



VOLUME I

B-21 Main Operating Base 1 (MOB 1) Beddown at Dyess AFB, Texas or Ellsworth AFB, South Dakota

FINAL

Environmental Impact Statement

March 2021



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PRIVACY ADVISORY

This Final EIS is provided in accordance with the National Environmental Policy Act (NEPA), the President's Council on Environmental Quality (CEQ) NEPA Regulations (40 Code of Federal Regulations [CFR] 1500–1508), and 32 CFR 989, Environmental Impact Analysis Process (EIAP).

The EIAP provides an opportunity for public input on Air Force decision-making, allows the public to offer inputs on alternative ways for the Air Force to accomplish what it is proposing, and solicits comments on the Air Force's analysis of environmental effects.

Public commenting received on the Draft EIS allowed the Air Force to make better informed decisions. Letters or other written or oral comments provided may be published in the EIS. As required by law, comments provided have been addressed in the EIS and made available to the public. Providing personal information is voluntary. Any personal information provided was used only to identify a desire to make a statement during the public comment portion of any public meetings or hearings or to fulfill requests for copies of the EIS or associated documents. Private addresses were compiled to develop a mailing list for those requesting copies of the EIS. However, only the names of the individuals making comments and specific comments are disclosed. Personal home addresses and phone numbers are not published in the Final EIS.

Information regarding the Final EIS is available on the website at www.B21EIS.com.

Please direct any requests for information or other inquiries to:
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COVER SHEET

a. Responsible Agency: U.S. Air Force

b. Cooperating Agencies: None.

c. Proposals and Actions: This Environmental Impact Statement (EIS) describes the potential consequences to the human environment from the proposed implementation of the B-21 Main Operating Base (MOB) 1 beddown, which includes B-21 Operational Squadrons, a B-21 Formal Training Unit (FTU), and a Weapons Generation Facility (WGF).

d. Inquiries: Information regarding the EIS is available on the website at www.B21EIS.com. Questions can also be directed to: B-21 EIS Project Manager, AFCEC/CZN, 2261 Hughes Avenue, Suite 155, JBSA Lackland, TX 78236-9853.

e. Designation: Final Environmental Impact Statement

f. Abstract: This EIS has been prepared in accordance with the National Environmental Policy Act (NEPA) to analyze the potential environmental consequences of the B-21 MOB 1 Beddown. The Department of Defense (DoD) is developing a new bomber aircraft, the B-21 "Raider," which will eventually replace existing B-1 and B-2 bomber aircraft. The beddown of the B-21 will take place through a series of three MOBs, referred to as MOB 1, MOB 2, and MOB 3. In this EIS, the U.S. Air Force (USAF) is evaluating the proposed MOB 1 beddown of the B-21. Decision-making associated with MOBs 2 and 3 will occur after a decision is made regarding MOB 1 and will be the subject of separate analysis in accordance with NEPA.

The purpose of the Proposed Action is to implement the goals of the National Defense Strategy by modernizing the U.S. bomber fleet capabilities. The B-21 Raider is being developed to carry conventional payloads and to support the nuclear triad by providing a visible and flexible nuclear deterrent capability that will assure allies and partners through the United States' commitment to international treaties. The B-21 will operate under the direction of the USAF Global Strike Command. The B-21 will have both conventional and nuclear roles and will be capable of penetrating and surviving in advanced air defense environments. It is projected to enter service in the 2020s, and the USAF intends to have at least 100 B-21 aircraft built.

This EIS evaluates alternatives that would support deterrence capabilities by basing the B-21 at an installation that can support USAF Global Strike Command's MOB 1 mission and can support training of crewmembers and personnel in the operation and maintenance of the B-21 aircraft in an appropriate geographic location that can provide sufficient airfield, facilities, infrastructure, and airspace to support the B-21 training and operations. The USAF developed a detailed screening process (see Section 2.2, Alternatives Development, of the EIS) to identify the alternatives carried forward in the analysis that meet the selection standards developed for each of the operational requirements summarized above and in the EIS. Three alternatives are included in the EIS, as discussed in Sections 2.4 (Dyess AFB Alternative) through 2.6 (No Action Alternative), which include the following:

- Dyess AFB Alternative
- Ellsworth AFB Alternative, including two subalternatives: North WGF Site Subalternative and South WGF Site Subalternative
- No Action Alternative

This EIS analyzes potential impacts associated with airspace, noise, air quality, land use, socioeconomics, environmental justice, biological resources, cultural resources, physical resources, hazardous materials and waste, health and safety, transportation, and utilities and infrastructure. The EIS also identifies potential mitigations and best management practices that the USAF could implement to minimize or offset potential adverse impacts.

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**Environmental Impact Statement for
B-21 Main Operating Base 1 (MOB 1) Beddown at
Dyess AFB, Texas or Ellsworth AFB, South Dakota**

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ACRONYMS AND ABBREVIATIONS

28 BW	28th Bomb Wing
7 BW	7th Bomb Wing
7 CES	7th Civil Engineering Squadron
ACAM	Air Conformity Applicability Model
ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing materials
AFB	Air Force Base
AFFF	aqueous film forming foam
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFOSH	Air Force Occupational and Environmental Safety, Fire Protection, and Health
AFPC	Air Force Personnel Center
AFRC	Air Force Reserve Command
AGE	Aerospace Ground Equipment
AGL	above ground level
AICUZ	Air Installation Compatible Use Zone
ASD	Abilene Independent School District
AMU	Aircraft Maintenance Unit
ANG	Air National Guard
ANSI	American National Standards Institute
APE	Area of Potential Effects
APZ	accident potential zone
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
ATEMS	Academy of Technology, Engineering, Mathematics and Science
BASH	bird/wildlife-aircraft strike hazard
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BG	Block Group
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BOS	Base Operating Support
BW/SEF	Bomb Wing/Flight Safety
C&D	construction and demolition
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CES	Civil Engineering Squadron
CFR	Code of Federal Regulations
CH ₄	methane
CIP	Capital Improvement Plan
CISD	Consolidated Independent School District
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
COA	Course of Action

COC	Community of Comparison
CT	Census Tract
CTE	Career and Technical Education
CZ	clear zone
D	Not shown to avoid disclosure of confidential information but included in total
dB	decibels
dBA	A-weighted decibels
DNL	day-night average sound level
DoD	Department of Defense
DOT	Department of Transportation
DRMO	Defense Reutilization Marketing Office
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESP	Explosive Site Plan
FAA	Federal Aviation Administration
FMS	Field Maintenance Shop
FPPA	Farmland Protection Policy Act
FPTA	Fire Protection Training Area
FTE	full-time employee
FTU	Formal Training Unit
FY	fiscal year
GAO	Government Accounting Office
GHG	greenhouse gas
GIS	geographic information system
GW	groundwater
GWP	global warming potential
HA	Health Advisory
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HAZMART	Hazardous Materials Pharmacy
I-20	U.S. Interstate 20
I-90	U.S. Interstate 90
IAP	Initial Accumulation Point
ICEMAP	Installation Complex Encroachment Management Action Plan
ICRMP	Integrated Cultural Resources Management Plan
ID	identification code
IDP	Installation Development Plan
IFR	instrument flight rules
IICEP	Interagency/Intergovernmental Coordination for Environmental Planning
INRMP	Integrated Natural Resources Management Plan
IPaC	Information for Planning and Consultation
IPCC	Intergovernmental Panel on Climate Change
ISD	Independent School District

JLUS	Joint Land Use Study
JO	Joint Order
kV	kilovolt
L ₁₀	loudest 10 percent noise level
lb	pounds
LBP	lead-based paint
L _{dn}	day-night average sound level (symbol)
L _{dnmr}	onset-rate adjusted monthly day-night average sound level
Leq	equivalent sound level
Leq(8h)	8-hour equivalent sound level
L _{max}	maximum sound level
LEED®	Leadership in Energy and Environmental Design®
LOS	level of service
LRS	Long Range Strike
LTM	Long Term Management
LUC	land use control
µg/L	micrograms per liter
MBTA	Migratory Bird Treaty Act
MCF	thousands of cubic feet per day
MGD	million gallons per day
MILCON	Military Construction
MOA	Military Operating Area
MOB	Main Operating Base
MRTFB	Major Range and Test Facility Base
MS4	Municipal Separate Storm Sewer System
MSA	Metropolitan Statistical Area
MSL	mean sea level
MSW	municipal solid waste
MT	Montana
MTR	Military Training Route
mVA	megavolt amperes
N ₂ O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
ND	North Dakota
NEI	National Emissions Inventory
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NLR	noise level reduction
NM	New Mexico
No.	Number
NOI	Notice of Intent
NO _x	nitrogen oxides
NRHP	National Register of Historic Places
NSA	Noise Sensitive Area
NSR	New Source Review

Ops	Operations
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
OWS	oil/water separator
PCL	Protective Concentration Level
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFSA	perfluoroalkyl carboxylates, sulfonate
PHL	potential hearing loss
PM ₁₀	particulate matter with a diameter of less than or equal to 10 microns
PM _{2.5}	particulate matter with a diameter of less than or equal to 2.5 microns
POL	petroleum, oil, and lubricant
POV	Privately Owned Vehicle
PR-	Powder River (Military Operating Area) (e.g., PR-1, PR-2, etc.)
PRIDE Hangar	Professional Results in Daily Efforts Hangar
PRTC	Powder River Training Complex
PSD	Prevention of Significant Deterioration
QD	quantity-distance
RCAS	Rapid City Area School
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROI	region of influence
RRS	Risk Reduction Standard
RSL	Regional Screening Level
SD	South Dakota
SDDENR	South Dakota Department of Environment and Natural Resources
SDGFP	South Dakota Game, Fish, and Parks
SEL	sound exposure level
SEL _{max}	maximum sound exposure level
sf	square feet
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer
SO ₂	sulfur dioxide
SOP	Standard Operating Procedure
SO _x	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasures
SUA	Special Use Airspace
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan
TCEQ	Texas Commission on Environmental Quality
TCP	traditional cultural property
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TRRP	Texas Risk Reduction Program
TX	Texas
U.S.	United States

US-277	U.S. Highway 277
US-83/84	U.S. Highway 83/84
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USDA-WS	U.S. Department of Agriculture Wildlife Services
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
VFR	visual flight rules
VOC	volatile organic compound
WGF	Weapons Generation Facility
WY	Wyoming

1. PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

The Department of Defense (DoD) is developing a new bomber aircraft, the B-21 “Raider,” which will eventually replace existing B-1 and B-2 bomber aircraft. The beddown of the B-21 will take place through a series of three Main Operating Bases (MOBs), referred to as MOB 1, MOB 2, and MOB 3. In this Environmental Impact Statement (EIS), the United States (U.S.) Air Force (USAF) is evaluating the proposed MOB 1 beddown of the B-21, which includes B-21 Operational Squadrons, a B-21 Formal Training Unit (FTU), and a Weapons Generation Facility (WGF). Decision-making associated with MOBs 2 and 3 will occur after a decision is made regarding MOB 1 and will be the subject of separate analysis in accordance with the National Environmental Policy Act (NEPA).

Through the USAF’s Strategic Basing Process (Air Force Instruction [AFI] 10-503, *Strategic Basing*), the USAF determined the three MOB locations would be Dyess Air Force Base (AFB) in Texas, Ellsworth AFB in South Dakota, and Whiteman AFB in Missouri. Subsequently, the Secretary of the Air Force announced that the preferred strategic basing alternative for MOB 1 would be Ellsworth AFB. In accordance with NEPA, the USAF also identified Dyess AFB as a reasonable alternative to the MOB 1 beddown analyzed in this EIS. Refer to Section 2.2.1 (Screening Criteria Process for MOB 1) for details on how the USAF chose Dyess AFB and Ellsworth AFB to be the alternative locations for MOB 1.

The EIS is being developed in compliance with NEPA (42 United States Code [U.S.C.] 4321 et seq.), which requires federal agencies to complete an EIS for any proposal that may significantly affect the quality of the human environment. In addition, the USAF is evaluating how the proposed basing action might be affected by or impact other federal and state regulatory and planning processes.

Recognizing other stakeholders may have concerns over potential impacts, the USAF conducted dialogue with the appropriate state agencies, as well as local counties, towns, and cities that may be impacted by the implementation of the basing action. The USAF also initiated government-to-government consultation with federally recognized tribes potentially affected by the Proposed Action (see Sections 3.8.1.2.1 and 3.8.1.2.2, Cultural Resources, Affected Environment, Dyess AFB and Ellsworth AFB, respectively).

1.2 BACKGROUND

On October 27, 2015, the USAF announced that Northrop Grumman Corporation was awarded the contract for Engineering and Manufacturing Development and early production for the Long Range Strike Bomber. The Secretary of the Air Force announced that the new bomber would be called the B-21 “Raider,” in honor of the Doolittle Raiders

of World War II. The USAF completed the Weapon System Critical Design Review in November 2018. The initial test aircraft is being manufactured.

The B-21 will operate under the direction of the USAF Global Strike Command. The B-21 will have both conventional and nuclear roles and will be capable of penetrating and surviving in advanced air defense environments. It is projected to enter service in the 2020s, and the USAF intends to have at least 100 B-21 aircraft built.

1.3 PURPOSE OF AND NEED FOR ACTION

As stated in the 2018 National Defense Strategy, the global security environment is “characterized by overt challenges to the free and open international order and the re-emergence of long-term, strategic competition between nations” (DoD, 2018a). The threats we face as a nation are increasingly transregional, multi-domain, and multi-functional. These threats frequently do not comply with international rules of law. They include ever-expanding, rapidly developing technologies of hostile state and non-state actors. Thus, the USAF must deter its adversaries, assure its allies, and be prepared to support operations that protect the homeland, respond to aggression with overlapping timelines, wage a global counter-terrorism campaign in cooperation with our allies and partners, and improve our ability to respond to emerging threats. Our adversaries must be aware that our weapons are reliable and will achieve the desired result regardless of enemy countermeasures.

1.3.1 Purpose of the Proposed Action

The purpose of the Proposed Action is to implement the goals of the National Defense Strategy by modernizing the U.S. bomber fleet capabilities. The B-21 Raider is being developed to carry conventional payloads and to support the nuclear triad by providing a visible and flexible nuclear deterrent capability that will assure allies and partners through the United States’ commitment to international treaties.

1.3.2 Need for the Proposed Action

The need for the Proposed Action stems from advancements in the technology that is available to potential adversaries of the United States. The United States must have advanced defense capabilities that discourage adversary nations from taking action and that can respond effectively to support national defense priorities if and when called upon to do so. The existing bomber fleet lacks the technology required to ensure U.S. global security and long-range strike missions into the future; therefore, a new, more technologically capable system must be developed and fielded to support the nation’s defense.

Therefore, the need for the Proposed Action is to support deterrence capabilities by basing the B-21 at an installation that can support USAF Global Strike Command’s MOB 1 mission. The B-21 will provide the only stealth bomber capability and capacity

needed to deter, and if necessary, defeat our adversaries in an era of renewed great power competition. The installation will support training of crewmembers and personnel in the operation and maintenance of the B-21 aircraft in an appropriate geographic location that can provide sufficient airfield, facilities, infrastructure, and airspace to support the B-21 training and operations.

1.4 ENVIRONMENTAL IMPACT ANALYSIS PROCESS

1.4.1 Requirements

Congress enacted NEPA to establish a national policy for the protection of the environment. It requires federal agencies to assess the environmental consequences of a proposed action and alternatives systematically as part of the decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well informed decisions by federal decision makers. In the case of this EIS, the Secretary of the Air Force will be the final decision maker.

The Council on Environmental Quality (CEQ) was established under NEPA, 42 U.S.C. 4341 et seq., to implement and oversee federal policy in this process. In 1978, the CEQ issued regulations implementing the NEPA process codified at 40 Code of Federal Regulations (CFR) 1500–1508.¹ The USAF Environmental Impact Analysis Process (EIAP) for meeting CEQ requirements is accomplished via procedures as promulgated at 32 CFR 989 and in conformance with the CEQ regulations. This EIS has been prepared in accordance with NEPA, CEQ regulations, and the USAF EIAP. Those regulations outline the responsibilities of federal agencies and provide specific procedures for preparing EISs to comply with NEPA.

In this EIS, the USAF has done its best to accurately predict potential impacts and anticipate future conditions using the best available information and tools at the time of analysis.

This NEPA analysis identifies environmental permits, potential specific mitigation measures, and management actions to prevent or minimize environmental impacts, if needed. The Record of Decision (ROD) will then determine which mitigation measures will be implemented. A mitigation plan will then be developed in accordance with 32 CFR 989.22(d) for the mitigations selected in the ROD.

1.4.2 Summary of Public Scoping Process

NEPA and the USAF's implementing regulations require the lead agency (in this case, the USAF) to seek public participation throughout the EIAP. "Scoping" identifies potential issues and alternatives early in the NEPA development process. The USAF filed a Notice

¹ This EIS was ongoing prior to the September 14, 2020, effective date of the CEQ's final rule updating its regulations for implementing the procedural provisions of NEPA. Accordingly, the new regulations were not used for this action, pursuant to 40 CFR 1506.13.

of Intent (NOI) to prepare an EIS and host public scoping meetings. The NOI was published in the Federal Register on March 6, 2020. Additionally, the USAF sent written notification to local, state, and federal agencies and tribes of the intent to prepare an EIS and host public scoping meetings. Appendix A, Public Involvement, provides a list of these contacts.

As a direct result of the National Emergency declared by the President on Friday, March 13, 2020, in response to the coronavirus (COVID-19) pandemic in the United States and the Center for Disease Control's recommendations for social distancing and avoiding large public gatherings, the USAF canceled the six previously scheduled scoping meetings that were set to occur in South Dakota and Texas from March 31, 2020, to April 9, 2020, as listed in the original NOI that was published on March 6, 2020 (Federal Register, Volume 85, Number [No.] 45, 13148). An amended NOI, announcing the cancellation of in-person scoping meetings due to COVID-19, was subsequently published in the Federal Register on March 24, 2020 (Federal Register, Volume 85, No. 57, 16619). The USAF also sent written updates about the public meeting cancellation to previously notified local, state, and federal agencies and tribes. Public meeting cancellation notifications were also published in the *Rapid City Journal* on March 28, 2020, the *Native Sun Times* on April 1, 2020, the *Original Briefs* on March 27, 2020, the *Indian Country Today* on March 26, 2020, the *Black Hills Pioneer* on March 28, 2020, and the *Abilene Reporter News* on March 29, 2020.

In lieu of the in-person scoping meetings, the USAF published all public scoping meeting materials on the project website (www.B21EIS.com) on March 27, 2020, and extended the public commenting deadline to May 9, 2020. For those without access to the website, a request for a mailed hardcopy package of scoping materials could be submitted to Ellsworth AFB and Dyess AFB Public Affairs offices, as provided in all public notices. Scoping materials included an eight-page brochure, 11 large informational displays, 4 small informational displays, the scoping presentation, and a mail-in comment form. Scoping comments could be submitted via the public website or by mail. In addition to providing information on how to provide scoping comments, the scoping materials also provided interested persons with an overview of the following:

- The NEPA/EIS process
- The anticipated EIS timeline and pertinent timeframes for public input
- The environmental resources being studied in the EIS
- The background of the project
- The elements of the B-21 MOB 1 beddown
- The purpose of and need for the Proposed Action
- The criteria used to select Dyess AFB and Ellsworth AFB
- The commonalities between the proposed alternatives
- The elements/scope of the proposed alternatives
- The No Action Alternative

1.4.2.1 Summary of Concerns Raised in the Public Scoping Process and Public Comment Period

During the public scoping period, public comments were submitted to the USAF via the website and e-mail. A total of 22 members of the public, tribes, and government agencies submitted comments during the scoping period. Concerns were related to:

- Ground-disturbing activities impacting cultural/historic areas
- Using credible scientific data for the analysis
- Implementing reclamation of all surface resource disturbances as soon as feasible
- Utilizing the latest state-listed threatened and endangered species lists
- Installing appropriate erosion and sediment control measures
- Obtaining proper permits
- Avoiding impact to tributaries, creeks, wetlands, and lakes
- Considering impacts to national park units and areas of national importance

1.4.3 Draft EIS Review Process

Public comments were also solicited on the Draft EIS. In providing for the opportunity to comment on the Draft EIS, the USAF requested that comments be substantive in nature. Generally, substantive comments are regarded as those specific comments that challenge the analysis, methodologies, or information in the Draft EIS as being factually inaccurate or analytically inadequate; that identify impacts not analyzed or develop and evaluate reasonable alternatives or feasible mitigations not considered by the USAF; or that offer specific information that may have a bearing on the decision, such as differences in interpretations of significance, scientific, or technical conclusions, or cause changes or revisions in a proposed action. Nonsubstantive comments, which do not require a USAF response, are generally considered those comments that are nonspecific, express a conclusion or opinion about a proposed action, agree or disagree with the proposals, vote for or against a proposal itself or some aspect of it, state a position for or against a particular alternative, or otherwise state a personal preference or opinion.

1.4.3.1 Summary of the Draft EIS Review Process

The Draft EIS public comment period began when the Notice of Availability (NOA) of the Draft EIS was published in the *Federal Register* on September 25, 2020 (see Appendix A, Section A.5, Draft EIS Notice of Availability) and ended on November 9, 2020. Notification of the NOA and announcement of virtual public hearings was published in local newspapers in September and October 2020 (Table 1.4-1). Additionally, Dyess AFB and Ellsworth AFB Public Affairs offices distributed press releases and public service announcements to local media and radio stations (Table 1.4-1). To further increase public awareness and participation leading up to the virtual public hearings, a digital marketing campaign ran from September 28 through October 11, 2020.

Table 1.4-1. Draft EIS Local Announcements

Outlet	Target Circulation	Published Date
<i>Ellsworth AFB Public Affairs</i>	Ellsworth AFB local media outlets	Friday, October 2, 2020 Friday, October 9, 2020 Monday, October 12, 2020
<i>Rapid City Journal</i>	Rapid City, Sturgis, and Box Elder, SD	Friday, September 25, 2020 Saturday, October 10, 2020
<i>Black Hills Pioneer</i>	Sturgis, SD	Friday, September 25, 2020 Saturday, October 10, 2020
<i>Original Briefs</i>	Crow and Northern Cheyenne Tribes	Friday, September 25, 2020 Friday, October 9, 2020
<i>Native Sun News</i>	Nationwide tribal paper	Wednesday, September 30, 2020 Wednesday, October 7, 2020
<i>Indian Country Today</i>	Nationwide tribal paper	Thursday, October 1, 2020 Thursday, October 8, 2020
<i>Dyess AFB Public Affairs</i>	Dyess AFB local media outlets	Friday, October 2, 2020 Friday, October 9, 2020 Friday, October 16, 2020 Monday, October 19, 2020
<i>Abilene Reporter News</i>	Abilene, Tye, and Wylie, TX	Friday, September 25, 2020 Saturday, October 10, 2020

The USAF's virtual public hearings were held via Zoom on October 15, 17, 20, and 22, 2020. The total number of attendees at each public hearing meeting hosted by the USAF was 40, 39, 46, and 25, respectively. The hearings provided agency representatives as well as interested and affected citizens an opportunity to present verbal comments on the content of the Draft EIS. A hearing officer (a military judge) presided over the virtual public hearings. During the public comment portion of each hearing, a court reporter transcribed verbal comments verbatim.

1.4.3.2 Summary of Concerns Raised During the Public Draft EIS Public Comment Period

During the Draft EIS public comment period, verbal and written public comments were submitted to the USAF via the website, e-mail, and verbally at the virtual public hearings. Members of the public, tribes, organizations, and government agencies submitted a total of 26 comment letters and verbal comments during the comment period. Substantive comments received relevant to the development of the EIS are discussed below. Section A.7 (Draft EIS Comments and Air Force Response to Comments) in Appendix A (Public Involvement) provides the comments received on the Draft EIS and presents the USAF's response to comments.

Airspace

Comments received on airspace asked for clarification on the meaning of "high altitude bands" and requested more specific information on B-21 operational altitudes. Other concerns were related to the increases in operations in the Powder River Training

Complex (PRTC) and potential impacts to wind farms. Another commenter suggested improvements to the issuance of Notices to Airmen.

Air Quality

Comments related to air quality were associated with the Ellsworth AFB minor source air quality permit.

Hazardous Materials and Solid Waste

Comments related to hazardous materials and solid waste included adding additional information on the proximity of low-level radioactive burial sites to the proposed WGF sites at Ellsworth AFB, as well as the use and storage of munitions.

Proposed Action

Comments associated with the Proposed Action included concerns that there would be two WGF sites at Ellsworth AFB and that information on the website indicated that the PRTC would be the primary training area for either basing location. One comment questioned the cost-effectiveness of Dyess AFB utilizing the PRTC.

Physical Resources

Comments received with regard to Physical Resources (soils, surface waters, ground water, wetlands, and floodplains) asked to discuss plans for the USAF to protect the creek beds and wetlands at Ellsworth AFB.

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2. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

To meet the underlying purpose and need, the Proposed Action is for the USAF to implement the beddown of the B-21 MOB 1. This beddown would include establishing B-21 Operations Squadrons and a B-21 FTU, constructing a WGF, developing new infrastructure, and increasing numbers of personnel to support and conduct B-21 aircraft operations.

This EIS considers two alternative locations for the MOB 1 beddown of the B-21 and evaluates impacts where training and operational activities would occur.

2.2 ALTERNATIVES DEVELOPMENT

NEPA and its implementing regulations require the USAF to develop and identify reasonable alternatives to a proposed action. In determining the scope of alternatives to be considered, emphasis is placed on what is “reasonable.” Reasonable alternatives include those “that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant” (CEQ, 1986). The following subsections describe the process that the USAF used to identify reasonable alternatives for consideration in this EIS.

As the location where the B-21 aircraft would be primarily located, the MOB 1 alternatives considered in this EIS are Dyess AFB (Texas) or Ellsworth AFB (South Dakota). As described in Section 1.1 (Introduction), Whiteman AFB (Missouri) was also identified as a potential host for the new B-21 aircraft. The Secretary of the Air Force has announced the preferred basing location as Ellsworth AFB and Dyess AFB as a reasonable alternative. Whiteman AFB is a candidate for subsequent MOB 2 and/or MOB 3 beddowns because B-2 operations would need to continue there for the near-term, foreseeable future to maintain continuous deterrence capabilities as the B-21 comes into service.

This EIS focuses on locating MOB 1 at only Dyess AFB or Ellsworth AFB. Any basing actions proposed to take place at Whiteman AFB would be addressed in a separate NEPA analysis and documentation.

2.2.1 Screening Criteria Process for MOB 1

The USAF used a three-phased screening process to identify reasonable alternatives for MOB 1 locations. Phase 1 of the process consisted of developing and applying initial screening criteria for the new B-21 mission. Phase 2 involved reviewing the current Global Strike Command mission at each base. Phase 3 incorporated assessments of the

missions that will be replaced by the B-21 mission, including an appropriate time-phased reduction of B-1 and B-2 aircraft.

2.2.1.1 Identification of Enterprise Bases and Objective Screening Criteria

The USAF uses the Strategic Basing Process outlined in AFI 10-503, *Strategic Basing*, to select locations to base USAF missions. The process begins by identifying all the bases that could reasonably support a given mission. The USAF then evaluates that “enterprise of bases” using objective criteria to screen for the top candidate bases. The relevant Major Command then leads site surveys at each candidate location to determine initial beddown plans and to estimate required costs. The Strategic Basing Executive Steering Group oversees the process and reports findings to the Secretary of the Air Force and Chief of Staff of the Air Force. The process was mandated by the Secretary of the Air Force to ensure that basing decisions are made using a standardized, repeatable, transparent, and deliberate process.

The B-21 basing strategy was a deliberate process to minimize mission impact, maximize facility reuse, and minimize cost. Therefore, the “enterprise of bases” was limited to current Air Force Global Strike Command bomber bases (Barksdale, Dyess, Ellsworth, Minot, and Whiteman AFBs) (Figure 2.2-1). All non-bomber bases were eliminated due to their limited runway length, ramp and hangar deficiencies, and insufficient concrete strength for bomber operations, which make them incapable of supporting the B-21 mission.

The objective screening criteria included essential requirements needed to base and operate the B-21 Raider at a given location. Requirements to support the B-21 Raider include sufficient runway length with adequate concrete strength and certain ramp and hangar dimensions. In addition, the USAF determined that the B-52 fleet would continue to operate well into the middle of the 21st century. Continuing the B-52 mission beyond 2050 leaves both Barksdale and Minot AFBs with insufficient capacity for the additional B-21 mission. Additionally, splitting up the B-52s to various other bomber bases would incur excessive costs and would cause operational risks and impacts, which goes against the strategy of using current infrastructure and minimizing impacts to current missions. The USAF’s choice not to break up the B-52 fleet is based, in part, on a 2018 Government Accounting Office (GAO) determination that when the USAF organizes its airframe fleets (e.g., the F-22) into small wings and squadrons, it causes less-efficient operations than when fleet aircraft are based in larger groups (GAO, 2018).

These facts, combined with the application of the objective screening criteria, identified the following candidate bases: Dyess, Ellsworth, and Whiteman AFBs.

2.2.1.2 Site Survey Criteria

The USAF then assessed the ongoing Global Strike Command missions at each of the three locations against site survey criteria derived from the objective screening criteria, along with military judgement and experience, to determine an initial beddown plan at each location and to estimate required costs.

