita County criteria pollutants emissions.
- Any significance criteria established by the Texas SIP would be exceeded.
- A permit to operate would be required.
- A change to the Title V permit would be required.

Under existing conditions, the ambient air quality in Wichita County is classified as unclassifiable/attainment for all national ambient air quality standards as defined in 40 CFR 50.

Texas has developed a SIP as required by Section 110 of the CAA to provide for the implementation, maintenance, and enforcement of the NAAQS for each air quality region within the state. The SIP is the primary vehicle used by USEPA for enforcement of federal air pollution legislation.

Section 176(c) of the CAA provides the basis for the relationship between the SIP and federal projects. It states that no federal agency shall support or approve any activity or action that does not conform to an implementation plan after the plan has been approved or promulgated under Section 110. This means that federally supported or funded activities would not (1) cause or contribute to any new violation of any air quality standard, (2) increase the frequency or severity of any existing violation of any standard, or (3) delay the timely attainment of any standard or any required interim emission reductions or other milestones in any area. In accordance with Section 176(c), USEPA promulgated the General Conformity Rule that is codified as 40 CFR 51, Subpart W. The provisions of this rule apply to state review of all federal general conformity determinations submitted to the state pursuant to 40 CFR 51, Subpart W. The Conformity Rule only affects federal actions occurring in nonattainment and maintenance areas. Since Sheppard AFB is located in an attainment area, the Air Force does not plan to prepare a conformity determination for the proposed action at Sheppard AFB.

Even though a conformity determination is not required, the federal action must still comply with the conformity requirements of Section 176(c); that is, the federal action may not exceed the threshold and criteria outlined above. For impacts screening in this analysis, a more restrictive criteria than found in the General Conformity Rule was used. Rather than comparing project emissions to 10 percent of a region's inventory (as required by the General Conformity Rule), emissions were compared to 10 percent of Wichita County's year 2002 inventory (National Emissions Inventory) for each pollutant, a more restrictive comparison. Therefore, the 10 percent criterion for each pollutant has been selected to determine if the proposed project causes adverse impacts to air quality.

Air quality effects would occur during construction and demolition activities, realignment of personnel, and aircraft operations associated with the proposed action and alternative action. Intermittent construction and demolition-related effects would result from fugitive dust (particulate matter) and combustive emissions generated by facility construction and demolition sources to include: (1) grading equipment; (2) stationary equipment (generators, saws etc.); (3) mobile equipment (forklifts, dump trucks, backhoes, graders, etc.); (4) architectural coating; (5) asphalt paving; and (6) construction worker commuting. Operational effects would occur from stationary sources such as boilers/space heaters used for heating, personnel realignment (commuter trips, government vehicle usage, space heating, facility heating, and a variety of common sources that occur from similar support activities found at other representative bases), and aircraft operations (landings/takeoffs, closed pattern operations, ground support equipment, jet engine test cells, etc.).

The methods selected to analyze air quality effects depend on the type of emission source being examined. The primary emission source categories associated with the proposed action and alternatives, as noted above, include construction/demolition activities and associated heating systems, realignment of personnel, and aircraft operations. Because the construction/demolition phase emissions are generally considered temporary, analysis is limited to estimating the amount of uncontrolled fugitive dust that may be emitted from disturbed areas, the amount of combustive emissions that may be emitted from worker commutes and construction equipment, and fugitive emissions from architectural coatings and paving. Analysis of personnel realignment includes estimating emissions from vehicle-related trips, residential and facility heating requirements, government vehicle usage, and other miscellaneous sources associated with base activities. Analysis of aircraft operations includes estimating emissions not only from flying activities, but also from operation of ground support equipment, engine trim tests, and jet engine test cells.

Fundamental steps in the evaluation of environmental effects on air quality are to identify the sources of the effect, identify the quantitative measures for evaluating the extent of the effect, and develop formulas for computing and assessing those measures. These formulations are based on the types of data that are generally available or can easily be collected for the proposed actions.

For the proposed action and alternatives, these following emission sources are anticipated to contribute to ambient air quality effects and have been targeted for analysis: construction/demolition activities, boiler/space heater operation associated with buildings constructed and/or demolished, and personnel realignment.

The algorithms embodied in the Air Force Air Conformity Applicability Model (ACAM) were used to calculate emissions from the various sources previously discussed. The purpose of ACAM is to estimate air quality impacts from Air Force actions, force structure consolidations, and other unit/mission changes. The algorithms were used to calculate pollutant emission rates for the following criteria pollutants and criteria pollutant precursors: CO, NO_X, SO_2, PM_{10}, and VOC. Emission factors used in the model were obtained from established sources/computer models or were derived from available, representative Air Force installation emission factors data. For a more detailed discussion of these algorithms and emission calculation methods (USAF 2005d and e).

4.3.11.2 No Action Alternative

Under the no action alternative, there would be no increase in personnel or mission activity at Sheppard AFB and there would be no construction or demolition accomplished in support of the CIP or the BRAC program as it relates to Sheppard AFB. Therefore, the base's operational and indirect emissions would be identical to current baseline emissions presented in Chapter 3.

4.3.11.3 Proposed Action

The primary emission source categories associated with the proposed action include construction/demolition activities, heating requirements due to any net increase/decrease in building space, personnel realignment, and aircraft operations. Because construction phase emissions are generally considered temporary, analysis is limited to estimating the amount of uncontrolled fugitive dust emission that may be emitted from disturbed areas, fugitive VOC emissions from application of architectural coatings and from paving activities, and the amount of combustive emissions that may be emitted from worker commutes and construction equipment. Analysis of boiler operation and mobile sources (vehicles, aircraft, and aircraft ground support equipment) during the operational phase consists of quantifying the emissions and evaluating how those emissions would affect progress toward maintenance of the national and state ambient air quality standards.

4.3.11.3.1 Construction Emissions

Fugitive and combustive emissions would be generated during the proposed construction/demolition activities under this alternative. Table 4-17 summarizes the conservative construction/demolition assumptions associated with the proposed action.

Table 4-17 Proposed Action Construction Emissions Calculation Inputs

	square feet	acres
Construction		
One story buildings	1,023,037	23.5
Recreational fields	417,300	9.6
New pavement	2,055,189	47.2
Demolition		
One story buildings	1,113,082	25.5
Recreational fields and pavement	2,094,405	48.1
Pavement	1,688,105	38.8

Fugitive dust emissions from new construction activities would primarily be generated from site clearing, grading, cut and fill operations, and from vehicular traffic moving over the disturbed sites. Fugitive emissions would be greatest during the initial site preparation activities and would vary from day to day depending on the amount of land being worked, the level of construction activity, the specific operations, and the prevailing meteorological conditions. Fugitive dust emissions from demolition/renovation activities would be generated primarily from building dismemberment, debris loading, and debris hauling. Additional fugitive VOC emissions sources would result from the application of architectural coatings and from paving activities.

Combustion emissions will be generated by construction equipment needed to construct and/or demolish facilities to support the proposed action. Additionally there will be exhaust emissions from the privately owned vehicles of the construction workers who commute to and from the base.

Fugitive and combustive emissions would produce slightly elevated short-term pollutant concentrations. In other words, effects from construction/demolition activities would be temporary and would fall off rapidly with distance from construction sites. Table 4-18 summarizes the estimated total fugitive and combustive emissions for the construction/demolition activities.

4.3.11.3.2 Operational Emissions

As noted above, operational emissions (increase/decrease) would come from heating requirements (boiler/space heater operation) due to any additional building space constructed (as opposed to building space demolished) as part of the proposed action. Based on construction/demolition details presented in Table 2-1, there will be 90,045 square feet more building space demolished than constructed under the proposed action (the 417,300 square feet of recreational field construction is not considered as building construction). Therefore, there will be a reduction in heating-related combustion related emissions.

Table 4-18 Total Emissions for Proposed Action (tons per year)

Pollutant Emission Source	CO	NO_X	SO_2	PM_{10}	VOC[1]
Construction					
Buildings	64.23	23.08	2.61	124.35	5.32
Facility Heating	3.18	3.90	0.02	0.28	0.20
Grading/Paving	2.50	9.42	0.96	257.63	1.06
Demolition					
Buildings	0.00	0.00	0.00	2.34	0.00
Facility Heating	-3.17	-3.88	-0.02	-0.28	-0.20
Fields/Pavement	2.43	9.15	0.93	250.51	0.97
Personnel Realignment	-299.96	-13.68	-0.30	-0.42	-25.96
Aircraft Operations	72.04	5.74	1.16	1.84	6.34
Vacated Buildings					
Facility Heating	-1.39	-1.70	-0.01	-0.12	-0.09
Sheppard AFB Total	-160.14	32.03	5.35	636.13	-12.36
Wichita County (2002 NEI)	34,253.00	10,954.00	866.00	9,502.00	10,026.00
Percent of Wichita County Emissions	-0.47	0.29	0.62	6.69	-0.12

[1]VOC is not a criteria pollutant. However, VOC is reported because, as an O_3 precursor, it is a controlled pollutant.

AFB	Air Force Base	CO	carbon dioxide
NO_X	nitrogen oxide	NEI	National Emissions Inventory
VOC	volatile organic compound	O_3	ozone
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to 10 microns	SO_2	sulfur dioxide

Calculations of pollutant emissions from aircraft operations were based on the annual number of landing-takeoff (LTO) and touch-and-go (TGO) cycles flown in conjunction with landings at Sheppard AFB. The rates of emissions from aircraft engines vary according to these types of aircraft operations. An LTO cycle includes an approach from 3,000 feet above ground level (AGL) to the airfield, landing, taxi-in to a parking position, taxi-out to the runway, take-off, and climb-out to 3,000 AGL. A TGO cycle is identical to an LTO cycle except that all taxi time has been excluded (in this analysis, TGOs were assumed to approximate closed pattern operations). Only those portions of the flying operation that take place below the atmospheric mixing height are considered (these are the only emissions presumed to affect ground level concentrations). The 3,000 feet AGL ceiling was assumed as the atmospheric mixing height above which any pollutant generated would not contribute to increased pollutant concentrations at ground level. Therefore, all pollutant emissions from aircraft generated above 3,000 feet AGL were excluded from the analysis.

Under the proposed action, Sheppard AFB would experience an increase in T-38 flight operations as shown in Table 4-18. Pollutant emissions for the various flight profiles were estimated by using Air Force published fuel rates, emission factors, and times-in-mode as input to the model algorithms. The calculated aircraft emissions rates also include emissions from engine testing, auxiliary power unit operation, and associated aircraft ground support equipment. Aircraft-related emissions are presented in Table 4-18.

4.3.11.3.3 Indirect Emissions

Implementation of the proposed action would result in a loss of 2,468 military and 107 civilian personnel. Based on the makeup of the present base population, this equates to a loss of 1,173 on-base military personnel and 1,294 military and 107 civilian personnel who live off base. This realignment action would reduce emissions from commuting and other miscellaneous personnel-related emissions (such as heating) related to miscellaneous on-base sources. Indirect emissions (i.e., emissions resulting from the growth inducing impacts) are therefore expected to decrease relative to the baseline. This decrease in indirect emissions is captured in Table 4-18.

Table 4-18 summarizes total emissions for the proposed action. As can be seen from the information presented in the table, projected increased emissions are minor when compared to the Wichita County emissions inventory and are well below the 10 percent criteria. In fact, there is a net overall reduction in emissions for CO and VOC due to the reduction in emissions associated with the personnel realignment (loss of personnel). It should be noted that a very conservative approach was taken in calculating and presenting emissions results—all activities were compressed into a 1-year period rather than spread out over the build out/operational phases of the proposed action. Even when analyzed using this compressed scenario, emissions are well below the 10 percent criteria limit. Due to the short-term effect of construction-related fugitive and combustive emission and the small area affected, there would be no potential adverse cumulative decrease in air quality associated with the proposed action activities.

4.3.11.4 Alternative Action

The primary emission source categories associated with the alternative action include construction/demolition activities, heating requirements due to any net increase/decrease in building space, personnel realignment, and aircraft operations. Because construction phase emissions are generally considered temporary, analysis is limited to estimating the amount of uncontrolled fugitive dust that may be emitted from disturbed areas and the amount of combustive emissions that may be emitted from worker commutes and construction equipment. Analysis of boiler operation and mobile sources (vehicles, aircraft, and aircraft ground support equipment) during the operational phase consists of quantifying the emissions and evaluating how those emissions would affect progress toward maintenance of the national and state ambient air quality standards.

4.3.11.4.1 Construction Emissions

Fugitive dust from ground disturbing activities and combustive emissions from construction equipment would be generated during the proposed construction/demolition activities under this alternative. For this action, it is assumed that construction/demolition will consist of the activities associated with the alternative action (which include the proposed action projects). Table 4-19 summarizes the construction/demolition assumptions associated with the alternative action.

Table 4-19 Alternative Action Construction Emissions Calculation Inputs

	square feet	acres
Alternative Action		
Construction		
One story buildings	6,175,134	141.8
New pavement	201,291	4.6
Demolition		
One story buildings	1,063,938	24.4
Proposed Action		
Construction		
One story buildings	1,023,037	23.5
Recreational fields	417,300	9.6
New pavement	2,055,189	47.2
Demolition		
One story buildings	1,113,082	25.5
Recreational fields and pavement	2,094,405	48.1
Pavement	1,688,105	38.8

Fugitive dust emissions from new construction activities would primarily be generated from site clearing, grading, cut and fill operations, and from vehicular traffic moving over the disturbed sites. Fugitive emissions would be greatest during the initial site preparation activities and would vary from day to day depending on the amount of land being worked, the level of construction activity, the specific operations, and the prevailing meteorological conditions. Fugitive dust emissions from demolition/renovation activities would be generated primarily from building dismemberment, debris loading, and debris hauling. Additional fugitive emissions sources would be the VOC emissions from the application of paints and from paving activities.

Combustion emissions will be generated by construction equipment needed to construct and/or demolish facilities to support the alternative action. Additionally, there will be exhaust emissions from the privately owned vehicles of the construction workers who commute to and from the base.

Fugitive emissions would produce slightly elevated short-term pollutant concentrations. In other words, effects from construction/demolition activities would be temporary and would fall off rapidly with distance from construction sites. Table 4-20 summarizes the estimated total fugitive and combustive emissions for the construction/demolition activities.

Table 4-20 Total Emissions for Alternative Action (tons per year)

Pollutant Emission Source	CO	NO_X	SO_2	PM_{10}	VOC[1]
Construction					
Buildings	141.46	44.28	4.64	383.07	12.9
Facility Heating	20.74	25.41	0.15	1.82	1.3
Grading/Paving	2.5	9.42	0.96	257.63	1.14
Demolition					
Buildings	35.74	9.55	1.08	5.34	3.01
Facility Heating	-6.2	-7.59	-0.04	-0.54	-0.39
Fields/Pavement	2.43	9.15	0.93	250.51	0.97
Personnel Realignment	1,640.33	69.02	1.17	1.66	141.84
Aircraft Operations	773.974	53.51	11.60	19.93	62.65
Sheppard AFB Total	2610.97	212.75	20.49	919.42	223.42
Wichita County (2002 NEI)	34,253.00	10,954.00	866.00	9,502.00	10,026.00
Percent of Wichita County Emissions	7.62	1.94	2.37	9.68	2.23

[1]VOC is not a criteria pollutant. However, VOC is reported because, as an O_3 precursor, it is a controlled pollutant.

AFB	Air Force Base	CO	carbon dioxide
NO_X	nitrogen oxide	NEI	National Emissions Inventory
VOC	volatile organic compound	O_3	ozone
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to 10 microns	SO_2	sulfur dioxide

4.3.11.4.2 Operational Emissions

As noted above, operational emissions would come from heating requirements (boiler operation) due to any additional building space constructed (as opposed to building space demolished) as part of the alternative action. Based on construction/demolition details presented in Table 2-1, there will be an additional 6,175,134 square feet of building space under the alternative action. Emissions from boiler operations required to heat the additional building space are provided in Table 4-20.

Calculations of pollutant emissions from aircraft operations were based on the annual number of LTO and TGO cycles flown in conjunction with landings at Sheppard AFB. The rates of emissions from aircraft engines vary according to these types of aircraft operations. An LTO cycle includes an approach from 3,000 feet AGL to the airfield, landing, taxi-in to a parking position, taxi-out to the runway, take-off, and climb-out to 3,000 AGL. A TGO cycle is identical to an LTO cycle except that all taxi time has been

excluded (in this analysis, TGOs were assumed to approximate closed pattern operations). Only those portions of the flying operation that take place below the atmospheric mixing height are considered (these are the only emissions presumed to affect ground level concentrations). The 3,000 feet AGL ceiling was assumed as the atmospheric mixing height above which any pollutant generated would not contribute to increased pollutant concentrations at ground level. Therefore, all pollutant emissions from aircraft generated above 3,000 feet AGL were excluded from the analysis.

Under the alternative action, Sheppard AFB would experience an increase in T-38 and T-6 flight operations as shown in Table 4-20 (refer to Section 4.3.1, Noise, for aircraft flight data).

Pollutant emissions for the various flight profiles were estimated by using Air Force published fuel rates, emission factors, and times-in-mode as input to the model algorithms. The calculated aircraft emissions rates also include emissions from engine testing, auxiliary power unit operation, and associated aircraft ground support equipment. Aircraft-related emissions are presented in Table 4-20.

4.3.11.4.3 Indirect Emissions

Based on an analysis of potential new facilities including administrative, training, and housing structures, it has been determined that the base has the potential to accommodate an additional 18,561 personnel. The breakout of the working/training personnel is as follows:

- Military on base: 1,730
- Military off base: 1,915
- Civilian employees: 4,067
- Trainees/cadets on base: 4,353
- Trainees/cadets off base: 1,769

Personnel-related indirect emissions include emissions from vehicle-related trips, residential and facility heating requirements, government vehicle usage, and other miscellaneous sources associated with base activities. Mobile source emissions are presented in Table 4-20.

Table 4-20 summarizes total emission for the alternative action. As can be seen from the information presented in the table, increased emissions are below the established significant level—10 percent of the Wichita County emissions inventory. It should be noted that a very conservative approach was taken in calculating and presenting emissions results—all activities were compressed into a 1-year period rather than spreading them out over the build out phase of the alternative action. Even when analyzed using this compressed scenario, emissions are still below the significant threshold. Due to the short-term effect of construction-related fugitive and combustive emission and the small area affected, there would be no potential adverse cumulative decrease in air quality associated with these construction activities.

4.3.11.5 Cumulative Impacts

The alternative action would contribute to air pollution emissions during construction and demolition, and during the operation phase that occurs in the out-years after base

construction/demolition activities are completed. The contribution from the different phases of the action would impact regional air quality goals and attainment standards, but the contribution from the alternative action would be negligible. Even when both construction/demolition and operational emissions are added together, the total is still less than 10 percent of Wichita County's annual emissions. Alternative action emissions would not contribute to other county emissions in any appreciable manner.

4.3.11.6 Measures to Reduce Impacts

It should be noted that the fugitive dust emissions were calculated assuming no dust control methods were utilized; however, fugitive dust emissions would be reduced with implementation of good management practices and use of control measures. The USEPA estimates that the effects of fugitive dust from construction activities would be reduced significantly with an effective watering program. In addition, the state requires that no person shall permit or allow the emissions of unconfined particulate matter from any activity, including vehicular movement; transportation of materials; construction, alteration, demolition, or wrecking without taking reasonable precautions to prevent such emissions. BMPs would be employed to control fugitive dust from any construction activity and help prevent any dust related problems that may occur in the vicinity of construction projects. These management practices may include the following controls:

- Application of water or chemical dust suppressants to control fugitive particulate emissions from such activities as demolition of buildings, grading roads, construction, and land clearing.
- Application of asphalt, water, oil, chemicals or other dust suppressants to unpaved roads, yards, open stockpiles, and similar sources.
- Removal of particulate matter from roads and other paved areas to prevent reentrainment, and from buildings or work areas to prevent particulate matter from becoming airborne.
- Sweeping vehicle/aircraft traffic areas where dust may accumulate either from carryover by construction equipment or from airborne settling.
- Reducing construction vehicle speed.
- Landscaping or planting of vegetation as soon as practical.

Combustive emissions from construction vehicles/equipment could be mitigated by efficient scheduling or equipment use, implementing a phased construction schedule to reduce the number of units operating simultaneously, and performing regular vehicle engine maintenance. The amount of emission reduction provided by these measures is not known with certainty because of the potential variables involved; however, it is assumed that implementation of these measures would substantially reduce combustive emissions and air quality effects from construction activities.

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Chapter 5

List of Preparers

CHAPTER 5

LIST OF PREPARERS

Name/Organization	Degree	Professional Discipline	Years of Experience
Kent R. Wells, P.G. Science Applications International Corporation (SAIC)	B.S., Geology M.S., Industrial Hygiene	Environmental Scientist	20
Benjamin P. Elliott, P.E. SAIC	B.A., Physical Sciences, B.S., Civil Engineering, M.S.E., Petroleum and Geosystems Engineering,	Civil Engineer Geographical Information Specialist	10
James A. Garrison, P.E., SAIC	M.E., Environmental Engineering, B.S. Agricultural Engineering	Environmental Engineer	30
Joshua B. Heiss, SAIC	B.S., Natural Resources and Environmental Science	Environmental Scientist	8
Irene M. Johnson, SAIC	B.S., Economics M.A., Economics	Economist	17
Brandi J. Mulkey, E.I.T SAIC	B.S., Environmental Engineering	Environmental Engineer Geographical Information Specialist	7
Victoria J. Wark SAIC	B.S., Biology	Biologist	18
William A. Wuest SAIC	M.P.A., Political Science B.S., Political Science	Noise Specialist	33

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Chapter 6

Persons and Agencies Consulted

CHAPTER 6

PERSONS AND AGENCIES CONSULTED

The following individuals were consulted during the preparation of this EA:

6.1 FEDERAL AGENCIES

Headquarters Air Education and Training Command

Voorhees, Ron (HQ AETC/A7CVI)
Gonzales, Gabriel (HQ AETC/A7CVI)
Hahn, Teresa (HQ AETC/A7CVQ)

Sheppard Air Force Base

Hunter, Timothy (82 CES/CEV)
Harper, Brent (82 CES/CECB)

US Army Corps of Engineers

Lea, Wayne (Chief, Regulatory Branch)

US Fish and Wildlife Service

Carter, Patricia (NEPA Program Coordinator)

6.2 STATE AGENCIES

Federal Emergency Management Agency

Fairley, Donald (Environmental Specialist)
Jennings, Lisa, Region IV Mitigation Division

State of Texas

Francis, Denise (Single Point of Contact, Governor's Office)

Texas Commission on Environmental Quality

Texas Historical Commission

Oaks, F. Lawrence (Executive Director)

Texas Parks and Wildlife Department

Stone, Harold (Intergovernmental Affairs)

Texas Water Development Board

Mathews, Ray Jr., TRACS Coordinator

6.3 LOCAL AGENCIES

Nortex Regional Planning Commission

Wilde, Dennis (Executive Director)

Wichita Falls County

Lee Bourgoin (Emergency Management Coordinator)

Chapter 7

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USAF. 2006b. *Application of the Resource Capability to Air Education and Training Command Sheppard Air Force Base*. Prepared by Weston Solutions Inc. and Booz Allen & Hamilton, Inc. March.