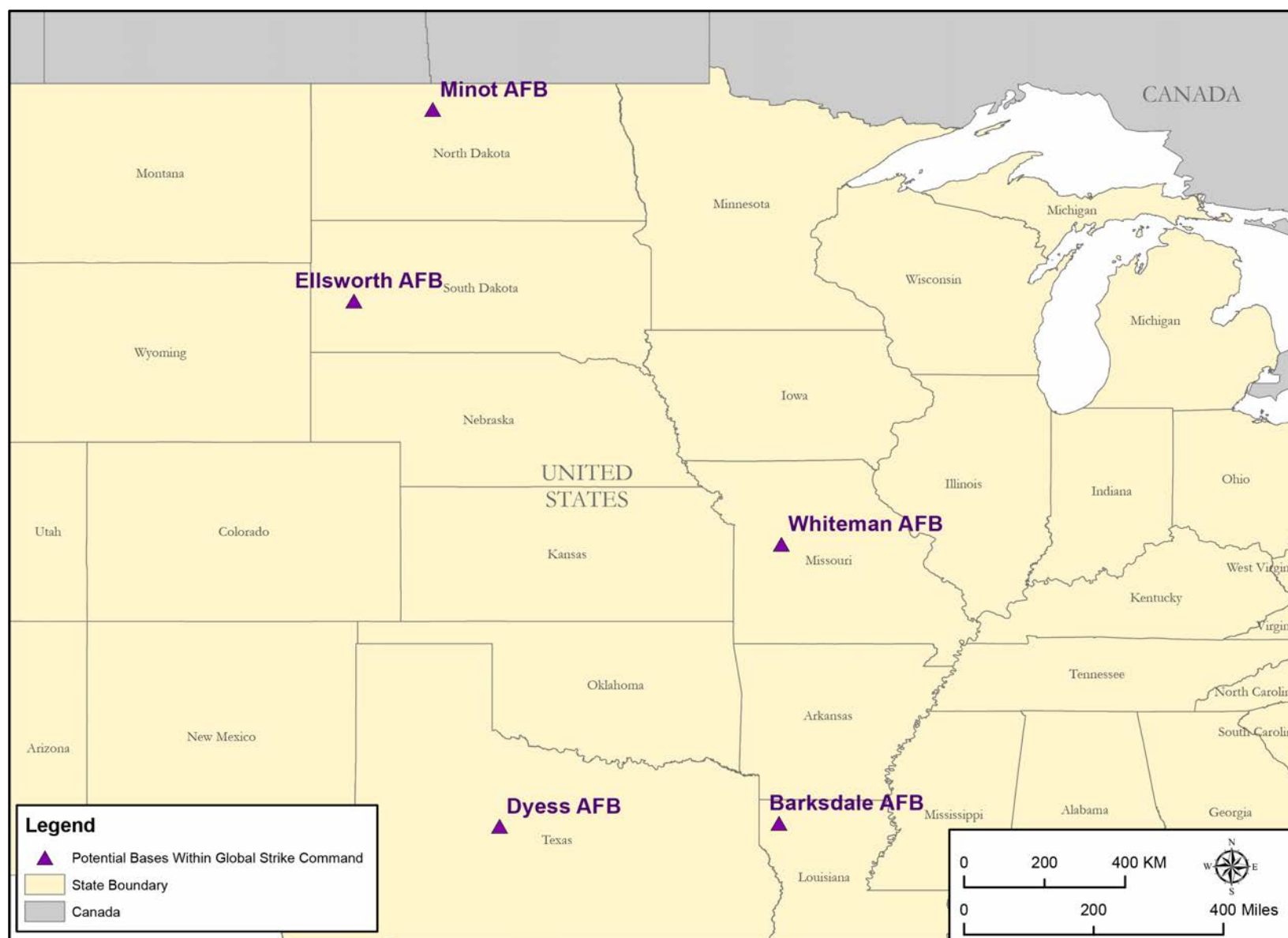


Figure 2.2-1. Possible Basing Locations Identified by Initial Screening Criteria (Phase I)

2.2.1.3 Time-Phased Aircraft Drawdown Criteria

The USAF next determined the timing involved in phasing out the Global Strike Command missions that will be replaced by the B-21 mission. The USAF determined that the aging B-1 fleet would be the first bomber aircraft to transition into retirement and replaced by the B-21. As B-1 missions are phased out at a given bomber base, it would be more readily available to receive new B-21 aircraft and thus better suited as the potential location for the first main operating base (MOB 1).

Current missions were also assessed to ensure that impacts to overall Global Strike Command tactical readiness would not occur from phasing in B-21 aircraft at each base. The USAF determined that adding the B-21 mission to Whiteman AFB while the B-2 mission was still supported there would jeopardize tactical mission readiness. Currently, the B-2 mission includes the employment of nuclear weapons. These nuclear weapons will be transitioned to the B-21. However, this transition will be time-phased, depending on B-21 production rates and integration into the USAF's bomber structure and aircraft inventory. To ensure an uninterrupted deterrent related to the United States' nuclear capabilities, the USAF determined that this transfer should occur after the initial beddown of MOB 1 and that Whiteman AFB will not be considered as a potential alternative for MOB 1 because the B-2 program will remain active at Whiteman AFB until a MOB 1 for the B-21 is established.

The two remaining locations for consideration as candidate bases for MOB 1 were Dyess AFB and Ellsworth AFB, which are carried forward for detailed analysis as alternatives in this EIS.

2.2.2 Screening Criteria for Base Infrastructure Development

While candidate bases Dyess AFB and Ellsworth AFB currently host B-1 missions, the support they each provide for their respective B-1 mission is unique. In an effort to use existing infrastructure in the most effective way at each candidate base, the basing planners developed additional screening criteria for each location to ensure a consistent approach in further refining potential alternatives. Applying this final screening criteria created distinct, site-specific alternatives for infrastructure and facilities at each candidate base.

The USAF's operational, safety, and airfield planning specialists evaluated each base's airfield planning criteria against B-21 aircraft requirements to identify infrastructure and facility needs. The airfield planning criteria used to evaluate each candidate base were:

- Operational readiness
- Site constraints
- Existing infrastructure evaluation

2.2.2.1 Operational Readiness

Operational readiness is the ability to accommodate all mission requirements that minimizes risks so missions can be performed efficiently. The following factors were considered when determining operational readiness criteria for the B-21 mission:

- Being near training airspace and ranges where bombers currently operate
- Being near aerial refueling capability
- Operational security concerns, including strategies to prevent potential adversaries from discovering critical operations-related data
- Time-sensitive requirements, accounting for various time-sensitive B-21 mission requirements, to include round-the-clock airfield availability
- Terminal areas, which are high-traffic areas of controlled airspace surrounding a USAF base (runways, ramp space, auxiliary ground equipment, etc.)

The distance from a training airspace or aerial refueling capabilities can be measured directly, whereas the USAF must use its military judgement and experience to evaluate requirements such as operational security and time sensitivity. For evaluation of terminal areas, the USAF considered the airspace directly related to airfield operations (e.g., takeoffs, landings, low approaches, touch-and-go landings, and instrument departures/arrivals).

2.2.2.2 Siting Constraints (Operational and Environmental)

The USAF analyzed the candidate bases for obstructions, built up areas, neighboring airports, topography, and soil conditions (DoD, 2020). Given the different geographic locations of the candidate bases, physical conditions that would limit project-related site choices at Dyess AFB would not necessarily be the same at Ellsworth AFB. At Dyess AFB, site constraints include floodplains and Environmental Restoration Program (ERP) sites. Planners at Ellsworth AFB identified wetland conditions that would present site constraints.

The USAF looked specifically at whether existing infrastructure would create unacceptable land use constraints for clear zones (CZs) and accident potential zones (APZs), APZ I and APZ II (AFI 32-7063). The CZ starts at the end of the runway and extends outward 3,000 feet in length and is 3,000 feet wide. It has the highest incident of accidents of the three zones. APZ I extends from the CZ by an additional 5,000 feet by 3,000 feet, and APZ II extends from APZ I by an additional 7,000 feet by 3,000 feet, with the potential for an accident decreasing in each subsequent area.

The USAF uses Air Force Handbook 32-7084, *Air Installation Compatible Use Zones (AICUZ) Program Manager's Guide*, to implement AFI 32-7063. The USAF adopted a policy of acquiring property rights to areas designated as CZs due to the high accident

potential. For homes and structures currently in those areas, the USAF AICUZ program already applies.

In addition to CZ considerations, explosives-safety arcs were utilized to help develop siting alternatives.

2.2.2.3 Existing Infrastructure Evaluation

As stated in Section 2.2.1 (Screening Criteria Process for MOB 1), the B-21 basing decision strategy was a deliberate process to minimize mission impact, maximize facility reuse, and minimize cost. The USAF considered whether selection of a candidate base would unreasonably impact existing missions or create unreasonable cost associated with establishing new infrastructure.

2.2.3 Alternatives Considered But Eliminated From Detailed Analysis

As outlined Section 2.2.1 (Screening Criteria Process for MOB 1), all continental United States non-bomber active duty bases were eliminated for consideration as well as Minot AFB, Barksdale AFB, and Whiteman AFB.

2.3 COMMONALITIES

The Proposed Action includes common elements that the B-21 would bring to, or require at, both candidate bases that would make them operationally ready. These commonalities are associated with personnel, airfield operations, airspace and range utilization, and the WGF.

2.3.1 Personnel

The B-21 mission would include initial training, transition/conversion training, refresher/requalification training, and instructor training. Students entering the B-21 program would be graduates of undergraduate aviator and maintainer training programs. Pilots and maintainers entering the program from another aircraft platform would go through a transitional training program, which would provide the requisite skills to meet the mission-qualified pilot or mission-qualified maintainer graduation criteria.

The full B-21 mission personnel complement required to execute the proposed mission would include pilot instructors, maintenance instructors, and contractor support personnel. Based on manpower reports, the USAF estimates that the B-21 MOB 1 mission would require approximately 3,500 military personnel. Precise dependents demographic data for the B-21 program are not known. Therefore, to obtain the ratio of USAF active duty members to family members for this EIS, the USAF reviewed the *2018 Demographics Profile of the Military Community* published by the DoD. According to that

report, on average, there are 1.2 family members, or dependents, for each active duty USAF personnel (DoD, 2018b). The USAF estimates total dependents associated with the B-21 MOB 1 beddown to be approximately 4,200. Additionally, the USAF also assumed that 55 percent of personnel are married, based on marital status statistics for USAF active duty members in that report (DoD, 2018b). The number of children are then calculated by subtracting the number of spouses from the total number of dependents. Table 2.3-1 presents the estimated maximum number of personnel associated with establishing the B-21 mission at the MOB 1 installation, which would be 7,700 total individuals. The B-21 MOB 1 proposal would eventually displace the personnel and aircraft associated with the B-1 mission. The eventual reduction of B-1 personnel associated with the Proposed Action would be 3,747 at Dyess AFB and 4,553 at Ellsworth AFB. Therefore, the analysis of potential impacts from changes in end-state populations at each MOB 1 location (Table 2.3-1) considers both the incoming B-21 mission and personnel as well as the retiring B-1 mission and associated personnel. Chapter 3 (Affected Environment and Environmental Consequences) provides a more detailed breakout of personnel changes in Table 3.0-1 and Table 3.0-2.

Table 2.3-1. Personnel Associated With the Incoming B-21 Mission and End-State Personnel

Personnel	Number of Individuals for B-21 Mission under the Proposed Action	End-State Personnel at Dyess AFB	End-State Personnel at Ellsworth AFB
Military	3,500	6,014	4,860
Civilian	NA	665	930
Contractor	NA	NA	139
Spouses ¹	1,925	3,674	3,261
Children ²	2,275	3,745	4,553
Total	7,700	14,098	13,743

Notes:

1. Based on statistics in the 2018 Demographics Profile of the Military Community (DoD, 2018b), 55 percent of the Air Force is married.
2. The number of children was estimated by assuming there are 1.2 dependents for each military family. The number of married Air Force personnel was multiplied by 1.2 to get the total number of dependents (4,200). The number of spouses was subtracted from the total dependents to obtain the estimated number of children.

2.3.2 Airfield Operations

The annual estimated number of total aircraft operations is approximately 9,120 per year for all the squadrons (Operations and FTU), based on 94.5 sorties per month. Twenty percent of all sorties would be conducted between 10:00 p.m. and 7:00 a.m.

On average, approximately 3.15 sorties would be conducted per day, of which approximately 50 percent would be flown by students within the FTU and the other 50 percent by the Operations Squadrons. Of the total sorties per year, at least 3 percent additional flights may be required for re-fly requirements, whereby students conduct additional work as a result of not completing a particular flight/mission profile. In addition, approximately 3 percent of the total sorties is captured in the proposed number of sorties for continuation training and cost of business. Continuation training is associated with

maintaining instructor training currency, while cost of business addresses instructor proficiency, ferry flights, maintenance checks, etc., associated with the day-to-day training requirements.

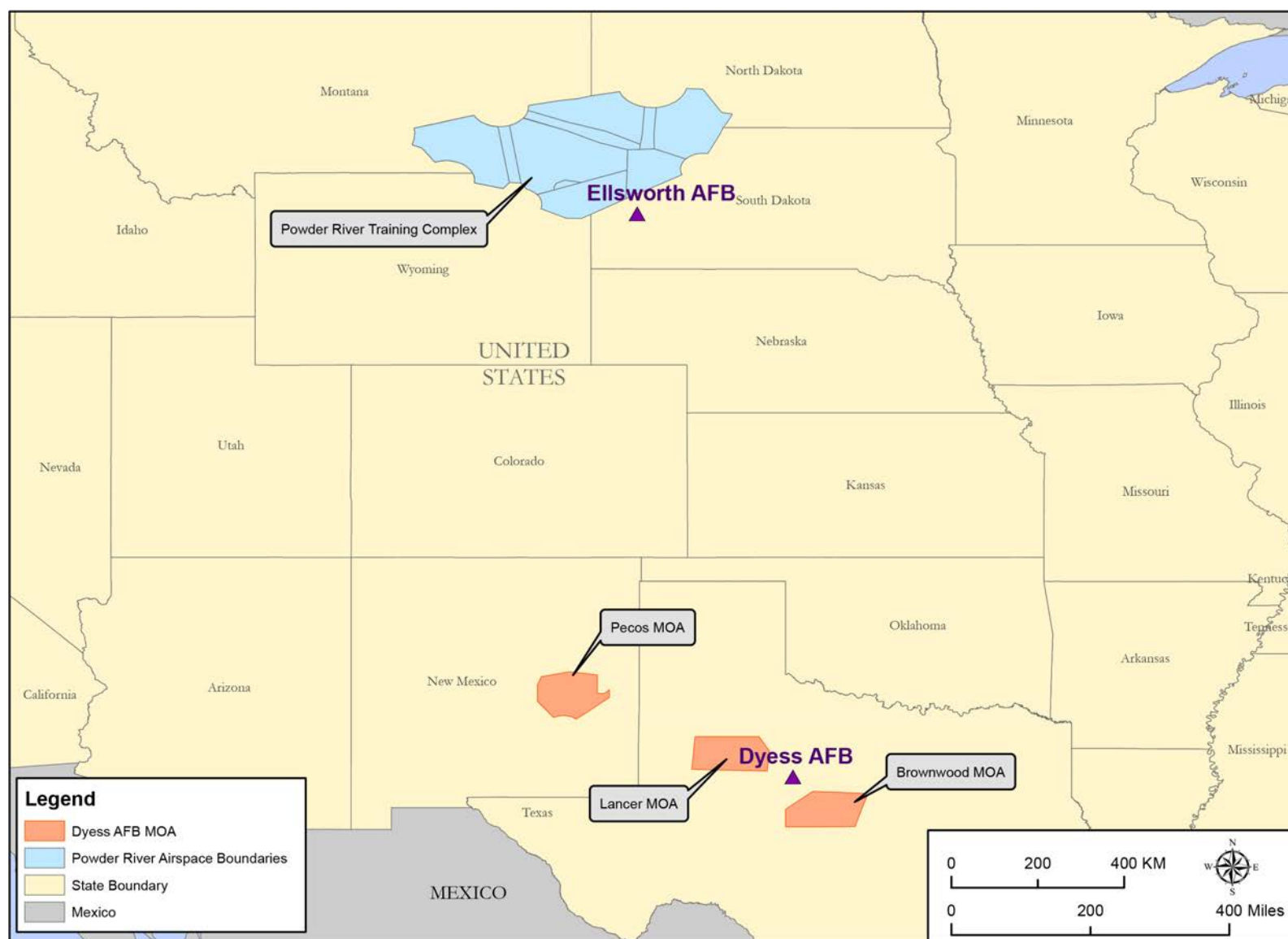
2.3.3 Airspace and Range Utilization

This EIS also addresses the B-21 training mission (Figure 2.3-1). Similar to other bombers, the B-21 can adequately train in Class A airspace using Federal Aviation Administration (FAA)-filed flight plans. However, training in Military Operating Areas (MOAs) and Air Traffic Control Assigned Airspaces (ATCAAs) provide additional flexibility and integration opportunities. For any military aircraft flying out of Ellsworth AFB, the PRTC airspace is the most cost-effective and convenient training area. Other Class A airspace and Major Range and Test Facility Bases (MRTFBs) would be used on an as-needed basis. For military aircraft flying out of Dyess AFB, the Lancer MOA and the Pecos MOA and all associated ATCAAs are the most cost-effective and convenient training areas to use. Dyess AFB-based aircraft would utilize the PRTC and the Brownwood MOA as supplemental training airspaces.

There are no plans to modify any of the airspace listed above as a result of the Proposed Action. PRTC-related B-21 air operations would adhere to the legal descriptions for the PRTC MOAs published in the National Flight Data Digest (effective date: September 17, 2015) (FAA, 2021). This airspace was analyzed in the USAF's 2014 *Final EIS for the Powder River Training Complex, Ellsworth Air Force Base, and South Dakota* (the "2014 PRTC EIS") ROD (signed on January 16, 2015) (USAF, 2015) and the FAA ROD (signed on March 24, 2015) (FAA, 2015).

2.3.4 Weapons Generation Facility

The WGF is a facility that is unique and would require new construction at the selected base. The WGF will provide a safe and secure location for the storage of USAF nuclear munitions. The WGF will require a construction footprint of approximately 35 acres, with an approximately 52,000-square-foot building as well as an additional 17,000-square-foot munitions maintenance building. The USAF will implement construction and operations in a manner consistent with AFI 20-110, *Nuclear Weapons-Related Materiel Management*. Due to national security implications, the details regarding the infrastructure associated with the WGF is not releasable. It should be noted that the munitions storage areas for each of the candidate bases have adequate capacity for conventional USAF assets. The WGF provides a consolidated facility within a single, controlled site that accommodates maintenance, storage, and support functions under one roof to provide enhanced operations and security measures for the entire mission. The configuration of the facility allows for efficient movements of all assets in various configurations, which improves both the safety and security associated with mission requirements.



AFB = Air Force Base; MOA = Military Operating Area

Figure 2.3-1. Range and Airspace Boundaries

2.4 DYESS AFB ALTERNATIVE

2.4.1 Background

Dyess AFB is located in Taylor County in west central Texas within the incorporated limits of the City of Abilene (Figure 2.4-1). The installation encompasses approximately 5,424 acres of land and hosts three runways (Dyess AFB, 2017). Runway 16/34 is a north-south runway that is 13,500 feet long and 300 feet wide. Runways 163/343 and 164/344 (C-130 landing zones) located west of Runway 16/34 are 3,500 feet long and 60 feet wide.

Originally established and operated as Abilene Army Air Base in 1942, Dyess AFB has hosted a variety of missions and aircraft types throughout its history. Currently at Dyess AFB, the 7th Bomb Wing (7 BW) is the host unit and is responsible for providing combat-ready B-1 aircraft, crews, and associated combat support for global engagement taskings. The 7 BW is one of only two B-1 bomb wings assigned to the 8th Air Force under USAF Global Strike Command. The B-1 and the C-130J Super Hercules are the only aircraft stationed at Dyess AFB. The primary tenants at Dyess AFB include the 489th Bomb Group, the 317th Airlift Wing, the 436th Training Squadron, the 77th Weapons Squadron, the 337th Test and Evaluations Squadron, and the Armed Forces Reserves Center.

The Dyess AFB Alternative would establish MOB 1 at Dyess AFB, which includes all common elements described above in Section 2.3 (Commonalities) plus the construction of the facilities, infrastructure, and the WGF as described in Sections 2.4.2 (Facilities and Infrastructure) and 2.4.3 (Weapons Generation Facility) below.

2.4.2 Facilities and Infrastructure

As outlined in Section 2.2.1 (Screening Criteria Process for MOB 1), USAF planners applied screening criteria that included leveraging facilities and infrastructure at each base individually, factoring base-specific site constraints, to maximize facility reuse and minimize cost. This selection process uses the strengths of each base to optimize the B-21 beddown strategy. Using this process, USAF planners developed three Courses of Action (COAs) for the B-21 beddown at Dyess AFB.

The general construction footprints for each of these COAs are shown in Figure 2.4-2. There are some overlapping footprints in Figure 2.4-2 where proposed facility and infrastructure projects are the same for all three COAs.

The facilities and infrastructure projects included in COA 1 would occur along the northern end of the parking apron. COA 2 projects would be located along the middle section of the parking apron currently used by the 317th Airlift Wing for C-130J operations and associated flightline maintenance support.

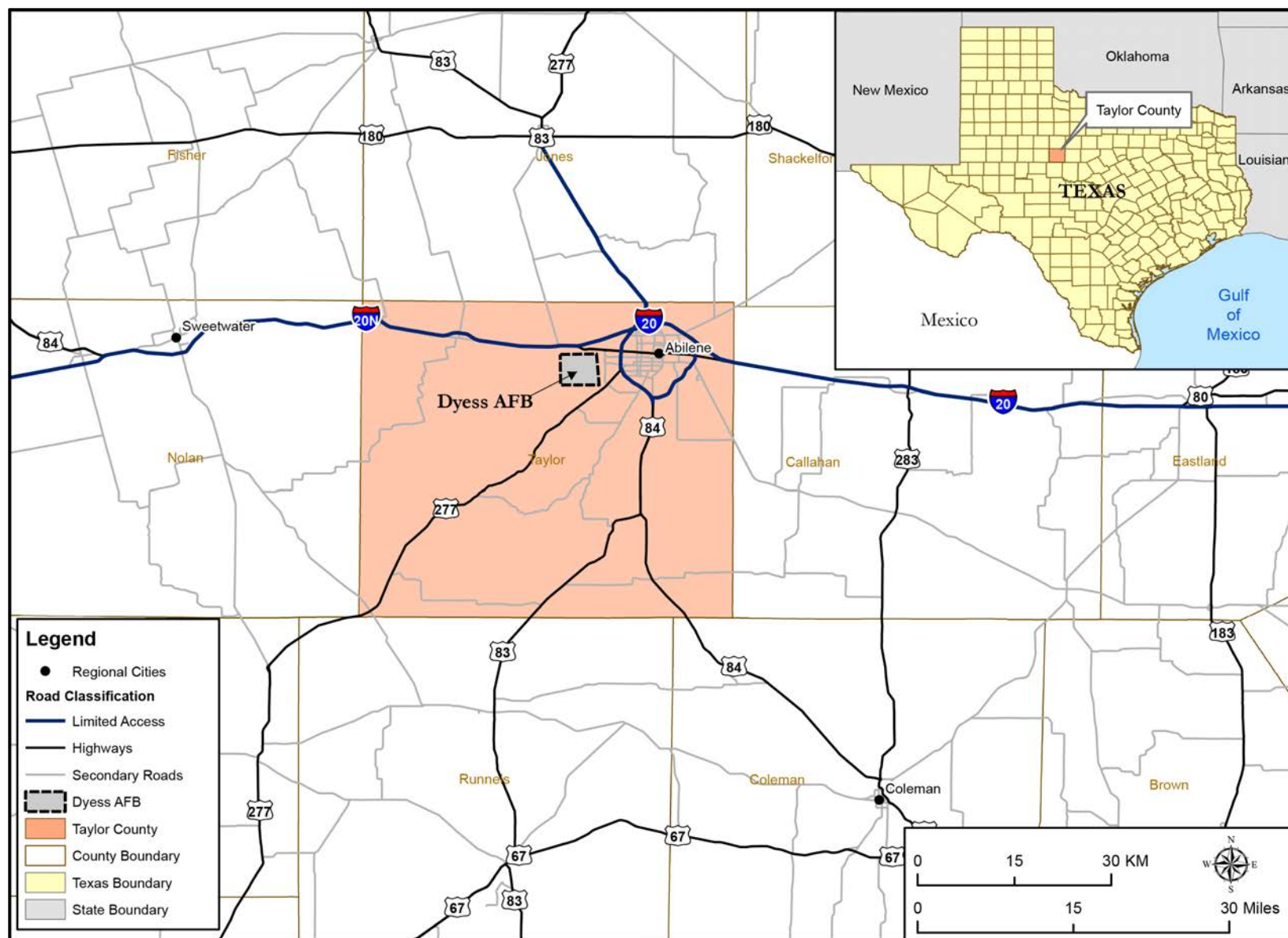


Figure 2.4-1. Dyess AFB Location

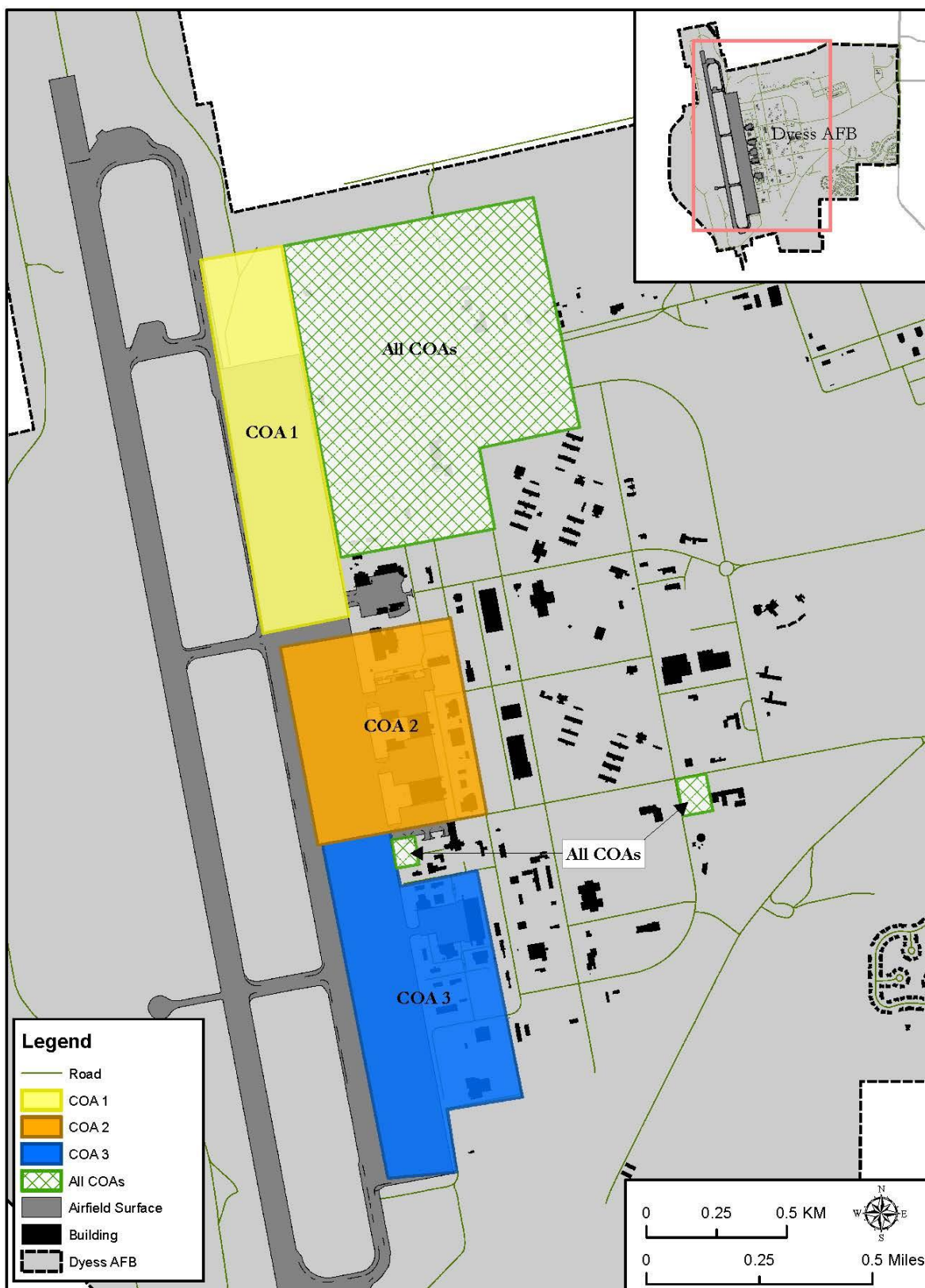


Figure 2.4-2. Dyess Courses of Action (COAs) Evaluated for MOB 1

Implementation of COA 2 for the B-21 MOB 1 beddown would disrupt this critical mission associated with the 317th Airlift Wing. Therefore, the USAF eliminated COA 2 from consideration for MOB 1.

COA 3 projects would be located at the southern end of the parking apron where current B-1 operations occur. Even though the B-21 will eventually replace B-1 bombers, implementing COA 3 would interrupt current B-1 critical missions. Consequently, the USAF also eliminated COA 3 from consideration for MOB 1. As shown in Figure 2.4-2, the construction footprint associated with COA 1 consolidates all facilities and infrastructure projects needed to support the B-21 into one main area on the base. This configuration provides an efficient solution for establishing the necessary infrastructure and facilities required to support MOB 1 operational functions. Furthermore, implementation of COA 1 would not interfere with other ongoing missions at Dyess AFB. As a result, the USAF carried forward COA 1 as part of the Dyess AFB Alternative.

The facilities and infrastructure projects associated with COA 1 are shown in Table 2.4-1 and would be constructed to establish the B-21 MOB 1 at Dyess AFB.