USAF. 2006c. Personal interview with Timothy Hunter, 82 CES/CEVE, Sheppard Air Force Base, Texas. Obtained biological resources update during telephone interview. November.

USAF. 2006d. Personal interview with Samuel Hagins, P.E., 82 CES/CEOE, Sheppard Air Force Base, Texas. Obtained fiscal year 2005 data during interview. May.

USAF. 2006e. *Sheppard AFB Statistical Notebook, Sheppard Air Force Base, Texas*. Financial Analysis Office 82 CPTS/FMA. March.

USBC. 2006a. Census State & County QuickFacts for City of Wichita Falls, Archer County, Clay County, Wichita County and State of Texas.

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Appendix A

Interagency and Intergovernmental Coordination for Environmental Planning

APPENDIX A

INTERAGENCY AND INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING

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DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

April 18, 2007

Regulatory Office

Mr. Timothy W. Hunter
Environmental Impact Analysis Manager
82 CES/CEVX
231 9th Avenue Stop 201
Sheppard AFB, TX 76311-3333

Dear Mr. Hunter:

This is in reference to your letter of March 14, 2007, requesting comments on the submitted Draft Environmental Assessment for installation development at Sheppard Air Force Base, Texas. We have reviewed the submitted data relative to Section 404 of the Clean Water Act (CWA).

The referenced property contains both potentially jurisdictional waterways and wetlands that may be subject to Section 404 of the CWA as indicated in the submitted Draft Environmental Assessment of March 14, 2007. The placement of dredged or fill material within any jurisdictional waterway and/or wetland would require Department of the Army authorization pursuant to Section 404 of the CWA prior to commencement. Should your method of construction necessitate a discharge into any potentially jurisdictional aquatic resource, please submit project specific information regarding the aquatic resource that would be impacted (including the location, surface acres that would be impacted, and materials being discharged) so that a permit evaluation can be conducted.

Your request has been assigned Identification No. 2007-201. Please refer to this number during future correspondence. If you have any questions, contact Mr. Bryan K. Taylor at 918-669-4950.

Sincerely,

David A. Manning
Chief, Regulatory Office

U.S. Department of Homeland Security
FEMA Region 6
800 North loop 288
Denton, TX 76209-3698

FEMA

April 11, 2007

Timothy W. Hunter, GS-11 DAF
Environmental Impact Analysis Mgr.
Department of the Air Force
82 CES/CEVX
231 9TH Avenue
Sheppard Air Force Base, TX 76311-3333

Re: Draft Environmental Review

Dear Mr. Hunter:

We have received your letter dated March 7, 2007. Thank you for the opportunity to comment on the above-proposed project.

The concerns of the Federal Emergency Management Agency (FEMA) are directed toward the National Flood Insurance Program (NFIP) and the possible negative impact upon identified special flood hazard areas within the outlined project boundaries.

The City of Wichita Falls and Wichita County both participate in the National Flood Insurance Program (NFIP). Therefore, any development that takes place within the city/county must be reviewed and appropriate permits issued to ensure compliance with their adopted Flood Damage Prevention Ordinance. Our records show that Mr. David Clark is the current Floodplain Administrator for the City; he can be reached at 940-761-7451 and Mr. Lee Bourgoin is the current Floodplain Administrator for Wichita County; he can be reached at 940-763-0820.

Also, please review proposed development to assure that all necessary permits have been received from those governmental agencies from which approval is required by Federal or State Law, including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334.

Coordination with the Floodplain Administrator for the City/County can ensure that this project is in compliance with the city's/county's Flood Damage Prevention Ordinance.

Sincerely,

for Dolores J. LeVinus, CFM
Natural Hazards
Program Specialist

www.fema.gov

IMSW-SIL-PWE (200) 28 March 2007

MEMORANDUM FOR: AT-38 from Sheppard AFB, TX
ATTN: Mr. Timothy Hunter, Agronomist/NEPA Manager, Sheppard AFB, TX

SUBJECT: Re-evaluation of AT-38 operations at Falcon Range Fort Sill, OK

1. Upon receipt of email request dated 16 March 2007, from Mr. Hunter of ATC 1-40th C Company, the Environmental Quality Division (EQD), Directorate of Public Works (DPW) initiated an environmental review on subject project. This review was based on the documentation provided by Mr. Hunter (enclosed). If the scope or conditions of this project change an additional review will be required. EQD concurs with this U.S. Air Force Training provided the following comments are complied with and resolved in their entirety.

a. All National Environmental Policy Act requirements have been evaluated and judged not to meet the threshold requiring an amendment to the Environmental Assessment dated 1993, *Proposed Beddown of AT-38 Aircraft at Sheppard AFB, Texas,* or Environmental Impact Statement. A REC for this project is assigned the following Categorical Exclusions from 32 CFR 651, Appendix B

(b)(13) "Actions affecting Army property that fall under another federal agency's list of categorical exclusions when the other federal agency is the lead agency (decision maker), or joint actions on another federal agency's property that fall under that agency's list of categorical exclusions (REC required)".

(j)(2) "Flying activities in compliance with Federal Aviation Administration Regulations and in accordance with normal flight patterns and elevations for that facility, where the flight patterns/elevations have been addressed in an installation master plan or other planning document that has been subject to NEPA public review".

Contact Kelly Longfellow, EQD 580-442-2792 should there be any questions regarding NEPA applications or guidelines. The criteria provided in this document must be followed.

b. Documentation provided by Mr. Hunter state the EA written in 1993 analyzed sorties to be: AT-38 sorties 925, F-16 and all other aircraft sorties 1,765 (other aircraft included F-18, Alpha Jets and other), totaling sorties 2,690. To date, Falcon Range is reporting: AT-38 sorties 1,179, F-16 and other aircraft sorties 812, totaling sorties 1,991. Even though Sheppard AFB has increased their sorties by 254 sorties annually, Falcon Range overall has experienced a decrease of 699 sorties annually.

IMSW-SIL-PWE (200)
MEMORANDUM FOR: AT-38 from Sheppard AFB, TX
ATTN: Mr. Timothy Hunter, Agronomist/NEPA Manager, Sheppard AFB, TX

2. Other questions or concerns can be directed to the undersigned at 580-442-5445 or Kelly Longfellow 580-442-2792.

GLEN WHEAT
Chief, Environmental Quality Division
Directorate of Public Works

TEXAS HISTORICAL COMMISSION

The State Agency for Historic Preservation

RICK PERRY, GOVERNOR

JOHN L. NAU, III, CHAIRMAN

F. LAWERENCE OAKS, EXECUTIVE DIRECTOR

March 23, 2007

Timothy W. Hunter, GS-11, DAF
Environmental Impact Analysis Manager
Department of the Air Force
Air Education and Training Command
82 CES/CEVX
231 9th Avenue Stop 201
Sheppard AFB TX 76311-3333

Re: Draft, Environmental Assessment (EA), Installation Development at Sheppard Air Force Base, Wichita County, Texas.

Dear Mr. Hunter:

Thank you for your correspondence describing the above referenced project. This letter serves as comment on the proposed undertaking from the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission.

Our staff, led by William McWhorter, has completed a review of the above referenced project. After cross checking the list of buildings in the *May 2002, Sheppard Air Force Base Cold War-Era Buildings and Structures Inventory and Assessment Final Report* to the list of buildings scheduled for demolition/alteration in the above referenced Draft, Environmental Assessment (EA), we find that several buildings recommended for demolition/alteration in the Draft EA are not on the previously reviewed document from 2002. We request that you provide, for our review, pictures and construction dates for the following buildings suggested for demolition (or otherwise altered as indicated):

Project #	Building #	Page # from Draft EA
4	620	2-5
6	2050	2-5
7	1012	2-6
9	589	2-6
10	843	2-6
17	983	2-7
19	101	2-8
22	1105 (expansion)	2-8

TEXAS HISTORICAL COMMISSION

The State Agency for Historic Preservation

RICK PERRY, GOVERNOR

JOHN L. NAU, III, CHAIRMAN

F. LAWERENCE OAKS, EXECUTIVE DIRECTOR

23	1108 (addition)	2-8
23	340 (expansion)	2-8

We also request that in addition to mentioning (Table 2-3, continued, page 2-20) under Proposed Action, that "No adverse impacts on cultural resources are expected. Consultation regarding Section 106 of the National Historic Preservation Act has been accomplished;" you add to the Final Environmental Assessment's appendix a copy of the August 29, 2002, letter *re: Project review under Section 106 of the National Historic Preservation Act of 1966, Cold War Era Buildings and Structures Inventory and Assessment, Sheppard AFB, Wichita County, Texas (USAF)* addressed to you from the Texas Historical Commission, as well as a copy of this letter and (if possible) any follow up correspondence regarding the Texas Historical Commission's review of the buildings listed in this letter.

We concur with the finding of eligibility for listing in the National Register of Historic Places , the B-52 alert pads (apron), Building 2560, and Building 2130, also known as "Little Adobe."

We agree with the statement in the Draft EA (Historical Resources, pages 3-46 & 3-47) that the CRMP determination that an historic structures inventory project for the identification and evaluation of the six buildings apparently associated with Kell Field, the fifteen permanent and 48 semi-permanent facilities constructed during World War II and the four additional permanent structures constructed in 1948 and 1949 is warranted.

Thank you for your cooperation in the federal review process, and for your efforts to preserve the irreplaceable heritage of our nation. If you have any questions concerning this review or if we can be of further assistance, please call William McWhorter at 512/463-5833.

Sincerely,

William McWhorter

for: F. Lawerence Oaks
State Historic Preservation Officer

P.O. BOX 12276 · AUSTIN, TX 78711-2276 · 512/463-6100 · FAX 512/475-4872 · TDD 1-800/735-2989
www.thc.state.tx.us

Nortex Regional Planning Commission

P.O. Box 5144
Wichita Falls, Texas 76307
Area 940-322-5281
Fax 940-322-6743

February 16, 2007

Sheppard AFB
231 9th Ave Stop 201
Sheppard AFB, Texas 76311-3333

Attn: Mr. Tim Hunter

Re: Environmental Assessment Installation Development
SAI#: TX-R-20070126-0011-03

Dear Mr. Hunter:

This is to inform you that the Nortex Regional Planning Commission has completed the review and comment on the above referenced application as required by the Texas Review and Comment System (TRACS). Individuals and organizations listed below have been sent copies; however, you may also use this letter to inform appropriate agencies of our action and to document your compliance with areawide procedures as required by TRACS.

Your application was reviewed for appropriate areawide concerns. This normally includes consideration by one of Nortex Regional Planning Commission's Advisory Review Committees, as well as review by the General Membership/Executive Board. On the basis of this review process, the General Membership Committee at its February 15, 2007 meeting, adopted the following areawide position:

> The Nortex Regional Planning Commission regional review process has determined that this project meets the review criteria specified in the rules of the Texas Review and Comments System.
> **Favorable consideration of the project is recommended.**

We sincerely thank you for the opportunity to review your application. If we can be of further service or assistance, please feel free to call me.

Sincerely,

Dennis Wilde
Executive Director

DW/plv

RESOLUTION NO. **2675**

A RESOLUTION OF NORTEX REGIONAL PLANNING COMMISSION COMMENTING ON AN ENVIRONMENTAL ASSESSMENT SUBMITTED BY THE UNITED STATES AIR FORCE RELATING TO THE PROPOSED INSTALLATION DEVELOPMENT ON SHEPPARD AIR FORCE BASE, WICHITA COUNTY, AND ASCERTAINING THAT SUCH ACTION IS IN CONFORMANCE WITH LOCAL AND AREA WIDE PLANS.

WHEREAS, Nortex Regional Planning Commission was originated under Article 1011m, V.A.C.S., as amended, for the purpose of orderly planning and development of the North Texas Planning Region; and,

WHEREAS, the Governor's Office, serving as the State Clearinghouse pursuant to Presidential Executive Order No. 12372 and Texas Bill 1172, 64th Legislature, is responsible for coordinating the review of federal assistance applications; environmental assessments, and plans; and,

WHEREAS, the Governor's Planning Office, has designated each of the 24 Regional Councils to review and comment upon applications for federal assistance, environmental assessments, and plans that may have impact upon local governments in a planning region; and,

WHEREAS, Sheppard Air Force Base, has submitted said environmental assessment to Nortex Regional Planning Commission for review and comment; and,

WHEREAS, the TRACS Review Committee of Nortex Regional Planning Commission has commented favorably on said environmental assessment,

NOW, THEREFORE, BE IT RESOLVED BY NORTEX REGIONAL PLANNING COMMISSION THAT:

The environmental assessment submitted by the United State Air Force relating to the proposed Installation Development on Sheppard Air Force Base, Wichita County, is in conformance with local and area wide plans.

PASSED AND APPROVED THIS 15th DAY OF FEBRUARY 2007.

Robert Lawrence

Mayor Robert Lawrence, Chairman

ATTEST:

Ed Garnett

Mayor Ed Garnett, Secretary

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

March 16, 2007

Kelly Longfellow
IMSW-SIL-PWE
NEPA Coordinator and Safety Officer
2930 Currie Rd
Fort Sill OK 73503

Re: AT-38 Usage of Falcon Range

Dear Ms. Longfellow:

1. Sheppard AFB is currently conducting an Environmental Assessment (EA) for Installation Development. We are seeking a review and possible Categorical Exclusion (CX) for AT-38 operations currently utilizing Falcon Range.

2. In 1993 an EA was conducted for the *Proposed Beddown of AT-38 Aircraft at Sheppard AFB, Texas*. This resulted in a Finding of No Significant Impact (FONSI) signed July 12, 1993. This EA analyzed AT-38 impacts and the cumulative effects from other aircraft using Falcon Range. The 1993 analysis for sorties was as follows:
AT-38 sorties 925
F-16 and all other aircraft sorties 1,765 (other aircraft included F-18, Alpha Jets and other)
Total sorties 2,690

FY 06 figures from Falcon Bombing Range Office are:
AT-38 sorties 1,179
F-16 and other aircraft sorties 812
Total sorties 1,991

Our operation has increased by 254 sorties annually while cumulatively the range has experienced a decrease of 699 sorties annually.

3. We are requesting your office review current operations and provide my office with NEPA documentation and CX if possible.

4. Should you have any questions or need further information please contact me at DSN 736-5698 or email me at tim.hunter@sheppard.af.mil.

//Signed//

TIMOTHY W. HUNTER, GS-11, DAF
Agronomist/NEPA Manager

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

March 7, 2007

82 CES/CEVX
231 9th Avenue Stop 201
Sheppard AFB TX 76311-3333

Donald Fairley
Environmental Specialist
Federal Emergency Management Agency
FRC 800 North Loop 288
R6-IM
Denton, Texas 76209-3698

Dear Sir/Madam

The Draft Environmental Assessment (EA) for installation development at Sheppard Air Force Base (AFB) is enclosed for your review and comment. This document addresses the manner in which the Air Force proposes to develop the base and implement the Base Realignment and Closure Commission's final recommendations for Sheppard AFB. The EA was prepared in accordance with the National Environmental Policy Act of 1969, as amended, and your comments are solicited in accordance with Executive Order 12372, Intergovernmental Review of Federal Programs.

A copy of the Draft EA that analyzes the proposal and alternatives is enclosed for your review and comment. A listing of the other federal and state agencies contacted in the development of the action alternatives and for comments on this EA has also been included. The comment period for this EA is 30 calendar days from the date of this letter. If we do not receive a response within 35 calendar days of the date of this letter, the Air Force will proceed with signature of the Finding of No Significant Impact/Finding of No Practicable Alternative associated with this EA. I have enclosed one copy of the Draft EA for your review. If you have any questions, feel free to contact me at (940) 676-5698.

Sincerely

TIMOTHY W. HUNTER, GS-11, DAF
Environmental Impact Analysis Manager

Attachments:
1. EA for Installation Development Sheppard AFB
2. List of federal Agencies Contacted

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

March 7, 2007

82 CES/CEVX
231 9th Avenue Stop 201
Sheppard AFB TX 76311-3333

Patricia Carter
NEPA Program Coordinator
Branch of Advanced Planning and Habitat Conservation
Division of Habitat and Resource Conservation
U.S. Fish and Wildlife Service
4401 North Fairfax Drive, Suite 400
ARLSQ-400
Arlington, Virginia 22203

Dear Sir/Madam

The Draft Environmental Assessment (EA) for installation development at Sheppard Air Force Base (AFB) is enclosed for your review and comment. This document addresses the manner in which the Air Force proposes to develop the base and implement the Base Realignment and Closure Commission's final recommendations for Sheppard AFB. The EA was prepared in accordance with the National Environmental Policy Act of 1969, as amended, and your comments are solicited in accordance with Executive Order 12372, Intergovernmental Review of Federal Programs.

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Sincerely

TIMOTHY W. HUNTER, GS-11, DAF
Environmental Impact Analysis Manager

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2. List of federal Agencies Contacted

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

March 7, 2007

82 CES/CEVX
231 9th Avenue Stop 201
Sheppard AFB TX 76311-3333

Donald Fairley
Environmental Specialist
Federal Emergency Management Agency
FRC 800 North Loop 288
R6-IM
Denton, Texas 76209-3698

Dear Sir/Madam

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TIMOTHY W. HUNTER, GS-11, DAF
Environmental Impact Analysis Manager

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DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

March 7, 2007

82 CES/CEVX
231 9th Avenue Stop 201
Sheppard AFB TX 76311-3333

Denise S. Francis
State Single Point of Contact
Governor's Office of Budget and Planning
State Insurance Building
1100 San Jacinto
Austin, Texas 78701

Dear Sir/Madam

The Draft Environmental Assessment (EA) for installation development at Sheppard Air Force Base (AFB) is enclosed for your review and comment. This document addresses the manner in which the Air Force proposes to develop the base and implement the Base Realignment and Closure Commission's final recommendations for Sheppard AFB. The EA was prepared in accordance with the National Environmental Policy Act of 1969, as amended, and your comments are solicited in accordance with Executive Order 12372, Intergovernmental Review of Federal Programs.

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TIMOTHY W. HUNTER, GS-11, DAF
Environmental Impact Analysis Manager

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DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

March 7, 2007

82 CES/CEVX
231 9th Avenue Stop 201
Sheppard AFB TX 76311-3333

Wayne Lea
Chief, Regulatory Branch
Permits Section
U.S. Army Corps of Engineers
819 Taylor Street, Room 3A37
CESWF-PER-R
Fort Worth, Texas 76012-6124

Dear Sir/Madam

The Draft Environmental Assessment (EA) for installation development at Sheppard Air Force Base (AFB) is enclosed for your review and comment. This document addresses the manner in which the Air Force proposes to develop the base and implement the Base Realignment and Closure Commission's final recommendations for Sheppard AFB. The EA was prepared in accordance with the National Environmental Policy Act of 1969, as amended, and your comments are solicited in accordance with Executive Order 12372, Intergovernmental Review of Federal Programs.

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Sincerely

TIMOTHY W. HUNTER, GS-11, DAF
Environmental Impact Analysis Manager

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DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

March 7, 2007

82 CES/CEVX
231 9th Avenue Stop 201
Sheppard AFB TX 76311-3333

F. Lawrence Oaks
Executive Director
Texas Historical Commission
1511 Colorado Street
Austin, Texas 78701

Dear Sir/Madam

The Draft Environmental Assessment (EA) for installation development at Sheppard Air Force Base (AFB) is enclosed for your review and comment. This document addresses the manner in which the Air Force proposes to develop the base and implement the Base Realignment and Closure Commission's final recommendations for Sheppard AFB. The EA was prepared in accordance with the National Environmental Policy Act of 1969, as amended, and your comments are solicited in accordance with Executive Order 12372, Intergovernmental Review of Federal Programs.

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Sincerely

TIMOTHY W. HUNTER, GS-11, DAF
Environmental Impact Analysis Manager

Attachments:
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2. List of federal Agencies Contacted

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

March 7, 2007

82 CES/CEVX
231 9th Avenue Stop 201
Sheppard AFB TX 76311-3333

Mr. Lee Bourgoin
900 7th Street
Wichita Falls TX 76301

Dear Sir/Madam

The Draft Environmental Assessment (EA) for installation development at Sheppard Air Force Base (AFB) is enclosed for your review and comment. This document addresses the manner in which the Air Force proposes to develop the base and implement the Base Realignment and Closure Commission's final recommendations for Sheppard AFB. The EA was prepared in accordance with the National Environmental Policy Act of 1969, as amended, and your comments are solicited in accordance with Executive Order 12372, Intergovernmental Review of Federal Programs.