Table 2.4-1. Facilities and Infrastructure for the Dyess AFB Alternative

Facility	Size (square feet)	Status
Low Observable Facility	87,000	New
Fire Pump House	3,000	New
Central Maintenance Hangar Apron	235,000	New
Airfield Operations Facility	12,845	New
Fuels Support (Administrative, Lab)	6,342	New
Fuel Truck Parking Area	120,000	New
Fuel Truck Maintenance Facility	7,703	New
Long Range Strike Cargo/Terminal	5,972	New
Network Infrastructure Upgrade	50,000	New
Formal Training Unit (FTU) Operations (Ops)/Aircraft Maintenance Unit (AMU) (co-located)	50,000	New
General Maintenance (1 bay)	34,776	New
General Maintenance (1 bay)	34,776	New
Simulation Facility	20,000	New
Field Training Detachment	26,000	New
Mission Planning Cell	35,000	New
Squadron Ops/AMU 1	120,000	New
Overhead Mission Generation Shelters	18,000	New
Phase Dock (2 bays)	87,000	New
Northern Maintenance Hangar Apron	190,000	New
Parts Store	11,000	New
Warehouse SAP and Cold Storage	10,000	New
Measurements Hangar (1 bay)	60,000	New
Weapons Load Training	37,258	New
Southern Maintenance Hangar Apron	210,000	New
Fuel Cell (1 bay)	34,776	New
Fuel Cell (1 bay)	34,776	New
Armament Shop	54,993	New
1 Bay Wash Rack	34,776	New
1 Bay Wash Rack	34,776	New

Table 2.4-1. Facilities and Infrastructure for the Dyess AFB Alternative

Facility	Size (square feet)	Status
Alert Facility	19,000	New
Alert Ramp	825,000	New
Aerospace Ground Equipment (AGE)	15,000	New
AGE Refueling	3,000	New
Squadron Ops 2	113,000	New
Privately Owned Vehicle Parking	16,000	New
Simulation Facility Phase II	20,000	New
Base Operating Support (BOS) – Dormitory	62,000	New
BOS – Child Development Center	10,000	Renovation
BOS – Fitness Center	15,000	Renovation
BOS – Dining Facility	4,000	Renovation
Avionics	18,000	New
AGE	10,000	Renovation
BOS – Command Post	7,000	Renovation
Alert Support Facilities	10,000	New
Engine Run Up Areas/Test Areas	630	New
Engine Shop	20,000	New
HAZMART (Hazardous Materials Pharmacy)	2,000	New
Building 4112	5,972	Demolition
Building 4119	3,382	Demolition
Building 4170	7,703	Demolition
Building 4111	7,089	Demolition
Building 9001	12,840	Demolition
1 Bay Wash Rack	34,776	Demolition

Due to operational security concerns, the specific locations of the facilities included in Table 2.4-1 cannot be illustrated. However, USAF planners evaluated land use limitations and identified the general planned area of construction, or construction footprint, shown in Figure 2.4-3. The resulting general planned areas of construction correspond to the COA 1 footprint shown in Figure 2.4-2. Construction associated with each of these facilities and infrastructure projects included in COA 1 would allow both initial operational flying and flight training activities associated with both the Operations and FTU squadrons.

2.4.3 Weapons Generation Facility

USAF planners identified five locations at Dyess AFB as possible sites for the WGF (Figure 2.4-4). Four locations were eliminated due to the presence of one or more negative site evaluation criteria discussed in Section 2.2.2 (Screening Criteria for Base Infrastructure Development). As shown on Figure 2.4-4, Location 2 was eliminated because it occurs at an existing Explosive Ordnance Disposal range where the presence of unexploded ordnance is possible and would require closure studies and necessitate construction of a new range at an undisturbed site. Locations 3 and 4 were eliminated because flood zones run across both sites. Location 5 was eliminated based on a combination of operational readiness concerns, including nearness to the airfield. The remaining proposed location satisfies all evaluation criteria that are unique to the WGF and is depicted as Location 1 on Figure 2.4-4.

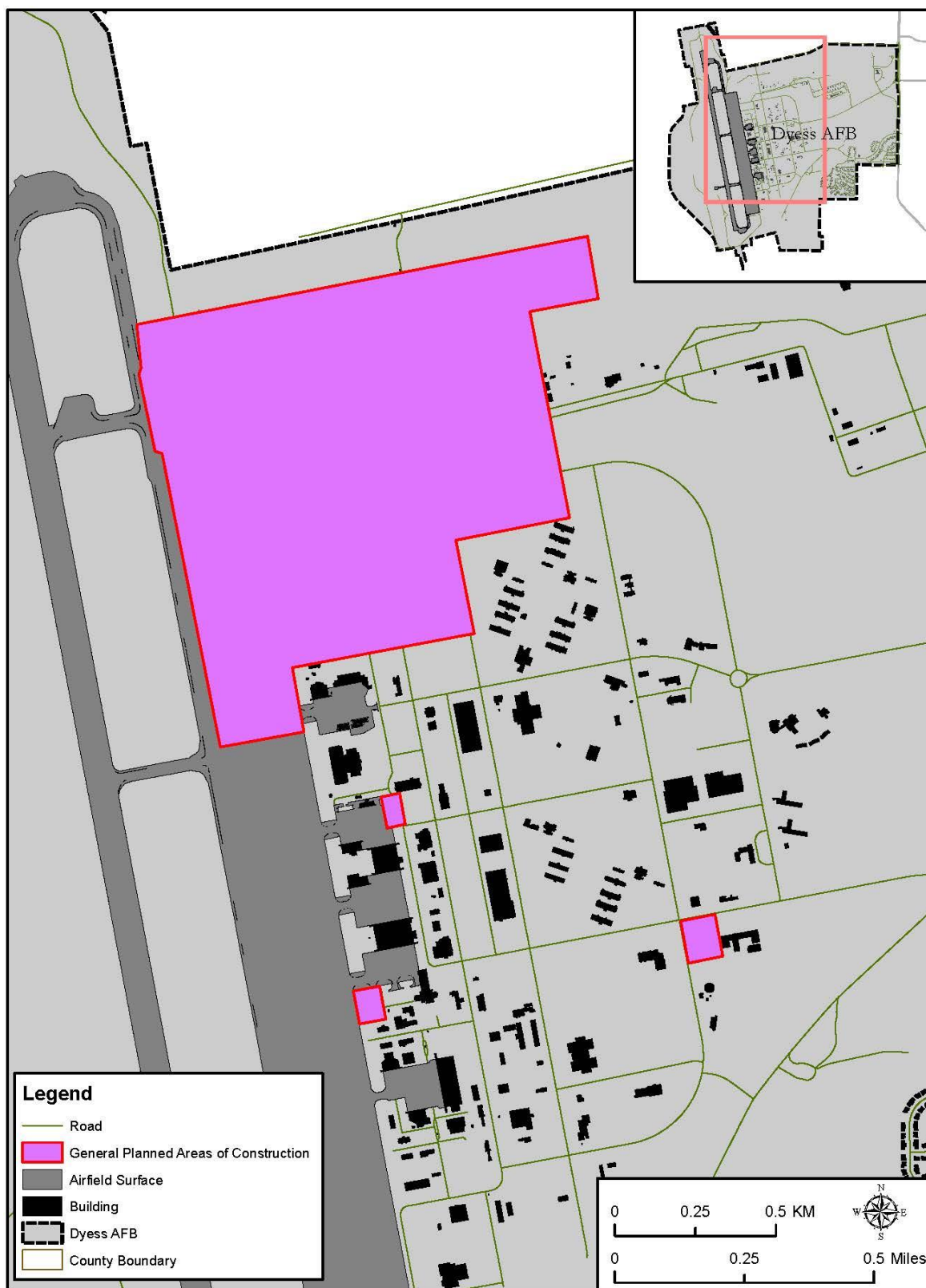


Figure 2.4-3. Facilities and Infrastructure Planned Areas of Construction – Dyess AFB Alternative

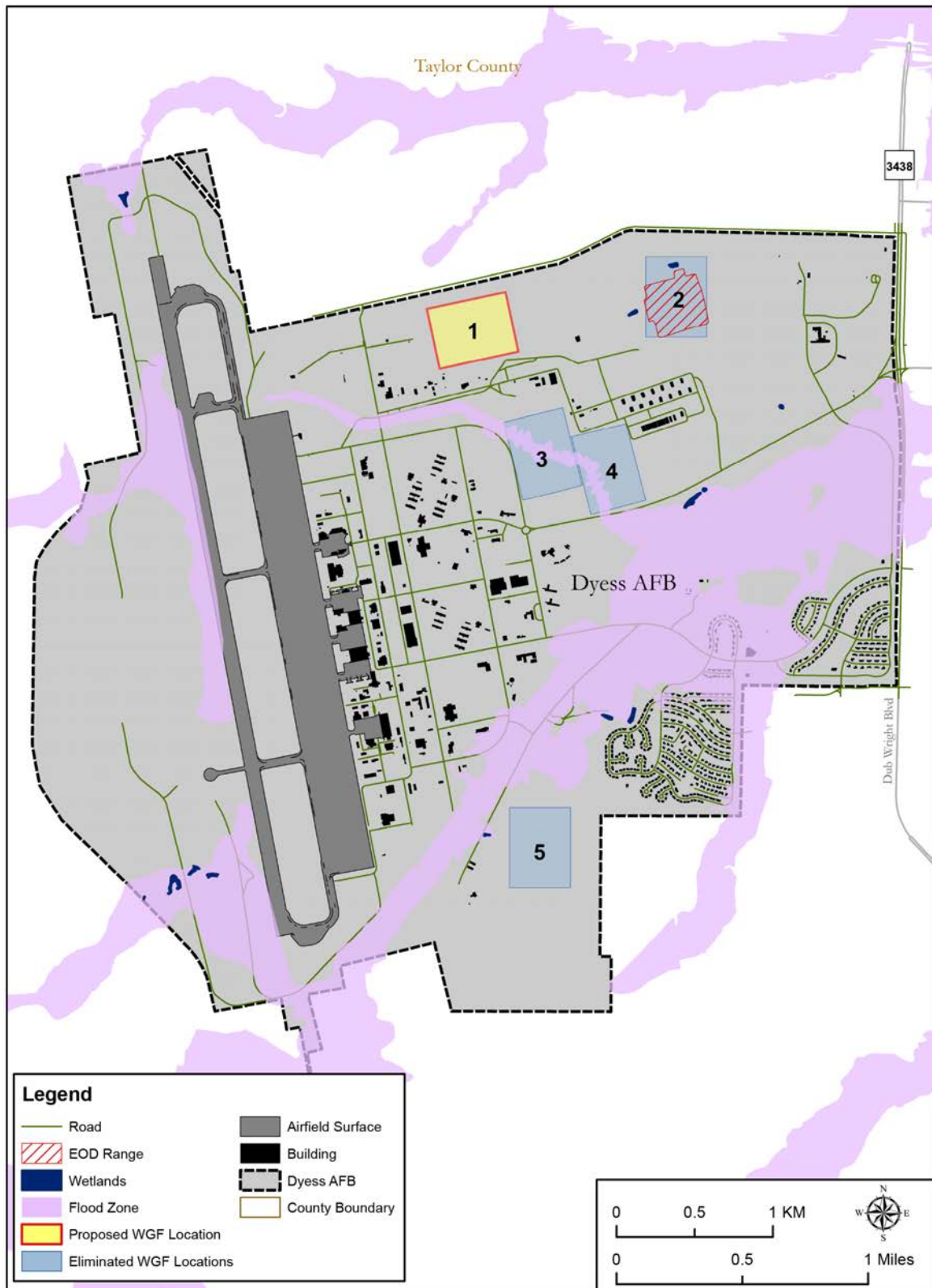


Figure 2.4-4. Weapons Generation Facility (WGF) Planned Areas of Construction – Dyess AFB Alternative

2.5 ELLSWORTH AFB ALTERNATIVE (PREFERRED ALTERNATIVE)

2.5.1 Background

Ellsworth AFB consists of approximately 5,415 acres in Meade and Pennington Counties in southwestern South Dakota, 7 miles northeast of Rapid City (see Figure 2.5-1). The City of Box Elder borders the installation to the south.

The 28th Bomb Wing (28 BW) is the host unit to Ellsworth AFB and is aligned with the 8th Air Force under USAF Global Strike Command. The 28 BW is the other B-1 strategic bomber wing in the USAF, along with the 7 BW at Dyess AFB. It is responsible for training and equipping combat-ready forces for the application of conventional airpower worldwide. The primary tenants of Ellsworth AFB include the 372nd Training Squadron, the 89th Attack Squadron, the Air Force Financial Services Center, and the Air Force Office of Special Investigations Detachment 816. Currently, the B-1 is the only aircraft that operates out of Ellsworth AFB.

The Ellsworth AFB Alternative would establish MOB 1 at Ellsworth AFB, which includes all common elements described above in Section 2.3 (Commonalities). The siting of facilities, infrastructure, and the WGF on Ellsworth AFB, as described in Section 2.5.2 (Facilities and Infrastructure) and Section 2.5.3 (Weapons Generation Facility), presented the USAF with a scenario where multiple solutions have been identified for establishing MOB 1 at Ellsworth AFB. As a result, two subalternatives are associated with the Ellsworth AFB Alternative, described in Sections 2.5.4 (North WGF Site Subalternative at Ellsworth AFB) and 2.5.5 (South WGF Site Subalternative at Ellsworth AFB).

Based on the results of the analyses presented in the Draft EIS and consideration of public comments received during the scoping process, the USAF has validated the Ellsworth AFB Alternative as the Preferred Alternative. Comparison of potential impacts from the beddown at Dyess AFB and Ellsworth AFB did not yield a substantial difference between the two locations.

2.5.2 Facilities and Infrastructure

As outlined in Section 2.2.1 (Screening Criteria Process for MOB 1), USAF planners applied screening criteria at each base individually, considering base-specific site constraints, to maximize facility reuse and minimize cost. This selection process uses the strengths of each base to optimize the B-21 beddown strategy. Using this process, USAF planners developed three COAs for the B-21 beddown at Ellsworth AFB.

The general construction footprints for each of these COAs are shown in Figure 2.5-2. There are some overlapping footprints in Figure 2.5-2 where proposed facility and infrastructure projects are the same for all three COAs.

The facilities and infrastructure projects for COA 1 would occur along the southern end of the runway. Implementation of COA 1 would re-use much of the existing infrastructure associated with the south docks, but would require maintenance operations to be split across the base. Additionally, existing infrastructure would need significant renovation and substantial pavement additions to areas associated with COA 1. Because of the cost and split maintenance operations, the USAF determined that COA 1 would not be a reasonable solution for supporting B-21 MOB 1 operations. As shown in Figure 2.5-2, facilities and infrastructure projects included in COAs 2 and 3 would be located along the north end of the runway. While COA 2 and COA 3 would be located near where current B-1 operations occur, neither COA would interrupt the B-1 mission. COA 2 and COA 3 have overlapping construction footprints, but COA 3 is a variation on the use of the same infrastructure as COA 2. After engineering review, the USAF determined that implementing a combination of COA 2 and COA 3 would be more efficient than COA 3 in meeting B-21 MOB 1 operations. As a result, the USAF carried forward the combination of COA 2 and COA 3, hereinafter referred to as the revised COA 2.

The facilities and infrastructure projects associated with the revised COA 2 listed in Table 2.5-1 would be implemented to establish the B-21 MOB 1 at Ellsworth AFB. Similar to the Dyess AFB Alternative, due to operational security concerns, the exact locations of the facilities included in Table 2.5-1 cannot be illustrated. However, Figure 2.5-3 shows where USAF planners evaluated land use limitations and identified a general planned area of construction, or construction footprint. The general planned areas of construction correspond to the revised COA 2 footprint shown in Figure 2.5-2.

Table 2.5-1. Facilities and Infrastructure for the Ellsworth AFB Alternative

Facility	Size (square feet)	Building Type
Low Observable Facility	95,691	New
Aerospace Ground Equipment (AGE) Refueling	268,000	New
Pavement associated with 60 Row	268,000	New
Demolition associated with 60 Row	109,632	Demolition
Field Training Detachment	57,333	New
Formal Training Unit (FTU) Operations/Aircraft Maintenance Unit	93,263	New
Mission Planning Complex	47,117	New
Operations 1	4,000	Re-Use
Parts (B-1) Reno	29,165	Re-Use
AGE and Corrosion/Paint/Crane	124,694	Re-Use
Wash/Maintenance Hangar (2 bays)	56,810	New
Overhead Mission Generation Shelters (30 total)	600,000	New
Pavement	307,000	New

Table 2.5-1. Facilities and Infrastructure for the Ellsworth AFB Alternative

Facility	Size (square feet)	Building Type
Simulator Building Phase 1	26,340	Add/Alter
Radio Frequency Facility (1 bay)	67,000	New
Weapons Load Training	46,624	Re-Use
Fire Pump House	3,000	New
Armament Shop	26,316 ^a	Re-Use
Pavement	105,000	New
Parts and Prop (B-21) Reno	40,249	Re-Use
Privately Owned Vehicle (POV) Parking	732	New
Simulator Building Phase 2	30,304	Re-Use
Fuel Cell	32,094	Re-Use
Fuel Cell	28,885	Re-Use
Phase Hangar (2 bays)	88,200 ^b	New
Pavement	1,211,000	New
POV Parking	244	New
Alert Facility and Ramp	131,897 ^c	Re-Use
Alert Apron	510,088	New
Maintenance Hangar	30,729	Re-Use
Maintenance Hangar	30,776	Re-Use
Weapons Load Training	36,437	Re-Use
Operations 2	4,000	Re-Use (B7270)
Pavement	845,000	Re-Use
Base Operating Support (BOS) – Dormitories (2)	170,000 ^d	New
BOS – Youth Center/Childhood Development Center	48,450	New
BOS – Ballfields	243,320 ^e	New
Combat Arms Training and Maintenance	30,000	New
Fire Station #2	23,000	New
HAZMART (Hazardous Materials Pharmacy)	16,500	Add/Alter
Rushmore Center Upgrades	66,985	Re-Use
Contractor Laydown Areas/Batch Plant	67,000	New
Supply Warehouse (replace B7510)	40,000	New

Notes:

a. Includes additional storage space

b. Total square footage for two bays

c. Includes facility and apron

d. Total square footage for two dormitories, based on 198 occupants in each

e. Assumes two football fields, one baseball field, and a 10 percent buffer area around the fields

2.5.3 Weapons Generation Facility

USAF planners identified six possible locations at Ellsworth AFB for the WGF (see Figure 2.5-4). After applying the screening criteria (see Section 2.2.2, Screening Criteria for Base Infrastructure Development), USAF planners eliminated four locations. Locations 2 and 3 were eliminated because they did not adequately satisfy operational readiness requirements because they were considered to be too far away from the runway and the alert apron to accommodate time-sensitive mission requirements. Location 4 was eliminated due to its proximity to wetlands, and Location 6 was eliminated due to unfavorable topography that would result in construction complications. Therefore, Locations 1 and 5 were selected as proposed locations because they satisfied the site evaluation criteria unique to the WGF.

2.5.4 North WGF Site Subalternative at Ellsworth AFB

In addition to the commonalities described in Section 2.3 (Commonalities), the North WGF Site Subalternative consists of constructing the WGF at a location on Ellsworth AFB hereafter referred to as the North WGF Site (Location 1 on Figure 2.5-4). The North WGF Site is located at the north end of the runway, which facilitates operational readiness requirements for the B-21 mission.

2.5.5 South WGF Site Subalternative at Ellsworth AFB (Preferred Subalternative)

In addition to the commonalities described in Section 2.3 (Commonalities), the South WGF Site Subalternative consists of constructing the WGF at a location referred to as the South WGF Site (Location 5 on Figure 2.5-4). The South WGF Site occurs in a flat area adjacent to the alert apron on the south side of the base. Similar to the North WGF Site, this location meets operational readiness requirements for the B-21 mission and does not contain any other site constraint features, such as uneven topography or wetlands.

Upon evaluation of both subalternatives, the USAF selected the South WGF Site as the Preferred Subalternative as part of identifying the Ellsworth AFB Alternative as the Preferred Alternative for the B-21 MOB 1 beddown. The South WGF Site's close proximity to the alert apron to meet time-sensitive requirements, favorable topographic conditions, and minimal site constraints made this location the best choice for the WGF. After identifying the South WGF Site Subalternative as the Preferred Subalternative, the USAF recognized the need to provide direct access to the WGF from the alert apron to further facilitate time-sensitive B-21 mission requirements. As a result, the USAF would construct a new bridge connecting the WGF to the alert apron. The bridge would disturb up to 12 acres of land, which includes approximately 1 acre of floodplains and 0.4 acre of wetlands. Discussion of bridge impacts are presented in the environmental consequences sections in Chapter 3, where applicable.

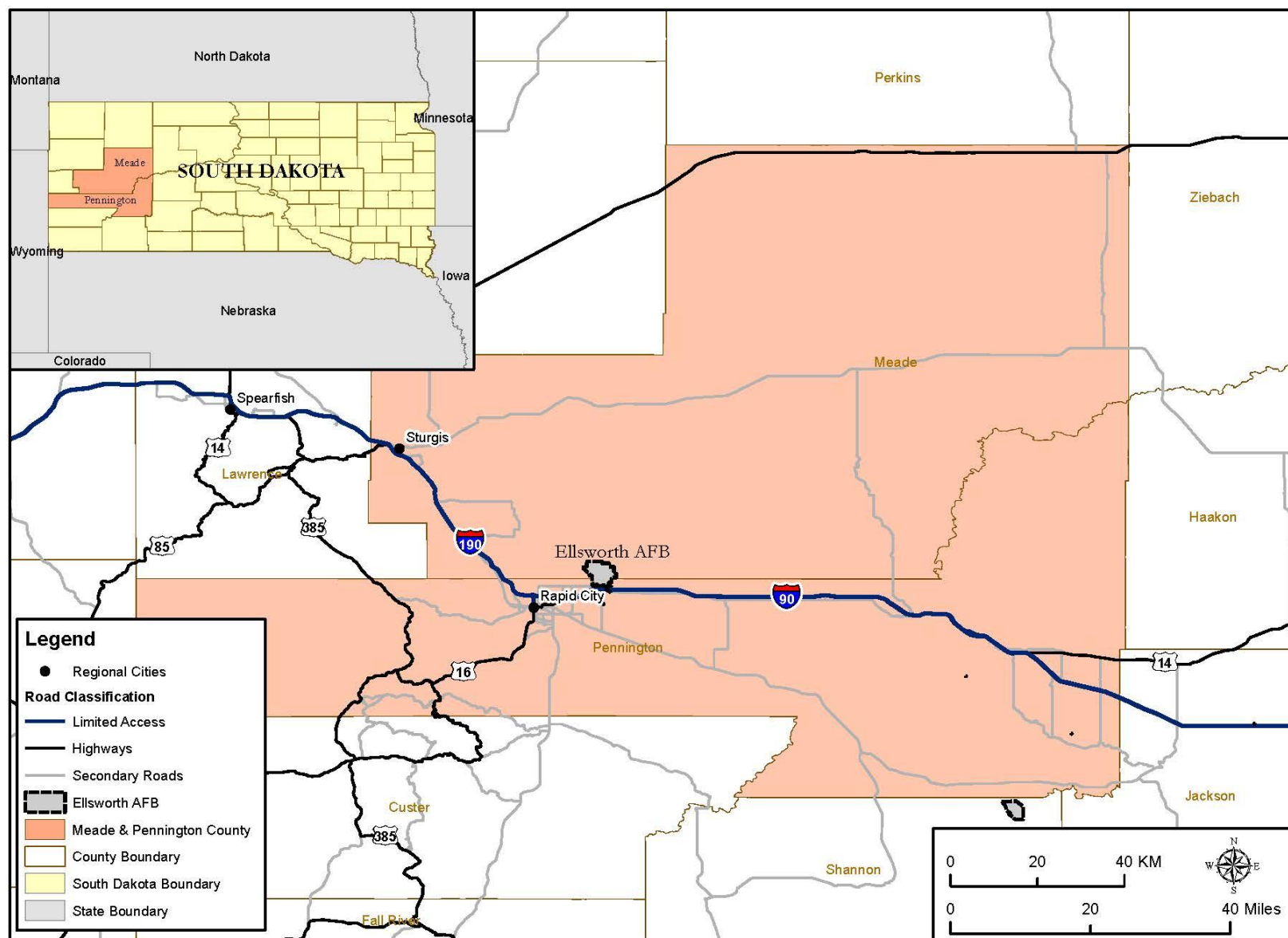


Figure 2.5-1. Ellsworth AFB Location

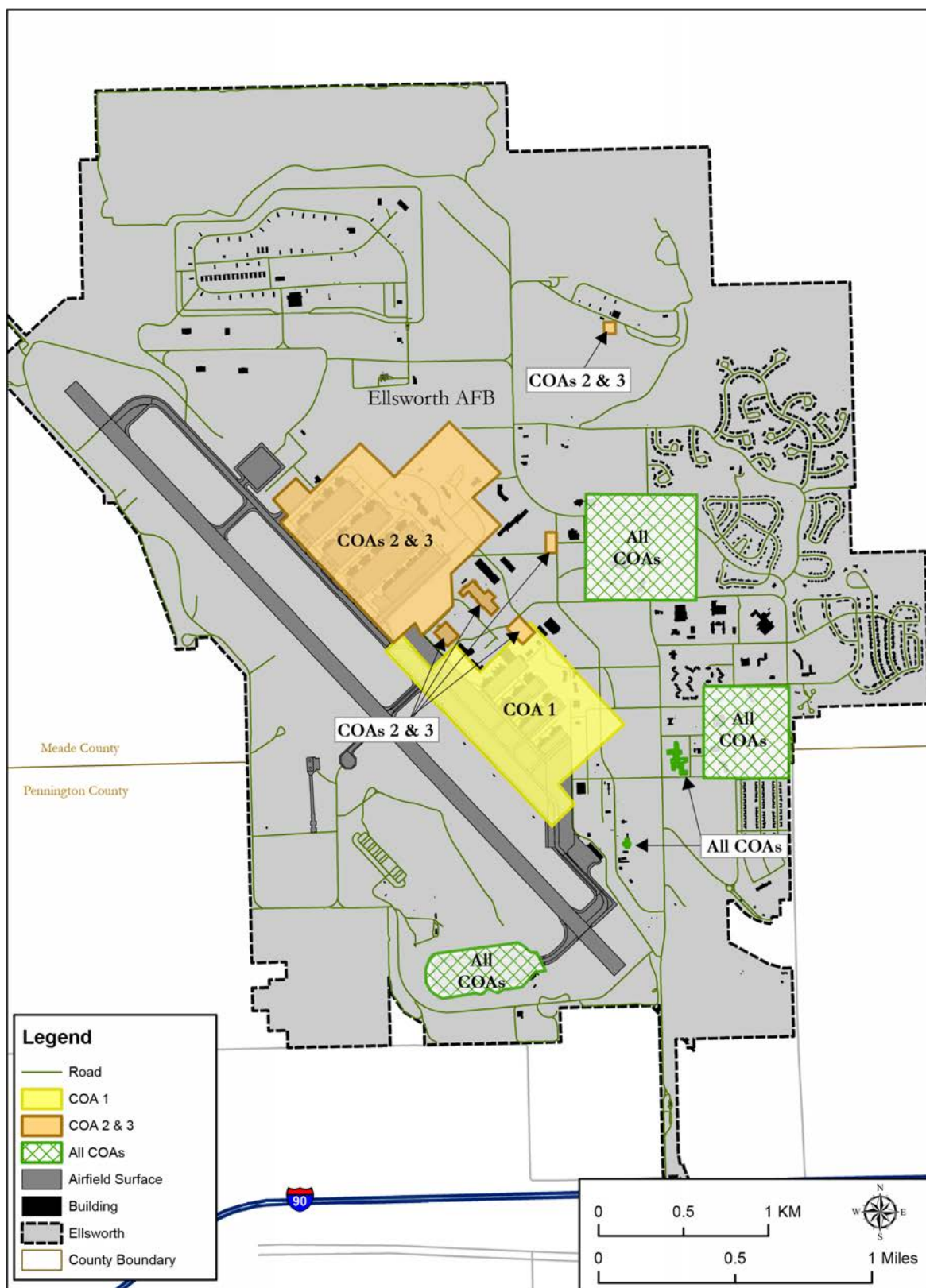


Figure 2.5-2. Ellsworth Courses of Action (COAs) Evaluated for MOB 1

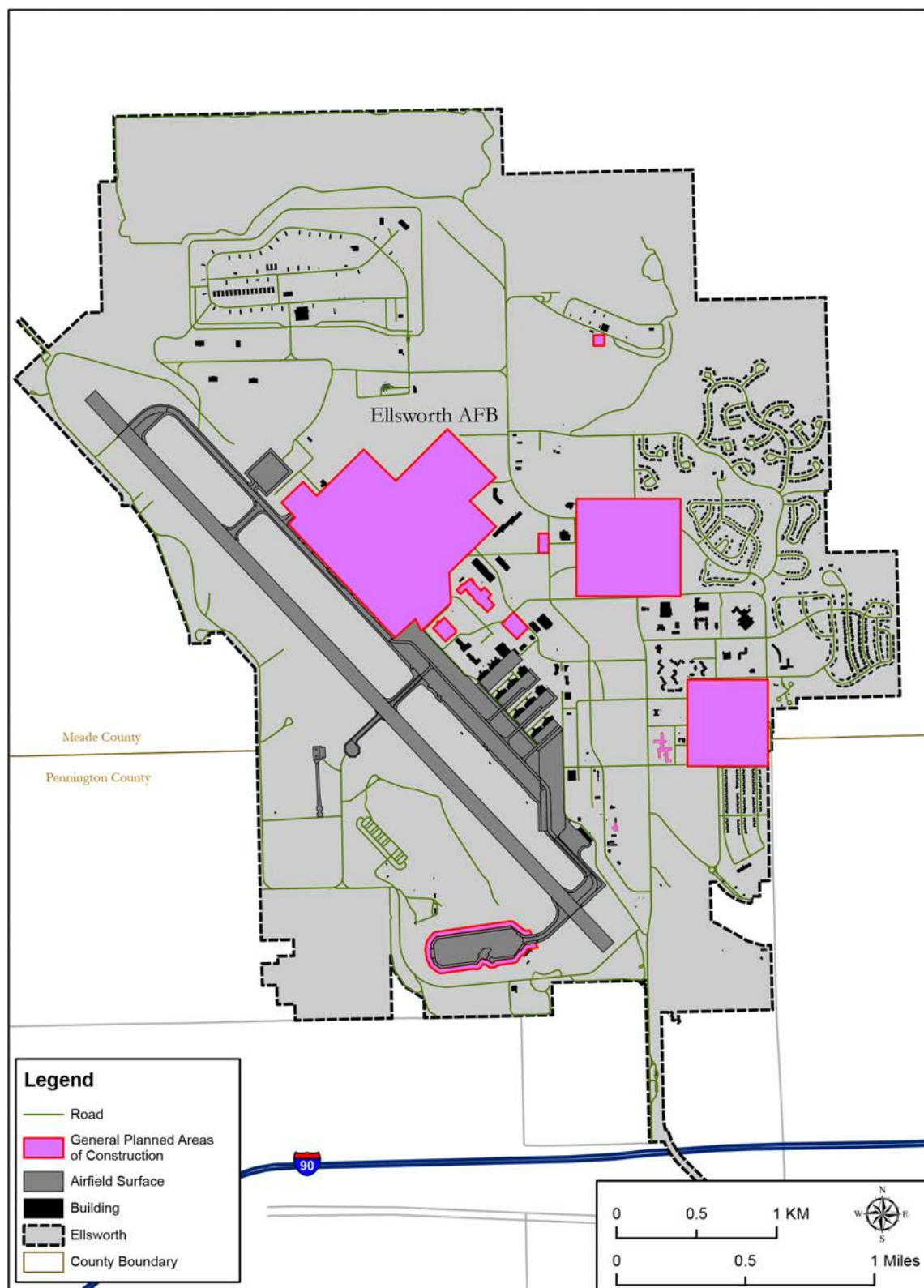


Figure 2.5-3. Facilities and Infrastructure Planned Areas of Construction – Ellsworth AFB Alternative

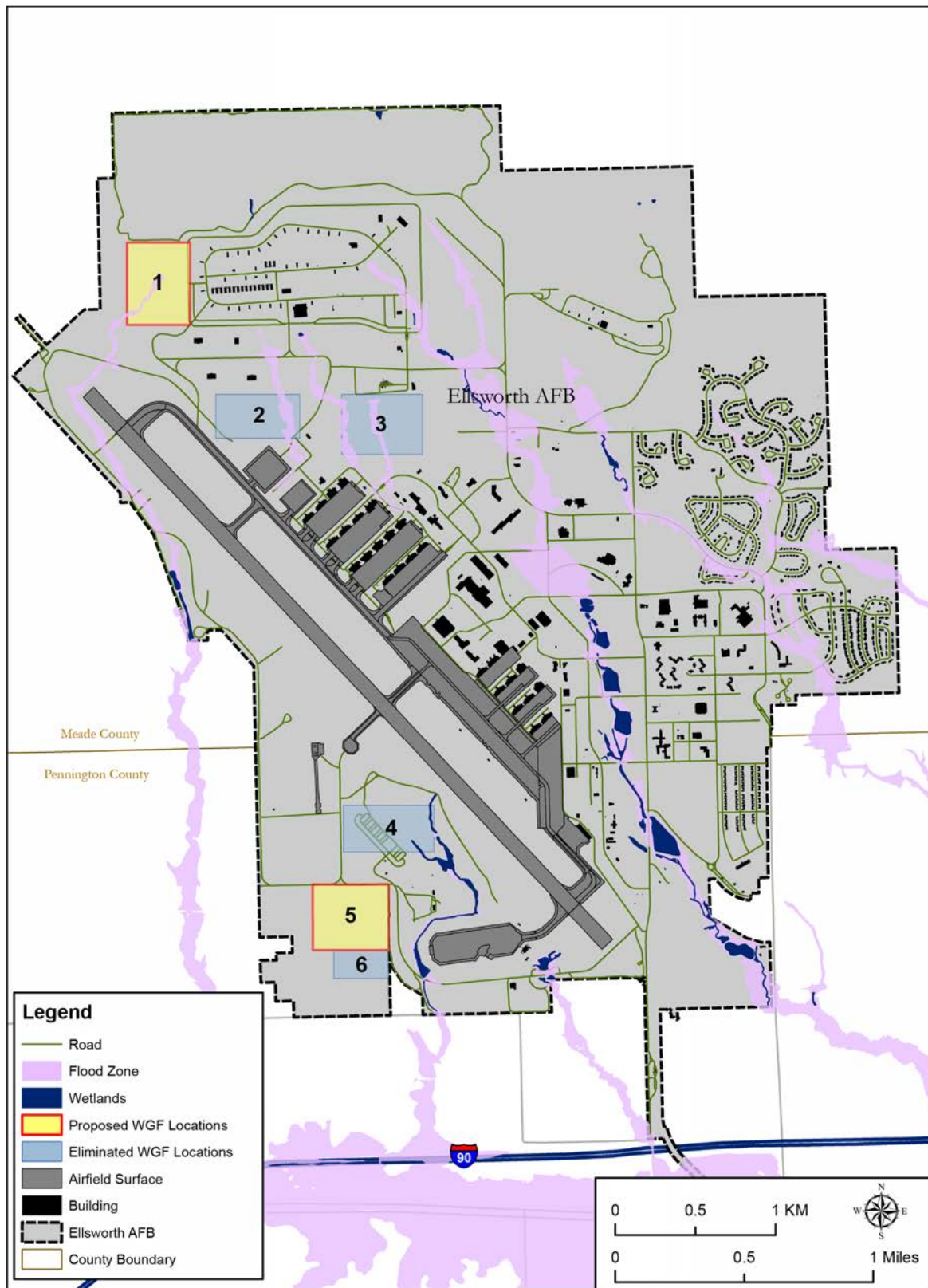


Figure 2.5-4. Weapons Generation Facility (WGF) Planned Areas of Construction – Ellsworth AFB Alternative

2.6 NO ACTION ALTERNATIVE

The CEQ regulations (40 CFR 1502.14(d)) require the alternatives analysis in an EIS to “include the alternative of no action.” Under the No Action Alternative, the B-21 would not be based at either Dyess AFB or Ellsworth AFB. However, the B-21 program is a major DoD initiative to ensure that the U.S. nuclear triad, consisting of land-, submarine-, and aircraft-launched nuclear weapons, is and remains effective. The B-21 program will be implemented whether or not the No Action Alternative is selected. If the No Action Alternative was selected due to unforeseen issues, the USAF would re-evaluate their B-21 phasing approach, using the strategic basing process, and implement the basing at another, undetermined location. Under the No Action Alternative, the B-1 mission would continue at both Dyess AFB and Ellsworth AFB until the USAF conducted their re-evaluation of the B-21 phasing approach.

Implementation of the No Action Alternative is not likely, but analysis of this alternative provides a baseline against which decision makers can compare the magnitude of potential environmental effects resulting from the action alternatives.

In this EIS, under the No Action Alternative, the B-21 would not be beddown at either Dyess AFB or Ellsworth AFB. This would mean that each alternative installation would continue their individual missions at current levels that are used as the baseline for the analysis. The following sections provide descriptions of the activities associated with the No Action Alternative, categorized by (1) personnel, (2) airfield operations, (3) airspace and range utilization, and (4) facilities.

2.6.1 No Action Alternative at Dyess AFB

Personnel

Table 2.6-1 lists the total number of active military and civilian personnel and dependents associated with the No Action Alternative at Dyess AFB, which includes the total number of dependents of 5,111 persons (Dyess AFB, 2018a). Since the actual numbers of children and spouses are not provided in the *Economic Impact Statement for Dyess AFB* (2018a), this EIS extrapolates these numbers from the total number of dependents by assuming that 55 percent of the active military and civilian personnel are married. The remaining number of total dependents are counted as children.

Personnel supporting current B-1 operations at Dyess AFB are also presented in Table 2.6-1. The ratios of spouses and children to active military and civilian personnel were calculated and used to estimate the number of dependents specifically associated with B-1 mission personnel. Under the No Action Alternative, personnel associated with the B-1 mission would stay at Dyess AFB and these numbers are already incorporated in the total number of personnel.

Table 2.6-1. No Action Alternative at Dyess AFB – Personnel

Personnel ^a	Total Number of Individuals	Number of B-1 Mission Individuals
Active Military	4,369	1,855
Civilian ^b	665	NA
Contractor	NA	NA
Spouses	2,769 ^c	1,020 ^d
Children	2,342 ^c	872 ^d
Total	10,145	3,747

Source: (Dyess AFB, 2018a)

NA = not available

Notes:

a. Does not include private businesses on base (Branch Banks/Credit Union) or retirees

b. Includes appropriated and non-appropriated fund civilians

c. Numbers of spouses and children were extrapolated from the total dependent number of 5,111, assuming 55 percent of military and civilian personnel are married and the remaining dependents are children.

d. The number of spouses and children at Dyess AFB associated with the B-1 mission was derived by calculating the ratio of actual dependents to total active military and civilian personnel. This resulted in ratios of 0.55 spouses and 0.47 children per active military personnel. These ratios were multiplied by 1,855 to obtain numbers of spouses and children associated with the B-1 mission at Dyess AFB.

Airfield Operations

Table 2.6-2 presents the number of air operations that would occur under the No Action Alternative at Dyess AFB.

Table 2.6-2. No Action Alternative at Dyess AFB – Airfield Operations

Aircraft Type	Airfield Operations
B-1	9,720
C-130J	36,400
Transient Aircraft	2,820
Total	48,940

Note: Operation counts are based on pilot estimates for fiscal year 2019.

Due to the numerous different types of aircraft that use Dyess AFB for transient activities, the T-38 was selected as a surrogate for air quality and noise modeling because the T-38 represents the highest percentage of transient aircraft activities at Dyess AFB.

Airspace and Range Utilization

Airspace and range utilization for the No Action Alternative at Dyess AFB would continue to include the PRTC, the Nevada Test and Training Range, and the Utah Test and Training Range for supersonic training activities, as well as additional training in the airspace above the Brownwood MOA, Lancer MOA, and the Pecos MOA (Figure 2.3-1) and their associated ATCAAs.

Facilities

There would be no construction associated with the No Action Alternative at Dyess AFB. However, there would be annually planned demolition, construction, and maintenance activities, which is reflected in the cumulative impacts section.

2.6.2 No Action Alternative at Ellsworth AFB

Personnel

Table 2.6-3 lists the total number of active military, civilian, and contractor personnel and dependents associated with the No Action Alternative at Ellsworth AFB, which includes the total number of dependents of 6,331 persons (Ellsworth AFB, 2016a). Since the actual numbers of children and spouses are not provided in the *Economic Impact Analysis for Ellsworth AFB* (Ellsworth AFB, 2016a), this EIS extrapolates these numbers from the total number of dependents by assuming that 55 percent of the active military, civilian, and contractor personnel are married. The remaining number of total dependents are counted as children.

Personnel supporting current B-1 operations at Ellsworth AFB are also presented in Table 2.6-3. The ratios of spouses and children to active military and civilian personnel were calculated and used to estimate the number of dependents specifically associated with B-1 mission personnel. Under the No Action Alternative, personnel associated with the B-1 mission would stay at Ellsworth AFB and these numbers are already incorporated in the total number of personnel.

Table 2.6-3. No Action Alternative at Ellsworth AFB – Personnel

Personnel ^a	Total Number of Individuals	Number of B-1 Mission Individuals
Active Military	3,196	1,836
Civilian ^b	930	NA
Contractor	139	NA
Spouses	2,346 ^c	1,010 ^d
Children	3,985 ^c	1,707 ^d
Total	10,596	4,553

Source: (Ellsworth AFB, 2016a)

Notes:

a. Does not include private businesses on base (branch banks/credit union): 26 personnel

b. Includes appropriated and non-appropriated fund civilians

c. Numbers of spouses and children were extrapolated from the total dependent number of 6,331, assuming 55 percent of military, civilian, and contractor personnel are married and the remaining dependents are children.

d. The number of spouses and children at Ellsworth AFB associated with the B-1 mission was derived by calculating the ratio of actual dependents to total active military, civilian, and contractor personnel. This resulted in ratios of 0.55 spouses and 0.93 children per active military personnel. These ratios were multiplied by 1,836 to obtain numbers of spouses and children associated with the B-1 mission at Ellsworth AFB.

Airfield Operations

Table 2.6-4 presents the number of airfield operations that would occur under the No Action Alternative at Ellsworth AFB.

Table 2.6-4. No Action Alternative at Ellsworth AFB – Airfield Operations

Aircraft Type	Airfield Operations
B-1	8,256
Transient	654
Total	8,910

Note: Operation counts are based on projected fiscal year 2020 annual sorties. Transient aircraft at Ellsworth AFB include C-130J, T-38, F/A-18E/F, C-12, KC-135, P-8A, and H-60.

Airspace and Range Utilization

Until the completion of the time-phased drawdown of existing B-1 aircraft, range utilization for the No Action Alternative at Ellsworth AFB would continue to include the PRTC, the Nevada Test and Training Range, and the Utah Test and Training Range for supersonic training activities.

Facilities

There would be no new construction associated with the No Action Alternative at Ellsworth AFB. However, there would be annually planned demolition, construction, and maintenance activities, which is reflected in the cumulative impacts section.

2.7 REGULATORY COMPLIANCE

2.7.1 Other Regulations and Permit Requirements

This EIS has been prepared in compliance with NEPA; other federal statutes, such as the Clean Air Act and the Clean Water Act; Executive Orders (EOs); and applicable state statutes and regulations. A list of permits and certifications was compiled and reviewed during the EIS process. Table 2.7-1 summarizes these applicable federal, state, and local permits/regulations and the potential for change to the permits due to implementing the proposed beddown or an alternative at each candidate base.

Table 2.7-1. Applicable Federal, State, and Local Permits/Regulations

Resource Area	Permits/Regulations	Dyess AFB Potential Changes	Ellsworth AFB Potential Changes
Air Quality	Clean Air Act, Title V Air Operating Permit	Although permit status is not likely to be affected, it would be prudent to review equipment (e.g., boilers) and operations at the proposed facilities to ensure there are no required amendments to the existing Synthetic Minor Source Air Operating Permit (RN 100218858, Permit 1377 for Dyess and Permit No. 28.9904-02 for Ellsworth).	
Environmental Justice	Executive Order (EO) 12898, <i>Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations</i> (1994)	None	
	EO 13045, <i>Protection of Children from Environmental Health Risks and Safety Risks</i> (1997)	None	
Biological Resources	U.S. Fish and Wildlife Service-issued depredation permits, updated annually Ellsworth AFB: State-issued resident wildlife depredation permit and a federal bird banding permit	None	

Table 2.7-1. Applicable Federal, State, and Local Permits/Regulations

Resource Area	Permits/Regulations	Dyess AFB Potential Changes	Ellsworth AFB Potential Changes
Cultural Resources	National Historic Preservation Act (NHPA)	No permits required. Section 106 consultation with the State Historic Preservation Officer (SHPO) and Tribes have occurred as needed.	No permits required. NHPA (54 United States Code 306108) consultation with the SHPO and Tribes have been conducted to determine effects and mitigate any adverse effects to historic properties associated with construction activities.
Physical Resources	Dyess AFB: Texas Pollutant Discharge Elimination System (TPDES) General Permit TXR05000; Municipal Separate Storm Sewer System (MS4) Permit TXR040000.	The Storm Water Pollution Prevention Plan (SWPPP) for each base would need to be revised to include changes to the stormwater management system, drainage pathways, and base operations after establishment of the B-21 Main Operating Base (MOB).	
	Ellsworth AFB: Surface Water Discharge Permit SD0000281		
	Dyess AFB: Construction General Permit TXR150000	Construction projects would result in land disturbance greater than 1 acre and would require coverage under the state's Construction General Permit.	
	Ellsworth AFB: Construction General Permit SDR100000		
	Dyess AFB: Floodplain development permit from Taylor County Ellsworth AFB: Floodplain development permit from Meade County	The base may need to obtain a floodplain development permit from Taylor County for Dyess AFB or Meade County for Ellsworth AFB if B-21 facilities are to be constructed within floodplain areas.	
	40 Code of Federal Regulations (CFR) 112: Oil Pollution Prevention		
	40 CFR 280: Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks	If new underground storage tanks are installed as part of the B-21 MOB 1, design and operation of the tanks must adhere to the requirements specified in this regulation.	
	State Storage Tank Programs		
	Section 438 of the Energy Independence and Security Act	Stormwater management controls would conform with Section 438 of the Energy Independence and Security Act.	

Table 2.7-1. Applicable Federal, State, and Local Permits/Regulations

Table 17: Air Applicable Federal, State, and Local Permit/Regulations			
Resource Area	Permits/Regulations	Dyess AFB Potential Changes	Ellsworth AFB Potential Changes
Hazardous Materials and Hazardous and Solid Wastes	Texas: Texas Administrative Code, Title 25, Part 1, Chapter 295, Subchapter C (asbestos) and Subchapter I (lead-based paint)	Asbestos and lead-based paint abatement during construction and/or renovation activities would be subject to notification and other requirements.	
	South Dakota: Administrative Rules of South Dakota 74:31 and 74:36:08 (asbestos), Sections 402a and 404 of the Toxic Substances Control Act, Title IV (lead-based paint)		
		Department of Defense and State (South Dakota Department of Environment and Natural Resources) Memorandum of Agreement Cooperative Agreement	Ellsworth AFB has a Federal Facility Agreement that provides information on how contamination at Environmental Restoration Program (ERP) sites are addressed by USAF, federal, and state regulators.

2.8 ENVIRONMENTAL COMPARISON OF ALTERNATIVES

Table 2.8-1 provides a summary of the environmental consequences of the B-21 beddown construction activities, grouped by resource area, associated with each alternative. It also shows the No Action condition for each resource. Table 2.8-2 provides a similar summary for B-21 flight training activities.

Table 2.8-1. Environmental Consequences of B-21 MOB 1 Construction by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative (Preferred Alternative)	No Action Alternative
Airspace Use and Management	Airspace would not be affected by construction activities.		
Noise	Facilities and infrastructure C&D activities would result in temporary, localized increases in noise levels. However, the installation and surrounding area is exposed to frequent loud aircraft operations noise and ground vehicle traffic noise under baseline conditions. Additionally, demolition and construction activities would be conducted during normal business hours. In this context, the temporary and localized noise generated by C&D activities on the installation could be disruptive and annoying, but would not be significant.		Under the No Action Alternative, there would be no additional construction and no associated noise impacts.
Air Quality	Air quality impacts from construction/demolition/renovation activities would be minor and temporary. Particulate matter impacts could be reduced through the use of BMPs, such as spraying with water and covering of haul loads. Additionally, construction would likely be phased, which would serve to further minimize impacts over the length of the construction timeframe.		Under the No Action Alternative, there would be no additional construction and thus there would be no adverse impacts to regional air quality.
Land Use	All on-base development activities associated with the B-21 beddown would be conducted in accordance with installation land use planning procedures and requirements. There would be no change to existing land use designations. Any adjacent off-base development resulting from the B-21 beddown would likely occur with consideration of aircraft noise, APZs, height restrictions, and corresponding land use compatibility. No significant impacts would result from implementation of either alternative.		Under the No Action Alternative, the B-21 beddown would not take place at Dyess AFB or Ellsworth AFB and there would be no associated construction, demolition, or renovation activities. On-base development would continue to adhere to existing land use planning procedures and requirements. Any future development projects would be subject to project-specific environmental review. There would be no significant impacts.
Socioeconomics	New construction, demolition, and modifications to facilities and infrastructure would result in direct, indirect, and induced economic impacts in the ROI. Cost details regarding the facilities and infrastructure are not available at the time of this EIS. However, it would be anticipated that construction, demolition, and renovations for base facilities and infrastructure would result in near-term economic benefits to the ROI, driven by an increase in construction spending. Construction-related impacts would last for the duration of the activities.		Under the No Action Alternative, the B-21 beddown would not take place at Dyess AFB or Ellsworth AFB and there would be no construction, demolition, or renovation activities required.

Table 2.8-1. Environmental Consequences of B-21 MOB 1 Construction by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative (Preferred Alternative)	No Action Alternative
Environmental Justice	No impacts to environmental justice or sensitive populations would occur because all construction activities would occur within installation boundaries and noise would be intermittent and temporary.		
Biological Resources	Activities associated with construction, renovation, and demolition projects would occur in previously developed, turf, or landscaped areas. Noise resulting from the proposed construction, demolition, and renovation activities would be localized, short-term, and only occur during daylight hours. Areas proposed for construction are in a military industrial land use area, with frequent elevated noise levels. No significant impacts to vegetation, wildlife, or special status would result from implementation of either alternative.		Under the No Action Alternative, the B-21 beddown would not take place at Dyess AFB or Ellsworth AFB, and there would be no associated construction, demolition, or renovation activities. On-base biological resources would continue to be managed through each of the installation's BASH and Integrated Natural Resource Management programs.
Cultural Resources	Construction would not directly result in adverse effects to any historic properties at Dyess AFB.	The Area of Potential Effects includes all disturbance limits of the B-21 MOB 1 beddown, including demolition, construction, and renovation of facilities and structures on Ellsworth AFB. The proposed undertaking would require the demolition of three historic properties, renovation of a fourth historic property, and new construction for the WGF. Therefore, the USAF conducted National Historic Preservation Act Section 106 (54 United States Code 306108) consultation with the South Dakota SHPO and Advisory Council on Historic Preservation. The South Dakota SHPO concurred with the USAF's determinations for the modification of the PRIDE Hangar on February 4, 2020, and for the adverse effects on the demolition of Buildings 7258, 7260, and 7262 on June 23, 2020. In addition, on January 22,	Under the No Action Alternative, no historic properties would be affected and the bases would continue to manage cultural resources in accordance with their ICRMPs.

Table 2.8-1. Environmental Consequences of B-21 MOB 1 Construction by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative (Preferred Alternative)	No Action Alternative
Cultural Resources (continued)		2021, the South Dakota SHPO concurred with findings from a 2020 archaeological survey of the South WGF Site, indicating that no archaeological sites were identified. On February 16, 2021, the USAF and South Dakota concluded the Section 106 consultation, with the signing of a Memorandum of Agreement, which includes stipulations to mitigate the adverse effect resulting from demolition of the three historic properties (Appendix F, Cultural Resources).	
Physical Resources	There would be low potential for soil erosion from land disturbance during construction, due to flat topography. The CES Environmental Group reviews all projects and requires erosion and sediment control measures be implemented for construction projects. Coverage under a construction general permit would be required for land disturbances greater than 1 acre. The SWPPP includes BMPs for erosion and sediment control. Increased runoff associated with increased impervious surfaces can be addressed through design of stormwater conveyances using established engineering standards. Increased runoff can be managed by stormwater features that treat, store,	There would be moderate to high soil erosion potential in areas with moderate to steep topography. The base recognizes the presence of erosion-prone areas and has included erosion and sediment control measures for moderate to steep slopes in the base SWPPP. Coverage under a construction general permit would be required for land disturbance greater than 1 acre. A bridge connecting the alert apron and South WGF Site would be constructed over jurisdictional wetlands. The bridge would be designed to avoid construction within the wetlands to the greatest extent possible. If impacts to wetlands would occur, the USAF would consult with the U.S. Army Corps of Engineers to obtain a permit	Under the No Action Alternative, there would be no impacts on physical resources from activities associated with implementation of the Proposed Action. However, demolition, construction, and maintenance would continue as part of normal operations and development; these activities may affect physical resources but would be controlled by sediment and erosion control requirements in the SWPPP for each base, as well as the construction general permit requirements, if construction involves areas greater than 1 acre. Overall, no significant impacts would be expected under this alternative.

Table 2.8-1. Environmental Consequences of B-21 MOB 1 Construction by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative (Preferred Alternative)	No Action Alternative
Physical Resources (continued)	and promote infiltration of stormwater before it can impact surface waters. Stormwater management controls would be implemented in accordance with requirements in Section 438 of the Energy Independence and Security Act. Buildings should be sited to avoid the 100-year floodplain, which is present in a limited area within the planned primary area of construction. The existing aircraft parking apron would need to be expanded, impacting a portion of the Northern Diversion Ditch and approximately 2 acres of floodplain delineated within the ditch (an already disturbed environment). The proposed extension of the ramp to the north would require extending the existing 10-foot by 10-foot concrete box culvert that runs west to east under the main runway, maintaining similar flow capacity and discharging to the existing lined culvert of the diversion ditch. The hydrological properties of the floodplain would not be impacted. If the Dyess AFB Alternative is chosen, a Finding of No Practicable Alternative (FONPA) will be included in the Record of Decision. B-21 operations would not result in impacts to water quality if personnel adhere to operational requirements	under Section 404 of the Clean Water Act. The USAF would implement any management or mitigation requirements associated with the permit. Increased runoff associated with increased impervious surfaces can be addressed through design of stormwater conveyances using established engineering standards. Increased runoff can be managed by stormwater features that treat, store, and promote infiltration of stormwater before it can impact surface waters. Stormwater management controls would be implemented in accordance with requirements in Section 438 of the Energy Independence and Security Act. Buildings should be sited to avoid 100-year floodplains. Some of the planned construction areas and the North WGF Site include 100-year floodplains. If this subalternative is selected and the floodplain area at the North WGF Site cannot be avoided, the USAF would prepare a FONPA and include it in the Record of Decision. B-21 operations would not result in impacts to water quality if personnel adhere to operational requirements specified in the SWPPP, SPCC Plan, and requirements specified by the	

Table 2.8-1. Environmental Consequences of B-21 MOB 1 Construction by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative (Preferred Alternative)	No Action Alternative
Physical Resources (continued)	specified in the SWPPP, SPCC Plan, and requirements specified by the base Hazardous Material Management and Hazardous Waste Disposal Programs. Additional POL use and storage associated with the B-21 MOB would increase the potential for spills, but this potential would be reduced through the application of industry standards in designing the POL storage facilities and adherence to the base SPCC Plan. Overall, no significant impacts would be expected under this alternative.	base Hazardous Material Management and Hazardous Waste Disposal Programs. It is particularly important that personnel recover aircraft deicing residuals from aprons as soon as practicable. Additional POL use and storage associated with the B-21 MOB would increase the potential for spills, but this potential would be reduced through the application of industry standards in designing the POL storage facilities and adherence to the base SPCC Plan. Overall, no significant impacts would be expected under this alternative with implementation of erosion control measures in areas with moderate to steep topography, and with proper design of facilities in the 100-year floodplain that would prevent filling of or obstructions to the flood control channel.	
Hazardous Materials and Hazardous and Solid Waste	Hazardous Materials Management – No significant impacts related to hazardous materials would occur with implementation of established management procedures. Toxic Substances and Hazardous Wastes – Management of ACM and LBP generated during redevelopment would be accomplished in accordance with all regulatory requirements. Hazardous and nonhazardous waste generated from aircraft maintenance would also be managed according to established procedures. No change to permits, hazardous waste generator status, or management procedures would be required and no adverse environmental impacts are anticipated.		Under the No Action Alternative, the Proposed Action would not occur and there would be no change in the storage or use of hazardous materials or the generation of solid or hazardous wastes. Ongoing activities related to the management of ERP sites would continue. As such, implementation of the No Action Alternative would not result in significant impacts.

Table 2.8-1. Environmental Consequences of B-21 MOB 1 Construction by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative (Preferred Alternative)	No Action Alternative
Hazardous Materials and Hazardous and Solid Waste (continued)	ERP Sites – Development on or near any ERP or PFAS sites would be coordinated with the state regulatory agency and other relevant stakeholders, as applicable. No significant impacts related to ERP issues are anticipated. Solid Waste – MSW and C&D debris would not result in significant impacts to landfill capacity. Implementation of appropriate waste recycling, diversion, and management measures would further minimize any potential impacts.		
Health and Safety	Explosives Safety – Proposed structures within existing QD arcs would undergo an explosive safety review to ensure occupancy and land uses would be compatible with these locations. As required, the installation may implement compensatory measures, such as identifying which buildings need to be evacuated when munitions are loaded on certain areas of the flightline. Additionally, the WGF would be purpose-built to ensure that nuclear material and conventional explosives would be stored separately. Building design, combined with dedicated explosive safety and fire suppression systems, would eliminate any risk to the public. As part of this process, existing explosive safety plans (e.g., ESPs or Aircraft Parking Plans) would be updated accordingly. With implementation of these measures, there would be no adverse impacts related to explosive safety. Construction Safety – Ground operations and construction activities would continue to be conducted using the same safety processes and procedures as under current operations. All actions would be accomplished by technically qualified personnel and would be conducted in accordance with applicable USAF safety requirements, approved technical data, and AFOSH standards; consequently, no significant impacts would occur.		Under the No Action Alternative, ground operations and construction activities would continue to be conducted using the same safety processes and procedures as under current operations. All actions would be accomplished by technically qualified personnel and would be conducted in accordance with applicable USAF safety requirements, approved technical data, and AFOSH standards; consequently, no significant impacts would occur.
Transportation	Construction, renovation, and demolition projects could potentially result in traffic congestion and reduced service levels, particularly during peak hours. Unaffected roads could potentially accommodate rerouted traffic, and LOS would not likely be affected substantially on most parts of the base. Delivery and removal of materials and debris, as well as base access by construction crews, would result in a small increase in off-base traffic. However, the number of vehicles involved would be small, and activities would potentially occur throughout the work day. The effects of these actions would be temporary and would cease with completion of the projects. No significant impacts would result from implementation of either alternative.		Under the No Action Alternative, the B-21 beddown would not take place at Dyess AFB or Ellsworth AFB, and there would be no associated construction, demolition, or renovation activities. Transportation projects not associated with the B-21 beddown would continue with a project-specific environmental review. Traffic operations on and outside the

Table 2.8-1. Environmental Consequences of B-21 MOB 1 Construction by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative (Preferred Alternative)	No Action Alternative
Transportation (continued)			bases would continue as under existing conditions. The on-base road system at Dyess AFB would continue to function adequately, with the exception of a few intersections. Traffic in areas adjacent to the base would continue to function adequately at times, but substantial traffic congestion would likely be experienced on some roads during peak hours. The on-base road system at Ellsworth AFB would continue to function adequately, with little traffic congestion. Traffic in areas adjacent to the base would generally continue to function adequately, but some intersections would likely operate at poor service levels. Although off-base transportation service levels would be low at some times and locations, activities at Dyess AFB and Ellsworth AFB would have little effect on operations, and impacts would be less than significant.
Utilities and Infrastructure	Utility usage would not exceed any permitted/allowed usage capacity limits. There would be no significant impacts on utilities.		Under the No Action Alternative, utility usage under would continue to be well below permitted/allowed capacity limits. There would be no significant impacts.