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Sincerely

TIMOTHY W. HUNTER, GS-11, DAF
Environmental Impact Analysis Manager

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DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

March 7, 2007

82 CES/CEVX
231 9th Avenue Stop 201
Sheppard AFB TX 76311-3333

Harold Stone
Intergovernmental Affairs
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744

Dear Sir/Madam

The Draft Environmental Assessment (EA) for installation development at Sheppard Air Force Base (AFB) is enclosed for your review and comment. This document addresses the manner in which the Air Force proposes to develop the base and implement the Base Realignment and Closure Commission's final recommendations for Sheppard AFB. The EA was prepared in accordance with the National Environmental Policy Act of 1969, as amended, and your comments are solicited in accordance with Executive Order 12372, Intergovernmental Review of Federal Programs.

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Sincerely

TIMOTHY W. HUNTER, GS-11, DAF
Environmental Impact Analysis Manager

Attachments:
1. EA for Installation Development Sheppard AFB
2. List of federal Agencies Contacted

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

January 26, 2007

82 CES/CEVX
231 9th Avenue Stop 201
Sheppard AFB TX 76311-3333

Dennis Wilde
Nortex Regional Planning Commission
4309 Jacksboro Hwy., Suite 200
Wichita Falls, TX 76367

Dear Sir/Madam

The Draft Environmental Assessment (EA) for installation development at Sheppard Air Force Base (AFB) is enclosed for your review and comment. This document addresses the manner in which the Air Force proposes to develop the base and implement the Base Realignment and Closure Commission's final recommendations for Sheppard AFB. The EA was prepared in accordance with the National Environmental Policy Act of 1969, as amended, and your comments are solicited in accordance with Executive Order 12372, Intergovernmental Review of Federal Programs.

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Sincerely

TIMOTHY W. HUNTER, GS-11, DAF
Environmental Impact Analysis Manager

Attachments:
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2. List of federal Agencies Contacted

Patricia Carter
NEPA Program Coordinator
Branch of Advanced Planning and Habitat Conservation
Division of Habitat and Resource Conservation
U.S. Fish and Wildlife Service
4401 North Fairfax Drive, Suite 400
ARLSQ-400
Arlington, Virginia 22203
7033581764

Donald Fairley
Environmental Specialist
Federal Emergency Management Agency
FRC 800 North Loop 288
R6-IM
Denton, Texas 76209-3698

Denise S. Francis
State Single Point of Contact
Governor's Office of Budget and Planning
State Insurance Building
1100 San Jacinto
Austin, Texas 78701
5123059415

Wayne Lea
Chief, Regulatory Branch
Permits Section
U.S. Army Corps of Engineers
819 Taylor Street, Room 3A37
CESWF-PER-R
Fort Worth, Texas 76012-6124
8178861730

F. Lawrence Oaks
Executive Director
Texas Historical Commission
1511 Colorado Street
Austin, Texas 78701
5124636100

Mr. Lee Bourgoin
900 7th Street
Wichita Falls TX 76301

Harold Stone
Intergovernmental Affairs
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744
5124630840

Dennis Wilde
Executive Director
Nortex Regional Planning Commission
Region 03
4309 Jacksboro Hwy., Suite 200
Wichita Falls, Texas 76367
9403225281

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

October 11, 2006

82 CES/CEVX
231 9th Avenue Stop 201
Sheppard AFB TX 76311-3333

Ms. Denise S. Francis
State Single Point of Contact
Texas Office of State-Federal Relations
PO Box 13005
Austin TX 78711

Dear Ms. Francis

A proposed Description of Proposed Action and Alternatives Installation Development (DOPAA) for Sheppard AFB, TX is enclosed for your review and comments. This document addresses the manner in which the Air Force proposes to develop the base.

The DOPAA was prepared in accordance with the National Environmental Policy Act of 1969, as Amended to define the scope of the proposed action and alternatives associated with the installation development at Sheppard AFB Texas. Yours and other state agency comments are requested prior to the development of the Environmental Assessment for Installation Development, Sheppard AFB Texas. The comment period for this action is 30 calendar days from the date of this letter. If we do not receive a response within 35 calendar days from the date of this letter, the Air Force will proceed with development and approval of the environmental assessment.

I have enclosed five copies of the document. If you have any questions, feel free to contact me at (940) 676-5698.

Sincerely

//Signed//

TIMOTHY W. HUNTER, GS-11, DAF
Environmental Impact Analysis Manager

Attachments:
5 copies of DOPAA for Installation Development Sheppard AFB

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

October 11, 2006

82 CES/CEVX
231 9th Avenue Stop 201
Sheppard AFB TX 76311-3333

Mr. Dennis Wilde
4309 Jacksboro Hwy
Wichita Falls TX 76302

Dear Mr. Wilde

A proposed Description of Proposed Action and Alternatives Installation Development (DOPAA) for Sheppard AFB, TX is enclosed for your review and comments. This document addresses the manner in which the Air Force proposes to develop the base.

The DOPAA was prepared in accordance with the National Environmental Policy Act of 1969, as Amended to define the scope of the proposed action and alternatives associated with the installation development at Sheppard AFB Texas. Yours and other state agency comments are requested prior to the development of the Environmental Assessment for Installation Development, Sheppard AFB Texas. The comment period for this action is 30 calendar days from the date of this letter. If we do not receive a response within 35 calendar days from the date of this letter, the Air Force will proceed with development and approval of the environmental assessment.

I have enclosed a copy of the document. If you have any questions, feel free to contact me at (940) 676-5698.

Sincerely

//Signed//

TIMOTHY W. HUNTER, GS-11, DAF
Environmental Impact Analysis Manager

Attachments:
1 copy of DOPAA for Installation Development Sheppard AFB

Appendix B

Capability Analysis

APPENDIX B

CAPABILITY ANALYSIS

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FINAL

CAPABILITY ANALYSIS

FOR THE
INSTALLATION DEVELOPMENT ON
SHEPPARD AIR FORCE BASE, TEXAS

United States Air Force
Air Education and Training Command
Sheppard Air Force Base, Texas

March 2007

ACRONYMS AND ABBREVIATIONS

%	percent
AC	Advisory Circular
ACES	Automated Civil Engineering System
AFB	Air Force Base
AFH	Air Force Handbook
ANSI	American National Standards Institute
DAF	Department of the Air Force
dB	decibel
dBA	A-weighted decibel
EA	Environmental Assessment
ENJJPT	Euro-NATO Joint Jet Pilot Training
EP	effective population
FAA	Federal Aviation Administration
FY	fiscal year
Hz	hertz
IMC	Instrument Meteorological Conditions
kgal	thousand gallons
KVA	kilovolt-ampere
kW	kilowatt
KWh	kilowatt-hour
L_{dn}	Day-Night Average Sound Level
Mcf	thousand cubic feet
Mcf/d	thousand cubic feet per day
Mcf/hr	thousand cubic feet per hour
MFH	Military Family Housing
mg	million gallons
mgd	million gallons per day
MOA	Military Operations Area
MWh	megawatt-hour
NA	not applicable
NPS	non-prior service
PF	power factor
RAPCON	Radar Approach Control
SAIC	Science Applications International Corporation
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
VMC	Visual Meteorological Conditions
WFMA	Wichita Falls Municipal Airport

FINAL

Capability Analysis

Installation Development Program on
Sheppard Air Force Base, Texas

Department of the Air Force
82nd Training Wing
Sheppard Air Force Base, Texas

March 2007

This Report Printed on 20% Recycled Paper

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Executive Summary

EXECUTIVE SUMMARY

The objective of this Capability Analysis was to quantify sustainable non-flying and flying mission growth through the year 2013 to define the maximum development potential for Sheppard Air Force Base considering limiting factors. The parameters evaluated in this Capability Analysis were analyzed only to that level of detail required to determine a general capacity for growth. The growth potential identified in this Capability Analysis will be used to define a potential development alternative to be assessed in the Installation Development Environmental Assessment.

The results of the on-base housing (bed space) analysis presented in Section 2.1 suggest that an additional 18,561 persons could be supported by future planned changes to the dormitories, lodging facilities, and military family housing areas. The results of the land use analysis presented in Section 2.2 suggest that an additional 26,985 persons could be supported by planned additions to base facilities (associated with scheduled construction and demolition) and future developable areas.

The difference between the supportable population estimates derived from the housing and land use analyses resulted from the use of occupancy doubling in all unaccompanied military housing and generalized ratios between current on-base and off-base population in the case of the housing analysis, and the use of doubling the intensity (number of floors) for all projected replacement facilities and site-wide averaging of construction and demolition parameters in the case of the land use analysis. Although the two analytical methods appear to converge on a similar conclusion, the population estimate based on housing will be brought forward for further analysis in the Environmental Assessment because it is considered a more accurate representation of potential population growth.

Table ES-1 summarizes the resource constrains determined in this Capability Analysis. Based on the available information, Sheppard Air Force Base appears to have the capability to construct 7,198,171 square feet of facilities and associated pavements, provided the required demolition of 4,291,425 square feet of existing outdated facilities is implemented. A net increase of 2,906,746 square feet of building space and an associated 58 acres of pavements would be realized. In implementing the capability, the base would realize a total increase of 186.6 acres in impervious surfaces. The Capability Analysis considered the physical capability of the aviation facilities at Sheppard AFB to handle increased operations, and the increases in noise exposure that would result from those potential increases. The prime limiting factor was noise exposure, indicating a maximum desirable capacity increase of 50 percent in based-aircraft operations. Considering this increase, assessments showed that the physical capability of Sheppard AFB is sufficient to handle this increase. Furthermore, noise exposure increases under the military training

airspace at this increased level of operations would not create an adverse impact. The net increase in building space and operations would support up to 18,651 additional personnel (inclusive of students, military and civilian personnel, and on-base resident dependents), as demonstrated by the on-base housing analysis and currently available utility resources.

Table ES-1
Summary of Resource Constraints on Potential Development

Resource Usage Category	Allocation or Capability	Percent Utilized Basewide	Remaining Capability	Additional Population Supported
Base Land (acres)	4,631	89 percent	489	Not applicable
Current and Future Building Space (square feet)	12,713,317	77 percent	2,906,746	26,985
Potable Water (million gallons per day)	6.55	51 percent	3.23	24,000
Electrical System (megawatt-hour)	385,440	34 percent	253,795	Not applicable
Sewer System (million gallons per day)	4.60	32 percent	3.14	Not applicable
Gas System (thousand cubic feet per hour)	419	26 percent	312	Not applicable

Notes: Calculation details are provided in Appendices A and B.

Housing analysis estimated an additional total population of 18,561 people (12,953 effective population) could be supported based on future dormitory additions, double occupancy in all unaccompanied dormitories, and assuming base year 2005 ratios between on- and off-base housing populations remain constant.

Based on the land use analysis, approximately 26,985 additional people could be supported.

Chapter 1

Introduction

CHAPTER 1

INTRODUCTION

1.1 PURPOSE

The purpose of this Capability Analysis is to define development potential for Sheppard Air Force Base (AFB), Texas (Figure 1-1), considering limiting factors. The primary objective is to quantify sustainable non-flying and flying mission growth through the year 2013.

The 82nd Training Wing at Sheppard AFB is planning future installation development based on the current Capital Improvements Plan and Base Realignment and Closure activities. These activities would provide operational support for current missions, improve the effectiveness of training, replace inadequate facilities, correct current deficiencies, and accommodate new mission activities.

The information provided in this document will be the basis for a subsequent Installation Development Environmental Assessment (EA). The growth potential quantified in this Capability Analysis will be used to define a potential development alternative to be assessed in the Installation Development EA.

1.2 GENERAL METHODOLOGY AND APPROACH

This Capability Analysis will provide information on development potential for Sheppard AFB. The Capability Analysis is presented in two major sections: the Non-flying Mission and the Flying Mission. As part of the Non-flying Mission evaluation (Figure 1-2), the Capability Analysis determined the supportable population at Sheppard AFB based on housing capability (Section 2.1). The Capability Analysis also considered the net acreage available for development in each land use category (Section 2.2) that was free of any physical and/or operational constraints (i.e., floodplains, height constraints, safety easements, Environmental Restoration Program sites, wetlands). The analysis also examined the base's ability to provide basic infrastructure support to the expanded population and facilities (Section 2.3). Flying mission capability was assessed by considering increased flight operations, the effect these increases would have on noise around the airfield, the physical throughput capacity of the airfield and air traffic control, and possible availability constraints on military training airspace supporting unit operations (Section 3.0).

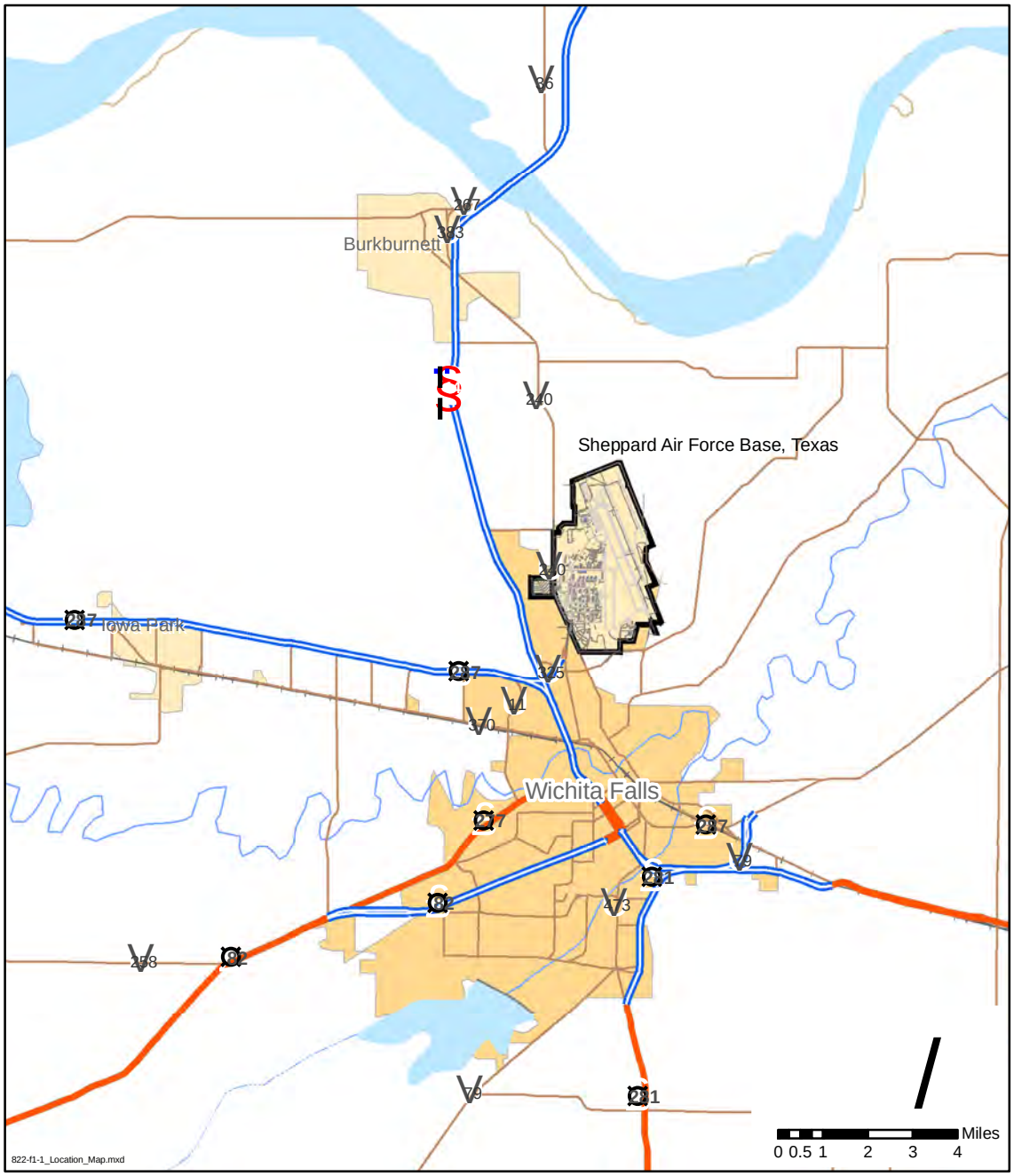

Figure 1-1 Location of Sheppard Air Force Base, Texas

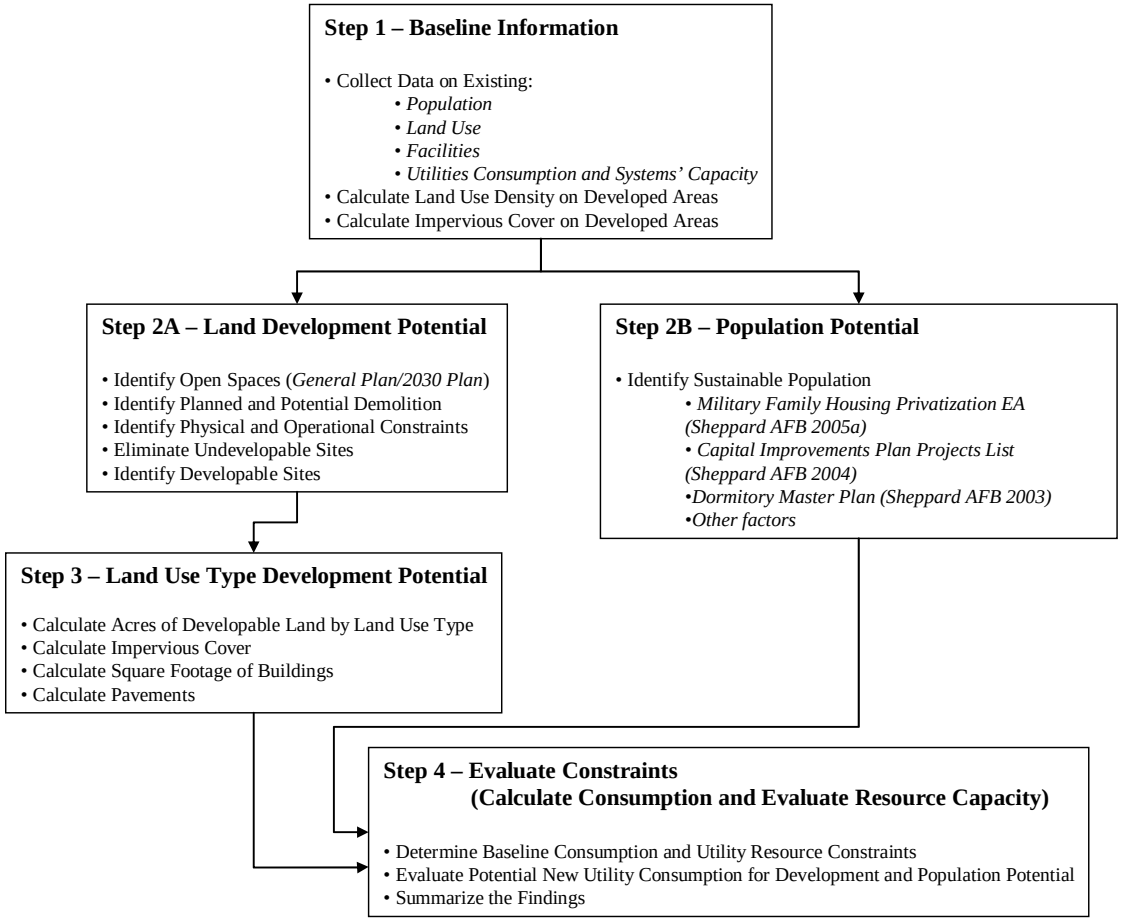

Figure 1-2 Process Flow Diagram

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After determining the current baseline conditions, the first step in the Capability Analysis was to determine the sustainable population based on potential housing availability. The next step was to determine the maximum installation development potential based on available acreage per land use category from the future land use map. For Sheppard AFB, the evaluation of available acreage included a review of all vacant and underutilized parcels; these included land associated with scheduled demolition projects during the planning period (before 2013) as well as facilities and buildings that exceeded a recommended life expectancy of 50 years within the planning period (before 2013) that would potentially be available for reassignment (Sheppard AFB 2004a). The resulting maximum developable land area and corresponding sustainable population were then evaluated with respect to potentially limiting factors such as utility systems. Finally, the flying capacity at the airfield and the associated training airspace, as well as the noise environment surrounding Sheppard AFB and the utilized training airspace were evaluated to determine the maximum growth potential for the flying mission.

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Chapter 2

Non-Flying Mission Capability

CHAPTER 2

NON-FLYING MISSION CAPABILITY

2.1 SUSTAINABLE POPULATION EVALUATION

2.1.1 Baseline Population

This Capability Study referenced the Fiscal Year (FY) 2005 population, housing assets, and occupancy data reported in the March 2006 edition of the *Statistical Notebook* compiled by the Sheppard AFB Financial Analysis Office (Sheppard AFB 2006a). The estimate of base population for this Capability Study was restricted to those population members (i.e., all personnel, students, on-base dependents, and transient personnel), who would have a higher cumulative effect upon the potentially limiting base resources. In total, the 2005 baseline population of Sheppard AFB was 18,084 persons. Table 2-1 summarizes the baseline population at Sheppard AFB used for this Capability Study.

As referenced in Table 2-1, the total 2005 baseline population of 18,084 persons comprised military and dependents residing on base, military and civilian employees residing off base, and students residing on base. The effective population (EP) of 13,052 is defined as the estimate of the equivalent 24-hour population served by Sheppard AFB's utility systems. On-base residents use the Sheppard AFB utility systems at home and at work (i.e., 24 hours), but off-base residents use the AFB's utilities only during work hours (i.e., 8 hours). Therefore, on-base residents have an EP factor of one, but off-base residents (present only one-third of the 24-hour period) have an EP factor of approximately one-third. EP was used to measure the capacity of those utility systems (i.e., water, sanitary sewer, and electrical) that have population-dependent usage rates (Section 2.3). Table 2-2 summarizes the baseline EP at Sheppard AFB used for this Capability Study.

Table 2-1
2005 Baseline Total Population, Sheppard AFB

Classification	Living on Base	Living off Base	Total
Military Personnel[1]	1,687	1,861	3,548
Civilian Personnel[2]	0	3,963	3,963
Average Daily Student Load[3]	4,242	1,724	5,966
Military Dependents[4]	3,618	NA[6]	3,618[6]
Transient Personnel[5]	989	0	989
Total Population[6]	10,536	7,548[6]	18,084[6]

Source: March 2006 edition of *Statistical Notebook* (Sheppard AFB 2006a) for both on- and off-base population

Notes:

[1] Military personnel included permanent party officers and enlisted military. On-base and off-base military personnel were estimated from the available housing in the military family housing (MFH) areas (1,210 units) and the utilization of available unaccompanied officers' quarters (171 out of 192) and enlisted quarters (306 out of 396) bed space as reported in the *Statistical Notebook* (Sheppard AFB 2006a). [1,687 = 1210+171+306]

[2] Civilian personnel included all civil service, non-tax funded, contract, and other employees that are non-military as reported in the *Statistical Notebook* (Sheppard AFB 2006a). It was assumed that civilian personnel do not live on base.

[3] Average Daily Student Load (5,966) was provided in the *Statistical Notebook* personnel summary. Off-base students were estimated from the total student population and the utilization of available non-prior service (NPS) dormitory bed space (4,242 of 6,610 beds) as reported in the *Statistical Notebook* (Sheppard AFB 2006a). The 2,368 empty beds are assumed to be in single occupied rooms or otherwise unavailable at the time.

[4] Dependents were obtained from family members data (6,321 people) found in the *Statistical Notebook* (Sheppard AFB 2006a). On-base dependents were estimated as 3,618 based on 1,210 housing units and an average number of bedrooms of 2.99, assuming 1 dependent per bedroom, based on data reported in the *EA MFH Privatization* (Sheppard AFB 2005b). Off-base dependents were estimated as 2,703, but were excluded from base population totals.

[5] Transient personnel were estimated from the number of rooms and the average annual occupancy as reported in the *Statistical Notebook* (Sheppard AFB 2006a) for the following: Visiting Officers' Quarters (211 out of 248), Visiting Airman's Quarters (689 out of 929), Visiting Quarters (44 out of 54), and Temporary Lodging Facility (45 out of 77). [989 = 211+ 689 + 44 +45]

[6] Total population for this Capability Analysis excluded off-base dependents, retirees, and other members of the base extended population that had no significant effect on the availability of on-base resources.

AFB Air Force Base
EA Environmental Assessment
MFH Military Family Housing
NA not applicable
NPS non-prior service

2.1.2 Limiting Factors

The most limiting factor on population at Sheppard AFB appeared to be available undeveloped land outside of the 100-year floodplain. A recent evaluation of the *Resource Capability* report indicated that only 82.9 acres of unconstrained open spaces (i.e., above the 100-year floodplain) remained at Sheppard AFB (Sheppard AFB 2006b). However, as stated in the recently completed *Implementation Plan*, "much of the base has been developed so new projects require relocation of occupants and demolition of existing facilities to clear the site" (Sheppard AFB 2005a). Available land, currently undeveloped or through demolition, is evaluated in more detail in Section 2.2.

Table 2-2
2005 Baseline Effective Population, Sheppard AFB

Category	Population	Effective Population Factor	Effective Population
Military on Base	1,687	1.00	1,687
Dependents on Base	3,618	1.00	3,618
Military off Base	1,861	0.3333	620
Trainees/Cadets on Base	4,242	1.00	4,242
Trainees/Cadets off Base	1,724	0.3333	575
Civilian Employees	3,963	0.3333	1,321
Transient Personnel	989	1.00	989
Total	18,084	--	13,052

Source: Sheppard AFB 2006a and Table 2-1.

2.1.3 Maximum Population

Potential population at Sheppard AFB was derived from an analysis of the on-base housing potential and the current breakdown between on- and off-base resident personnel. This analysis included a review of all military family housing (MFH), unaccompanied permanent party personnel dorms, technical training student housing for non-prior service (NPS) personnel (NPS Dorms), and all other on-base lodging including the Visiting Officers' Quarters, Visiting Airmen's Quarters, Visiting Quarters, and Temporary Lodging Facilities. The analysis assumed the off-base housing market is capable of absorbing additional growth associated with new mission changes at the base.

The 2003 *Dormitory Master Plan* for Sheppard AFB is presently being updated to include several dormitory replacement facilities shown in the *Implementation Plan* schedule to be completed within the planning period ending in 2013 (short-term), as well as several additional facilities that would be completed as funding becomes available in the mid- to long-term period ending in 2030 (Sheppard AFB 2003 and 2005a). The recently completed *Environmental Assessment MFH Privatization* indicated plans to privatize and reduce the available MFH from approximately 1,210 units to 910 units, which would result in an accompanied housing capability reduction of approximately 1,300 people (inclusive of dependents) (Sheppard AFB 2005a, 2005b, and 2006b). The privatization of the MFH areas would result in reduced demand on base utility resources, because utilities would be provided by the housing privatization contractor (Sheppard AFB 2005b).

Table 2-3 presents the current, short term planned, and maximum population capacity for Sheppard AFB based on housing availability. The distinction between short term and maximum population is defined by the anticipated project completion date as listed in the Implementation Plan (Sheppard AFB 2005b). The planning period ending in 2013 was used to define short-term projects and 2030 was used to identify longer-term projects.

Table 2-3 On-base Housing Analysis

Category	Baseline (2005) Population[1]	Current (2006) Housing Capability[2]	Planned (2013) Future Housing Capability[3]	Maximum Future (2030) Housing Capability[4]
Accompanied Housing (MFH)	1,210 military 3,618 dependent	1,210 military 3,618 dependent	910 military 2,721 dependent	910 military 2,721 dependent
Permanent Party Housing	171 officer 306 enlisted	192 officer 396 enlisted	241 officer 768 enlisted	482 officer 1,536 enlisted
Student Housing	4,242	6,610	6,000	14,416
Transient Housing	989	1,308	1,308	620
Total On-base Population[5]	5,929 military 3,618 dependent 989 transient	8,408 military 3,618 dependent 1,308 transient	7,919 military 2,721 dependent 1,308 transient	17,344 military 2,721 dependent 620 transient
Off-base Population[6]	7,548	9,549	8,560	15,960[7]
Total Base Population[6]	18,084	22,883	20,508	36,645
Effective Population[6]	13,052	16,517	14,801	26,005

Source: *Dormitory Master Plan* (Sheppard AFB 2003), *Dormitory Master Plan Outbrief Presentation* (Sheppard AFB 2006c), *EA MFH Privatization* (Sheppard AFB 2005a), *General Plan* (Sheppard AFB 2004a), *Implementation Plan* (Sheppard AFB 2005b), *Statistical Notebook* (Sheppard AFB 2006a), Building Data, and 7115 data obtained from ACES in May 2006.

Notes:

[1] Baseline population data obtained from Table 2-1 of this report.

[2] Current housing capability based on *EA MFH Privatization*, ACES data, and *Statistical Notebook*.

[3] Planned housing capability based on *General Plan*, *Implementation Plan* (short-term projects), *EA MFH Privatization*, and *Dormitory Master Plan Outbrief Presentation*.

[4] Maximum housing capability based on *Implementation Plan* (mid- to long-term projects), doubling up on unaccompanied housing occupancy.

[5] Total on-base estimate for military population capability includes all Transient Housing, Student Housing, Unaccompanied Permanent Party Housing, and Accompanied Housing. Dependent housing capability estimates are based upon the *EA MFH Privatization* plans, assuming one dependent per bedroom.

[6] Off-base populations for current, planned, and maximum capability are estimated from the ratio of on to off-base population established from the 2005 baseline population data. Total base population is the sum of on and off-base population. Effective population is the sum of the on-base population and one third of the off-base population, this number is used in evaluating population-based utilities such as potable water consumption.

[7] Displaced transient population was added to total off-base population to account for the shift of personnel off base.

ACES Automated Civil Engineering System
AFB Air Force Base
EA Environmental Assessment
MFH Military Family Housing

2.1.4 Summary of Population

The maximum on-base housing (bed space) analysis compared to the 2005 baseline population suggested that an approximate 100 percent increase in total and effective service population was possible at Sheppard AFB provided other base resources could accommodate the higher demand and privatization proceeds as planned. The population potentially supported by the base maximum capability scenario described in Table 2-3 is 36,645 people (total population) and 26,005 people (EP), compared to 18,084 people (total population) and 13,052 people (EP) for the 2005 baseline population. The net increase in the base population would be 18,561 people for the total population and 12,953 people for the EP.

As further described in Section 2.2, the available land is capable of supporting the new buildings and facilities required by this projected population increase provided the demolition required for restructuring the base is performed. As further described in Section 2.3, the available potable water supplies and other base utilities are fully capable of meeting the demand associated with this projected population increase.

2.2 LAND USE EVALUATION

The *General Plan* and *Implementation Plan* provided the foundation of the land use analysis (Sheppard AFB 2004a and 2005a). The following section describes the evaluation of developable spaces by land use type. Additional details related to the developable parcels are included in Appendix A.

2.2.1 Current and Future Land Use

As identified in the *General Plan* and *Implementation Plan*, there is limited open and undeveloped space on Sheppard AFB (Sheppard AFB 2004a and 2005a). The installation's goal has been to consolidate compatible functions within the same land use areas to improve operational efficiency and safety, improve traffic circulation patterns, and provide aesthetic areas that enhance the quality of life for personnel. The land use categories used by the Air Force are defined in Table 2-4. Figure 2-1 presents the current distribution of land uses for Sheppard AFB. Airfield and Indoor Training are the base's two largest land use categories in terms of acreage, accounting for 1,994 and 532 acres, respectively.

The future land use map (see Figure 2-2) shows logical land uses that would support reasonably foreseeable changes and expansion in the various missions on Sheppard AFB. Table 2-5 summarizes the distribution of land uses based on the existing and future land use plans for Sheppard AFB and the change in area between existing and future land uses for each land use category.

Table 2-4
Land Use Categories

Land Use Categories	Description
Aircraft Operations and Maintenance	Aircraft maintenance hangers, shops, base operations, control tower, fire station, and flight training.
Administrative	Headquarters, civilian personnel areas, education center, law center, and security operations.
Airfield	Associated clearances and safety zones.
Airfield Pavements	Runways, taxiways, and aprons.
Community Commercial	Commissary, exchange, club, dining hall, recreation center, gym, and theater.
Community Service	Post office, library, chapel, childcare center, and education center.
Housing Accompanied	Family housing, temporary living facilities, and associated support.
Housing Unaccompanied	Dormitories and visitors housing.
Industrial	Base engineering, maintenance shops, storage, warehousing, and utilities.
Medical	Hospital, clinic, and medical storage.
Open Space	Conservation area, buffer space, and undeveloped land.
Outdoor Recreation	Swimming pool, outdoor courts and field, and golf course.
Training - Indoor	Officer, technical, classroom instruction, and field training.

2.2.2 Limiting Factors

During the review of base aerial photographs and land use planning maps to identify potentially developable areas, discriminating factors were considered that would prevent development. The most common discriminating factors evaluated included sites within the 100-year floodplain, the 3,000-foot by 3,000-foot clear zone, active Environmental Restoration Program sites, established outdoor training and recreation areas, areas within projected high noise zones, wetlands, and sites that were too small to develop (less than one acre) within established setback requirements.

Two other factors were also considered in the identification of developable parcels: (1) short-term proposed project location and (2) age of the building. Proposed locations for future projects were considered as potentially developable parcels and assumed that demolition of the current facilities in the identified area would be conducted. Concerning the building age factor, the *General Plan* identifies all base buildings as having an average useful life of 50 years (Sheppard AFB 2004a). Therefore, any areas with buildings older than 50 years (through the planning period of 2013) were also considered developable.

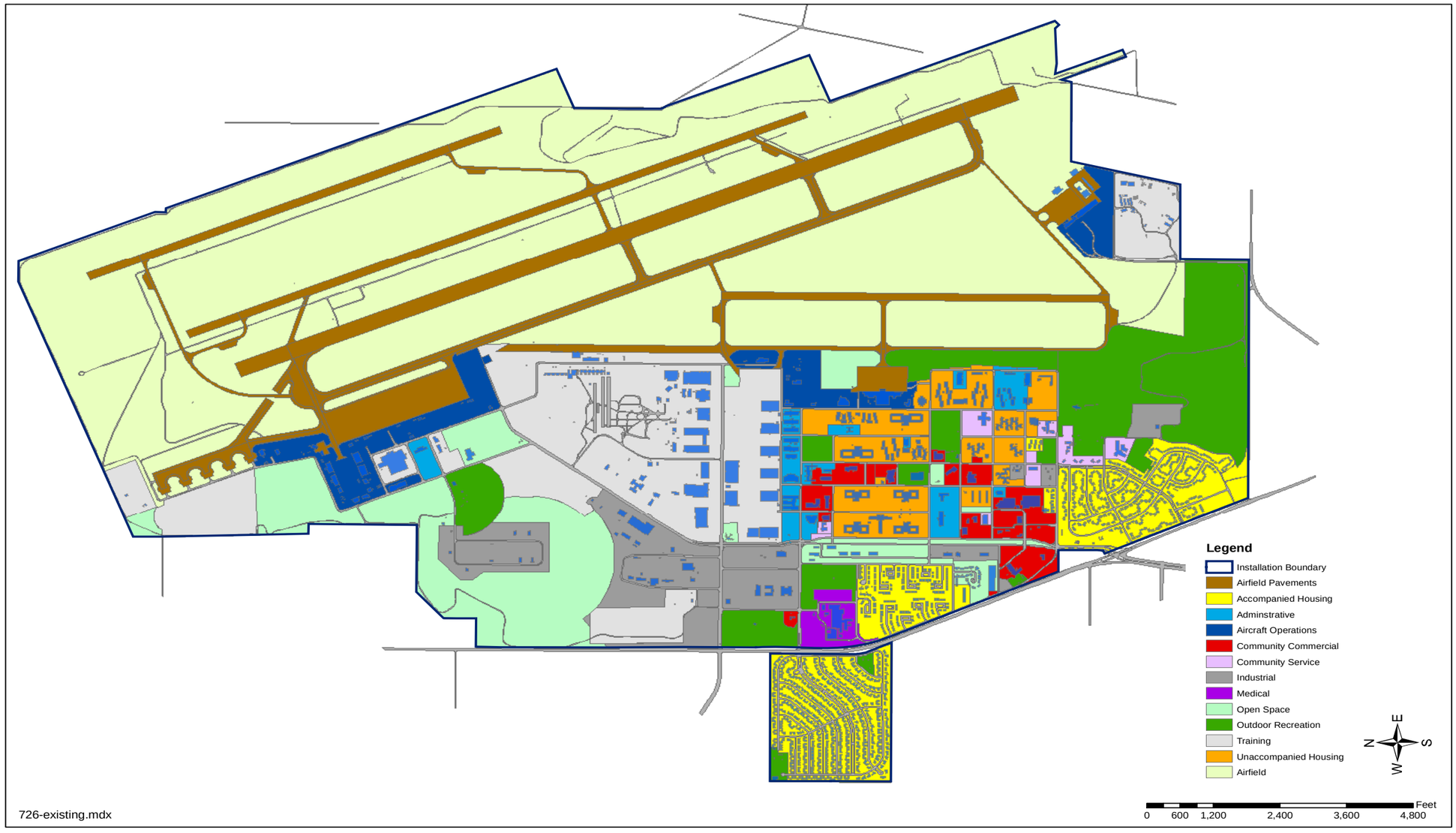

Figure 2-1 Existing Land Use, Sheppard Air Force Base, Texas

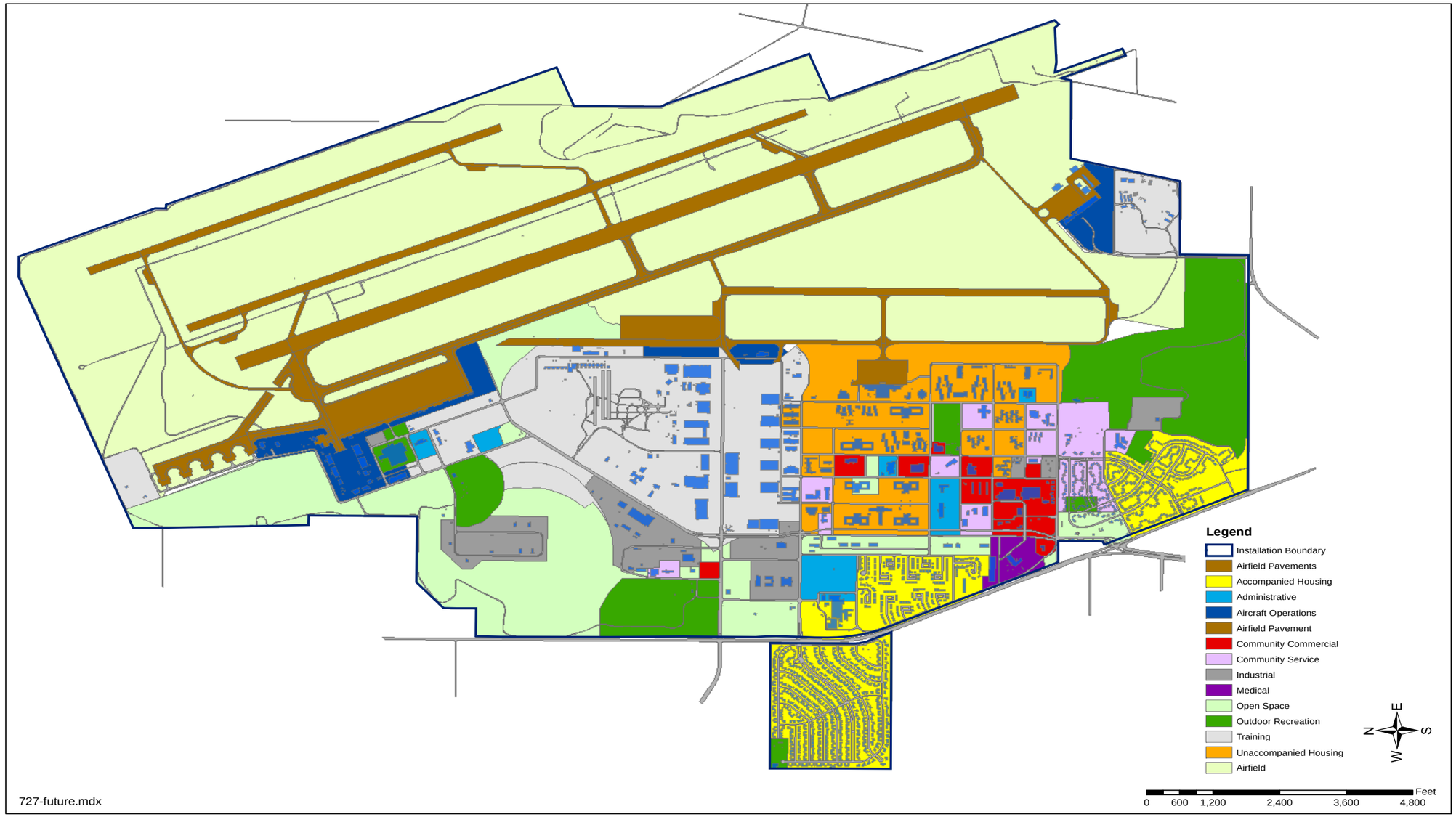

Figure 2-2 Future Land Use, Sheppard Air Force Base, Texas

Table 2-5
Existing and Future Land Use Acreage by Land Use Category

Land Use Category	Existing Land Use		Future Land Use		Change in Land Use (acres)
	Acres	Percent Distribution	Acres	Percent Distribution	
Aircraft Operation and Maintenance	143	3.1	105	2.3	-38
Administrative	71	1.5	56	1.2	-15
Airfield	1,994	43.1	1,967	42.5	-27
Airfield Pavements	421	9.1	449	9.7	28
Community Commercial	84	1.8	68	1.5	-16
Community Service	30	0.6	100	2.2	70
Housing Accompanied	306	6.6	292	6.3	-14
Housing Unaccompanied	158	3.4	279	6.0	121
Industrial	206	4.4	138	3.0	-68
Medical	26	0.6	19	0.4	-7
Open Space	325	7.0	361	7.8	36
Outdoor Recreation	335	7.2	296	6.4	-39
Training - Indoor	532	11.5	501	10.8	-31
Total	4,631		4,631		

Source: General Plan (Sheppard AFB 2004a)

2.2.3 Maximum Developable Land

Base aerial photographs and land use planning maps were reviewed and 153 potentially developable parcels comprising 937 acres were visually identified (Figure 2-3). Of the 153 sites, 38 were eliminated due to physical and operational constraints[1] (Appendix A, Table A-1).

The remaining 115 parcels (501 acres) were considered developable with the implementation of proposed demolition at short-term project locations (through 2013) and the demolition of buildings older than 50 years. Available areas by land use category are summarized in Table 2-6. Additional detail is presented in Appendix A, Table A-5.

[1] Many of the potentially developable sites were included as parcels due to proposed activities in the *General Plan* (Sheppard AFB 2004a) and still have buildings or other facilities located upon them. Demolition would occur prior to construction of proposed projects.

Table 2-6 Developable Parcels by Land Use Category

Land Use Category	Developable Parcels (acres)	Non-developable Parcels (acres)
Aircraft Operation and Maintenance	9.2	4.98
Administrative	23.0	1.39
Airfield	0.00	0.00
Airfield Pavements	0.00	0.00
Community Commercial	25.5	4.02
Community Service	27.7	0.39
Housing Accompanied	19.7	0.00
Housing Unaccompanied	152.6	1.92
Industrial	16.7	4.20
Medical	12.3	0.00
Open Space	70.8	312.33
Outdoor Recreation	26.9	53.74
Training - Indoor	116.4	53.28
Total	**500.8**	**436.25**

Source: Appendix A (Tables A-1 and A-5)

Based on the current development ratios per land use area and the building density factors required to house the maximum population described in Section 2.1.3, the square footage of buildings and pavements that could be accommodated within these developable parcels was estimated. Sheppard AFB could accommodate an additional 2,920,853 square feet of building space (7,212,279 square feet of construction with 4,291,425 square feet of associated demolition) with an accompanying 59 acres of pavements (including roadways, sidewalks, and parking areas). A summary of this potential development per land use area is provided in Table 2-7 and in Appendix A. Figure 2-3 depicts the potentially developable parcels on Sheppard AFB.