ACM = asbestos-containing materials; AFB = Air Force Base; AFOSH = Air Force Occupational and Environmental Safety, Fire Protection, and Health; APZ = accident potential zone ; BASH = bird/wildlife-aircraft strike hazard; BMP = best management practice; C&D = construction and demolition; CES = Civil Engineering Squadron; EIS = Environmental Impact Statement; ERP = Environmental Restoration Program; ESP = Explosive Site Plan; ICRMP = Integrated Cultural Resources Management Plan; LBP = lead-based paint; LOS = level of service ; MOB 1 = Main Operating Base 1; MSW = municipal solid waste; NRHP = National Register of Historic Places; PFAS = per- and polyfluoroalkyl substances; POL = petroleum, oil, and lubricant; PRIDE = Professional Results in Daily Efforts; QD = quantity-distance; ROI = region of influence; SHPO = State Historic Preservation Officer; SPCC = Spill Prevention, Control, and Countermeasures; SWPPP = Storm Water Pollution Prevention Plan; USAF = U.S. Air Force; WGF = Weapons Generation Facility

Table 2.8-2. Environmental Consequences of B-21 Flight Training at MOB 1 by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative	No Action Alternative
Airspace Use and Management	Air operations (takeoffs, landings, and closed patterns) at Dyess AFB would decrease by 1.12 percent from baseline levels. Flight operations would decrease across all SUAs with the exception of the Pecos MOA, which would increase by approximately 15 percent; this could lead to increased congestion and/or scheduling impacts. However, because the B-21 would tend to use a range of higher altitudes that are currently underutilized, airspace would not likely be adversely impacted. Furthermore, as the program develops, MOA usage and distribution may be adapted to better accommodate the B-21 training mission. For instance, the Lancer MOA, where operations decreased by nearly 18 percent, could be utilized more extensively to alleviate any strains in the Pecos MOA.	Flight operations would increase by up to 15.8 percent at Ellsworth AFB. Total flight operations at the PRTC would increase by 41.1 percent. This could lead to increased congestion and/or scheduling impacts. However, because the B-21 would tend to use a range of higher altitudes that are currently underutilized, airspace would not likely be adversely impacted. Additionally, as the program develops, SUA usage and distribution may be adapted to better accommodate the B-21 training mission.	Under the No Action Alternative, there would be no changes to operations or airspace use. The USAF would continue to adhere to the legal descriptions for the PRTC MOAs published in the National Flight Data Digest (effective date: September 17, 2015) (FAA, 2021).
Noise	Under the Dyess AFB Alternative, 4,355 acres and an estimated 496 persons could be exposed to noise levels exceeding 65 dB DNL near Dyess AFB. Overall, this is a decrease of 7,142 acres and 923 persons from the No Action Alternative. Because the B-21 is projected to be generally quieter and tends to fly higher than the B-1, the noise in the area and the number of acres and people impacted would decrease overall, as a result of implementing the Proposed Action at Dyess AFB. Noise levels beneath the SUAs would decrease or remain the same, and there would be no adverse impacts.	Under the Ellsworth AFB Alternative, 1,610 acres and an estimated 358 persons could be exposed to noise levels exceeding 65 dB DNL near Ellsworth AFB. This represents a decrease of 4,224 acres and 1,627 persons from the No Action Alternative. Because the B-21 is projected to be generally quieter and tends to fly higher than the B-1, the noise in the area and the number of acres and people impacted would decrease overall, as a result of implementing the Proposed Action at Ellsworth AFB. Noise levels beneath the PRTC would decrease or remain the same, and there would be no adverse impacts.	Under the No Action Alternative, there would be no changes to operations, and noise levels would remain at baseline levels.

Table 2.8-2. Environmental Consequences of B-21 Flight Training at MOB 1 by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative	No Action Alternative
Air Quality	Under the Dyess AFB Alternative, air emissions at Dyess AFB due to increased personnel and training operations would increase from the ROI baseline. However, emissions of all criteria pollutants other than CO would increase by less than 3.5%. CO emissions would decrease under the Dyess AFB Alternative. B-21 flight operations in the SUAs would typically occur higher than the B-1 currently, so emissions in the SUAs would decrease or remain nominal. Therefore, there would be no adverse impacts to regional air quality.	Under the Ellsworth AFB Alternative, air emissions at Ellsworth AFB due to increased personnel and training operations would decrease from the ROI baseline for all criteria pollutants except for NO _x emissions, which would increase by approximately 1.6%. The B-21 would typically fly higher than the B-1 currently, so emissions in the PRTC would decrease for all criteria pollutants. Therefore, there would be no adverse impacts to regional air quality.	Under the No Action Alternative, there would be no changes to operations and the emissions would remain at baseline levels. Regional air quality would not be adversely impacted.
Land Use	The on-base and off-base noise zones associated with aircraft operations would decrease substantially relative to existing conditions, resulting in potentially beneficial impacts. All on-base land use would be compatible with expected noise levels. Noise levels under the airspace for either alternative would decrease or remain the same relative to existing conditions, and there would be no significant impacts due to airspace and range utilization.		The B-21 beddown would not take place at Dyess AFB or Ellsworth AFB, and there would be no change to existing noise zones or APZs resulting from aircraft operations. Incompatible land use would continue, but impacts would be less than significant due to the relatively small area affected. There are no known USAF initiatives that would result in ground-disturbing activities that would cause changes to land use under the PRTC, Lancer MOA, Brownwood MOA, or Pecos MOA airspace. Aircraft operations would continue at current levels because the B-21 MOB 1 beddown would not occur.

Table 2.8-2. Environmental Consequences of B-21 Flight Training at MOB 1 by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative	No Action Alternative
Socioeconomics	There would be a total end state of 14,098 active military, civilians, contractors, and dependents under this alternative, which equates to approximately 3,953 more people in the ROI than under the No Action Alternative. There would be a total of 7,419 dependents at the end state, which is approximately 2,308 more than under the No Action Alternative. Of the 7,419 dependents, approximately 1,951 would be children of school age (5 to 18 years old), a change of 727 from the No Action Alternative, and would be enrolled in the Abilene ISD within the ROI. An end state of 6,014 active military and 665 civilian USAF employees would have a direct impact of 6,679 jobs. Direct jobs would have an impact of 2,232 indirect jobs, with a value of \$84,874,718; this would be approximately 1,645 more direct jobs, 477 indirect jobs, and a \$19,945,461 value from indirect jobs compared to the No Action Alternative. An end state of 6,014 active military personnel would result in approximately 1,347 personnel on base and 4,667 personnel off base, with a total demand for 4,282 housing units; this would be an increase of 1,170 units above what would be demanded under the No Action Alternative. There would be greater demand for public service professionals in the Abilene MSA	There would be a total end state of 13,743 active military, civilians, contractors, and dependents under this alternative, which equates to approximately 3,147 more people in the ROI than under the No Action Alternative. There would be a total of 7,795 dependents at the end state, which is approximately 1,464 more than under the No Action Alternative. Of the 7,795 dependents, approximately 2,358 would be children of school age (5 to 18 years old), a change of 284 from the No Action Alternative, and would be enrolled in the local school districts within the ROI. An end state of 4,860 active military and 930 civilian USAF employees would have a direct impact of 5,790 jobs. Direct jobs would have an impact of 2,110 indirect jobs, with a value of \$86,518,200; this would be approximately 1,664 more direct jobs, 582 indirect jobs, and \$23,878,400 value from indirect jobs compared to the No Action Alternative. An end state of 4,860 active military personnel would result in approximately 1,638 personnel on base and 3,222 personnel off base, with a total demand for 2,956 houses; this would be an increase of 1,011 units above what would be demanded	Under the No Action Alternative, there would be no personnel changes. Under this alternative, population, employment, housing, education, and public services in the ROI would continue to follow existing trends and grow at average annual growth rates similar to those experienced over the last several years.

Table 2.8-2. Environmental Consequences of B-21 Flight Training at MOB 1 by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative	No Action Alternative
Socioeconomics (continued)	ROI. For example, to keep the level of service similar to the national average, approximately 22 medical professionals, 26 career firefighters, 85 volunteer firefighters, and 39 law enforcement personnel may be required to support the incoming 14,098 personnel and dependents associated with the Dyess AFB Alternative. This would represent an estimated change of 6 medical professionals, 7 career firefighters, 24 volunteer firefighters, and 11 law enforcement personnel. A greater number of public service professionals may be required during construction activities.	under the No Action Alternative. There would be greater demand for public service professionals in Meade and Pennington Counties. For example, to keep the level of service similar to the national average, approximately 22 medical professionals, 25 career firefighters, 83 volunteer firefighters, and 38 law enforcement personnel may be required to support the incoming 13,743 personnel and dependents associated with the Ellsworth AFB Alternative. This would represent an estimated change of 5 medical professionals, 6 career firefighters, 19 volunteer firefighters, and 9 law enforcement personnel. A greater number of public service professionals may be required during construction activities.	
Environmental Justice	Implementation of the Dyess AFB Alternative would result in a 65 percent decrease in total residents exposed to noise levels greater than 65 dB once all B-21 aircraft have replaced the B-1, and a 39 percent decrease during the Dyess AFB Alternative Snapshot Scenario. Environmental justice and sensitive populations exposed to noise levels greater than 65 dB would also decrease. Minority and low-income residents would decrease by 63 and 73 percent, respectively; youth and elderly residents would decrease by 70 and 66 percent, respectively, under the Dyess AFB	Implementation of the Ellsworth AFB Alternative would result in an 82 percent decrease in total residents exposed to noise once all B-21 aircraft have replaced the B-1, and a 51 percent decrease during the Ellsworth AFB Alternative Snapshot Scenario. Environmental justice and sensitive populations exposed to noise levels greater than 65 dB would also decrease. Minority and low-income residents would decrease by 86 and 82 percent, respectively; youth and elderly residents would decrease by 83 and 81 percent, respectively, under	Under the No Action Alternative, residents within the ROI would continue to be exposed to noise levels described under the No Action Alternative at Dyess AFB and Ellsworth AFB.

Table 2.8-2. Environmental Consequences of B-21 Flight Training at MOB 1 by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative	No Action Alternative
Environmental Justice (continued)	Alternative. Under the Dyess AFB Alternative Snapshot Scenario, minority and low-income residents would decrease by 38 and 44 percent, respectively; youth and elderly residents would decrease by 39 and 37 percent, respectively. Therefore, positive impacts to environmental justice and sensitive populations would occur, due to decreased noise levels in the ROI.	the Ellsworth AFB Alternative. Under the Ellsworth AFB Alternative Snapshot Scenario, minority and low-income residents would decrease by 52 and 43 percent, respectively; youth and elderly residents would decrease by 48 and 52 percent, respectively. Therefore, positive impacts to environmental justice and sensitive populations would occur, due to decreased noise levels in the ROI.	
Biological Resources	Under the Dyess AFB Alternative, the annual estimated number of total aircraft operations would vary by airspace. Decreases in air operations would occur at Dyess AFB, the PRTC, Lancer MOA, and Brownwood MOA. An increase in air operations would occur at the Pecos MOA, potentially increasing bird/wildlife-aircraft strikes. Adherence to the existing BASH program and the USFWS-issued Depredation Permit conditions would minimize the risk of bird-aircraft strikes at Dyess AFB, including those for migratory birds (including BCC) and special status species birds, to negligible levels. The air operations associated with the B-21 would adhere to the limitations established in the USAF's PRTC EIS ROD (USAF, 2015) and the FAA ROD (FAA, 2015). Noise levels would decrease from the baseline conditions analyzed under the No Action Alternative. Because the B-21	Under the Ellsworth AFB Alternative, the annual estimated number of total aircraft operations would increase. Any increase in operations would potentially increase the potential for bird/wildlife aircraft strikes. Adherence to the existing BASH program and the USFWS-issued Depredation Permit conditions would minimize the risk of bird-aircraft strikes at Ellsworth AFB, including those for migratory birds (including BCC) and special status species birds, to negligible levels. The air operations associated with the B-21 would adhere to the limitations established in the USAF's PRTC EIS ROD (USAF, 2015) and the FAA ROD (FAA, 2015). Noise levels would decrease from the baseline conditions analyzed under the No Action Alternative. Because the B-21 is projected to be generally quieter and tends to fly higher than the	Under the No Action Alternative, aircraft operations and airspace use under current operational parameters would continue at baseline levels, because the B-21 MOB 1 beddown would not occur.

Table 2.8-2. Environmental Consequences of B-21 Flight Training at MOB 1 by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative	No Action Alternative
Biological Resources (continued)	is projected to be generally quieter and tends to fly higher than the B-1, the noise in the area, the number of acres, and wildlife exposed would decrease overall, as a result of establishing the B-21 MOB 1 beddown at Dyess AFB. No significant impacts to noise-sensitive wildlife, special status species, migratory birds (including BCC), and bald or golden eagles within the training airspace and ranges would occur under the Dyess AFB Alternative.	B-1, the noise in the area, the number of acres, and wildlife exposed would decrease overall, as a result of establishing the B-21 MOB 1 beddown at Ellsworth AFB. No significant impacts to noise-sensitive wildlife, special status species, migratory birds (including BCC), and bald or golden eagles would occur under the Ellsworth AFB Alternative.	
Cultural Resources	Because the B-21 is projected to be generally quieter than the B-1, noise levels received by historic properties at either base would be less than current levels. Because the B-21 tends to fly higher than the B-1, noise in the airspace associated with each alternative would be the same or less than the No Action Alternative, and no adverse impacts due to noise are expected. The PRTC Programmatic Agreement is currently being renewed and will address aircraft operations.		Under the No Action Alternative, operations would continue in accordance with existing procedures and the PRTC Programmatic Agreement is currently being renewed and will address aircraft operations.
Physical Resources	Water resources could potentially be impacted by inadvertent releases of hazardous chemicals that may occur during airfield operations and from leaking fuel storage tanks. The volume of fuels and hazardous chemicals used and volume of hazardous waste generated are not expected to change under any alternative. With continued implementation of hazardous material and hazardous waste management actions, as well as spill prevention and response plans, significant impacts would not be expected under either alternative.		Under the No Action Alternative, normal operations at each base may affect physical resources. However, impacts would not be significant.
Hazardous Materials and Hazardous and Solid Wastes	There would be no potential impacts to hazardous materials and hazardous wastes under any alternative.		
Health and Safety	Flight Safety – Because the B-21 would be a new aircraft, historical mishap rates are not available; however, current aircraft flight safety policies and procedures are designed to ensure the potential for aircraft mishaps is reduced to the lowest possible level. These safety policies and procedures would continue under this alternative. If a mishap was to occur, there are well-established procedures for responding to aircraft mishaps on USAF and non-USAF property.		Under the No Action Alternative, the installations would continue current operations using the B-1 aircraft. Established procedures would continue for flight safety and mishap prevention and for weapons safety.

Table 2.8-2. Environmental Consequences of B-21 Flight Training at MOB 1 by Alternative

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative	No Action Alternative
Transportation	Increased personnel associated with the B-21 beddown would result in increased on-base and off-base traffic operations. Higher on-base traffic volume would likely increase traffic congestion significantly and decrease road segment or intersection service levels, and could cause some road segments to operate near capacity. Increased off-base vehicle operation would add to existing congestion, particularly during peak commute hours. Without mitigation measures, additional personnel would potentially cause a significant increase in congestion and queuing near installation gates.		Under the No Action Alternative, the B-21 beddown would not take place at Dyess AFB or Ellsworth AFB, and there would be no personnel changes or associated effects to traffic operations on or adjacent to the installations. There would be no significant impacts.
Utilities and Infrastructure	Utility usage would not exceed any permitted/allowed usage capacity limits. There would be no significant impacts on utilities.		Under the No Action Alternative, utility usage would continue to be well below permitted/allowed capacity limits. There would be no significant impacts.

% = percent; AFB = Air Force Base; APZ = accident potential zone; BASH = bird/wildlife-aircraft strike hazard; BCC = Birds of Conservation Concern; BMP = best management practice; CO = carbon monoxide; dB = decibel; DNL = day-night average sound level; EIS = Environmental Impact Statement; FAA = Federal Aviation Administration; ISD = Independent School District; MOA = Military Operating Area; MOB 1 = Main Operating Base 1; MSA = Metropolitan Statistical Area; NO_x = nitrogen oxides; PRTC = Powder River Training Complex; ROD = Record of Decision; ROI = region of influence; SEL = sound exposure level; SPCC = Spill Prevention, Control, and Countermeasures; SUA = Special Use Airspace; USAF = U.S. Air Force; USFWS = U.S. Fish and Wildlife Service

2.9 MITIGATION

Specified mitigation measures have been identified and will be carried forward, to the extent practicable, in implementing the selected alternative and will be defined in the Record of Decision. Chapter 3 (Environmental Consequences) includes and analyzes mitigations for impacts identified or required by regulation or agency guidance for each affected resource.

2.9.1 Mitigation Measures

The mitigations discussed in an EIS cover a range of issues. Generally mitigations may be applied in the development of the proposed action or alternatives (i.e., mitigation by avoidance) or applied during the impact analysis. Mitigation measures may also be considered for impacts that, by themselves, would not be considered “adverse.” The proposed action is considered as a whole to address specific effects on the environment (regardless of the level of the impacts), and mitigations are developed where it is feasible to do so.

CEQ regulations (at 40 CFR 1508.20) define mitigation in the following five ways:

1. **Avoiding** the impact altogether by not taking a certain action or parts of an action
2. **Minimizing** impacts by limiting the degree or magnitude of the action, and its implementation
3. **Rectifying** the impact by repairing, rehabilitating, or restoring the affected environment
4. **Reducing or eliminating** the impact over time by preservation and maintenance operations during the life of the action
5. **Compensating** for the impact by replacing or providing substitute resources or environments

A mitigation plan will be developed in accordance with 32 CFR 989.22(d) to address specific mitigations selected in the Record of Decision. The mitigation plan, for example, will also include a Storm Water Pollution Prevention Plan (SWPPP) and a Spill Prevention, Control, and Countermeasures (SPCC) Plan or updates to these plans specific to the alternative selected. These plans are in addition to and complement any permits that may be issued to implement mission actions at the chosen alternative.

NEPA imposes a continuing duty to supplement (40 CFR 1502.9(c)) existing NEPA documents when substantial changes are made that are relevant to environmental concerns or in response to the identification of “significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts (40 CFR 1502.9(c)(1)(ii)). The USAF is responsible for monitoring the predictions (e.g., impact, mitigations) made in its completed NEPA documentation (40 CFR 1505.3, 1505.2(c)). If substantial changes are recognized that are relevant to environmental concerns or that bear on a proposed action or its impacts, the USAF would reevaluate for potential impacts related to those changes.

2.9.2 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

Table 2.9-1. Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative (Preferred Alternative)
Noise	Based on the noise analysis in this EIS, no mitigations would be necessary. However, the USAF is responsible for monitoring the predictions (e.g., impact, mitigations) made in its completed NEPA documentation (40 CFR 1505.3, 1505.2(c)). If substantial changes are recognized that are relevant to environmental concerns or that bear on a proposed action or its impacts, the USAF will reevaluate for potential impacts related to those changes. This would include monitoring noise and public noise complaints and developing potential mitigation measures that could be implemented based on USAF monitoring.	
Air Quality	Construction activities would employ standard management measures for construction such as watering of graded areas, covering of soil stockpiles, and contour grading (if necessary), to minimize temporary generation of dust and particulate matter. This would serve to minimize air emissions associated with the elements of the Proposed Action.	
Socioeconomics	The USAF would work with the local community to assist in any way possible with the planning for the increased population and increased requirements for support.	
Cultural Resources	No mitigations would be necessary.	The adverse effects caused by the demolition to Buildings 7258, 7260, and 7262 have been mitigated via a Memorandum of Agreement between Ellsworth AFB and the South Dakota SHPO, as required by the National Historic Preservation Act Section 106 (54 U.S.C. 306108). The MOA was signed on February 16, 2021 (Appendix F) and includes the following stipulations to be carried out prior to demolition: • The USAF must take photographic documentation of the buildings for the South Dakota SHPO to approve for inclusion in the South Dakota State Archives. • The USAF must conduct a search for any existing reports, photographs, drawings, plans, or similar documents related to Buildings 7258, 7260, and 7262. The USAF will submit a letter to South Dakota SHPO documenting what repositories or files were searched. The South Dakota SHPO will make documents submitted available for public use and reproduction through the South Dakota State Archives.

Table 2.9-1. Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative (Preferred Alternative)
Physical Resources	Construction-related impacts on soil and surface water quality can be reduced through implementation of erosion and sediment control measures. Examples of controls include minimization of earth-moving activities during wet weather/conditions, covering soil stockpiles, installation of silt fencing and sediment traps, and revegetation of disturbed areas with native plants as soon as possible to contain and prevent off-site migration of sediment or eroded soils from the project areas. Site drainage around the new facilities should be designed to manage the anticipated increase in runoff from increased impervious surfaces through properly sized stormwater conveyance structures and incorporating stormwater management features such as porous pavements and infiltration basins that treat, store, and infiltrate runoff onsite before it can affect downstream water bodies (EPA, 2020a). Building sites should be located to avoid the 100-year floodplain areas, if possible.	Construction-related impacts on soil and surface water quality can be reduced through implementation of erosion and sediment control measures. If possible, buildings should be sited in areas with moderate slopes and avoid disturbing areas with steep slopes, specifically at the North WGF Site. Site drainage around the new facilities should be designed to manage the anticipated increased runoff from the increased impervious surface through properly sized stormwater conveyance structures, and by incorporating stormwater management features such as porous pavements and infiltration basins that treat, store, and infiltrate runoff onsite before it can affect downstream water bodies (EPA, 2020a). Facilities and structures where military operations would involve handling of hazardous chemicals or fueling operations would be best placed where spill control valves serve as physical barriers that could prevent releases from flowing into the ponds and offsite streams. Building sites should be located to avoid the 100-year floodplain areas. These areas are present at the North WGF Site and in some planned construction areas but are limited in areal extent and could be easily avoided. Additionally, approximately 1 acre of floodplains and 0.4 acre of jurisdictional wetlands occur in the area between the alert apron and the South WGF Site, where a bridge would be constructed. If construction activities cannot avoid impacting floodplains and wetlands, Ellsworth AFB would coordinate with the U.S. Army Corps of Engineers to obtain a permit under Section 404 of the Clean Water Act. In general, actions resulting in loss of wetland functions may require compensatory mitigation measures.

Table 2.9-1. Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

Resource Area	Dyess AFB Alternative	Ellsworth AFB Alternative (Preferred Alternative)
Hazardous Materials and Solid Wastes	There is a potential that construction sites could be impacted by PFOS/PFOA or other contaminants (e.g., fuels, solvents). The base would comply with USAF guidance to manage PFAS impacted soils and other waste streams containing PFAS. No other mitigation measures or additional management actions other than those described in the Commonalities section would be necessary to reduce impacts to below significant levels for hazardous materials and hazardous and solid waste as no significant impacts are anticipated.	
Transportation	During construction, demolition, and renovation activities, consider scheduling commercial deliveries outside peak traffic hours and requiring all construction crews to use the commercial gate. During project planning, include measures to ensure proper emergency response ability is maintained during construction activities and after project completion.	

AFB = Air Force Base; CFR = Code of Federal Regulations; EIS = Environmental Impact Statement; EPA = U.S. Environmental Protection Agency; NEPA = National Environmental Policy Act; PFAS = per- and polyfluoroalkyl substances; PFOA = perfluorooctanoic acid; PFOS = perfluorooctane sulfonate; SHPO = State Historic Preservation Officer; USAF = U.S. Air Force; U.S.C. = United States Code; WGF = Weapons Generation Facility

2.9.3 Unavoidable Impacts

Certain B-21 activities are projected to result in disturbance and/or noise within areas not previously or recently subject to these effects. However, some impacts that cannot be mitigated would occur. Some of these impacts could be considered adverse or annoying to potentially affected individuals.

Potential impacts that could occur and cannot be mitigated include the following:

- The existing capacity of regional landfills would be reduced due to the solid waste generated.
- Hazardous and nonhazardous waste would be generated as a result of maintenance functions associated with B-21 operations.
- Individual biological species would be affected by construction activities and daily B-21 operations.
- Historical structures would be demolished at Ellsworth AFB.

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3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.0 INTRODUCTION

For each environmental resource analyzed in this EIS, Chapter 3 defines the resource, describes the region of influence (ROI) potentially affected by the Proposed Action, explains the analysis methodology, and presents the environmental consequences of the No Action Alternative and each action alternative.

Traditionally, Chapter 3 of an EIS would present the affected environment and Chapter 4 would outline the environmental consequences. This EIS combines the affected environment and environmental consequences for each environmental resource together in Chapter 3.

Additionally, as noted in Section 2.6 (No Action Alternative), the No Action Alternative for this EIS represents baseline conditions for each potentially affected resource, except for the baseline for land use, which is defined in Section 3.4.1.3 (Land Use, Analysis Methodology). This EIS presents the No Action Alternative analysis before the action alternatives' analysis, which allows the reader and decision makers to easily compare the consequences from the baseline conditions with consequences of the action alternatives.

The "Analysis Methodology" section for each resource area describes the approach taken to evaluate impacts and any assumptions made in the analysis for that resource. The analysis methodology for each resource primarily addresses the context of the environmental resource and the intensity of any potential consequence to the resource resulting from the Proposed Action per the requirements of 40 CFR 1508.27. For some environmental resources that use modeling and other calculations for quantitative analyses (e.g., air quality), supplemental technical information, data, and other background information relevant to the analyses are provided in appendices to this EIS.

The "Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts" sections identify potential mitigations or management actions that the proponent could implement to minimize or offset potential adverse impacts.

Incorporating B-21 flight training into Global Strike Command's ongoing mission is a dynamic issue that is being addressed in this EIS. To help illustrate the gradual change from B-1 to B-21 aircraft operations over time, an approximation, or "snapshot" scenario was developed. This "snapshot" assumes there will be a period of time when there would be a temporary overlap of B-1 and B-21 operations and that personnel levels would be 10 percent higher and flight operations would be 20 percent above those expected at the end state of the Proposed Action, as illustrated in Table 3.0-1, Table 3.0-2, and Table 3.0-3. (The "end state" reflects the point in time when all B-21s are in place and all B-1s have been removed.)

Table 3.0-1. Summary of Personnel at Dyess AFB with Snapshot Scenario

Personnel ^a	No Action Alternative Individuals	B-1 Mission Individuals	B-21 Mission Individuals	Snapshot Analysis ^g			End State Personnel	End State Change Over No Action
				10% B-1 Individuals	B-21 + 10% B-1 Individuals	Total Snapshot		
Active Military	4,369	1,855	3,500	186	3,686	6,200	6,014	1,645
Civilian ^b	665	NA	NA	NA	NA	665	665	0
Contractor	NA	NA	NA	NA	200 ^h	200 ^h	NA	NA
Spouses	2,769 ^c	1,020 ^d	1,925 ^e	102	2,027	3,776	3,674	905
Children	2,342 ^c	872 ^d	2,275 ^f	87	2,362	3,832	3,745	1,403
Total	10,145	3,747	7,700	375	8,275	14,673	14,098	3,953 (39%)

Source: (Dyess AFB, 2018a)

% = percent; + = plus; NA = not available

Notes:

a. Does not include private businesses on base (branch banks/credit union) or retirees

b. Includes appropriated and non-appropriated fund civilians

c. Numbers of spouses and children were extrapolated from the total dependent number of 5,111, assuming 55 percent of military and civilian personnel are married and the remaining dependents are children.

d. The number of spouses and children at Dyess AFB associated with the B-1 mission was derived by calculating the ratio of actual dependents to total active military and civilian personnel. This resulted in ratios of 0.55 spouses and 0.47 children per active military personnel. These ratios were multiplied by 1,855 to obtain numbers of spouses and children associated with the B-1 mission at Dyess AFB.

e. Based on statistics in the 2018 Demographics Profile of the Military Community (DoD, 2018b), 55 percent of the Air Force is married. The number of spouses was calculated by multiplying B-21 active military personnel by 55 percent.

f. Based on statistics in the 2018 Demographics Profile of the Military Community (DoD, 2018b), there are 1.2 dependents for each active duty Air Force member, for a total of 4,200 dependents for the B-21 mission. The number of children was estimated by subtracting the number of spouses (1,925) from the total dependents (4,200).

g. Snapshot analysis considers overlap between B-21 and B-1 transition. Assumes all B-21 personnel and 10 percent of B-1 personnel are present on the base at the same time along with temporary contractor support. Snapshot personnel number = Baseline population – B-1 personnel + B-21 personnel + 10 percent B-1 personnel + temporary contractor support.

h. Dependents were not calculated for temporary contractors (200 personnel) associated with supporting the B-21 and B-1 transition depicted in the snapshot analysis.