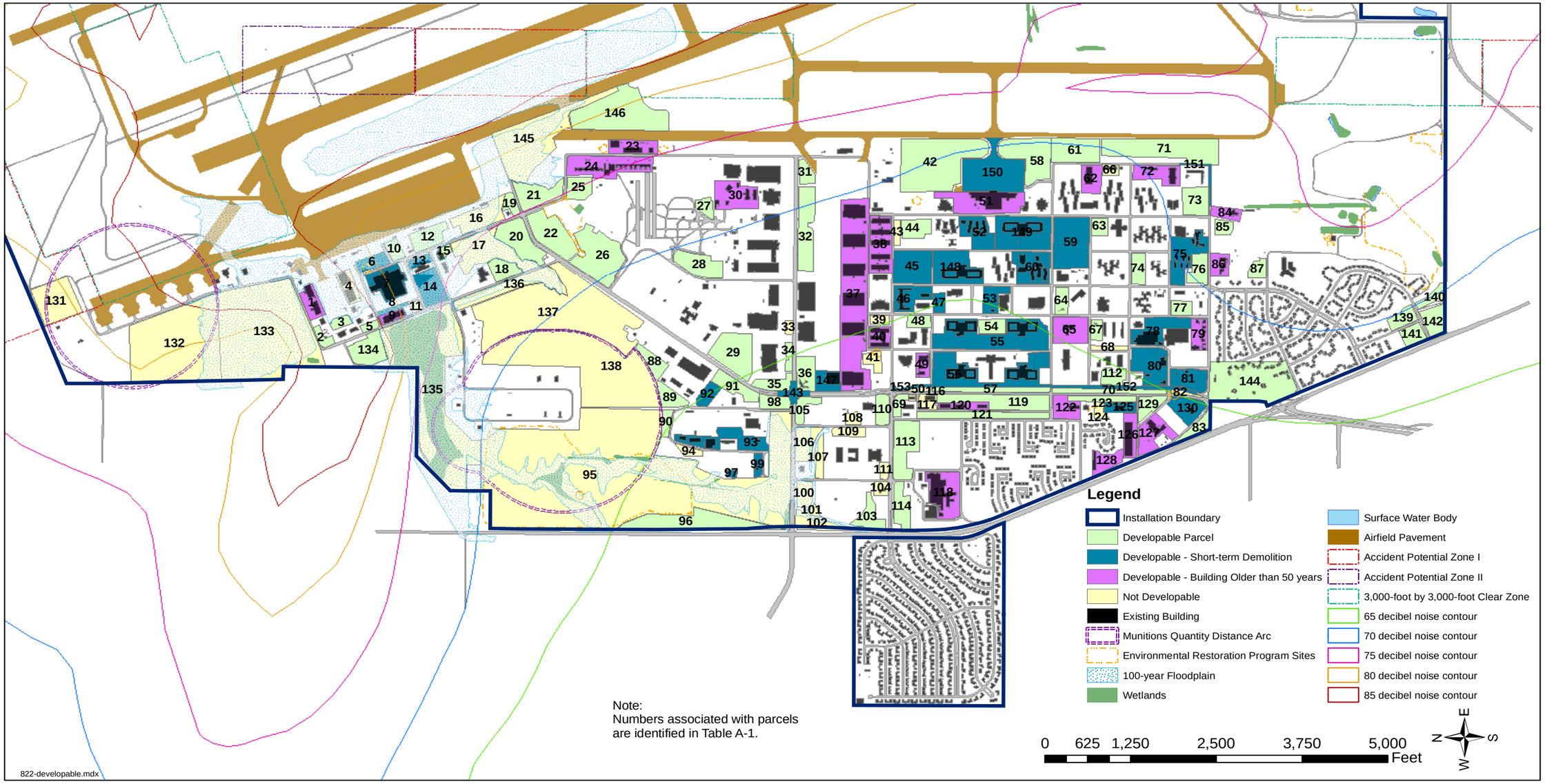

Figure 2-3 Potentially Developable Parcels, Sheppard Air Force Base, Texas

Table 2-7
Potential Development per Land Use Category

Land Use Category	Developable Parcels (acres)	Future Building Capability (square feet)	Total Impervious Surface Capability (acres)
Aircraft Operation and Maintenance	9.2	49,920	3.39
Administrative	23.0	523,199	15.94
Airfield	0.00	0	0.00
Airfield Pavements	0.00	0	0.00
Community Commercial	25.5	283,150	14.87
Community Service	27.7	228,073	12.7
Housing Accompanied	19.7	143,852	7.51
Housing Unaccompanied	152.6	4,518,179	79.22
Industrial	16.7	56,085	1.46
Medical	12.3	379,327	7.04
Open Space	70.8	57,448	4.89
Outdoor Recreation	26.9	5,972	1.86
Training - Indoor	116.4	952,965	37.69
Total	**500.8**	**7,198,171**	**186.56**

Source: Appendix A (Table A-5)

Note: Demolition of existing facilities was not considered in the calculation of building and impervious surface square footage.

2.3 INFRASTRUCTURE EVALUATION

2.3.1 Potable Water

The installation purchases all of its potable water from the City of Wichita Falls, Texas. The sources of this water are Lake Arrowhead and Lake Kickapoo. Potable water is delivered from the city-owned Puckett water tower to the Capehart housing area and to the Building 140 area and is connected into the base system (Sheppard AFB 2004a).

The Sheppard AFB potable water system was designed to supply 6.552 million gallons per day (mgd), based on infrastructure analysis provided in the *Resource Capability* report (Sheppard AFB 2006b). The City of Wichita Falls' potable water supply capability was recently increased from 54 mgd to 64 mgd and is anticipated to reach 76 mgd upon the finalization of improvements scheduled for completion by the end of 2006 (Taylor 2004). Potable water consumption at Sheppard AFB in FY2005 averaged approximately 1.24 mgd; the maximum daily consumption was estimated as 1.82 mgd based on monthly consumption reported for July 2005 (Hagins 2006).

2.3.1.1 Baseline Potable Water Conditions

Water received at the base is delivered to a booster station containing four pumps. The pumps are used to maintain adequate water pressure on the base. The distribution system is made up of over 48 miles of water line and approximately 500 fire hydrants. Water sampling is conducted throughout the base distribution system; samples are analyzed for chlorine residual, fluorine, pH, and bacteria (Sheppard AFB 2004a).

Water storage is required for firefighting should the city's supply system be impaired (Sheppard AFB 2004a). The approximate storage requirement is based on the sum of the worse case fire water requirement (presently 1.5 mg) and one-half of the average daily consumption (presently 1.24 mg) (Sheppard AFB 2004b). Based on 2005 consumption data and fire water requirements, the current water storage needs are approximately 2.12 mg. This firefighting water is stored on base in three ground level storage tanks that can be pumped to an elevated storage tank. The three ground storage tanks (two 500,000-gallon tanks and one 1.5-million gallon [mg] tank) provide primary water storage. Although the primary storage capacity of 2.5 mg exceeds the current water storage needs, secondary storage is provided by an elevated 500,000-gallon capacity water tower.

The current irrigation systems are supplied with recycled treated wastewater effluent from the city of Wichita Falls and supports irrigation of approximately 75 percent of the major facilities on the installation including ball fields, the football field, and the parade ground. There are 81 irrigation systems (56 automated and 25 manual), and about 47 miles of associated piping. Treated wastewater effluent is brought in from the City of Wichita Falls' North Side Wastewater Treatment Plant through an 8-inch line to the golf course pond and then used for irrigation (Sheppard AFB 2004a). The average annual consumption for treated wastewater effluent based upon data reported in 2001 and 2002 is approximately 0.2 mgd (Hagins 2006).

2.3.1.2 Limiting Factors on Potable Water

Sheppard AFB is regularly under water restrictions due to drought conditions. This constraint on vegetation and water features is mitigated by reusing treated wastewater for golf course irrigation. Previous efforts at conservation included plans to irrigate other areas on base along the wastewater effluent line, but this plan was abandoned due to hookup costs and lack of sufficient wastewater effluent. This might not be the case in the future if off-base or on-base development brings more domestic wastewater into the treatment plant, which would then generate more effluent. An effluent line comes from the North Side Wastewater Treatment Plant that runs by the area and could be tapped for the purpose of filling the ponds and preventing the ponds from drying up (Sheppard AFB 2004a).

About 75 percent of the metal water mains are being replaced because of age and deterioration. Asbestos cement pipes, which make up about 30 percent of the system, are being identified and replaced as well. The Avenue F water main needs to be replaced and

connected to another water main to create a looped system. Approximately 5 percent of the water main valves require replacement because of leaking and broken stems (Sheppard AFB 2004a).

The current irrigation system requires ongoing maintenance and is inadequate to support existing development areas. Further development area growth as proposed in the 2030 Plan will undoubtedly require irrigation, and the potential of that irrigation will be of concern. Additional irrigation requirements in the vicinity of the floodplain and the proposed Heritage Center recreational fields, in particular, will require more detailed evaluation in a separate irrigation system study (Sheppard AFB 2004a).

2.3.1.3 Maximum Potable Water Capability

The base potable water system was designed to supply 6.552 mgd. Potable water consumption at Sheppard AFB in FY2005 averaged approximately 1.24 mgd; the maximum daily consumption was estimated as 1.82 mgd based on monthly consumption reported for July 2005 (Hagins 2006). The estimated worst-case fire water requirement was 1.5 mg (Sheppard AFB 2004b). Table 2-8 summarizes the potable water system capability, current consumption, and surplus capability.

Analysis of the 2005 average consumption data and the current design capability demonstrated there was a 3.81 mgd surplus in the current supply. Assuming non-population based demands on the potable water supply do not change significantly, this amount of surplus potable water would support an EP (equivalent 24-hour population) of at least 28,000 additional persons based on a typical average daily per capita consumption of 135 gallons (Desert Water Association 2006). Based on the 2005 worst-case peak flow condition and the current design capability, there was a 3.23 mgd surplus in the current potable water supply under extreme conditions. This amount of water would support an additional 24,000 24-hour EP, again based on a 135-gallon typical average daily per capita consumption.

Although many portions are aged and subject to failure, the water system on Sheppard AFB is structurally adequate to handle the current mission needs. The system has an adequate supply for the firefighting requirements and could be increased along with future expansion plans to continue to provide adequate capacity for future supply requirements (Sheppard AFB 2004a). The water supply and distribution system (including irrigation) at Sheppard AFB is not a limiting factor for current operations or future expansion.

Table 2-8 Potable Water Capability Summary

Category	Value	Percent of Current Supply[1]	Headroom from Designed
Potable Water Supply			
Wichita Falls City Supply Capacity (mgd)[2]	64	NA	NA
Sheppard System Design Capacity (mgd)[3]	6.552	10 percent[1]	NA
Potable Water Consumption			
FY2005 Average Daily (mgd)	1.24	19 percent	5.31
July 2005 Estimated Maximum Daily (mgd)	1.82	28 percent	4.73
2005 Average Daily with Fire Water Reserve[4]	2.74	42 percent	3.81
2005 Maximum Daily with Fire Water Reserve[4]	3.32	51 percent	3.23
Potable Water Storage			
Total Current Water Storage (mg)[5]	3.00	100 percent	NA
Estimated Storage Requirement (mg)[6]	2.12	71 percent	0.88

Source: Sheppard AFB 2004a, Sheppard AFB 2006b, and Hagins 2006.

Notes:

[1] Sheppard AFB system capacity is 10 percent of the current Wichita Falls city supply; percent of consumption to supply estimates are relative to the established Sheppard AFB capacity of 6.552 mgd; percent of storage requirement is relative to currently available storage of 3 mg.

[2] Wichita Falls city supply based on e-mail documentation from Taylor to Hagins in August 2004.

[3] Sheppard AFB system design capacity obtained from *Resource Capability* report (Sheppard AFB 2006b).

[4] Fire water reserve of 1.5 mg based upon worst- case fire requirement reported in *Water Vulnerability Risk Assessment* (Sheppard AFB 2004b) is added to the 2005 average and maximum daily average water consumption to establish potential worst-case consumption scenario under current conditions. This reserve is not a true limitation imposed on the potable water system.

[5] Water storage is based upon primary storage of two 500,000-gallon and one 1.5-mg tanks and secondary storage of one 500,000-gallon tank, totaling 3 mg.

[6] Estimated storage calculated using 50 percent of 2005 average daily average and adding it to the estimated worst-case fire water requirement of 1.5 mg.

AFB	Air Force Base
FY	fiscal year
mgd	million gallons per day
mg	million gallons
NA	not applicable

2.3.2 Wastewater Collection System

Sheppard AFB discharges its wastewater to the City of Wichita Falls' wastewater collection system. Approximately 80 percent of the base's wastewater is discharged to the River Road Wastewater Treatment Plant south of the base. The remaining 20 percent flows to the North Side Wastewater Treatment Plant. The installation tests the wastewater biannually. Both city-owned treatment plants discharge to the impaired 303(d)-listed Segment Number 0214 of the Wichita River. However, the impairment does not affect the base's discharge requirements or limitations.

2.3.2.1 Baseline Wastewater Collection System Conditions

The Sheppard AFB wastewater collection system includes over 35 miles of pipe, 725 manholes and 12 lift stations. Twenty-five percent of the wastewater collection mains is clay tile, and the remainder is polyvinyl chloride. Wastewater from the Capehart housing area, Sheppard AFB Hospital, Civil Engineering and 82nd Logistics Readiness Squadron complexes are treated at the city's North Side Wastewater Treatment Plant. Wastewater from the rest of the base is treated at the River Road Wastewater Treatment Plant (Sheppard AFB 2004a). The contract based flow limitations for the combined base average daily effluent is 4.5 mgd based on an annual allowance of 1,642,500 thousand gallons (kgal) and the system design capacity is 4.6 mgd based on current lift station capacity (Hagins 2006 and Sheppard AFB 2006a). The FY2005 annual wastewater discharge was 277,572 kgal with an average daily wastewater effluent of 0.76 mgd. The November 2004 estimated maximum daily flow was 1.10 mgd. Estimated maximum daily flows from historical peak flow months were 1.46 mgd in August 2001, 1.22 mgd in July 2002, and 1.24 mgd in September 2003 (Hagins 2006).

2.3.2.2 Limiting Factors on Wastewater Collection System

A cross flow/cross-connection study in 1993 identified some deterioration problems in the wastewater collection system. These are being addressed as part of ongoing system maintenance. Although many portions are aged and subject to failure, Sheppard AFB's wastewater collection system is structurally adequate to handle the current mission needs (Sheppard AFB 2004a). The historical peak average daily flows are less than 32 percent of the average daily rate estimated from the annual contracted amount and less than 32 percent of the design capacity of the base wastewater collection system. No overall capacity limitations regarding the long-range development plan are anticipated.

2.3.2.3 Maximum Wastewater Collection System Capability

Table 2-9 summarizes the wastewater collection system capability, current consumption, and surplus capability.

Table 2-9 Wastewater Collection System Capability Summary

Category	Value	Percent of Permitted Capacity	Percent of Current Design Capacity[3]	Headroom from Designed[3]
Wastewater Collection System Capacity				
Combined Effluent Flow from Contract with Wichita Falls (mgd)[1]	4.50	100%	NA	NA
Lift Station Capacity (mgd)	4.60	NA	NA	NA
Wastewater Collection System Consumption				
FY2005 Total Consumption (mgd)[1]	0.76	17%	17%	3.84
Estimated 2002 Peak Flow (mgd)[2]	1.46	32%	32%	3.14
Estimated 2003 Peak Flow (mgd)[2]	1.22	27%	27%	3.38
Estimated 2004 Peak Flow (mgd)[2]	1.24	28%	27%	3.36
Estimated 2005 Peak Flow (mgd)[2]	1.10	24%	24%	3.50

Source: Sheppard AFB 2004a, Sheppard AFB 2006b, and Hagins 2006.

Notes:

[1] Annual contracted rates and annual consumption are restated in terms of a daily rate, which is not actually a daily limit.

[2] Peak consumption is estimate from highest recorded monthly effluent and restated as a daily average.

[3] Percent of design capacity and headroom from design capacity expressed relative to lift station capacity.

% percent
mgd million gallons per day
NA not applicable

2.3.3 Electrical System

Sheppard AFB purchases all of its electricity from the Texas Utilities Company. There is one main substation on base and no secondary station. The base owns the substation and the distribution system it supplies, but not the feed lines.

2.3.3.1 Baseline Electrical System Conditions

Two feeds from the Texas Utilities Company supply the installation, each 69 kilovolts (Sheppard AFB 2004a). Although either feeder is sufficient to feed the base alone, both are normally maintained open for redundancy. The substation has adequate capacity to meet future needs (Hagins 2006). However, there is some concern over the lack of an alternate power circuit to supply the 80th Flying Training Wing area should the primary circuit fail (Sheppard AFB 2004a).

The distribution system includes about 23 miles of primary overhead lines, 41 miles of secondary overhead lines, 24 miles of primary underground lines, and 8 miles of secondary underground lines. A program is underway to place the remaining aboveground electrical lines underground to improve the aesthetic condition of the installation (Sheppard AFB 2004a).

Fifty generator units supply backup electric power to critical facilities on the installation. There are also five mobile emergency power units available to deliver power where needed for other services. All of the fuel tanks supplying generators and their piping are aboveground and within bermed areas (Sheppard AFB 2004a).

A summary of electrical demands from Air Force Forms 3556 and billing records for FY2005 is provided below. The power factor[2] for the base is approximately 85 percent in the summer and 88 percent in the winter (averaging 87 percent annually), the nominal supply is 44,000 kilovolt-amperes (KVA[2]), and the overload supply rating is 66,000 KVA (Hagins 2006).

- Annual Usage 131,645, 231 kilowatt-hours (KWh[2])
- Monthly Average Usage 10,970,440 KWh
- High Month Demand: August 2005 27,869 actual kilowatts (kW[2])
- Low Month Demand: March 2005 15,851 actual kW
- Contract Nominal Supply: 44,000 kW
- Contract Annual Supply (estimated[2]): 385,440,000 KWh

$$\left[44{,}000\,kW \times 365 \times 24 = 385{,}440{,}000\,KWh\right]$$

2.3.3.2 Limiting Factors on Electrical System

Infrastructure is not a limiting factor for the electrical system. The nominal and contract supply rates are generally less than 66 percent of the actual substation or switch capability. The actual annual consumption is generally less than 34 percent of the annual contracted supply capacity. The peak loads are generally less than 42 percent of the overload supply capacity and 63 percent of the nominal supply capability.

2.3.3.3 Maximum Electrical System Capability

Table 2-10 summarizes the electrical system capability, current consumption, and surplus capability. The available interior building space could easily be doubled based on the available electrical supply, provided the general mix of added facilities is approximately the same in demand profile as the current facilities and appropriate distribution system upgrades are incorporated into the individual project plans.

[2] The relationship between kilowatts (kW), kilowatt-hours (KWh), kilovolt-amperes (kVA), and the power factor (PF) is the following: kVA*PF = kW and kW*(hours of service) = KWh.

Table 2-10 Electrical System Capability Summary

Category	Value	Percent of Nominal Capacity	Percent of Actual Capacity	Headroom from Nominal
Electrical System Capacity				
Total Annual Capacity (MWh)	578,160	NA	100%	NA
Nominal Annual Capacity (MWh)	385,440	100%	66%	NA
Peak Overload Capacity (kW)	66,000	NA	100%	NA
Nominal Peak Capacity (kW)	44,000	100%	66%	NA
Electrical System Consumption				
FY2006 Consumption (MWh)	131,645	34%	23%	253,795
Estimated FY2003 Peak Demand (kW)	29,901	68%	45%	14,099
Estimated FY2004 Peak Demand (kW)	29,843	68%	45%	14,157
Estimated FY2005 Peak Demand (kW)	27,869	63%	42%	16,131

Source: Sheppard AFB 2004a, Sheppard AFB 2006b, and Hagins 2006.

%	percent
AFB	Air Force Base
FY	fiscal year
kW	kilowatt
MWh	megawatt-hour, which is equivalent to 1000 kilowatt-hour, and is the product of the power rating, ampere rating, and voltage rating in megawatts
NA	not applicable

2.3.4 Natural Gas Distribution System

2.3.4.1 Baseline Natural Gas Distribution System Conditions

Atmos Gas supplies natural gas to Sheppard AFB via a 1.25-inch pipeline, which is distributed to the base at approximately 20 pounds per square inch gauge. The contract based guaranteed supply is 5,520 thousand cubic feet per day (Mcf/d) and approximately 400,000 thousand cubic feet (Mcf) annually. The rated capacity of the gas supply line is approximately 10,024 Mcf/d (Hagins 2006). The distribution system at Sheppard AFB includes approximately 42 miles of pipe and 290 valves. Thirty percent of the distribution system is metal pipe, and the remainder is polyethylene piping. Most of the system is looped with only some dead branches, and these will be looped if possible. The goal is to replace all metal pipes with polyethylene piping. About 20 percent of the valves are somewhat defective and are being replaced as manpower and funds become available (Sheppard AFB 2004a).

A summary of gas usage from Air Force Form 3556 for FY2005 is provided below:

- Annual Usage: 400,734 Mcf
- Monthly Average Usage: 33,394 Mcf

- Daily Average Usage: 1,098 Mcf
- High Month (January 2005): 79,870 Mcf
- Low Month (July 2005): 10,433 Mcf
- Average Flow Rate: 45,746 cubic feet per hour
- Estimated Peak Flow Rate: 107,352 cubic feet per hour

2.3.4.2 Limiting Factors on Natural Gas Distribution

It is generally believed that there are no limiting factors to the implementation of the 2030 Plan from the gas distribution system. The current peak consumption is less than 47 percent of the contracted supply and less than 26 percent of the calculated pipeline capacity. The most limiting factor relates to a need to loop the main feed to the 80th Flying Training Wing area as part of any expansion of this complex (Sheppard AFB 2004a). Infrastructure is not a limiting factor for the natural gas system. The contract limitations on the main base natural gas supply are 5,520 Mcf/d and approximately 400,000 Mcf per year (Hagins 2006).