Table 3.0-2. Summary of Personnel at Ellsworth AFB with Snapshot Scenario

Personnel ^a	No Action Alternative Individuals	B-1 Mission Individuals	B-21 Mission Individuals	Snapshot Analysis ^g			End State Personnel	End State Change Over No Action
				10% B-1 Individuals	B-21 + 10% B-1 Individuals	Total Snapshot		
Active Military	3,196	1,836	3,500	184	3,684	5,044	4,860	1,664
Civilian ^b	930	NA	NA	NA	NA	930	930	0
Contractor	139	NA	NA	NA	200 ^h	339 ^h	139	0
Spouses	2,346 ^c	1,010 ^d	1,925 ^e	101	2,026	3,362	3,261	915
Children	3,985 ^c	1,707 ^d	2,275 ^f	172	2,447	4,724	4,553	568
Total	10,596	4,553	7,700	457	8,357	14,398	13,743	3,147 (30%)

Source: (Ellsworth AFB, 2016a)

% = percent; + = plus; NA = not available

Notes:

a. Does not include private businesses on base (branch banks/credit union): 26 personnel

b. Includes appropriated and non-appropriated fund civilians

c. Numbers of spouses and children were extrapolated from the total dependent number of 6,331, assuming 55 percent of military, civilian, and contractor personnel are married and the remaining dependents are children.

d. The number of spouses and children at Ellsworth AFB associated with the B-1 mission was derived by calculating the ratio of actual dependents to total active military, civilian, and contractor personnel. This resulted in ratios of 0.55 spouses and 0.93 children per active military personnel. These ratios were multiplied by 1,836 to obtain numbers of spouses and children associated with the B-1 mission at Ellsworth AFB.

e. Based on statistics in the 2018 Demographics Profile of the Military Community (DoD, 2018b), 55 percent of the Air Force is married. The number of spouses was calculated by multiplying B-21 active military personnel by 55 percent.

f. Based on statistics in the 2018 Demographics Profile of the Military Community (DoD, 2018b), there are 1.2 dependents for each active duty Air Force member, for a total of 4,200 dependents for the B-21 mission. The number of children was estimated by subtracting the number of spouses (1,925) from the total dependents (4,200).

g. Snapshot analysis considers overlap between B-21 and B-1 transition. Assumes all B-21 personnel and 10 percent of B-1 personnel are present on the base at the same time along with temporary contractor support. Snapshot personnel number = Baseline population – B-1 personnel + B-21 personnel + 10 percent B-1 personnel + temporary contractor support.

h. Dependents were not calculated for temporary contractors (200 personnel) associated with supporting the B-21 and B-1 transition depicted in the snapshot analysis.

Table 3.0-3. Summary of Operations at Both Bases with Snapshot Scenario

Airfield/Airspace	No Action^a Alternative	Proposed Action^b	Airfield Operations Change from No Action Alternative	Snapshot^c	Snapshot Change from No Action Alternative
Dyess AFB Alternative					
Dyess AFB Airfield	48,940	48,394	-546	50,327	1,387
PRTC	2,778	2,760	-18	2,834	56
Brownwood MOA	2,467	2,454	-13	2,461	-6
Lancer MOA	1,376	1,132	-244	1,301	-75
Pecos MOA	2,425	2,781	356	2,799	374
Ellsworth AFB Alternative					
Ellsworth AFB Airfield	8,910	10,318	1,408	11,860	2,950
PRTC	2,778	3,921	1,143	4,203	1,425

Notes:

a. Current flight operations data provided and validated by Dyess AFB personnel, HAF/SAF, and the Air Force Civil Engineer Center.

b. The Proposed Action flight operations represent the end-state operations removing the B-1 operations and adding B-21 operations maintaining existing operations for other Primary Assigned Aircraft and transient aircraft.

c. The Snapshot flight operations represent a transitional condition in which approximately 20 percent of current B-1 operations would potentially occur simultaneous with proposed B-21 operations maintaining existing operations for other Primary Assigned Aircraft and transient aircraft.

In the analysis of anticipated impacts, the USAF has done its best to accurately predict potential impacts and anticipate future conditions using the best available information and tools for the EIS analysis, including the “snapshot” scenario. As a new aircraft under development, B-21 data for noise, air quality, and safety analyses for the B-21 are currently incomplete or unavailable. The CEQ regulations implementing NEPA recognize that such a situation may occur. Agencies manage such situations in accordance with 40 CFR 1502.22, *Incomplete or Unavailable Information*, which provides the following guidance:

“When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an Environmental Impact Statement, and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

(a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives, and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the Environmental Impact Statement.

(b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant, or the means to obtain it are not known, the agency shall include within the Environmental Impact Statement the following:

1. A statement that such information is incomplete or unavailable;
2. A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
3. A summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and
4. The agency’s evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this Section, “reasonably foreseeable” includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.”

As indicated above, data for the B-21 aircraft that are necessary to model the aircraft’s noise, air quality, and safety impacts are currently unavailable. While the costs to obtain complete data for these purposes are not exorbitant, those data cannot be obtained at this time due to limitations on aircraft testing during its early developmental stage, the need for analyses during normal (versus developmental) flying conditions, and the time required to develop a flight safety record (40 CFR 1502.22(b) and 1502.22(b)(1)). The data and factors used in this analysis are presented in the body of this EIS for each alternative and further detailed in Appendix C for air quality issues.

Some environmental resources would not be affected by overlapping B-1 and B-21 operations. Only the resources that would be impacted by overlapping B-1 and B-21 operations present potential impacts for the “snapshot” scenario. Table 3.0-4 below indicates whether a given resource area section includes a “snapshot” analysis.

Table 3.0-4. Snapshot Analysis – Affected Resources

EIS Section	Resource Area	Snapshot Analysis Included	
		Personnel	Operations
Section 3.1	Airspace	No	Yes
Section 3.2	Noise	No	Yes
Section 3.3	Air Quality	Yes	Yes
Section 3.4	Land Use	No	No
Section 3.5	Socioeconomics	Yes	No
Section 3.6	Environmental Justice	No	Yes
Section 3.7	Biological Resources	No	No
Section 3.8	Cultural Resources	No	No
Section 3.9	Physical Resources	No	No
Section 3.10	Hazardous Materials and Hazardous and Solid Wastes	No	No
Section 3.11	Health and Safety	No	No
Section 3.12	Transportation	Yes	No
Section 3.13	Utilities and Infrastructure	Yes	No

3.1 AIRSPACE

3.1.1 Airspace, Affected Environment

3.1.1.1 Description of Resource

Special Use Airspace (SUA) is airspace where military airborne activities must be confined because of their nature and/or where limitations may be imposed on aircraft operations that are not part of those activities. An SUA has defined dimensions that are associated with an area on the surface of the earth. With the exception of Controlled Firing Areas, SUA is depicted on aeronautical charts. SUA includes the following types of charted airspace: MOAs, Restricted Areas, Warning Areas, Alert Areas, Prohibited Areas, and National Security Areas. Controlled Firing Areas are uncharted. The MOAs are the primary type of SUA of concern in this document.

Two types of flight rules (visual flight rules [VFR] and instrument flight rules [IFR]) apply to airspace, providing a general means of managing its use. Both military and civil aviation abide by these rules to ensure safe operations. For example, private pilots flying between airports to survey oil fields or livestock typically operate under VFR. The VFR pilots fly using visual cues along their desired flight route, as long as appropriate visibility conditions exist, day or night. Pilots flying IFR undergo much more flight training, operate using instruments without the aid of ground-based visual cues, and may fly during periods of reduced visibility. All commercial and military pilots are IFR certified.

FAA has designated MOAs as special use airspace. MOAs are airspaces established outside Class A airspace to separate or segregate certain nonhazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. MOAs provide military aircrews the opportunity to perform many different training activities within a large horizontal and vertical expanse of airspace. The ceiling of all MOAs can extend to no more than 17,999 feet mean sea level (MSL), while the floor can be established at any altitude. While any military or civilian pilot flying VFR can enter and fly through MOAs using see-and-avoid techniques, it is highly recommended that pilots contact the controlling agency prior to entering to determine if the MOA is active or not. When flying IFR, nonparticipating military (those not using the MOA for training) or civilian aircraft must obtain an Air Traffic Control (ATC) clearance to enter a MOA, if it is active.

ATCAAs are commonly assigned above MOAs and extend above 18,000 feet MSL. Once established, an ATCAA is activated for the time it is required in accordance with the controlling Letter of Agreement between FAA and the USAF. ATCAAs are not depicted on aeronautical charts.

The USAF maintains a cooperative, working relationship with FAA in all facets of aviation and aviation safety, from coordinating at the Headquarters FAA level through the Policy Board on Federal Aviation out of the Pentagon to regional representation at the USAF base level. Military representatives are also embedded with the Headquarters FAA to assist and advise on military aviation, airspace, and ATC matters. At the base level, the Airfield Operations Officer is the primary interface with local and regional FAA personnel and is responsible for coordinating any proposed actions or changes to the flight or ATC environment. Any proposed changes in procedures that would affect the flight environment are usually codified in a Letter of Agreement or Memorandum of Understanding between using agencies. Additionally, quarterly meetings are held on the base, where FAA personnel are invited to participate to discuss any proposed actions, policy, or procedural changes and mitigations/solutions. At some bases, an FAA liaison has an office on the base to assist and advise the military on FAA policy and procedures. Often, this individual may actually advise multiple bases in a region, if required.

3.1.1.2 Region of Influence

3.1.1.2.1 Dyess AFB

For military aircraft flying out of Dyess AFB, the Lancer MOA and the Pecos MOAs and all associated ATCAAs are the most cost-effective and convenient training areas to use. Dyess AFB-based aircraft would utilize the PRTC and the Brownwood MOA as supplemental training airspaces. Figure 3.1-1 shows the airspace associated with the three MOAs that would be used by the B-21 if Dyess AFB is selected as the location for MOB 1. The airspace associated with the PRTC, which includes all associated MOAs and ATCAAs, was described in the 2014 PRTC EIS and its associated ROD (USAF, 2014a; USAF, 2015) and is shown in Figure 3.1-2. All PRTC-related B-21 air operations would adhere to the legal descriptions for the PRTC MOAs published in the National Flight Data Digest (effective date: September 17, 2015). The 2014 PRTC EIS and associated RODs selected the alternative called “Modified Alternative A,” which adjusted the MOAs to consist of Powder River 1 (PR-1), PR-2, PR-3, and PR-4 as shown in Figure 3.1-2.



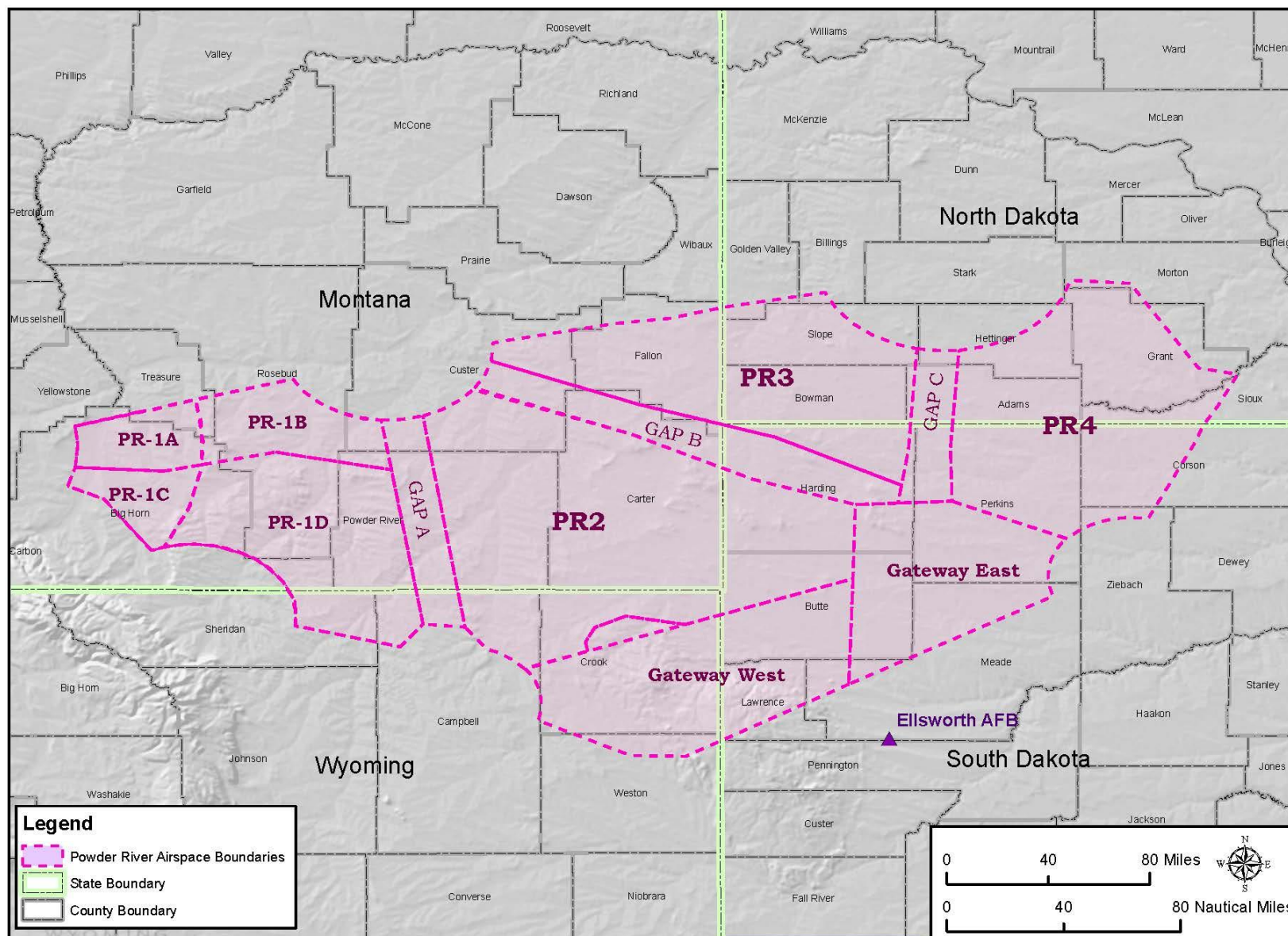


Figure 3.1-2. Powder River Training Complex Airspace

Numerous federal airways, jet routes, and civil aviation airports occur within the affected environment. Ranchers, crop dusters, and other local VFR pilots may operate at lower altitudes equivalent to those of Military Training Routes (MTRs). FAA charts, publications, and procedures provide the means for VFR pilots to plan for and safely transit an MTR. Neither FAA nor the state maintains records of the amount of VFR flight activity by civil aviation in the area. It is known, however, that ranchers, cloud seeding pilots, and other local VFR pilots frequently fly in these areas. ATC procedures, charting of MTRs for pilot awareness, pilot compliance with FAA flight procedures, and required see-and-avoid techniques collectively make MTR use compatible with civil aviation activities.

Airfields ranging from regional county airports to small airstrips on ranches are located within the affected environment.

3.1.1.2.2 Ellsworth AFB

If Ellsworth AFB is selected as the MOB 1 location, the PRTC airspace would be the primary training area for aircraft operations (Figure 3.1-2). The PRTC airspace is described in the 2014 PRTC EIS and associated ROD (USAF, 2014a; USAF, 2015). The 2014 PRTC EIS and associated RODs selected the alternative called “Modified Alternative A,” which adjusted the MOAs to consist of PR-1, PR-2, PR-3, and PR-4 as shown in Figure 3.1-2. Consequently, all PRTC-related B-21 air operations would adhere to the legal descriptions for the PRTC MOAs published in the National Flight Data Digest (effective date: September 17, 2015).

Several small public airports and private airfields are located under the PRTC airspace, with larger airports on the periphery of the airspace. Air travel can be the most practical means of transport for remote areas in southeastern Montana, the western Dakotas, and northeastern Wyoming. Emergency transport operations use the airspace for the medical evacuation of patients to regional medical centers from remote areas. Rapid delivery of machinery parts and personnel can be critical during harvesting periods or other industrial operations. Multiple public and private airfields ranging from regional county airports to small airstrips on ranches are located within the affected environment, and larger airports are located on the periphery of the direct ROI.

The MOAs and ATCAAs associated with the PRTC airspace are developed, coordinated, used, and managed in accordance with Letters of Agreement between the 28 BW and Salt Lake City, and Denver Air Route Traffic Control Centers. For the PRTC airspace, the Letter of Agreement defines responsibilities and outlines procedures for aircraft operations, ATC operations, and utilization of airspace for which the 28 BW is the scheduling authority. Such Letters of Agreement are supplementary to the procedures in the FAA Joint Order (JO) 7110.65Y, *Air Traffic Control*, and JO 7610.4V, *Special Operations*. Currently, B-1s operate within all airspace units associated with the existing complex.

3.1.1.3 Analysis Methodology

As previously mentioned in Section 2.3.3 (Airspace and Range Utilization) and Section 3.1.1.2 (Airspace, Region of Influence), none of the proposed alternatives would involve physical changes (external boundaries, dimensions, altitudes, etc.) to any airspace area currently proposed for use by the B-21.

Although additional airspace is not required, certain airspace may be utilized more extensively, while use of other airspace units may decrease. Therefore, the use of the current airspace would likely be adjusted. The result could potentially change noise levels, patterns, and dispersal due to changes in aircraft operations. See the noise analysis in Section 3.2 (Noise) for more details on potential noise impacts due to aircraft operation. Both civilian and military airfields share the regional airspace, both under and in the vicinity of the ROI airspace, and therefore, efficient management and safety are crucial. Mismanagement could result in the unavailability of the airspace, which could threaten military missions and impede civilian flight access to regional airports, potentially affecting recreational flight, agricultural operations, tourism, and other regional business.

3.1.2 Airspace, Environmental Consequences

3.1.2.1 No Action Alternative Consequences

3.1.2.1.1 No Action at Dyess AFB

Under the No Action Alternative, existing airspace would not be modified and aircraft operations would be consistent with current activities. Under the No Action Alternative, an estimated 46,120 B-1 and C-130 annual flight operations occur, including departures, arrivals, and VFR and IFR patterns. Additional transient operations raise the annual operations to 48,940 for modeling purposes. The No Action Alternative at Dyess AFB would not contribute to air traffic controller workload or congestion in the airspace areas. B-1s at Dyess AFB would continue to use the Lancer MOA as the primary location for training and would also continue to utilize Brownwood and Pecos MOAs and their associated ATCAAs as well as the PRTC for a portion of their operations. Under the baseline No Action Alternative, 2,778 annual operations are conducted in the PRTC airspace, including operations from Dyess AFB. There are currently 2,467 annual operations including Dyess AFB aircraft in the Brownwood MOA annually. Under the baseline condition, there are 1,376 total aircraft operations in the Lancer MOA and 2,425 in the Pecos MOA. These operations include Dyess AFB aircraft, as well as aircraft associated with other nearby installations (e.g., Sheppard AFB T-38s) and transient aircraft. Airspace utilization would be comparable to current conditions; therefore, there would be no increase in airspace utilization as a result of the No Action Alternative.

3.1.2.1.2 No Action at Ellsworth AFB

Under the No Action Alternative, existing airspace would not be modified and aircraft operations would be consistent with current activities. Under the No Action Alternative,

an estimated 8,910 annual flight operations occur, including departures, arrivals, and VFR and IFR patterns. The No Action Alternative at Ellsworth AFB would not contribute to either air traffic controller workload or congestion in the airspace areas. B-1s at Ellsworth AFB would continue to use the PRTC as the primary location for training. Under the baseline No Action Alternative, 2,778 annual operations are conducted in the PRTC airspace, including operations from Ellsworth AFB. Airspace utilization would be comparable to current conditions; therefore, there would be no increase in airspace utilization as a result of the No Action Alternative.

3.1.2.2 Dyess AFB Alternative

3.1.2.2.1 Airfield Operations

Existing airspace around the Dyess AFB airfield would not be modified under the Proposed Action. While there would be no airspace modifications, the way in which the airspace is utilized may change slightly with respect to flight profiles, patterns, etc. Under the Proposed Action at Dyess AFB, the total number of air operations (takeoffs, landings, and closed patterns) would decrease from the No Action Alternative baseline by 546 operations annually, or 1.12 percent. This decrease in operations is due to the drawdown of the B-1 operations, which would not be replaced one-for-one by B-21 operations. See Table 3.0-3 for a comparison of the total flight operations at the installations and in the SUA under the No Action Alternative, Proposed Action, and Snapshot Scenarios.

This 1.12 percent decrease in total operations is not likely to impact airspace use, ATC, or scheduling at Dyess AFB.

3.1.2.2.2 Airspace and Range Utilization

Powder River Training Complex

As mentioned previously, the existing airspace at the PRTC (as depicted in Figure 3.1-2) would not be modified under the Dyess AFB Alternative. Although airspace modifications are not required, certain airspace may be utilized more extensively, while use of other airspace units may decrease. Therefore, the use of the current airspace would likely change. The total number of annual flight operations at the PRTC would decrease by 18 operations annually, or 0.65 percent from the No Action Alternative baseline.

This 0.65 percent decrease in total operations is not likely to impact airspace use, ATC, or scheduling at the PRTC.

Lancer MOA

Although airspace modifications are not required, certain airspace may be utilized more extensively, while use of other airspace units may decrease. Therefore, the use of the current airspace would likely change. The total number of annual flight operations in the Lancer MOA would decrease by 244 operations annually, or 17.73 percent from the No Action Alternative baseline.

Congestion and use would decrease under the Dyess AFB Alternative. This decrease in total operations would not be likely to adversely impact airspace use, ATC, or scheduling in the Lancer MOA.

Brownwood MOA

Although airspace modifications are not required, certain airspace may be utilized more extensively, while use of other airspace units may decrease. Therefore, the use of the current airspace would likely change. The total number of annual flight operations in the Brownwood MOA would decrease by 13 operations annually, or 0.53 percent from the No Action Alternative baseline.

This 0.53 percent decrease in total operations is not likely to impact airspace use, ATC, or scheduling in the Brownwood MOA.

Pecos MOA

Although airspace modifications are not required, certain airspace may be utilized more extensively, while use of other airspace units may decrease. Therefore, the use of the current airspace would likely change. The total number of annual flight operations in the Pecos MOA would increase by 356 operations annually, or 14.68 percent from the No Action Alternative baseline.

Although a flight operations increase of 14.68 percent in the Pecos MOA may contribute to increased airspace congestion and/or scheduling conflicts, it is important to note that airspace usage and MOA distribution was projected to support the 9th Bomb Squadron currently. However, local training may also take place on an IFR track. Further, as the program develops, MOA usage and distribution may be adapted to better accommodate the B-21 training mission. For instance, because operations would decrease by nearly 18 percent in the Lancer MOA, it could be utilized more extensively to alleviate any strains in the Pecos MOA. Therefore, the change in total operations associated with the Dyess AFB Alternative would not be likely to adversely impact airspace use, ATC, or scheduling in the Pecos MOA.

3.1.2.2.3 Snapshot

Under the Snapshot Scenario at Dyess AFB, existing airspace at Dyess AFB would not be affected. Any changes would, again, be limited to how the airspace is used. Under the Snapshot Scenario at Dyess AFB, the total number of air operations (takeoffs, landings, and closed patterns) would increase from the No Action Alternative baseline by 1,387 operations annually, or 2.83 percent (see Table 3.0-3).

This minimal change in total operations would not be likely to adversely impact airspace use, ATC, or scheduling at Dyess AFB. Further, this would be a temporary situation, potentially occurring during the transition period as the B-1s are being drawn down and the B-21 is bedded down.

Under the Snapshot Scenario for the Dyess AFB Alternative, the existing airspace at the PRTC and in the Brownwood, Lancer, and Pecos MOAs would not be affected or altered.

The total number of annual flight operations at the PRTC would increase by 56 operations annually, or 2.02 percent from the No Action Alternative baseline. Annual operations at Brownwood and Lancer MOAs would decrease by 6 and 75 annual operations, respectively (0.24 and 5.45 percent). Operations in Pecos MOA would increase by 374 annual operations. That would represent a 15.42 percent increase from the No Action Alternative baseline.

Although a flight operations increase of 15.42 percent in the Pecos MOA may contribute to increased airspace congestion and/or scheduling conflicts, it is important to note that airspace usage and MOA distribution would continue to support the 9th Bomb Squadron. However, local training may also take place on an IFR track. Further, as the program develops, MOA usage and distribution may be adapted to better accommodate the B-21 training mission. For instance, the Lancer MOA, where operations would decrease by nearly 18 percent, could be utilized more extensively to alleviate any strains in the Pecos MOA. Therefore, this level of change in total operations would not be likely to adversely impact airspace use, ATC, or scheduling at the PRTC or in the Lancer, Brownwood, or Pecos MOAs.

3.1.2.2.4 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

No mitigations would be necessary to implement the Dyess AFB Alternative.

3.1.2.3 Ellsworth AFB Alternative (Preferred Alternative)

3.1.2.3.1 Airfield Operations

Existing airspace around the Ellsworth AFB airfield would not be modified under the Ellsworth AFB Alternative. Additional airspace would not be required, but the way in which the airspace is used may change slightly with respect to flight profiles, patterns, etc. Under the Ellsworth AFB Alternative, the total number of air operations (takeoffs, landings, and closed patterns) at Ellsworth AFB would increase from the No Action Alternative baseline by 1,408 operations annually, or 15.8 percent. However, local training may also take place on an IFR track. Further, as the program develops, MOA usage and distribution may be adapted to better accommodate the B-21 training mission.

This change in total operations would not be likely to adversely impact airspace use, ATC, or scheduling at Ellsworth AFB. See Table 3.0-3 for a comparison of the total flight operations at the installations and in the SUA under the No Action Alternative, Proposed Action, and Snapshot Scenarios.

3.1.2.3.2 Airspace and Range Utilization

As mentioned previously, the existing airspace at the PRTC would not be modified under the Ellsworth AFB Alternative. Additional airspace is not required, but certain airspace may be used more extensively, while use of other airspace units may decrease. Therefore, the use of the current airspace would likely be modified. For example, the B-21 would generally operate at higher altitudes than the B-1 operates currently. The total

number of annual flight operations at the PRTC would increase by 1,143 operations annually, or 41.1 percent from the No Action Alternative baseline. Although this increase is substantial, because the B-21 would be typically flying in a range of higher altitudes that are currently under-utilized, adverse impacts on airspace congestion or scheduling are unlikely. Further, the majority of B-21 flight operations in the PRTC would take place in PR-2. Flight operations would decrease in PR-1, PR-3, and PR-4. The USAF's PRTC EIS ROD (USAF, 2015) and the FAA ROD (FAA, 2015) mandate a 12 percent reduction in B-1 operations in PR-1, PR-3, and PR-4. Because the B-1 operations would not increase and would cease entirely in the end-state, this ROD requirement would continue to be met.

Implementation of B-21 operations at the PRTC under the Ellsworth AFB Alternative would impact air traffic controller workload and would contribute to increased congestion for military and civilian aircraft across the region. However, existing policies and procedures would enable ATC and schedulers to continue to coordinate operations such that this change in total operations would not be likely to adversely impact airspace use, ATC, or scheduling at the PRTC.

3.1.2.3.3 Snapshot

Under the Snapshot Scenario at Ellsworth AFB, existing airspace at Ellsworth AFB would not be adversely affected, and changes would be limited to how the airspace is used. Under the Snapshot Scenario at Ellsworth AFB, the total number of air operations (takeoffs, landings, and closed patterns) would increase from the No Action Alternative baseline by 1,387 operations annually, or 2.83 percent (see Table 3.0-3). This minimal change in total operations would not be likely to adversely impact airspace use, ATC, or scheduling at Ellsworth AFB. Further, this would be a temporary situation only potentially occurring during the transition period as the B-1s are being drawn down and the B-21 is bedded down.

Under the Snapshot Scenario at Ellsworth AFB, the existing airspace at the PRTC would not be altered. The total number of annual flight operations at the PRTC would increase by 1,425 operations annually, or 51.30 percent from the No Action Alternative baseline. Although this increase is substantial, because the B-21 would be typically flying in a range of higher altitudes that are currently under-utilized, adverse impacts on airspace congestion or scheduling are unlikely.

Further, existing policies and procedures would enable ATC and schedulers to continue to coordinate operations such that this change in total operations would not be likely to adversely impact airspace use, ATC, or scheduling at the PRTC. Additionally, as the program develops, SUA usage and distribution may be adapted to better accommodate the B-21 training mission.

3.1.2.3.4 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

No mitigations would be necessary to implement the Ellsworth AFB Alternative.

3.2 NOISE

3.2.1 Noise, Affected Environment

3.2.1.1 Description of Resource

Noise is defined as unwanted sound. Potential noise impacts are dependent on characteristics of the noise such as sound level, pitch, and duration. Noise impacts are also strongly influenced by characteristics of the noise receiver (i.e., persons, animals, or objects that hear or are affected by noise). Noise analysis considers potential impacts that could result in annoyance, speech interference, sleep disturbance, human health effects (auditory and nonauditory), wildlife impacts, and structural damage. Additional discussion of specific noise effects on other affected resources can be found in Section 3.5 (Socioeconomics), Section 3.6 (Environmental Justice), Section 3.7 (Biological Resources), and Section 3.8 (Cultural Resources). Appendix B (Noise) presents information on noise metrics and describes methods used to model aircraft noise levels.

3.2.1.2 Region of Influence

3.2.1.2.1 Dyess AFB

The ROI for noise includes Dyess AFB, and the areas surrounding the installation, as well as land areas included within the airspace units where B-21 flight operations and training would occur. Noise environments in the vicinity of Dyess AFB are dominated by aircraft noise. Other noise sources on the installation include ground vehicles, ongoing construction activities, and machinery. The area surrounding Dyess AFB is primarily rural/agricultural to the west, north, and south. There are a few small communities such as Tye, Merkel, Caps, and Buffalo Gap in those areas, and the city of Abilene to the east of Dyess AFB is the largest community that could potentially experience noise impacts associated with the Proposed Action.

3.2.1.2.2 Ellsworth AFB

The ROI for noise includes Ellsworth AFB, and the areas surrounding the installation, as well as land areas included within the airspace units where B-21 flight operations and training would occur. Noise environments in the vicinity of Ellsworth AFB are dominated by aircraft noise. Other noise sources on the installation include ground vehicles, ongoing construction activities, and machinery. The area surrounding Ellsworth AFB is primarily rural/agricultural. The small communities of Box Elder and Ashland Heights are to the south and west of the installation, respectively. The largest community near Ellsworth AFB is Rapid City approximately 5 miles to the southwest of the base.

3.2.1.2.3 Powder River Training Complex

The ROI for the PRTC includes the lands under and near the PRTC MOAs/ATCAAs. This includes several counties in North and South Dakota, Montana, and Wyoming (Figure 2.3-1). The area under the PRTC airspace is primarily rural/agricultural, but several communities occur beneath the airspace. Ellsworth AFB has established avoidance areas under the Powder River MOAs to reduce noise and overflight above communities, ranches, and other noise-sensitive locations.

3.2.1.2.4 Lancer MOA

The Lancer MOA ROI includes portions of eight counties in west Texas. The area beneath Lancer MOA is primarily rural/agricultural, but some small communities, such as Snyder and Lamesa, are situated beneath the airspace.

3.2.1.2.5 Brownwood MOA

The Brownwood MOA ROI includes all of Brown County and parts of seven other counties in midwest Texas. The area beneath Brownwood MOA is primarily rural/agricultural. The city of Brownwood and several smaller communities, such as Coleman, Comanche, and Cross Plains, are situated beneath the airspace.

3.2.1.2.6 Pecos MOA

The Pecos MOA ROI includes parts of five counties in eastern New Mexico. The area beneath the Pecos MOA is almost entirely open space with the exception of Fort Sumner in De Baca County. Fort Sumner is a small village consisting primarily of agricultural areas.

3.2.1.3 Analysis Methodology

AFI 32-7070, *Air Force Noise Program*, provides the overall framework for computing noise levels associated with aircraft operations within SUAs and in the vicinity of military airfields.

The primary effect of aircraft noise on exposed communities is one of annoyance, including activity interference, which includes speech interference and sleep disturbance. Noise annoyance is defined by the U.S. Environmental Protection Agency (EPA) as any negative, subjective reaction on the part of an individual or group (EPA, 1974). The best available method for predicting community annoyance response to aircraft noise is the updated Schultz curve (sometimes called the “Air Force Curve”) (Table 3.2-1).

Table 3.2-1. Relationship Between Annoyance and DNL

Noise Exposure (DNL)	Percent of Population Highly Annoyed
<65	<12.29
65–70	12.29–22.10
70–75	22.10–36.47
75–80	36.47–53.74

< = less than; DNL = day-night average sound level

There are several commonly recognized average noise level thresholds that are based on expected community reaction.

Because both the duration and frequency of noise events also play a role in determining overall noise impact, several metrics are used that account for these factors. Each metric discussed below is used in the assessment of noise impacts in this EIS. A more thorough explanation of these metrics can be found in Appendix B (Noise).

- A-weighted decibel (dBA) sound level measurements reflect the frequencies to which human hearing is most sensitive. Noise levels in this EIS can be assumed to be A-weighted unless a different weighting is specified.
- Day-night average sound level (DNL [symbol - L_{dn}]) represents aircraft noise level averaged over a 24-hour period with a 10-decibel (dB) adjustment to flights occurring between 10:00 p.m. and 7:00 a.m. to account for the added intrusiveness of noise during these hours.
- Sound exposure level (SEL) accounts for both the maximum sound level and the length of time a sound lasts.
- Equivalent sound level (L_{eq}) represents aircraft noise level averaged over a specified time period. This analysis uses a 1-hour L_{eq} to quantify expected noise levels in each of the hours of a school day (i.e., each 1-hour increment between 7:00 a.m. and 4:00 p.m.).
- Maximum sound level (L_{max}) is the highest sound level measured (using time integration of either 1/8 second or 1 second) during a noise event. L_{max} decreases as altitude or distance from the observer increases and varies according to the type of aircraft, airspeed, and power setting.
- Onset-rate adjusted monthly day-night average sound level (L_{dnmr}) is the measure used for subsonic aircraft noise in military airspace (ranges, MTRs, or MOAs).

Noise Modeling

The NOISEFILE database contains measured reference noise data for each aircraft. NOISEFILE is used by the noise modeling software MR_NMAP and NOISEMAP to predict noise levels. Operational data were collected from pilots, air traffic controllers, aircraft maintainers, range operators, and other sources in accordance with standard data collection procedures. Since the B-21 is a new airframe and validated noise source data is not yet available, B-2A noise source data was used in modeling. This is expected to result in a conservative noise estimate. In general, the B-21 is anticipated to produce less noise than the B-1 and to result in an overall noise decrease.

The operational data were put into computerized noise models to generate estimates of noise levels. The noise models described below were applied as appropriate for each type of noise. Table 3.0-3 provides a summary of the total number of flight operations that were modeled under the No Action Alternative, Proposed Action (Dyess and Ellsworth Alternatives), and the Snapshot Scenarios for each alternative. The Dyess AFB and Ellsworth AFB Alternatives represent the end-state after all B-1 operations have been

phased out and the full complement of B-21 aircraft has been beddown and made operational.

Subsonic Noise

The NOISEMAP suite of computer programs was used for computing subsonic aircraft noise in the vicinity of Dyess AFB and Ellsworth AFB. Aircraft noise levels in the vicinity of these installations were calculated and are presented using the DNL metric. Noise contours were used to calculate the area (in acres) and approximate population impacted by various noise levels. There is an amount of unavoidable uncertainty associated with estimates of population impacted by elevated noise levels. The method used to estimate number of persons affected is subject to some error. Off-installation residents were estimated by summing the populations of census blocks on land not owned by the USAF that were affected by noise contours. Where census blocks were split by a noise contour line, population within the noise contour was assumed to be proportional to the percentage of the census block located within the noise contour interval. While this assumption is not always correct, the results would not be expected to be biased in favor of either more or less population being included in the estimate.

The MOA and Range NOISEMAP (MR_NMAP) suite of computer programs was used for computing subsonic aircraft noise underneath the PRTC and Brownwood, Lancer, and Pecos MOAs. Noise levels from aircraft operations beneath military airspace units were calculated using the L_{dnmr} metric.

Classroom Learning

Good acoustical qualities are essential in classrooms in which speech communication is an important part of the learning process. Excessive background noise interferes with speech communication and thus presents an acoustical barrier to learning. The American National Standards Institute's (ANSI's) Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools provides "acoustical performance criteria, design requirements, and design guidelines for new school classrooms and other learning spaces" (ANSI, 2009). While this standard is not a requirement to be followed by school systems, it is applicable as a design guideline to new construction, as well as renovations of existing facilities, and is recommended to achieve a high degree of speech intelligibility in learning spaces. Because this ANSI standard was not finalized until 2009, it should not be expected that all schools constructed or renovated before that date would necessarily meet the recommended criteria.

The ANSI standard identifies an appropriate set of criteria for maximizing speech intelligibility in schools as an indoor L_{eq} of 40 dBA (for intermittent noise from transportation sources such as aircraft operations). To compare the outdoor noise levels to indoor recommended values, outdoor noise levels are adjusted to account for the noise level reduction (NLR) provided by the structure. Typical NLR values are 15 dB with windows open and 25 dB with windows closed, but vary by structure, climate, and noise sources.

Construction Noise

Construction noise was evaluated using Roadway Construction Noise Model version 1.1, the U.S. Department of Transportation (DOT)/Federal Highway Administration's standard model for the prediction of construction noise (U.S. DOT, 2016). The Roadway Construction Noise Model has the capability to model types of construction equipment that would be expected to be the dominant construction-related noise sources associated with this aspect of the Proposed Action. All construction noise analyses assumed that a standard set of construction equipment would be used. Construction noise is expected to be limited to normal working hours (7:00 a.m. to 5:00 p.m.). Construction noise impacts are quantified using the metrics $L_{\max}$ and L_{10} (loudest 10 percent noise level) as calculated based on distance from a given receptor.

Potential Hearing Loss

Potential hearing loss (PHL) as a noise impact is introduced in this section, and a detailed description of PHL is provided in Appendix B (Noise).

DoD policy requires that hearing loss risk be estimated for the at risk population, defined as the population exposed to DNL greater than or equal to 80 dB (DoD, 2009). Specifically, DoD components are directed to "use the 80 Day-Night A-Weighted (DNL) noise contour to identify populations at the most risk of potential hearing loss" (DoD, 2009). This does not preclude populations outside the 80 dB DNL contour (i.e., at lower exposure levels) from being at some degree of risk of hearing loss. However, the estimate should be restricted to populations within this contour area, including residents of on-base housing. The exposure of DoD employees in the area already defined as the hazardous noise are not included in this analysis because they already fall under the occupational noise regulations and would be evaluated using the appropriate DoD component regulations for occupational noise exposure.

3.2.2 Noise, Environmental Consequences

3.2.2.1 No Action Alternative Consequences

3.2.2.1.1 No Action at Dyess AFB

Aircraft Noise

Noise modeling was conducted to reflect current baseline aircraft operations under the No Action Alternative at Dyess AFB. Noise contours in the vicinity of Dyess AFB under the No Action Alternative are depicted in Figure 3.2-1, which also indicates the locations of representative noise-sensitive points of interest under the No Action Alternative at Dyess AFB using the DNL metric. Acreage, population, and residential parcels affected by DNL noise contours associated with all aircraft Dyess AFB under the No Action Alternative are shown in Table 3.2-2.

Under the No Action Alternative, 11,497 acres and an estimated 1,419 persons could be exposed to noise levels exceeding 65 dB DNL near Dyess AFB.

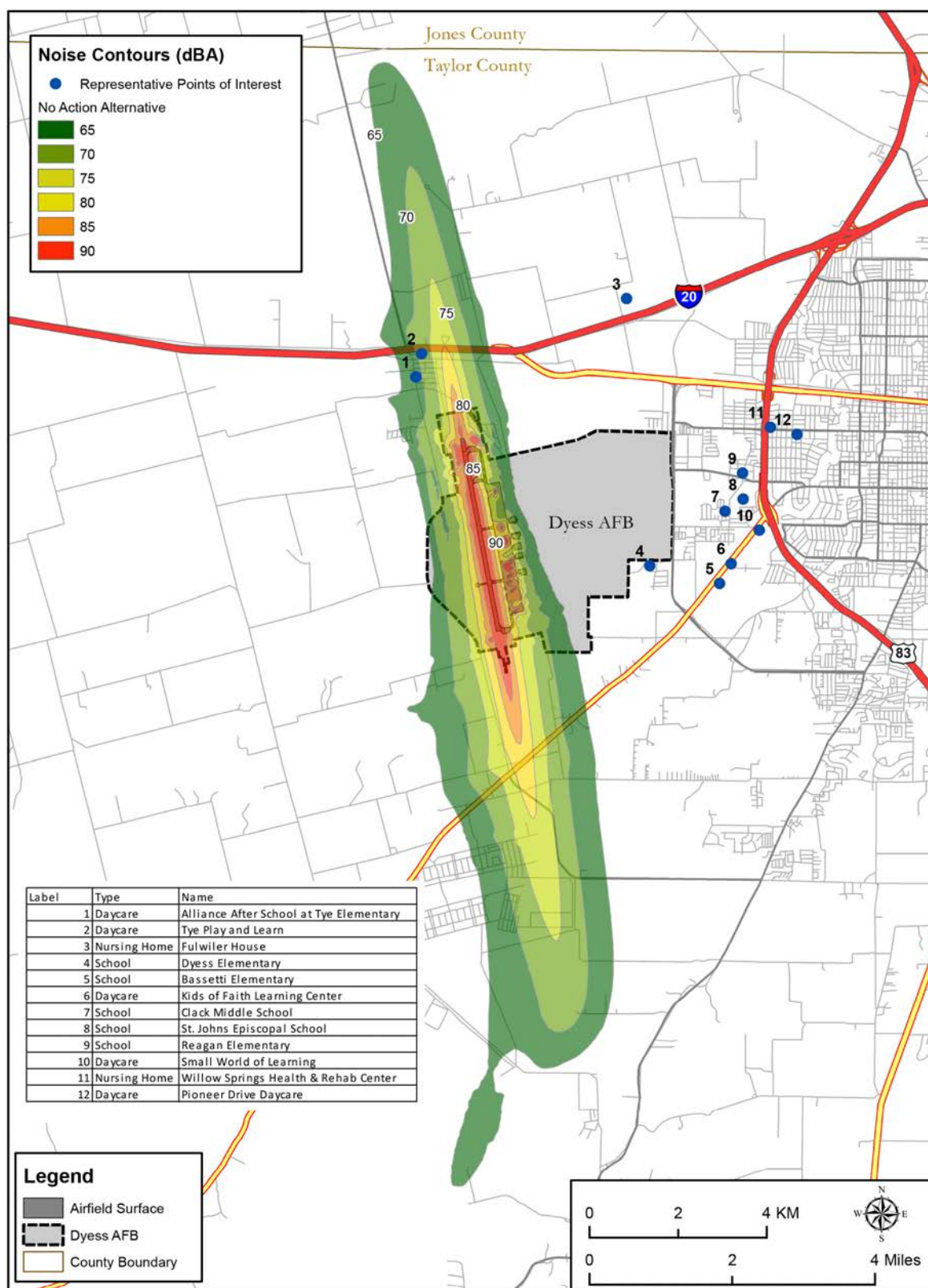


Figure 3.2-1. Noise Contours at Dyess AFB Under the No Action Alternative

Table 3.2-2. Acreage and Population Affected by Elevated Noise Levels Under the No Action Alternative at Dyess AFB

Noise Level (dB DNL)	Acres Off-Installation	Off-Installation Population ¹
65–69	6,052	700
70–74	3,341	448
75–79	1,431	180
80–84	476	64
>85	197	27
Total	11,497	1,419

> = greater than; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Note:

1. Population estimates were made based on 2014–2018 ACS 5-Year Estimates data (U.S. Census Bureau, 2018a). The number of persons currently residing in affected areas may differ from what has been stated.

Analysis was also conducted to look at the baseline aircraft noise in the SUAs used by each installation for training. Baseline noise levels in the PRTC were calculated for all aircraft including the B-1 and all other transient aircraft. Transient aircraft include the F-16C, B-52, and KC-135R. The percentage of these transient operations are significantly less than B-1 operations (approximately 30 percent of the total operations in the PRTC). Noise levels range from less than 35 dB DNL to 46.1 dB DNL across the PRTC (Figure 3.2-2). These levels are well below the 65 dB DNL level that would potentially impact land use, so there would be no adverse impacts associated with noise beneath the PRTC airspace under the No Action Alternative. Likewise, baseline noise levels beneath the Brownwood, Pecos, and Lancer MOAs (less than 35, 55.9, and 43.4 dB DNL, respectively) would also remain well below the 65 dB DNL level (Figure 3.2-3).

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Table 3.2-3 describes aircraft noise levels at representative noise-sensitive points of interest under the No Action Alternative at Dyess AFB using the DNL metric, which reflects noise over the course of an entire day, and the SEL metric, which reflects the noise generated by a single overflight event. Locations of points are shown in Figure 3.2-1. Because overflight noise levels vary depending on where and how the aircraft is flying, as well as ambient atmospheric conditions, any given location is exposed to a wide range of individual aircraft overflight noise levels. The loudest and most frequent types of overflights, particularly types of flights conducted frequently during the late night (10:00 p.m. to 7:00 a.m.), play a dominant role in determining overall DNL noise levels and people's reactions to the noise environment.

Under the No Action Alternative at Dyess AFB, the points of interest north of Dyess AFB would continue to experience DNL of up to 72 dB. Individual overflight noise levels (i.e., SEL) could reach up to 117 dB. These maximum SEL noise levels are attributable to B-1 operations at Dyess AFB.



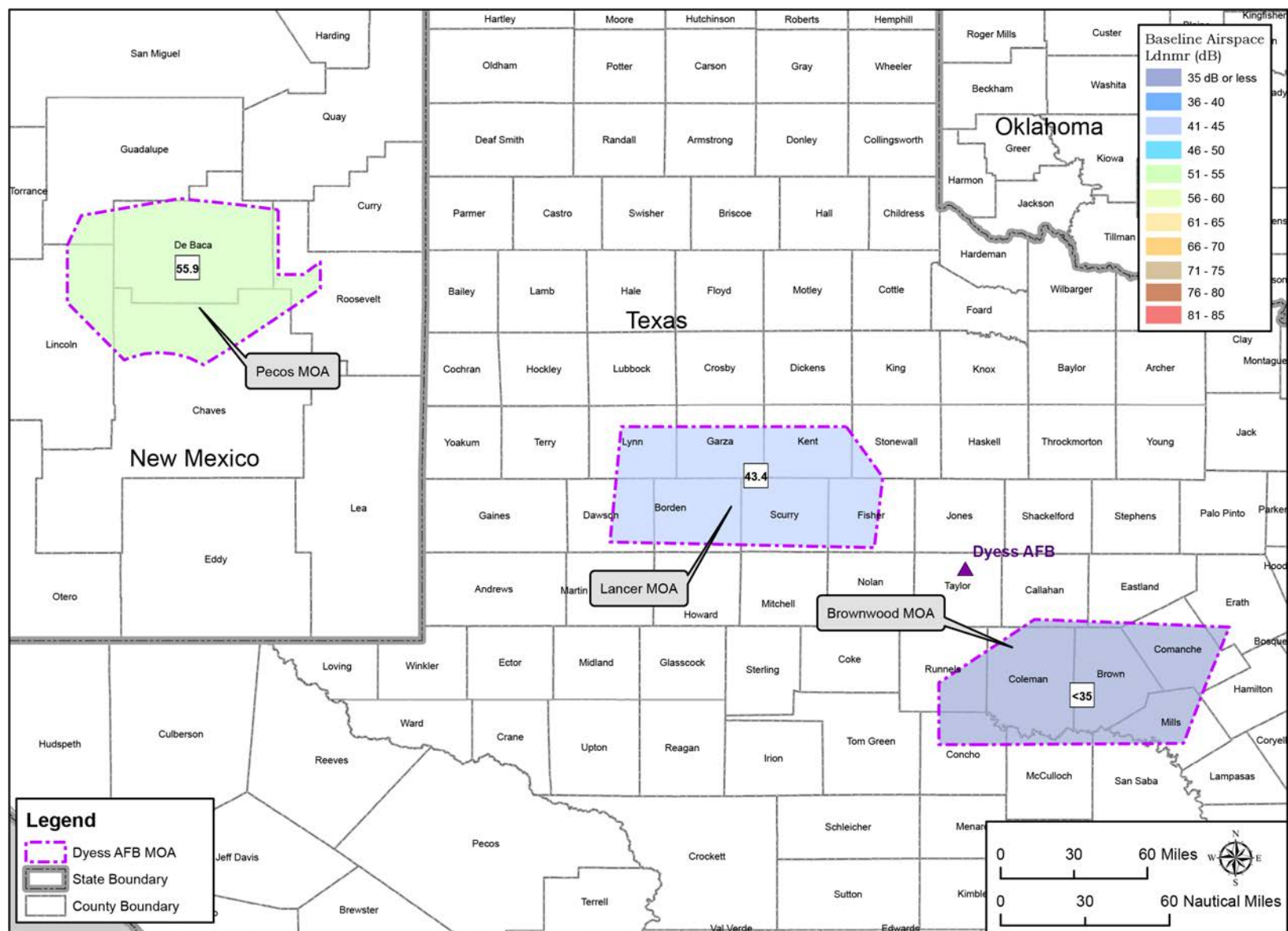


Figure 3.2-3. Airspace Noise at Brownwood, Lancer, and Pecos MOAs Under the No Action Alternative

Table 3.2-3. Noise Impacts at Representative Points of Interest Under the No Action Alternative at Dyess AFB

ID	General Description	Type	No Action Alternative	
			DNL (dB)	Maximum SEL (dB)
01	Alliance After School at Tye Elementary	Daycare	68	114
02	Tye Play and Learn	Daycare	72	117
03	Fulwiler House	Nursing Home	49	93
04	Dyess Elementary	School	54	98
05	Bassetti Elementary	School	47	89
06	Kids of Faith Learning Center	Daycare	45	88
07	Clack Middle School	School	44	87
08	St. John's Episcopal School	School	43	86
09	Reagan Elementary	School	42	86
10	Small World of Learning	Daycare	43	88
11	Willow Springs Health & Rehab Center	Nursing Home	47	95
12	Pioneer Drive Daycare	Daycare	46	95

AFB= Air Force Base; dB = decibel; DNL = day-night average sound level; ID = identification code; SEL = sound exposure level

Note: Points of Interest presented in this table are provided to help understand the noise environment. As such, this table may not include all noise-sensitive facilities (schools, churches, daycares, etc.) that are affected by noise contours.

Equivalent Sound Level (L_{eq}) and Number of Noise Events Analysis at Representative Points of Interest

Table 3.2-4 lists the outdoor and indoor estimated 8-hour L_{eq} values under the No Action Alternative during a typical school day (7:00 a.m. to 4:00 p.m., Monday through Friday) at points of interest near Dyess AFB. Schools at which the maximum estimated indoor L_{eq} exceeds 40 dB may not meet the 2009 ANSI guidance for at least a portion of 1 hour during a typical school day. The table also shows the number of events during an average school day at or above an indoor maximum (single event) sound level of 50 dB. For example, an individual attending after-school daycare at Alliance After-School at Tye Elementary (01) would typically experience as many as three disruptive events per hour with the windows open and one per hour with windows closed under the No Action Alternative.

Under the baseline No Action Alternative, two of the representative schools were expected to exceed the recommended noise guidelines. The two schools/daycares in the town of Tye north of Dyess AFB would potentially be impacted.

Noise impacts on property values are discussed in Section 3.5 (Socioeconomics) and Section 3.6 (Environmental Justice). Impacts on noise-sensitive land use types (e.g., residential areas) are discussed in Section 3.4 (Land Use).

Table 3.2-4. Hourly L_{eq} Noise Levels During the School Day at Representative Points of Interest Near Dyess AFB Under the No Action Alternative

Point of Interest		Outdoor $L_{eq(8h)}$ (dB)	Indoor			
			Windows Open		Windows Closed	
ID	Description		$L_{eq(8h)}$ (dB)	Events per Hour	$L_{eq(8h)}$ (dB)	Events per Hour
01	Alliance After School at Tye Elementary	66	51	3	41	1
02	Tye Play and Learn	70	55	3	45	2
03	Fulwiler House	47	<40	-	<40	-
04	Dyess Elementary	52	<40	1	<40	-
05	Bassetti Elementary	46	<40	-	<40	-
06	Kids of Faith Learning Center	44	<40	-	<40	-
07	Clark Middle School	42	<40	-	<40	-
08	St. John's Episcopal School	41	<40	-	<40	-
09	Reagan Elementary	41	<40	-	<40	-
10	Small World of Learning	42	<40	-	<40	-
11	Willow Springs Health & Rehab Center	45	<40	-	<40	-
12	Pioneer Drive Daycare	45	<40	-	<40	-
Number of Sites with More than 1 Intrusive Event per Hour				2		1
Lowest Number of Intrusive Events per Hour if More than 1				3		2
Highest Number of Intrusive Events per Hour if More than 1				3		2

< = less than; AFB = Air Force Base; ANSI = American National Standards Institute; dB = decibel; ID = identification code; $L_{eq(8h)}$ = 8-hour equivalent sound level

Notes:

1. Assumes 15 dB and 25 dB of Noise Level Reductions for windows open and closed, respectively.
2. Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <40 dB.
3. Daycares/schools presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours.

Construction Noise

Under the No Action Alternative, there are no proposed construction, demolition, or renovation projects. However, there may be several ongoing construction efforts occurring on the base. The *Environmental Assessment for Installation Development at Dyess, AFB* (USAF, 2017b) evaluated impacts from proposed planned projects for the near future at Dyess AFB. Projects would result in temporary, minor noise increases resulting from construction and demolition (C&D) activities.

As an example, the Federal Highway Administration's Roadway Construction Noise Model was used to calculate the noise levels at various distances from a typical construction site. Equipment included a backhoe, bulldozer, ground compactor, generators, pickup trucks, and pneumatic tools. The analysis assumed that a standard set of construction equipment would be used in all construction projects and would run for approximately 40 percent of the workday. Resulting noise levels at various receptor

distances from the construction site are listed in Table 3.2-5. At distances greater than 600 feet from the construction site, noise levels drop below the 65 dBA level, and annoyance is likely to be minimal.

Ongoing various C&D activities would result in temporary, localized increases in noise levels that could be disruptive and annoying. However, the installation and surrounding area is exposed to frequent loud aircraft operations noise and ground vehicle traffic noise under baseline conditions. Additionally, demolition and construction activities would be conducted during normal business hours. In this context, the temporary and localized noise generated by C&D activities on the installation could be disruptive and annoying but would not be significant.

Table 3.2-5. Construction Noise Level Expected from a Typical Construction Site

Distance to Receptor (feet)	L _{max} (dBA)	L ₁₀ (dBA)
100	79.2	82.5
200	74.6	78.2
300	69.6	73.0
400	67.1	70.5
500	65.2	68.3
600	63.6	67.0

dBA = A-weighted decibel; L₁₀ = loudest 10 percent noise level; L_{max} = maximum sound level

Potential Hearing Loss

PHL under the No Action Alternative was assessed using the methodology described above and in greater detail in Appendix B (Noise). Using census data calculation, there are approximately 91 people off-base who are exposed to 80 dB DNL or higher under the No Action Alternative at Dyess AFB.

3.2.2.1.2 No Action at Ellsworth AFB

Aircraft Noise

Noise modeling was conducted to reflect current baseline aircraft operations under the No Action Alternative at Ellsworth AFB. Noise contours in the vicinity of Ellsworth AFB under the No Action Alternative are depicted in Figure 3.2-4. Acreage, population, and residential parcels affected by DNL noise contours associated with all aircraft Ellsworth AFB under the No Action Alternative are shown in Table 3.2-6.

Under the No Action Alternative, 5,834 acres and an estimated 1,985 persons could be exposed to noise levels exceeding 65 dB DNL near Ellsworth AFB.

Under the No Action Alternative at Ellsworth AFB, airspace noise would be as shown in Figure 3.2-2. Noise levels range from less than 35 dB DNL to 46.1 dB DNL across the PRTC (Figure 3.2-2). These levels are well below the 65 dB DNL level that would potentially impact land use, so there would be no adverse impacts associated with noise beneath the PRTC airspace under the No Action Alternative.

Table 3.2-6. Acreage and Population Affected by Elevated Noise Levels Under the No Action Alternative at Ellsworth AFB

Noise Level (dB DNL)	Acres Off-Installation	Off-Installation Population ¹
65–69	4,088	1,313
70–74	1,219	391
75–79	432	190
80–84	77	78
>85	18	13
Total	5,834	1,985

> = greater than; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Notes:

1. Population estimates were made based on 2014–2018 ACS 5-Year Estimates data (U.S. Census Bureau, 2018a). The number of persons currently residing in affected areas may differ from what has been stated.

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Table 3.2-7 describes aircraft noise levels at representative noise-sensitive points of interest under the No Action Alternative at Ellsworth AFB using the DNL metric, which reflects noise over the course of an entire day, and the SEL metric, which reflects the noise generated by a single overflight event. Locations of points are shown in Figure 3.2-4. Because overflight noise levels vary depending on where and how the aircraft is flying, as well as ambient atmospheric conditions, any given location is exposed to a wide range of individual aircraft overflight noise levels. The loudest and most frequent types of overflights, particularly types of flights conducted frequently during the late night (10:00 p.m. to 7:00 a.m.), play a dominant role in determining overall DNL noise levels and people's reactions to the noise environment.

Table 3.2-7. Noise Impacts at Representative Points of Interest Under the No Action Alternative at Ellsworth AFB

ID	General Description	Type	No Action Alternative	
			DNL (dB)	Maximum SEL (dB)
01	Ellsworth Schoolage Care Program	Daycare	63	107
02	Child Development Services Program	Daycare	64	107
03	Douglas Middle School	School	67	111
04	Badger Clark Daycare	Daycare	70	114
05	Patriot Elementary	School	70	115
06	District Day Care	Daycare	71	116
07	Francis Case Daycare	Daycare	71	115
08	Douglas High School	School	74	119
09	Vandenberg Daycare	Daycare	77	123
10	Vandenberg Elementary	School	77	122
11	East Middle School	School	53	96
12	Emmanuel Baptist Church	Church	67	115
13	WaTiki Indoor Waterpark Resort	Resort	54	100

AFB = Air Force Base; dB = decibel; DNL = day-night average sound level; ID = identification code; SEL = sound exposure level

Note: Points of Interest presented in this table are provided to help understand the noise environment. As such, this table may not include all noise-sensitive facilities (schools, churches, daycares, etc.) that are affected by noise contours.