2.3.4.3 Maximum Infrastructure Capability Natural Gas

Table 2-11 summarizes the natural gas system capability, current consumption, and surplus capability.

Table 2-11 Natural Gas System Capability Summary

Category	Value	Percent of Supply	Headroom from Supply
Natural Gas System Supply			
Annual Supply (Mcf)	400,000	100%	NA
Daily Contract Rate Cap (Mcf/d)	5,520	100%	NA
Pipeline Capacity (Mcf/hr)	419.651	NA	NA
Natural Gas System Consumption			
FY2005 Annual (Mcf)	400,734	100.1%	NA
FY2005 Estimated Maximum Daily (Mcf/d)	2,576	47%	2,944
FY2005 Estimated Hourly Peak (Mcf/hr)	107.352	26%	312.299

Source: Sheppard AFB 2004a, Sheppard AFB 2006b, and Hagins 2006.

%	percent
FY	fiscal year
Mcf	thousand cubic feet
Mcf/d	thousand cubic feet per day
Mcf/hr	thousand cubic feet per hour
NA	not applicable

Chapter 3

Flying Mission Capability

CHAPTER 3

FLYING MISSION CAPABILITY

This section assesses Sheppard AFB's flying mission capacity. The assessment will consider two factors: 1) noise levels in the immediate vicinity of the airfield and 2) noise levels in the military training airspace which is used to support mission requirements and the airfield's and the airspace's capacity to support increased operations (which considers Air Traffic Control procedures and requirements).

The assessment addresses two conditions. First, existing operations both from the base and in the training airspace are described. These conditions are then compared with the potential increases in T-6 and T-38 operations to determine whether existing assets can support the increases.

Sheppard AFB provides primary and advanced pilot training. The base is the home of the 80th Flying Training Wing. The unit consists of three Flying Training Squadrons. Basic and advanced flying training is currently conducted in T-37 and T-38 aircraft. In the near future, the T-37 aircraft will be replaced by T-6 aircraft. However, overall operations will remain as under current conditions.

3.1 AVIATION RESOURCES

Airspace resources include the airfield at Sheppard AFB, the area in the vicinity of the airfield, and military training airspace used by the aircrew from Sheppard AFB to accomplish training requirements.

3.1.1 Airfield

The airfield includes runways, taxiways, aircraft parking area, ramps, an Air Traffic Control Tower, and the flight line (including surrounding grassed areas and roads).

The Sheppard AFB complex is joint-use, supporting both Sheppard AFB flying training requirements and functioning as the Wichita Falls Municipal Airport (WFMA), servicing commercial and general aviation traffic (United States Air Force [USAF] 1998).

Controlled airspace (Class D and E) has been established in the region to manage air traffic. Air traffic control at Sheppard AFB is supported by:

- The Sheppard Radar Approach Control (RAPCON) which operates from 0600 to 2100 (15-hour days) Monday through Friday and from 1200 to 1700 (5-hour days) on Sunday.

- The Sheppard Control Tower which operates from 0530 to 2100 (15.5-hour days) Monday through Friday and from 0900 to 1700 (8-hour days) on Saturday and Sunday (Sheppard AFB 2002).

The Sheppard RAPCON manages air traffic in the airspace designated by Fort Worth Air Route Traffic Control Center. The facility provides approach control services to Sheppard AFB/WFMA, Kickapoo Downtown Airport, and Wichita Valley Airport (Sheppard AFB 2002).

There are four runways at Sheppard AFB. Three are parallel and primarily support military operations. The fourth, Runway 17/35, is located west of the three parallel runways and primarily supports civil and general aviation operations at WFMA.

The parallel runways are oriented in a generally southeast to northwest direction. The fourth is oriented north to south. Runway 15L/33R is 6,000 feet long and 150 feet wide. The center runway, 15C/33C, is 10,003 feet long and 150 feet wide. Runway 15R/33L is 13,101 feet long and 300 feet wide. Runway 17/35 is 7,021 feet long and 150 feet wide. Runways 15C/33C and 15R/33L are equipped with arresting gear. Under normal conditions, Runway 15L / 33R primarily supports T-6 operations. T-38s and other military aircraft operate from Runways 15C / 33C and 15R / 33L.

3.1.2 Military Training Airspace

Pilot training is supported by regional Special Use Airspace. There are six Military Operations Areas (MOA) and a Restricted Area that supports air-to-ground training. The Sheppard 1 and Sheppard 2 MOAs are located north and east of the base, respectively. The Westover 1 and Westover 2 MOAs are located south-southwest of the base. The Hollis MOA is located northwest of the base. The Washita MOA is located north of the base. Most of these MOAs are subdivided into smaller areas, which facilitate scheduling. The Restricted Area (R-5601) is situated between the northern border of the Sheppard 1 MOA and the southern border of the Washita MOA (USAF 1998).

3.2 AVIATION RESOURCES CAPACITY

3.2.1 Airfield Capacity

The capacity of an airfield can be described by its throughput rate. Throughput rate is the maximum number of operations that can take place within a given time period. Operations considered include arrivals, departures, and closed patterns.

Many factors determine an airfield's capacity (e.g., number and types of runways, availability of taxiways, availability and capability of landside support facilities to cycle aircraft, and the number and types of aircraft operating at the facility). In order to assess these factors, the FAA has developed several models. These models are used in the civilian sector for airport planning. However, they are also frequently used by the military to determine airfield capacity at installations.

The Air Force has also published long-term runway capacity assessment procedures in Air Force Handbook (AFH) 32-1084, Civil Engineering: Facility Requirements. These procedures are based on data from FAA Advisory Circular (AC) 150/50601A, Airport Capacity Criteria Used in Preparing the National Airspace Plan. In these calculations, aircraft are placed into "types" based on the type aircraft and the number and kind of engines (USAF 1994).

A prime consideration in determining throughput capacity is the amount of time separation required between operations to minimize the potentially adverse effects of wake vortices. Subsequent to the publication of FAA AC 150/50601A, the FAA published FAA AC 150/5060-5 (and associated changes), which rescinded FAA AC 150/50601A. While the considerations in both publications are generally analogous, a prime difference is that aircraft are now placed into "types" based on their gross takeoff weight. The mass properties of the aircraft are now considered a better indicator of wake-vortex effects than simply the number and type of engines.

For this analysis, runway capacity is assessed using guidance in FAA AC 150/5060-5, Airport Capacity and Delay. Two different methods have been employed that evaluate capacity in general and then specific terms. The first is applicable to long-term planning, is somewhat generalized, and considers factors for all elements that can influence airfield capacity. The second is more detailed and specific, and focuses on individual elements that can determine the capacity of Sheppard AFB's runways.

The following assessments focus on the three parallel runways that support military operations. Runway 17/35 is not assessed specifically since it primarily supports civil operations, which are conducted at a relatively low level and are not expected to change. Nevertheless, this runway could be used to support military operations.

Long Term Planning

The assessment for long-term planning considers the mix of aircraft classes and the ratio of aircraft in each class operating from the airfield. It should be noted that T-37B aircraft and T-6 aircraft are categorized in the same class. Aircraft are classified by their maximum takeoff weight and the number of engines. This calculated "mix-index" is then applied to standard nominal values developed for the applicable runway configuration. Output from this assessment provides annual service volume (capacity) per year, and the number of operations per hour that can be conducted under Visual Meteorological Conditions (VMC) and Instrument Meteorological Conditions (IMC). These factors can then be compared with expected demand to assess the "capacity consumed" by a given level of operations.

Table 3-1 summarizes the assessment for annual conditions, and Table 3-2 shows similar data for operations per hour that could be conducted under VMC or IMC conditions on Runway 15L/33R supporting T-6 operations. Tables 3-3 and 3-4 reflect analogous data for Runways 15C/33C and 15R/33L supporting T-38 and other military aircraft operations. The capacity used and remaining is the ratio between the annual service volume/hourly capacity (FAA standard levels) and the annual demand/operations per hour estimated to occur at the airfield. It should be

noted that data in Tables 3-2 and 3-4 reflect a range of values. VMC and IMC would be mixed; neither would exist all of the time. Therefore, capacity would fall between the two values

Table 3-1
Comparison of Annual Capacity and Annual Demand (R/W 15L/33R)

Operations	Annual Service Volume[1]	Annual Demand	Capacity Used/ Remaining
Current[2]	230,000	195,400	85%/15%
Capability Build-up[3]	230,000	273,600	119%/None

Notes:
[1] Source: FAA 1983
[2] USAF 1998
[3] Reflects a 40 percent increase in Sheppard AFB-based military operations determined by noise exposure.
% percent
FAA Federal Aviation Administration
USAF United States Air Force

Table 3-2
Estimated Airfield Capacity under Varying Weather Conditions (R/W 15L/33R)

Operations	Operations per Hour Capacity[1]	Operations per Hour Expected	Capacity Used/ Remaining
VMC Conditions			
Current[2]	98	47	48%/52%
Capability Build-up[3]	98	66	67%/33%
IMC Conditions			
Current[2]	59	47	80%/20%
Capability Build-up[3]	59	66	111%/None

Notes:
[1] Source: FAA 1983
[2] USAF 1998
[3] Reflects a 40 percent increase in Sheppard AFB-based military operations determined by noise exposure.
% percent
FAA Federal Aviation Administration
IMC Instrument Meteorological Conditions
VMC Visual Meteorological Conditions
USAF United States Air Force

Table 3-3
Comparison of Annual Capacity and Annual Demand (R/W 15C/33C and 15R/33L)

Operations	Annual Service Volume[1]	Annual Demand	Capacity Used/ Remaining
Current[2]	300,000	215,100	72%/28%
Capability Build-up[3]	300,000	300,100	100%/None

Notes:
[1] Source: FAA 1983
[2] USAF 1998
[3] Reflects a 40 percent increase in Sheppard AFB-based military operations determined by noise exposure.
% percent
FAA Federal Aviation Administration
USAF United States Air Force

Table 3-4
Estimated Airfield Capacity under Varying Weather Conditions
(R/W 15C/33C and 15R/33L)

Operations	Operations per Hour Capacity[1]	Operations per Hour Expected	Capacity Used/ Remaining
VMC Conditions			
Current[2]	111	52	78%/53%
Capability Build-up[3]	111	72	65%/35%
IMC Conditions			
Current[2]	70	52	74%/26%
Capability Build-up[3]	70	72	103%/None

Notes:
[1] Source: FAA 1983
[2] USAF 1998
[3] Reflects a 40 percent increase in Sheppard AFB-based military operations determined by noise exposure.

%	percent
FAA	Federal Aviation Administration
IMC	Instrument Meteorological Conditions
VMC	Visual Meteorological Conditions
USAF	United States Air Force

As illustrated above, under the broad aspects of long-range planning, a 40 percent increase in operations would saturate the capacity of the runway. However, as previously stated, these assessments use nominal values for the many factors that influence an airfield's capacity. Many of these factors involve landside supporting facilities dealing with the handling and processing of aircraft and deplaning/emplaning of passengers at a civil facility. These considerations are not applicable for Sheppard AFB. Two other considerations are relevant. First, under VMC conditions, adequate capacity exists. Under adverse weather conditions (IMC), it is reasonable to assume that closed pattern operations would be curtailed, or totally cancelled. This would reduce the potential demand during these conditions. Second, Runway 17 / 35 would also be available, if required.

3.2.2 Runway Capacity

The FAA guidance in AC 150/5060-5 provides methodology to specifically model the throughput capacity for the runway. However, more specific data pertaining to specific types of operations and availability of taxiways is used than for the long-range planning addressed above.

Tables 3-5 and 3-6 show the modeled hourly capacity of Sheppard AFB's runway under IMC and VMC. This capacity is then assessed in relation to the estimated demand that would exist after an expansion of operations.

Table 3-5
Estimated Runway Capacity after Capability Build-up (R/W 15L/33R)

Weather Condition	Hourly Capacity[1]	Hourly Demand[2]	Capacity Used/ Remaining
IMC	137	66	48%/52%
VMC	69	66	95%/5%

Notes:
[1] Source: FAA 1983
[2] Reflects a 40 percent increase in Sheppard Air Force Base-based military operations determined by noise exposure.
% percent
FAA Federal Aviation Administration
IMC Instrument Meteorological Conditions
VMC Visual Meteorological Conditions

Table 3-6
Estimated Runway Capacity after Capability Build-up (R/W 15C/33C and 15R/33L)

Weather Condition	Hourly Capacity[1]	Hourly Demand[2]	Capacity Used/ Remaining
IMC	128	72	56%/54%
VMC	65	72	111%/None

Notes:
[1] Source: FAA 1983
[2] Reflects a 40 percent increase in Sheppard Air Force Base-based military operations determined by noise exposure.
% percent
FAA Federal Aviation Administration
IMC Instrument Meteorological Conditions
VMC Visual Meteorological Conditions

As illustrated above, a 40 percent increase in operations would saturate the capacity of Runways 15C / 33C and 15R / 33L under adverse weather conditions (IMC). As previously discussed, two other considerations are relevant. First, under VMC conditions, adequate capacity exists. Under IMC, it is reasonable to assume that closed pattern operations would be curtailed, or totally cancelled. This would reduce the potential demand during these conditions. Second, Runway 17 / 35 would also be available, if required.

Overall, it should be noted that the runway's are only stressed during IMC conditions. Since these weather conditions only exist for brief periods of time, it is reasonable to assume that operations would be reduced during such periods. Sheppard AFB would be expected to be able to accommodate a 40 percent increase in based-aircraft operations.

3.2.3 Military Training Airspace

In 1998, a capacity study for military training operations in the regional military training airspace was conducted. All assessments of military training airspace usage showed significant unused capacity (USAF 1998). Based on current operational activity, availability of military training airspace assets would not be expected to be stressed by either current or expanded operations as described in this analysis.

3.3 ENVIRONMENTAL NOISE

Noise is considered to be unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. The word "metric" is used to describe a standard of measurement. As used in environmental noise analysis, there are many different types of noise metrics. Each has a different physical meaning or interpretation. The values depicted in these metrics incorporate a common factor. The frequency of sound is measured in cycles per second, or hertz (Hz). This measurement reflects the number of times per second the air vibrates from the acoustic energy. Low frequency sounds are heard as rumbles or roars, and high frequency sounds are heard as screeches. Sound measurement is further refined with "A-weighting." The normal human ear can detect sounds that range in frequency from about 20 Hz to 15,000 Hz. However, not all sounds throughout this range are heard equally well. Therefore, through internal electronic circuitry, some sound meters are calibrated to emphasize frequencies in the 1,000 to 4,000 Hz range. The human ear is most sensitive to frequencies in this range, and sounds measured with these instruments are termed A-weighted, and are shown in terms of A-weighted decibels (dBA). The metric associated with this assessment is described below.

Day-Night Average Sound Level

This metric, identified as Day-Night Average Sound Level (L_{dn}), is the most commonly used. Normally, it is used to assess aircraft operations around an airport. It sums the individual noise events and averages the resulting level over a specified length of time. Thus, it is a composite metric representing the maximum noise levels, the duration of the events, the number of events that occur, and the time of day during which they occur. This metric adds 10 decibels (dB) to those events that occur between 10:00 P.M. and 7:00 A.M. to account for the increased intrusiveness of noise events that occur at night when ambient noise levels are normally lower than during the daytime. This cumulative metric does not represent the variations in the sound level heard. Nevertheless, it does provide an excellent measure for comparing environmental noise exposures when there are multiple noise events to be considered.

Public annoyance is the most common concern associated with exposure to elevated noise levels. When subjected to L_{dn} levels of 65 dBA, approximately 12 percent of the persons so exposed will be "highly annoyed" by the noise. At levels below 55 dBA, the percentage of annoyance is significantly lower (less than three percent), and at levels above 70 dBA, it is significantly higher (greater than 25 percent) (Finegold et al 1994).

L_{dn} metrics are the preferred noise metrics of the Department of Housing and Urban Development, the Department of Transportation, the Federal Aviation Administration (FAA), the United States Environmental Protection Agency (USEPA), and the United States Department of Veterans Affairs. While L_{dn} does provide a single measure of overall noise impact, it is fully recognized that it does not provide specific information on the number of noise events or the specific individual sound levels that do occur. For example, an L_{dn} of 65 dB could result from a very few noisy events, or a large number of quieter events. Although it does not represent the sound level heard at any one particular time, it does

represent the total sound exposure. Scientific studies and social surveys have found the L_{dn} to be the best measure to assess levels of community annoyance associated with all types of environmental noise. Therefore, its use is endorsed by the scientific community and governmental agencies (American National Standards Institute [ANSI] 1980 and 1988; USEPA 1974; Federal Interagency Committee on Urban Noise 1980; Federal Interagency Committee on Noise 1992).

It should be noted that ambient background noise is not considered in the aircraft noise calculations that are presented below. There are two reasons for this. First, ambient background noise, even in wilderness areas, varies widely, depending on location and other conditions. For example, studies conducted in an open pine forest in the Sierra National Forest in California have measured up to a 10 dBA variance in sound levels simply due to an increase in wind velocity (Harrison 1973). Therefore, assigning a value to background noise would be arbitrary. Secondly, and probably most important, is that it is reasonable to assume that ambient background noise in the project's radius of influence would have little or no effect on the calculated L_{dn}. In calculating noise levels, louder sounds dominate the calculations, and overall, aircraft noise would be expected to be the dominant noise source characterizing the acoustic conditions in the region.

Using measured sound levels as a basis, the Air Force developed several computer programs to calculate noise levels resulting from aircraft operations. Sound levels calculated by these programs have been extensively validated against measured data, and have been proven highly accurate.

3.3.1 Airfield Noise

The following terms are defined to provide a better understanding of how data are developed for input to the noise models used to calculate noise. Around an airfield, aircraft operations are categorized as takeoffs, landings, or closed patterns (which could include activities referred to as touch-and-gos or low approaches). Each takeoff or landing constitutes one operation. A closed pattern occurs when the pilot of the aircraft approaches the runway as though planning to land, but then applies power to the aircraft and continues to fly as though taking off again. The pilot then flies a circular or rectangular track around the airfield, and again approaches for landing. In some cases, the pilot may actually land on the runway before applying power, or in other cases, the pilot simply approaches very close to the ground. In either event, since a closed pattern operation essentially consists of a landing and a takeoff, it is considered two operations.

During 2004, Sheppard AFB supported approximately 410,500 military aviation operations (USAF 1998). This equates to approximately 1,579 daily operations. Considering all types of flight activities, a scenario representing an "average busy day's" operations was developed. The operations considered include arrivals (landings), departures (takeoffs), and closed patterns. Noise calculations consider the frequency of flight operations, runway utilization, and the flight tracks and flight profiles flown by each aircraft.

These levels and types of activity are then combined with information on climatology, maintenance activities, and aircraft flight parameters, and processed through the Air Force's BASEOPS/NOISEMAP (Moulton 1990) computer models to calculate L_{dn}. Once noise levels are calculated, they are plotted on a background map in 5-dB increments from 65 dBA to 85 dBA, as applicable. Baseline contours resulting from the aircraft conversion (T-37 to T-6) are shown in Figure 3-1. Contours associated with the capability build-up are shown in Figure 3-2, and the 65 dBA L_{dn} contours for the two conditions are compared in Figure 3-3. The land areas (in acres) encompassed by each contour for the conversion and the expanded-operations condition are shown in Table 3-7.

Table 3-7
Land Areas Exposed to Elevated Noise Levels (Baseline Conditions)

Noise Level (L_{dn})	Current Acres (T-38 and T-6)	Capability Acres[1]	Area Change	Percent Change
65 – 70	5,575.3	6,170.2	+ 594.9	+ 10.7
70 – 75	3,076.9	3,685.2	+ 608.3	+ 19.8
75 – 80	1,848.6	2,206.4	+ 357.8	+ 19.4
80 – 85	1,035.4	1,135.5	+ 100.1	+ 9.7
> 85	1,056.8	1,339.7	+ 282.9	+ 26.8
Total	**12,593**	**14,537**	**+ 1,944**	**+ 15.4**

Source: Wasmer and Maunsell 2002

Notes:
[1] Reflects a 50 percent increase in based-aircraft operations as described below.
L_{dn} Day-Night Average Sound Level

Total land area exposed to elevated noise levels would increase from 12,593 acres under baseline conditions to 14,537 acres with expanded operations. This is an increase of 1,944 acres; a 15.4 percent increase.

In order to further assess noise exposure from aviation activity, several locations around the base were selected for specific analysis. These points represent land uses that could be potentially sensitive to elevated noise levels.

The points represent:

- BKES – Sheppard-Burkburnett School
- CGLN – Residential Area
- CLRK – On-base Area
- CTCB – Shasta Baptist Church
- HRHS – Residential Area
- SPSC – Hanes School
- WRFH – On-base Area

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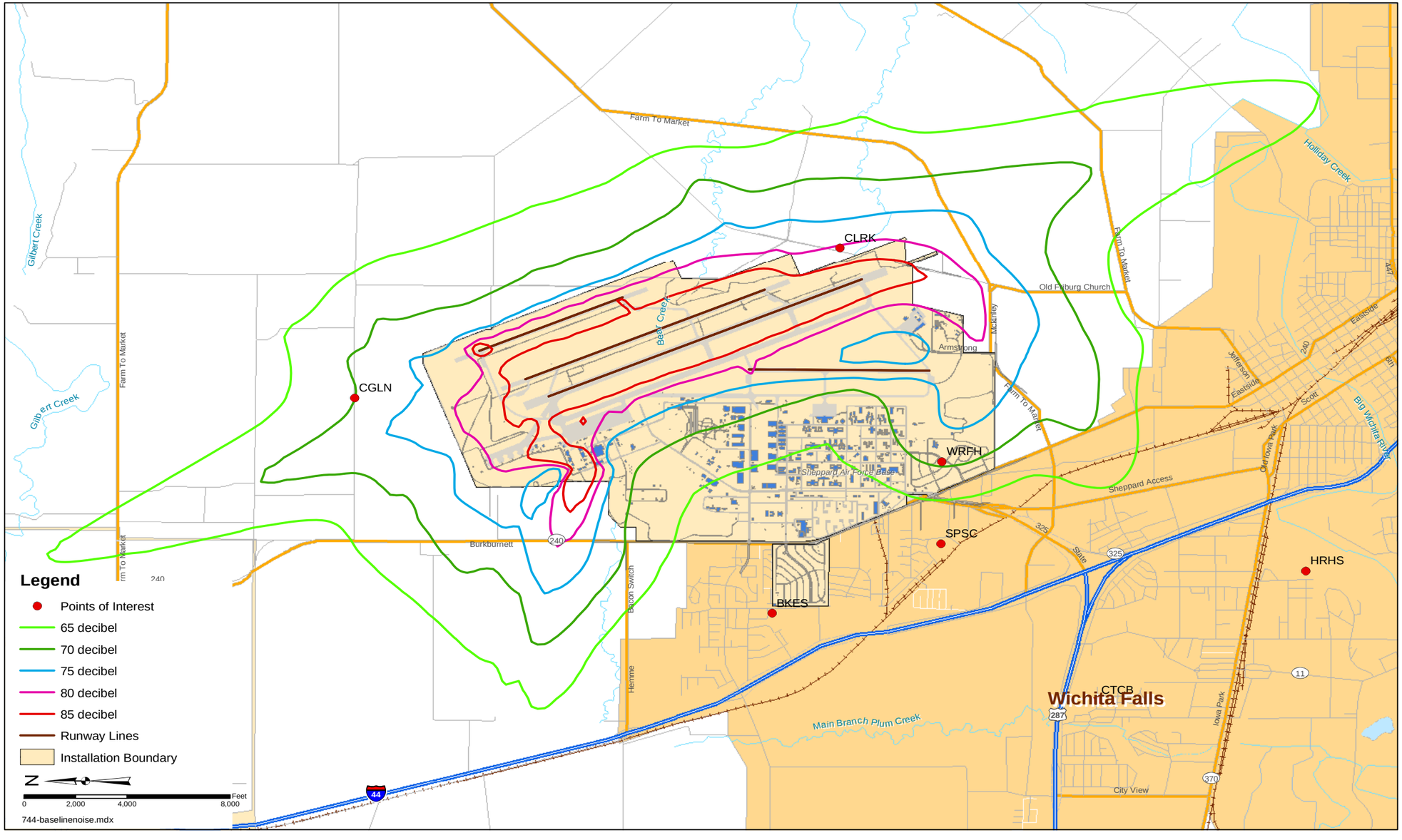

Figure 3-1 Baseline Noise Contours

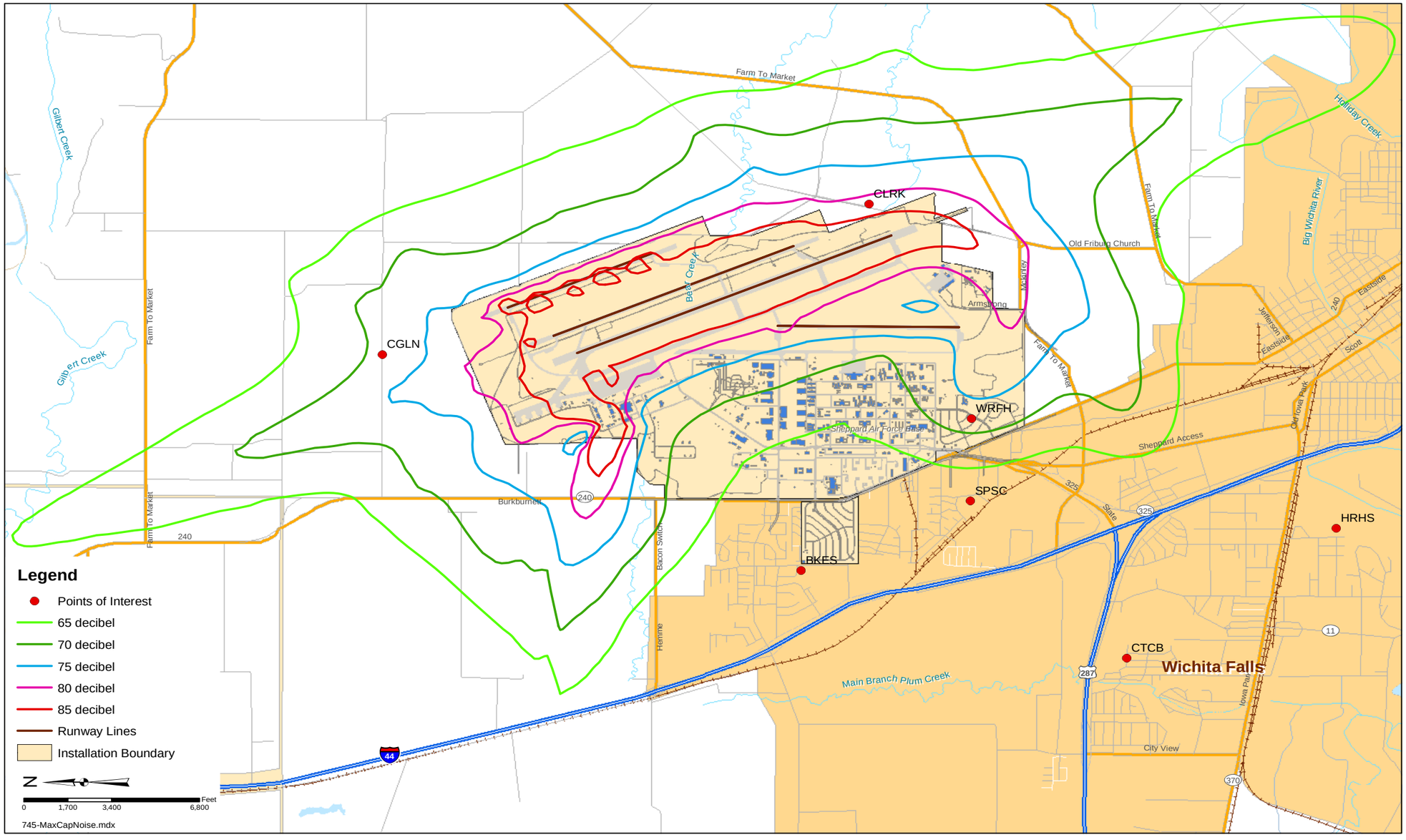

Figure 3-2 Noise Contours after Capability Build-up

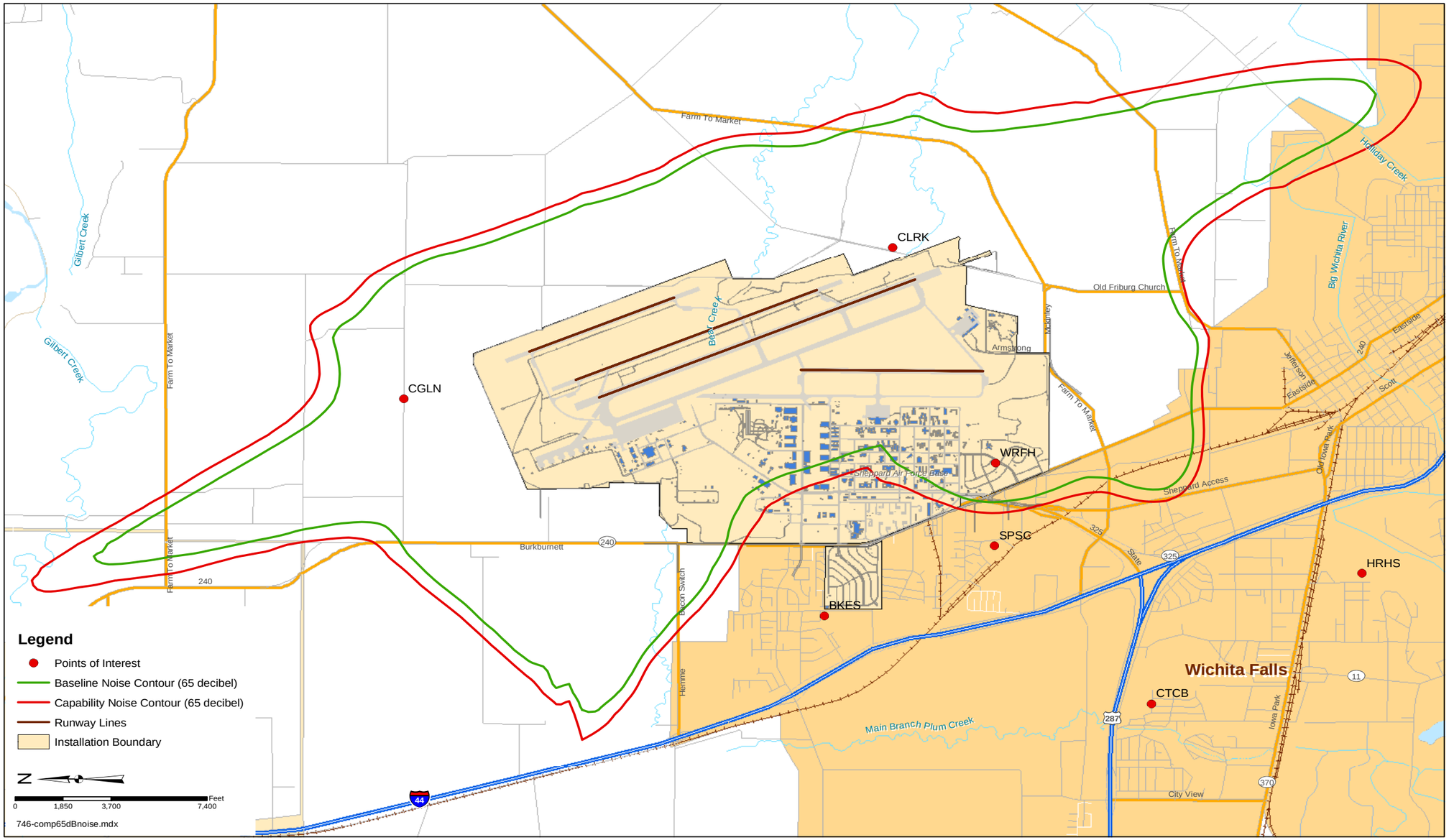

Figure 3-3 Comparison of Baseline Noise Contour (Green) with Capability Noise Contour (Red)

In order to assess the potential for the expansion of operations at Sheppard AFB, T-38 and T-6 flight operations were incrementally increased, and the changed noise levels were evaluated at the seven specific points. Two criteria were applied: These criteria reflect land use guidance provided in 14 Code of Federal Regulations Part 150, Subpart B, § 150.21:

- Capacity would be reached when a previously compatible land use became incompatible.
- Capacity would be reached when noise levels at any one currently-incompatible point increased by more than 1.5 dB.

The second criterion was met at a 40 percent increased level of T-38 and T-6 operations. This increase equates to performing approximately 574,260 annual, or 2,209 daily operations at the installation; an approximate 40 percent increase in total operations over current conditions.

Noise exposure at the seven specific points is shown in Table 3-8 and is assessed relative to the criteria described above. The location of the points is depicted in Figures 3-1 through 3-3.

Table 3-8
Specific Point Noise Levels under Expanded Operations

Point	Baseline L_{dn}	Build-up L_{dn}	Remarks
Sheppard-Burkburnett School (BKES)	54.9	56.4	
Residential Area (CGLN)	69.9	71.4	
On-base Area (CLRK)	80.5	81.6	Residential Area Increase 1.5 dB
Shasta Baptist Church (CTCB)	53.0	54.4	
Residential Area (HRHS)	50.1	51.4	
Hanes School (SPSC)	59.8	61.3	
On-base Area (WRFH)	70.7	72.2	

Source: NOISEMAP (Moulton 1990)

dB decibel
L_{dn} Day-Night Average Sound Level

As shown, at this level of operations, a residential land use that is currently incompatible is further exacerbated by an increase of 1.5 dB.

3.3.2 Military Training Airspace Noise

Noise levels in the military training airspace are not expected to change significantly from current conditions based on either the aircraft conversion (T-37s to T-6s) or the subsequent possible increase in operations.

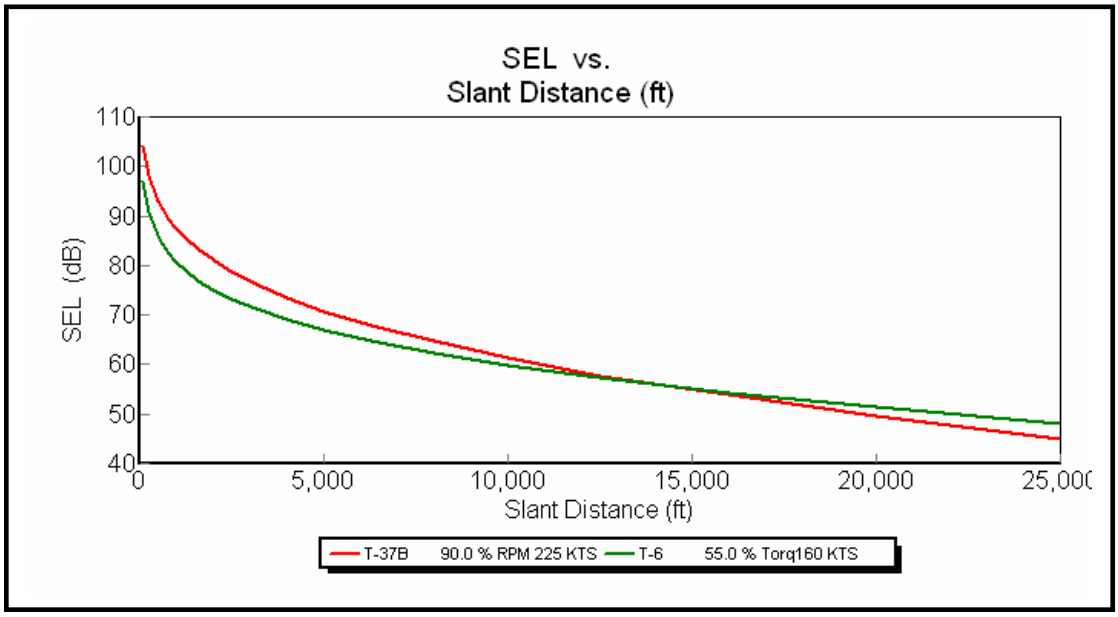

Figure 3-4 Sound Exposure Level Comparison

As illustrated in Figure 3-4, noise created by T-6 aircraft is very similar to noise created by T-37 aircraft using power settings applicable to use of military training airspace.

A further consideration involves the potential 40 percent expansion of operations conducted by Sheppard AFB-based military aircraft. This may be assessed by considering any given noise level, and calculating the impact of a 40 percent increase in operations.

Since noise levels are expressed in logarithmic terms, they cannot be directly calculated arithmetically. They must first be converted to units of energy. This is done by raising 10 to the power of the noise level divided by 10. For example, if a noise level of 50 L_{dn} is considered, the conversion would be solved by $10^{50/10}$, or 10^{5} resulting in 100,000. Then a 40 percent increase may be calculated by 100,000 X 1.4, or 140,000. Finally, the process is reversed by taking 10 times the logarithm of the energy (in this case 140,000). This yields a noise level of 51.5 L_{dn}, or an increase of 1.5 dB. This change would hardly be noticeable.

3.4 SUMMARY AND CONCLUSIONS

This assessment considered the physical capability of the aviation facilities at Sheppard AFB to handle increased operations, and the increases in noise exposure that would result from those potential increases. The prime limiting factor was noise exposure, indicating a maximum desirable capacity increase of 40 percent in based-aircraft operations. Considering this increase, assessments showed that the physical capability of Sheppard AFB is sufficient to handle this increase. Furthermore, noise exposure increases under the military training airspace at this increased level of operations would not create an adverse impact.

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Chapter 4

List of Preparers

CHAPTER 4

LIST OF PREPARERS

Name/ Organization	Degree	Professional Discipline	Years of Experience
Kent R. Wells Science Applications International Corporation (SAIC)	B.S., Geology M.S., Industrial Hygiene	Environmental Scientist	20
Benjamin Elliott, P.E. SAIC	B.A. Physical Sciences, B.S. Civil Engineering, M.S.E. Petroleum and Geosystems Engineering,	Civil Engineer	10
Lesley Pedde, P.E. SAIC	B.S., Professional Chemistry B.S.C.E., Civil Engineering with an Environmental Option	Environmental Engineer	30
Bill Wuest SAIC	M.P.A., Political Science B.S., Political Science	Noise Specialist	33
Alysia Baumann SAIC	B.S. Chemical Engineering	Chemical Engineer/NEPA Specialist	2
Brandi Mulkey, E.I.T SAIC	B.S., Environmental Engineering	Environmental Engineer	7
Victoria Wark SAIC	B.S., Biology	Biologist	18
Carol Johnson SAIC	B.S., Education	Senior Technical Editor	9
Lisa P. Barron SAIC	A.A., Secretarial Science	Administrative Assistant (Electronic Publishing Specialist)	10

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Appendix A

Land Use Factors and Calculations

APPENDIX A

LAND USE FACTORS AND CALCULATIONS

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Land Use Density Formula, Tables, and Calculations

Information on the existing land use categories on Sheppard Air Force Base (AFB) was provided by representatives from 82nd Civil Engineering Squadron. The additional information required to define the existing and future land use plans for Sheppard AFB was extracted from the *General Plan* and incorporated into this effort (Sheppard AFB 2004a).

For non-flying missions where open space was available, potential development areas were identified and evaluated using a Geographic Information System overlay analysis. Table A-1 identifies potentially developable parcels for Sheppard AFB. Each parcel was evaluated to determine if the area was available or appropriate for development. Areas possessing physical or operational constraints were eliminated from further consideration in the evaluation. The *General Plan* was used to define future land use and development constraints along with input from representatives of the 82nd Civil Engineering Squadron (Sheppard AFB 2004a). Parcels were also identified as developable if a demolition project was scheduled to occur within the planning period and if any buildings reached 50 years or older during the planning period (through 2013).

In order to determine utility consumption estimates for evaluating constraints, population and interior building space were calculated by applying previously developed land use density factors to the identified developable parcels. The parcel density factor for impervious cover (Table A-2) and the authorized number of floors established by local development practices were used along with authorized per capita space (Table A-3) established in Air Force Handbook (AFH) 32-1084 (United States Air Force [USAF] 1994) to determine the capability of the parcel to manage additional facilities and population. Based on the authorized number of floors established for the base, an increased building density factor was applied to increase the total height of the buildings, and therefore, increase the interior building capacity of the base. Table A-4 provides the current interior building space by land use for the base.

Table A-5 presents the data used in the calculations presented below. The following equations are used to calculate the estimated additional population, increased interior building space, and future pavements for developable parcels available:

Population Equation:

$$P = \frac{FB_I}{d}$$

Where:

P = Increase in Population

FB_I = Future Building Interior Area (square feet)

d = Density of occupancy in square foot per person (square feet/person) - (factors obtained from AFH 32-1084)

Future Building Interior Area Equation:

$$FB_I = A \times I_f \times B_I \times 43560$$

Where:

FB_I = Future building interior area (square feet)

A = Parcel size (acres)

I_f = Future intensity factor

B_I = Interior building space factor

Interior Building Factor Equation:

$$B_I = \frac{B_{Is}}{T_A}$$

Where:

B_I = Interior building space factor

B_{Is} = Existing building interior (acres)

T_A = Total existing area - by land use (acres)

Future Building Area Footprint Equation:

$$F_{BF} = \frac{FB_I}{s \times I_f}$$

Where:

F_{BF} = Future building footprint (square feet)

FB_I = Future building interior space (square feet)

s = Building floors

I_f = Future intensity factor

Future Impervious Capacity Equation:

$$F_{IP} = A \times I_c \times 43560$$

Where:

F_{IP} = Future impervious capacity (square feet)

A = Parcel size (acres)

I_c = Impervious cover factor (defined by local practices)

Future Pavements Equation:

$$F_P = \frac{\left(F_{IP} - F_{BF}\right)}{\frac{43560}{\sum FB_I}} \times \left(\sum FB_I - D\right)$$

Where:

F_P = Future pavements (acres)

F_{IP} = Future impervious capacity (square feet)

F_{BF} = Future building footprint (square feet)

FB_I = Future building interior area (square feet)

D = Sum of total associated demolition (square feet)

Table A-1
Potentially Developable Parcels

Parcel Number	Rationale for Development	Constraint	Developable	Acres
1	Building older than 50 years	--	Yes	2.63
2	Open area	--	Yes	1.10
3	Open area	--	Yes	1.05
4	Open area	Flood Zone	No	2.53
5	Open area	Project Location - Less than 1 acre	Yes	0.75
6	Short-term	--	Yes	2.00
7	Short-term	--	Yes	5.19
8	Short-term	Flood Zone	No	0.62
9	Building older than 50 years	--	Yes	1.15
10	Open area	Project Location - Flood Zone	Yes	1.41
11	Open area	Flood Zone, Less than 1 acre	No	0.58
12	Open area	Project Location - Flood Zone	Yes	3.51
13	Short-term	--	Yes	1.10
14	Short-term	--	Yes	4.36
15	Open area	Project Location - Less than 1 acre	Yes	0.76
16	Open area	Flood Zone	No	5.14
17	Open area	Flood Zone	No	9.16
18	Open area	--	Yes	2.53
19	Open area	--	Yes	1.28
20	Open area	--	Yes	5.88
21	Open area	--	Yes	4.93
22	Open area	--	Yes	7.06
23	Building older than 50 years	--	Yes	3.31
24	Building older than 50 years	--	Yes	8.10
25	Open area	--	Yes	2.71
26	Open area	--	Yes	10.37
27	Open area	--	Yes	1.40
28	Open area	--	Yes	4.81
29	Open area	--	Yes	7.31
30	Building older than 50 years	--	Yes	5.77
31	Open area	--	Yes	1.59
32	Open area	--	Yes	6.54
33	Open area	Less than 1 acre	No	0.54

Note:
Each parcel number corresponds to a parcel identified on Figure 2-3.

Table A-1
Potentially Developable Parcels (cont.)

Parcel Number	Rationale for Development	Constraint	Developable	Acres
34	Open area	--	Yes	1.01
35	Open area	--	Yes	2.30
36	Open area	--	Yes	3.20
37	Building older than 50 years	--	Yes	25.97
38	Building older than 50 years	--	Yes	6.56
39	Open area	Less than 1 acre	No	0.89
40	Building older than 50 years	--	Yes	2.38
41	Open area	ERP Site	No	1.51
42	Open area	--	Yes	18.37
43	Open area	Less than 1 acre	No	0.85
44	Open area	--	Yes	2.73
45	Short-term	--	Yes	6.65
46	Short-term	--	Yes	4.01
47	Short-term	--	Yes	1.21
48	Open area	--	Yes	1.44
49	Building older than 50 years	--	Yes	1.66
50	Open area	Less than 1 acre	No	0.54
51	Building older than 50 years	--	Yes	8.03
52	Short-term	--	Yes	4.63
53	Short-term	--	Yes	2.55
54	Open area	--	Yes	1.97
55	Short-term	--	Yes	14.70
56	Short-term	--	Yes	12.82
57	Open area	--	Yes	3.13
58	Open area	--	Yes	8.28
59	Short-term	--	Yes	9.23
60	Short-term	--	Yes	5.96
61	Open area	--	Yes	5.89
62	Building older than 50 years	--	Yes	2.93
63	Open area	--	Yes	1.43
64	Open area	--	Yes	1.81
65	Building older than 50 years	--	Yes	4.61
66	Open area	Less than 1 acre	No	0.92

Note:
Each parcel number corresponds to a parcel identified on Figure 2-3.

Table A-1
Potentially Developable Parcels (cont.)

Parcel Number	Rationale for Development	Constraint	Developable	Acres
67	Open area	--	Yes	1.22
68	Open area	Less than 1 acre	No	0.82
69	Open area	--	Yes	1.06
70	Open area	--	Yes	3.07
71	Open area	--	Yes	11.83
72	Building older than 50 years	--	Yes	4.01
73	Open area	--	Yes	3.77
74	Open area	--	Yes	2.27
75	Short-term	--	Yes	6.38
76	Open area	--	Yes	2.80
77	Open area	--	Yes	1.50
78	Short-term	--	Yes	5.27
79	Building older than 50 years	--	Yes	2.59
80	Short-term	--	Yes	6.17
81	Short-term	--	Yes	3.66
82	Open area	Less than 1 acre	No	0.64
83	Open area	--	Yes	2.14
84	Building older than 50 years	--	Yes	1.73
85	Open area	--	Yes	1.27
86	Building older than 50 years	--	Yes	2.15
87	Open area	--	Yes	1.53
88	Open area	--	Yes	2.46
89	Open area	--	Yes	2.43
90	Open area	--	Yes	1.24
91	Open area	--	Yes	3.17
92	Short-term	--	Yes	1.84
93	Open area	--	Yes	6.86
94	Open area	Less than 1 acre	No	0.92
95	Open area	Flood Zone and Munitions Quantity Distance Arcs	No	133.04
96	Open area	--	Yes	10.29
97	Short-term	Less than 1 acre	No	0.40
98	Open area	--	Yes	2.08
99	Short-term	Less than 1 acre	No	0.98

Note:
Each parcel number corresponds to a parcel identified on Figure 2-3.

Table A-1
Potentially Developable Parcels (cont.)

Parcel Number	Rationale for Development	Constraint	Developable	Acres
100	Open area	Flood Zone	No	2.04
101	Open area	Flood Zone, Less than 1 acre	No	0.59
102	Open area	Flood Zone	No	3.09
103	Open area	--	Yes	2.97
104	Open area	Less than 1 acre	No	0.96
105	Open area	--	Yes	1.77
106	Open area	Flood Zone	No	3.37
107	Open area	Flood Zone	No	1.77
108	Open area	Less than 1 acre	No	0.82
109	Open area	Flood Zone	No	1.50
110	Open area	--	Yes	2.16
111	Open area	Less than 1 acre	No	0.77
112	Open area	--	Yes	1.91
113	Open area	--	Yes	6.37
114	Open area	--	Yes	3.29
115	Open area	Less than 1 acre	No	0.24
116	Open area	Less than 1 acre	No	0.60
117	Open area	Less than 1 acre	No	0.72
118	Building older than 50 years	--	Yes	6.95
119	Open area	--	Yes	6.78
120	Building older than 50 years	--	Yes	1.87
121	Open area	--	Yes	4.22
122	Building older than 50 years	--	Yes	2.95
123	Open area	--	Yes	2.11
124	Open area	ERP Site, less than 1 acre	No	0.92
125	Short-term	--	Yes	1.55
126	Building older than 50 years	--	Yes	3.11
127	Building older than 50 years	--	Yes	4.34
128	Building older than 50 years	--	Yes	2.65
129	Open area	--	Yes	2.13
130	Open area	--	Yes	3.39

Note:
Each parcel number corresponds to a parcel identified on Figure 2-3.

Table A-1
Potentially Developable Parcels (cont.)

Parcel Number	Rationale for Development	Constraint	Developable	Acres
131	Open area	Munitions Quantity Distance Arcs	No	7.81
132	Open area	Munitions Quantity Distance Arcs	No	32.56
133	Open area	Flood Zone	No	42.56
134	Open area	--	Yes	4.64
135	Open area	Flood Zone and Munitions Quantity Distance Arcs	No	40.65
136	Open area	Flood Zone	No	7.14
137	Open area	Training Area	No	37.60
138	Open area	Munitions Quantity Distance Arcs	No	37.67
139	Open area	--	Yes	2.12
140	Open area	--	Yes	1.55
141	Open area	--	Yes	2.00
142	Open area	--	Yes	2.89
143	Short-term	--	Yes	1.58
144	Open Space	--	Yes	17.10
145	Open Space	Flood Zone	No	17.55
146	Open Space	--	Yes	15.23
147	Mid-term	--	Yes	2.65
148	Mid-term	--	Yes	7.54
149	Mid-term	--	Yes	9.45
150	Mid-term	--	Yes	11.33
151	Mid-term	--	Yes	0.88
152	Mid-term	--	Yes	2.32
153	Mid-term	--	Yes	0.59

Note:
Each parcel number corresponds to a parcel identified on Figure 2-3.

Table A-2
Land Use Capability Facility Density Factors

Land Use Type	Percent Impervious Cover[1] "I_c"
Airfield Operation and Maintenance	37%
Administrative	69%
Airfield	1%
Airfield Pavements	100%
Community Commercial	58%
Community Service	46%
Housing Accompanied	38%
Housing Unaccompanied	52%
Industrial	9%
Medical	57%
Open Space	7%
Outdoor Recreation	7%
Training - Indoor	32%

[1]Land use density factors verified against the *General Plan* (Sheppard AFB 2004a).
I_c = density of parcel coverage by facility footprint and parking

% percent
AFB Air Force Base

Table A-3
Space Authorizations by Land Use

Land Use	Authorized Space[1] (square feet/person) "d"
Airfield Operation and Maintenance	500
Administrative	180
Airfield[2]	NA
Airfield Pavements[2]	NA
Community - Commercial	1,000
Community - Services	500
Housing - Accompanied	450
Housing – Unaccompanied – Student Dormitories	236
Housing – Unaccompanied – Permanent Party Dormitories	145
Industrial	750
Medical	500
Open Space[2]	NA
Outdoor Recreation[2]	NA
Training - Indoor	100

[1]Data obtained from AFH-1084 (USAF 1994).

[2]No personnel would be assigned to these land uses.

d = density of occupancy

AFH Air Force Handbook
NA not applicable
USAF United States Air Force

Table A-4
Current Interior Building Space by Land Use

Land Type	Building Interior (square feet)	Building Interior B_{Is} (acres)
Airfield Operation and Maintenance	456,426	10.5
Administrative	807,547	18.5
Airfield	78,162	1.8
Airfield Pavements	NA	NA
Community Commercial	466,365	10.7
Community Service	123,505	2.8
Housing Accompanied	2,234,447	51.3
Housing Unaccompanied	2,339,031	53.7
Industrial	384,351	8.8
Medical	400,915	9.2
Open Space	263,707	6.1
Outdoor Recreation	74,377	1.7
Training - Indoor	2,177,738	50.0
Total	**9,806,571**	**225**

NA not applicable

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Table A-5
Design Factors and Calculations

Land Type	Developable (acres)	Impervious Cover (percent)	Available Land Use (acres)	Authorized Space (square feet/person)	Current Building Floors (stories)	Future Intensity Factor	Existing Building Interior (square feet)	Existing Building Interior (acres)	Interior Building Space Factor	Future Building Interior (acres)	Future Building Interior (square feet)	Future Building Footprint (square feet)	Future Impervious Capacity (square feet)	Future Impervious Capacity (acres)	Future Pavements (square feet)	Future Pavements (acres)	Number of People (people)
Variable	A	I_c		d	s	I_f	B_{Is}		B_I		FB_I	F_{BF}	F_{IP}		F_P		P
Airfield Operation and Maintenance	9.2	37%	3.39	500	1.2	1.7	456,426	10.5	0.0733	1.146	49,920	24,470.39	147,461	3.39	49,666	1.14	100
Administrative	23.00	69%	15.94	180	3.0	2.0	807,547	18.5	0.2611	12.011	523,199	87,199.89	694,513	15.94	245,953	5.65	2,907
Airfield	0.00	1%	0.00	NA	1	1	78,162	1.8	0.0000	0.000	0	0.00	0	0.00	0	0.00	NA
Airfield Pavements	0.00	100%	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00	NA	NA	NA
Community Commercial	25.50	58%	14.87	1000	2.0	2.0	466,365	10.7	0.1275	6.500	283,150	70,787.58	647,791	14.87	239,608	5.50	283
Community Service	27.70	46%	12.70	500	1.0	2.0	123,505	2.8	0.0945	5.236	228,073	114,036.72	553,252	12.70	182,390	4.19	456
Housing Accompanied	19.70	38%	7.51	450	1.0	1.0	2,234,447	51.3	0.1676	3.302	143,852	143,851.62	327,029.65	7.51	76,067	1.75	320
Housing Unaccompanied	152.60	52%	79.22	236	3.0	2.0	2,339,031	53.7	0.3399	103.723	4,518,179	753,029.88	3,450,757	79.22	1,120,265	25.72	19,145
Industrial	16.70	9%	1.46	750	1.1	1.8	384,351	8.8	0.0428	1.288	56,085	28,325.96	63,444	1.46	14,583	0.33	75
Medical	12.30	57%	7.04	500	3.0	2.0	400,915	9.2	0.3540	8.708	379,327	63,221.20	306,590	7.04	101,062	2.32	759
Open Space	70.80	7%	4.89	NA	1.0	1.0	263,707	6.1	0.0186	1.319	57,448	57,447.59	213,050	4.89	63,017	1.45	NA
Outdoor Recreation	26.90	7%	1.86	NA	1.0	1.0	74,377	1.7	0.0051	0.137	5,972	5,972.36	81,179	1.86	31,231	0.72	NA
Training - Indoor	116.40	32%	37.69	100	2.0	2.0	2,177,738	50.0	0.0940	21.877	952,965	476,482.52	1,641,702	37.69	471,894	10.83	9,530
Total	500.8		186.56				9,806,571	225			7,198,171					58.42	33,573

Note:
Approximately 4,291,425 square feet of demolition must occur prior to construction. Therefore, the new added building space is approximately 2,906,746 square feet.
Based on the land use analysis, approximately 33,573 personnel could be supported by new construction with the decrease of 6,588 personnel displaced by demolition for a net population increase of 26,985 personnel.

NA not applicable

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Appendix B

Utility Summary Data

APPENDIX B

UTILITY SUMMARY DATA

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Table B-1
Fiscal Year 2005 Estimated Monthly Utility Data

Electrical

	Actual KW	ENJJPT (MWh)	Hospital (MWh)	Military Family Housing (MWh)	Main Base (MWh)	Total (MWh)
October	22,760	1,156.944	1,203.860	1,769.841	6,568.262	10,698.907
November	22,934	1,252.419	1,216.354	1,613.806	6,076.305	10,158.884
December	16,547	746.376	964.803	1,769.841	4,912.032	8,393.052
January	16,315	1,044.975	681.535	1,073.305	5,541.113	8,340.928
February	16,257	1,108.484	737.788	1,163.128	5,442.932	8,452.332
March	15,851	896.262	453.711	957.263	7,019.390	9,326.626
April	21,366	1,283.142	727.016	861.984	6,130.810	9,002.952
May	25,849	945.222	820.035	1,131.721	9,000.201	11,897.179
June	27,579	1,153.437	813.080	1,885.636	9,011.972	12,864.125
July	27,753	1,216.991	886.077	2,260.012	9,578.974	13,942.054
August	27,869	1,355.014	888.047	2,333.571	10,437.528	15,014.160
September	27,114	1,329.190	967.674	2,269.685	8,987.483	13,554.032
Total	**27,869**	**13,488.456**	**10,359.980**	**19,089.793**	**88,707.002**	**131,645.231**

ENJJPT Euro-NATO Joint Jet Pilot Training
KW kilowatt
MWh megawatt -hour

Table B-1 (cont.)
Fiscal Year 2005 Estimated Monthly Utility Data

Natural Gas

	ENJJPT	Hospital (Mcf)	Military Family Housing (Mcf)	Main Base (Mcf)	Total (Mcf)
October	471.076	3,487.245	6,331.140	7,160.539	17,450
November	2,282.538	2,997.668	9,343.780	30,989.014	45,613
December	5,793.222	3,699.580	6,959.800	56,305.398	72,758
January	7,751.410	2,108.618	9,988.800	60,021.172	79,870
February	4,774.765	1,942.687	5,873.740	46,557.808	59,149
March	4,789.983	1,427.990	5,669.640	34,739.387	46,627
April	2,944.785	1,103.471	3,813.840	12,554.904	20,417
May	1,339.554	1,068.597	2,530.340	11,560.509	16,499
June	492.366	851.093	884.540	8,432.001	10,660
July	877.191	755.845	2,427.540	6,372.191	10,433
August	771.825	712.120	1,970.540	7,170.515	10,625
September	1,069.786	838.219	2,254.751	6,470.244	10,633
Total	**33,358.501**	**20,993.133**	**58,048.451**	**288,333.68**	**400,734**

ENJJPT Euro-NATO Joint Jet Pilot Training
Mcf thousand cubic feet

Table B-1 (cont.)
Fiscal Year 2005 Estimated Monthly Utility Data

Water

	ENJJPT	Hospital (kgal)	Military Family Housing (kgal)	Main Base (kgal)	Total (kgal)
October	2,036.660	1,625.750	8,779.668	21,930.766	34,372.844
November	2,036.660	1,570.320	9,215.468	20,368.556	33,191.004
December	2,036.660	1,457.660	8,998.668	15,330.368	27,823.356
January	2,036.660	813.870	9,711.268	14,096.922	26,658.720
February	2,036.660	1,071.190	7,865.583	15,625.447	26,598.880
March	2,036.660	1,226.410	7,664.536	16,750.638	27,678.244
April	2,036.660	948.590	9,911.324	20,691.618	33,588.192
May	2,036.660	981.290	9,913.044	31,994.634	44,925.628
June	2,036.660	1,637.100	15,806.384	25,742.440	45,222.584
July	2,036.660	1,432.550	10,545.764	42,442.570	56,457.544
August	2,036.660	1,647.700	14,732.508	33,072.460	51,489.328
September	2,036.660	2,087.900	11,927.604	28,076.096	44,128.260
Total	**24,439.920**	**16,500.330**	**125,071.819**	**286,122.515**	**452,134.584**

ENJJPT Euro-NATO Joint Jet Pilot Training
kgal thousand gallons

Table B-1 (cont.)
Fiscal Year 2005 Estimated Monthly Utility Data

Sewer

	ENJJPT	Hospital (kgal)	Military Family Housing (kgal)	Main Base (kgal)	Total (kgal)
October	1,425.662	1,138.025	6,145.768	19,254.525	27,963.980
November	1,425.662	1,099.224	6,450.828	24,261.666	33,237.380
December	1,425.662	1,020.362	6,299.068	11,388.076	20,133.168
January	1,429.456	569.709	6,797.888	10,431.035	19,228.088
February	1,425.662	749.833	5,467.128	12,448.657	20,091.280
March	1,425.662	858.487	5,365.175	11,126.972	18,776.296
April	1,425.662	664.013	6,937.927	8,260.174	17,287.776
May	1,425.662	686.903	6,939.131	9,313.200	18,364.896
June	1,425.662	1,145.970	11,064.469	10,753.935	24,390.036
July	1,425.662	1,002.785	7,382.035	12,557.710	22,368.192
August	1,425.662	1,153.390	10,312.756	16,286.924	29,178.732
September	1,425.662	1,461.530	8,349.323	15,315.989	26,552.504
Total	17,111.738	11,550.231	87,511.496	161,398.863	277,572.328

ENJJPT Euro-NATO Joint Jet Pilot Training
kgal thousand gallons

Appendix C

Socioeconomics Impact Calculations

APPENDIX C

SOCIOECONOMICS IMPACT CALCULATIONS

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Socioeconomics Population Impacts Calculations

BASELINE

	Living on Base	Living off Base	Total
Military Personnel	1,687	1,861	3,548
Student Personnel	4,242	1,724	5,966
Military Dependents	3,618	2,703	6,321
Civilian Personnel	0	3,963	3,963
Transient Personnel	989	0	989
Total Baseline Population	**10,536**	**7,548**	**20,787**

ALTERNATIVE ACTION

	Living on Base	Living off Base	Total
Military Personnel	1,241	1,369	2,610
Student Personnel	10,174	4,135	14,309
Military Dependents	-897	5,547	4,650
Civilian Personnel	0	1,767	1,767
Transient Personnel	-369	1,141	772
Total Baseline Population	**10,149**	**13,959**	**24,108**

ALTERNATIVE SHEPPARD POPULATION

	Living on Base	Living off Base	Total
Military Personnel	2,928	3,230	6,158
Student Personnel	14,416	5,859	20,275
Military Dependents	2,721	8,250	10,971
Civilian Personnel	0	5,730	5,730
Transient Personnel	620	1,141	1,761
Total Baseline Population	**20,685**	**24,210**	**44,895**

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Appendix D

Notice of Availability

APPENDIX D

NOTICE OF AVAILABILITY

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PUBLISHED IN THE MARCH 13, 2007 *WICHITA FALLS TIMES RECORD NEWS*

PUBLIC NOTICE

The United States Air Force Invites Public Comment

Environmental Assessment for Installation Development at Sheppard Air Force Base, Texas

The US Air Force has prepared a draft environmental assessment (EA) and proposed Finding of No Significant Impact (FONSI)/Finding of No Practicable Alternative (FONPA) for installation development at Sheppard AFB, Texas.

The EA, prepared in accordance with the National Environmental Policy Act and Air Force instructions, evaluates potential impacts of the proposed action, alternative action, and no-action alternative on the environment. The EA evaluated: noise, land use, air quality, earth resources, water resources, hazardous materials and wastes, biological resources, utilities and infrastructure, and socioeconomics.

A copy of the EA and proposed FONSI/FONPA will be maintained at the Wichita Falls Public Library, 600 11th Street, Wichita Falls, Texas, 76301.

Written comments may be submitted through April 12, 2007 and should be directed to Mr. Tim Hunter, 82 CES/CEVX, 231 9th Avenue, Sheppard AFB, Texas, 76311.

PRIVACY ADVISORY: Comments on this draft EA are requested. Letters or other public comment documents provided may be published in the final EA. Information provided will be used only to improve analysis of issues in the draft EA. Comments will be addressed in the final EA and made available to the public. However, only the name of the individual and specific comments will be disclosed.

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ACRONYMS AND ABBREVIATIONS (CONT.)

LTO	landing-takeoff
Mcf/d	thousand cubic feet per day
MFH	Military Family Housing
mg/m^3	milligrams per cubic meter
mgd	million gallons per day
MOA	Military Operations Area
MSA	Metropolitan Statistical Area
NA	not applicable
NAAQS	national ambient air quality standards
NATO	North Atlantic Treaty Organization
NEI	National Emissions Inventory
NEPA	*National Environmental Policy Act*
NFIP	National Flood Insurance Program
NHPA	*National Historic Preservation Act*
NM	nautical miles
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_2	nitrogen dioxide
NO_x	nitrogen oxide
NPS	non-prior service
NRHP	National Register of Historic Places
O_3	ozone
Pb	lead
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to 10 microns
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to 2.5 microns
POL	petroleum, oil, and lubricant
ppm	parts per million
PSD	prevention of significant deterioration
RAPCON	Radar Approach Control
RCRA	*Resource Conservation and Recovery Act*
ROI	region of influence
SAIC	Science Applications International Corporation
SEL	sound exposure level
SFHA	Special Flood Hazard Area
SHPO	State Historic Preservation Officer
SIP	state implementation plan
SO_2	sulfur dioxide
SPCC	spill prevention control and countermeasure
SUA	Special Use Airspace
SWPPP	Stormwater Pollution Prevention Plan
TCE	trichloroethene
TCEQ	Texas Commission on Environmental Quality
TOG	touch-and-go
TPDES	Texas Pollutant Discharge Elimination System
tpy	tons per year
TWDB	Texas Water Development Board
US	United States
USAF	United States Air Force
USC	*United States Code*
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VFR	Visual Flight Rule
VOC	volatile organic compound
WFMA	Wichita Falls Municipal Airport
WWTP	wastewater treatment plant