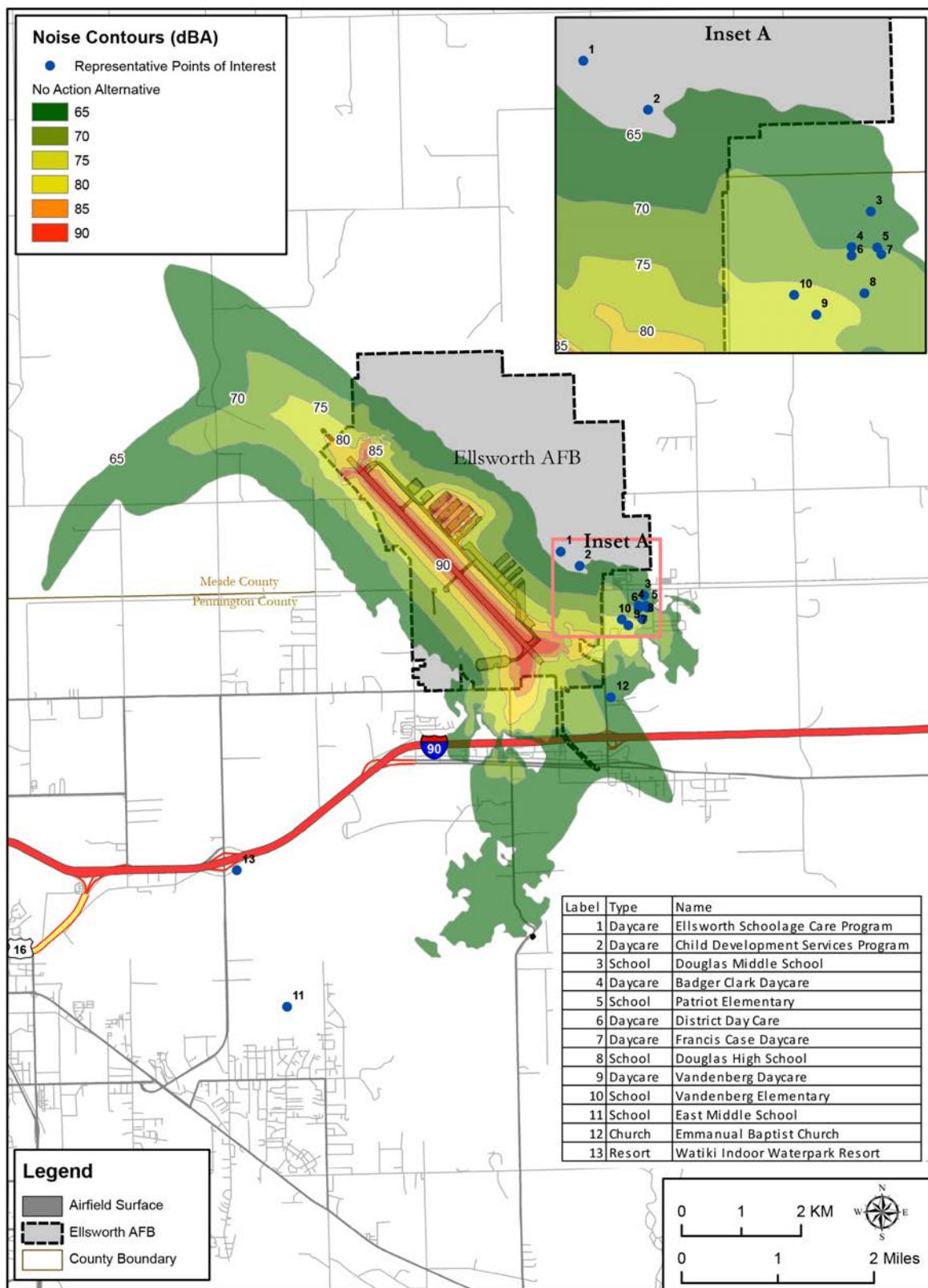


Figure 3.2-4. Noise Contours at Ellsworth AFB Under the No Action Alternative

Equivalent Sound Level (L_{eq}) at Representative Points of Interest

Table 3.2-8 lists the outdoor and indoor estimated 8-hour L_{eq} values under the No Action Alternative during a typical school day (7:00 a.m. to 4:00 p.m., Monday through Friday) at points of interest near Ellsworth AFB. Schools at which the maximum estimated indoor L_{eq} exceeds 40 dB may not meet the 2009 ANSI guidance for at least a portion of 1 hour during a typical school day. The table also shows the number of events during an average school day at or above an indoor maximum (single event) sound level of 50 dB. For example, an individual attending after-school daycare at Ellsworth Schoolage Care Program (01) would typically experience one disruptive event per hour with the windows open and one per hour with windows closed under the No Action Alternative.

Under the baseline No Action Alternative, all five representative schools are expected to exceed the recommended noise guidelines. Additionally, the six daycares used as representative points of interest would exceed the recommended noise guidelines as well.

Noise impacts on property values are discussed in Section 3.5 (Socioeconomics) and Section 3.6 (Environmental Justice). Impacts on noise-sensitive land use types (e.g., residential areas) are discussed in Section 3.4 (Land Use).

Table 3.2-8. Indoor Classroom Learning Disruption at Representative Points of Interest Near Ellsworth AFB Under the No Action Alternative

Point of Interest		Outdoor L _{eq(8h)} (dB)	Indoor			
ID	Description		Windows Open		Windows Closed	
			L _{eq(8h)} (dB)	Events per Hour	L _{eq(8h)} (dB)	Events per Hour
01	Ellsworth Schoolage Care Program	64	49	1	<40	1
02	Child Development Services Program	65	50	1	<40	1
03	Douglas Middle School	68	53	1	43	1
04	Badger Clark Daycare	71	56	1	46	1
05	Patriot Elementary	71	56	1	46	1
06	District Day Care	72	57	1	47	1
07	Francis Case Daycare	72	57	1	47	1
08	Douglas High School	75	60	1	50	1
09	Vandenberg Daycare	79	64	1	54	1
10	Vandenberg Elementary	78	63	1	53	1
11	East Middle School	53	<40	1	<40	-
12	Emmanuel Baptist Church	68	53	1	43	1
13	WaTiki Indoor Waterpark Resort	55	<40	1	<40	-
Number of Sites with More than 1 Intrusive Event per Hour				0		0
Lowest Number of Intrusive Events per Hour if More than 1				0		0
Highest Number of Intrusive Events per Hour if More than 1				1		1

< = less than; AFB = Air Force Base; ANSI = American National Standards Institute; dB = decibel; ID = identification code; $L_{eq(8h)}$ = 8-hour equivalent sound level

Notes:

1. Indoor L_{eq} is assumed to be 25 decibels less than outdoor L_{eq} due to the noise level reduction provided by the structure with windows closed. Actual outdoor-to-indoor noise level reduction varies from school to school and between locations within individual schools.
2. Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <40 dB.
3. Daycares/schools presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours.

Construction Noise

The ambient noise environment around Ellsworth AFB is affected mainly by aircraft operations and vehicle traffic. Noise from aircraft operations dominates the ambient environment throughout Ellsworth AFB due to 28 BW and transient operations. While no construction projects are proposed under the No Action Alternative, there are likely to be other construction, demolition, and/or renovation projects occurring at Ellsworth AFB as part of other actions. See Table 3.2-5 above for typical C&D noise levels at various distances from the project site. Again, at distances greater than 600 feet, noise levels would be below 65 dB DNL and would not be likely to significantly impact public annoyance.

Ongoing various C&D activities would result in temporary, localized increases in noise levels that could be disruptive and annoying. However, the installation and surrounding area is exposed to frequent loud aircraft operations noise and ground vehicle traffic noise under baseline conditions. Additionally, demolition and construction activities would be conducted during normal business hours. In this context, the temporary and localized noise generated by C&D activities on the installation could be disruptive and annoying but would not be significant.

Potential Hearing Loss

PHL under the No Action Alternative was assessed using the methodology described in Appendix B (Noise). No individuals in the vicinity of Ellsworth AFB would be exposed to aircraft noise 80 dB DNL or greater under the No Action Alternative.

3.2.2.2 Dyess AFB Alternative

3.2.2.2.1 Personnel

Additional personnel would not be likely to appreciably contribute to noise in the area. The area near Dyess AFB is characterized by aircraft noise and vehicular noise. Personnel would continue to commute on established roads, and the relatively minor increase in personnel and traffic overall would not be likely to impact noise adversely.

3.2.2.2.2 Airfield Operations

Figure 3.2-5 depicts noise contours in the vicinity of Dyess AFB under the Dyess AFB Alternative compared with the No Action Alternative. Acreage, population, and residential parcels affected by DNL noise contours associated with all aircraft under the Dyess AFB Alternative are shown in Table 3.2-9.

Under the Dyess AFB Alternative, 4,355 acres and an estimated 496 persons could be exposed to noise levels exceeding 65 dB DNL near Dyess AFB. This is a decrease of 7,142 acres and 923 persons overall from the No Action Alternative. The change in noise level is attributable both to reduction in flight operations and to the fact that the B-21 is projected to be generally quieter than the B-1.

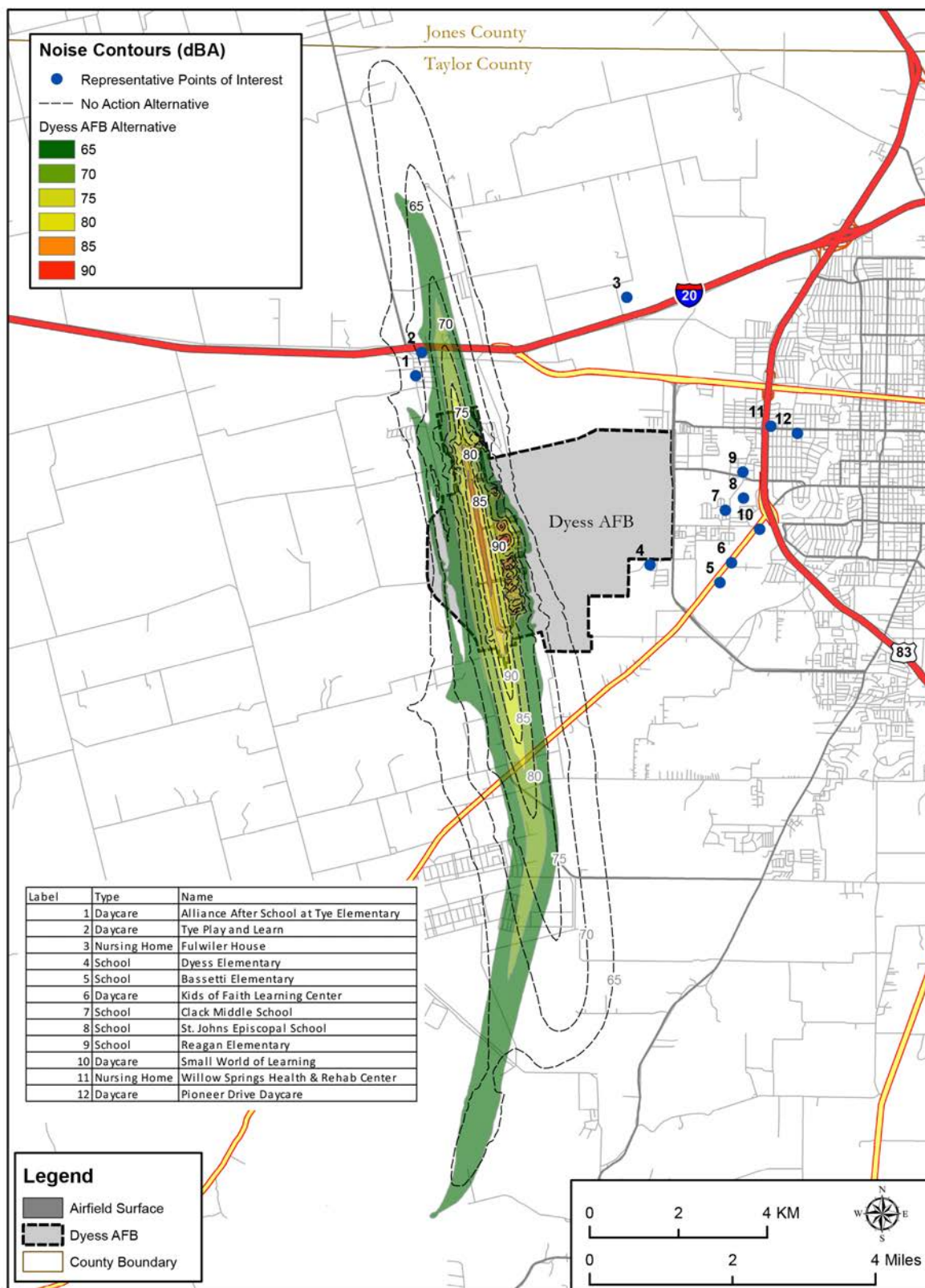


Figure 3.2-5. Noise Contours at Dyess AFB Under the Dyess AFB Alternative Compared with the No Action Alternative

Table 3.2-9. Acreage and Population Affected by Elevated Noise Levels Under the Dyess AFB Alternative

Noise Level (dB DNL)	Acres Off-Installation	No Action Alternative Acres Off-Installation	Change from No Action Acres Off-Installation	Off-Installation Population ¹	No Action Off-Installation Population ¹	Change from No Action Off-Installation Population
65–69	3,222	6,052	-2,830	341	700	-359
70–74	925	3,341	-2,416	126	448	-322
75–79	207	1,431	-1,224	29	180	-151
80–84	0	476	-476	0	64	-64
>85	0	197	-197	0	27	-27
Total	4,355	11,497	-7,142	496	1,419	-923

> = greater than; - = minus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Notes:

1. Population estimates were made based on 2014–2018 ACS 5-Year Estimates data (U.S. Census Bureau, 2018a). The number of persons currently residing in affected areas may differ from what has been stated.

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Table 3.2-10 describes aircraft noise levels at representative noise-sensitive points of interest under the Dyess AFB Alternative using the DNL metric, which reflects noise over the course of an entire day, and the SEL metric, which reflects the noise generated by a single overflight event. Locations of points are shown in Figure 3.2-5. Because overflight noise levels vary depending on where and how the aircraft is flying, as well as ambient atmospheric conditions, any given location is exposed to a wide range of individual aircraft overflight noise levels. The loudest and most frequent types of overflights, particularly types of flights conducted frequently during the late night (10:00 p.m. to 7:00 a.m.), play a dominant role in determining overall DNL noise levels and people's reactions to the noise environment.

Under the Dyess AFB Alternative, the points of interest north of Dyess AFB would continue to experience DNL of up to 64 dB. Individual overflight noise levels (i.e., SEL) could still reach up to 117 dB. However, the noise levels at all representative points would decrease from the baseline as described under the No Action Alternative and presented above in Table 3.2-10. Similarly, the maximum SEL (SEL_{max}) would decrease at all the representative points by up to 16 dB.

Table 3.2-10. Noise Impacts at Representative Points of Interest Under the Dyess AFB Alternative

Point of Interest		DNL (dBA)			Maximum SEL (dBA)		
ID	Description	No Action	Dyess AFB Alternative	Change from No Action	No Action	Dyess AFB Alternative	Change from No Action
01	Alliance After School at Tye Elementary	68	62	-6	114	108	-6

Table 3.2-10. Noise Impacts at Representative Points of Interest Under the Dyess AFB Alternative

Point of Interest		DNL (dBA)			Maximum SEL (dBA)		
ID	Description	No Action	Dyess AFB Alternative	Change from No Action	No Action	Dyess AFB Alternative	Change from No Action
02	Tye Play and Learn	72	64	-8	117	110	-7
03	Fulwiler House	49	40	-9	93	87	-6
04	Dyess Elementary	54	45	-9	98	87	-11
05	Bassetti Elementary	47	39	-8	89	82	-7
06	Kids of Faith Learning Center	45	37	-8	88	81	-7
07	Clark Middle School	44	37	-7	87	79	-8
08	St. John's Episcopal School	43	35	-8	86	82	-4
09	Reagan Elementary	42	35	-7	86	83	-3
10	Small World of Learning	43	35	-8	88	81	-7
11	Willow Springs Health & Rehab Center	47	34	-13	95	79	-16
12	Pioneer Drive Daycare	46	33	-13	95	80	-15

- = minus; AFB = Air Force Base; dBA = A-weighted decibel; DNL = day-night average sound level; ID = identification code; SEL = sound exposure level

Note: Points of Interest presented in this table are provided to help understand the noise environment. As such, this table may not include all noise-sensitive facilities (schools, churches, daycares, etc.) that are affected by noise contours.

Equivalent Sound Level (L_{eq}) and Number of Noise Events Analysis at Representative Points of Interest

Table 3.2-11 lists the outdoor and indoor estimated 8-hour L_{eq} values under the Dyess AFB Alternative during a typical school day (7:00 a.m. to 4:00 p.m., Monday through Friday) at points of interest near Dyess AFB. Schools at which the maximum estimated indoor L_{eq} exceeds 40 dB may not meet the 2009 ANSI guidance for at least a portion of 1 hour during a typical school day. The table also shows the number of events during an average school day at or above an indoor maximum (single event) sound level of 50 dB. For example, an individual attending after-school daycare at Alliance After School at Tye Elementary (01) would typically experience as many as three disruptive events per hour with the windows open and no events per hour with windows closed under the Dyess AFB Alternative (a decrease of one event per hour from the baseline with windows closed).

Noise impacts on property values are discussed in Section 3.5 (Socioeconomics) and Section 3.6 (Environmental Justice). Impacts on noise-sensitive land use types (e.g., residential areas) are discussed in Section 3.4 (Land Use).

Under the Dyess AFB Alternative, the two representative schools in Tye to the north of Dyess AFB were expected to continue to exceed the recommended noise guidelines.

Table 3.2-11. Hourly L_{eq} Noise Levels During the School Day at Representative Points of Interest Near Dyess AFB Under the Dyess AFB Alternative

Point of Interest		Dyess AFB Alternative					Change from No Action				
		Outdoor Leq(8h) (dB)	Indoor				Outdoor Leq(8h) (dB)	Indoor			
			Windows Open		Windows Closed			Windows Open		Windows Closed	
ID	Description		Leq(8h) (dB)	Events per Hour	Leq(8h) (dB)	Events per Hour		Leq(8h) (dB)	Events per Hour	Leq(8h) (dB)	Events per Hour
01	Alliance After School at Tye Elementary	57	42	3	<40	-	-10	-10	-	-10	-1
02	Tye Play and Learn	58	43	3	<40	2	-12	-12	-	-12	-
03	Fulwiler House	<40	<40	-	<40	-	-11	-11	-	-11	-
04	Dyess Elementary	42	<40	-	<40	-	-11	-11	-1	-11	-
05	Bassetti Elementary	<40	<40	-	<40	-	-10	-10	-	-10	-
06	Kids of Faith Learning Center	<40	<40	-	<40	-	-10	-10	-	-10	-
07	Clark Middle School	<40	<40	-	<40	-	-9	-9	-	-9	-
08	St. John's Episcopal School	<40	<40	-	<40	-	-9	-9	-	-9	-
09	Reagan Elementary	<40	<40	-	<40	-	-9	-9	-	-9	-
10	Small World of Learning	<40	<40	-	<40	-	-10	-10	-	-10	-
11	Willow Springs Health & Rehab Center	<40	<40	-	<40	-	-16	-16	-	-16	-
12	Pioneer Drive Daycare	<40	<40	-	<40	-	-16	-16	-	-16	-
Number of Sites with More than 1 Intrusive Event per Hour				2		1			-		-
Lowest Number of Intrusive Events per Hour if More than 1				3		2			0		0
Highest Number of Intrusive Events per Hour if More than 1				3		2			0		0

< = less than; - = none; AFB = Air Force Base; ANSI = American National Standards Institute; dB = decibel; ID = identification code; $L_{eq(8h)}$ = 8-hour equivalent sound level

Notes:

1. Assumes 15 dB and 25 dB of noise level reductions for windows open and closed, respectively.
2. Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <40 dB.
3. Daycares/schools presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours.

Potential Hearing Loss

PHL under the Dyess AFB Alternative was assessed using the methodology described in Appendix B (Noise). According to census data, it is estimated that no individuals in the vicinity of Dyess AFB would be exposed to aircraft noise 80 dB DNL or greater under the Dyess AFB Alternative. This is a decrease from the estimated 91 individuals potentially impacted under the No Action Alternative.

3.2.2.2.3 Airspace and Range Utilization

Table 3.2-12 shows the noise levels in the PRTC and the Lancer, Pecos, and Brownwood MOAs under the No Action Alternative and the Dyess AFB Alternative as well as the net change. Under the Dyess AFB Alternative, noise in the PRTC would remain below 46.1 dB, and noise beneath Lancer and Pecos MOAs would decrease, the noise level in the Brownwood MOA would remain below 35 dB, and noise levels in all areas of the PRTC would remain the same. Figure 3.2-6 shows the noise in the PRTC under the Dyess AFB Alternative, and Figure 3.2-7 shows the noise in the Lancer, Brownwood, and Pecos MOAs. The following sections discuss the change from the No Action Alternative in each SUA/MOA. Because the B-21 is projected to be generally quieter and tends to fly higher than the B-1, the noise in all the airspace areas would decrease or remain the same overall as a result of implementing the Dyess AFB Alternative.

There would be no adverse impacts to noise beneath the SUAs under the Dyess AFB Alternative.

Table 3.2-12. Dyess AFB Alternative Airspace Noise

Location	Special Use Airspace	No Action Alternative (dB)	Air Operations Dyess (dB)	Change from No Action Alternative (dB)
MOAs	Lancer	43.4	<35	-8.4
	Pecos	55.9	36.9	-19
	Brownwood	<35	<35	0
PRTC	Gap A	44.2	44.2	0
	Gap B	41.9	41.9	0
	Gap C	35.5	35.5	0
	Gateway East	<35	<35	0
	Gateway West	36.4	36.4	0
	Powder River 1A	42.8	42.8	0
	Powder River 1B	42.8	42.8	0
	Powder River 1C	45.7	45.7	0
	Powder River 1D	39.1	39.1	0
	Powder River 2	46.1	46.1	0
	Powder River 3	37.1	37.1	0
	Powder River 4	<35	<35	0

< = less than; - = minus; AFB = Air Force Base; dB = decibel; MOA = Military Operating Area; PRTC = Powder River Training Complex

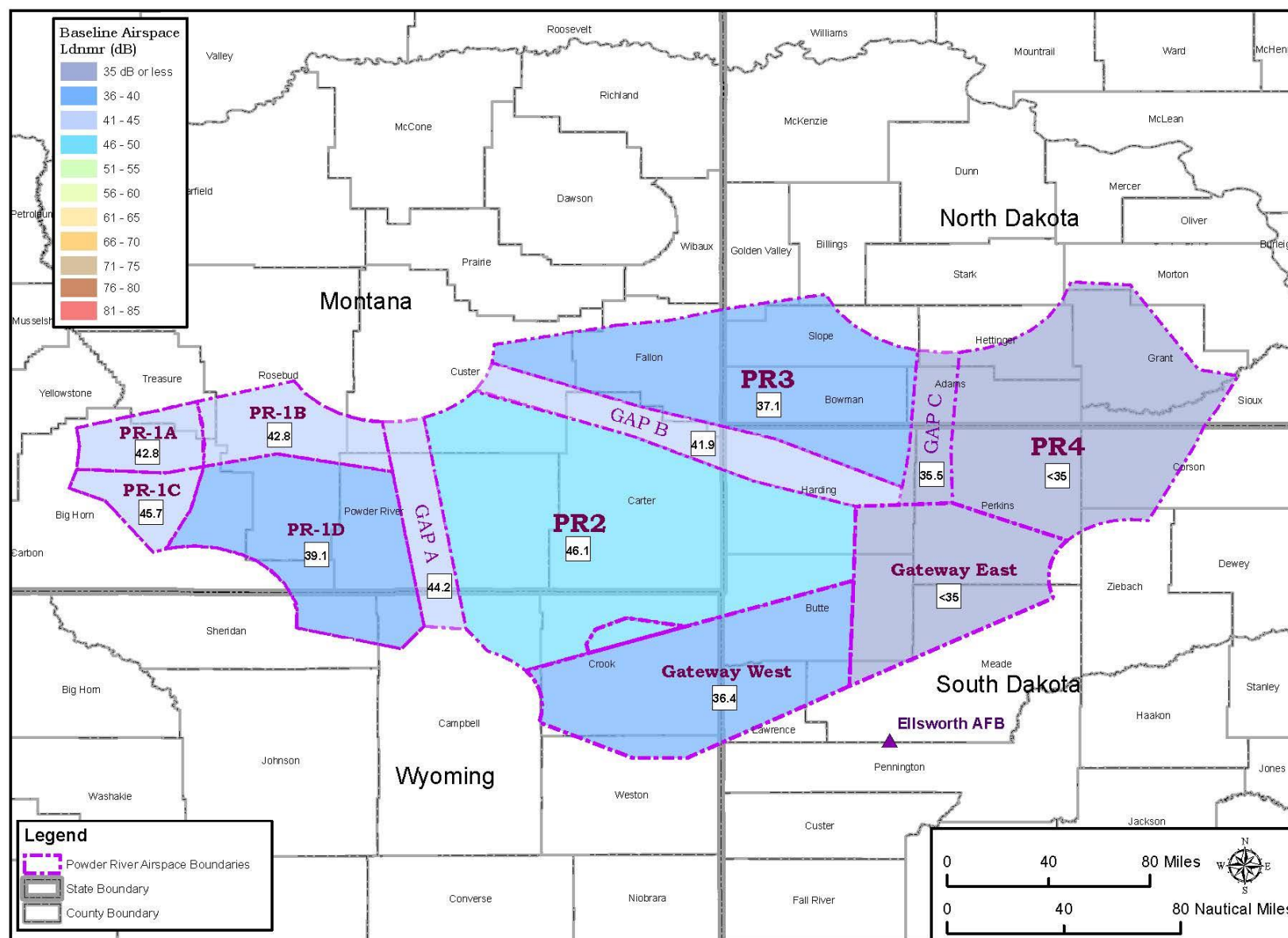


Figure 3.2-6. PRTC Noise Under the Dyess AFB Alternative

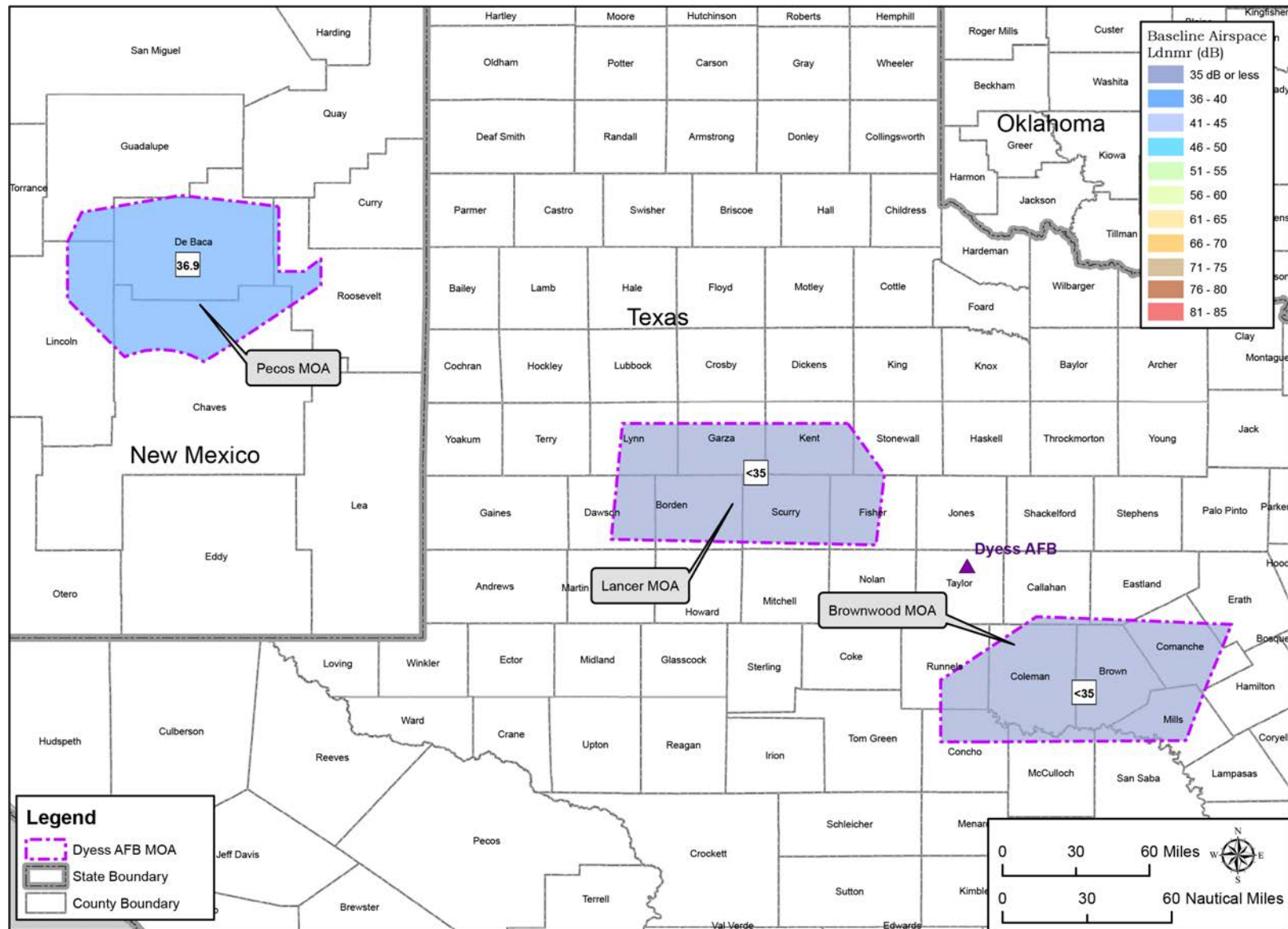


Figure 3.2-7. Airspace Noise at Brownwood, Lancer, and Pecos MOAs Under the Dyess AFB Alternative

3.2.2.2.4 Facilities and Infrastructure

Facilities and infrastructure C&D activities would result in temporary, localized increases in noise levels as discussed above and in Table 3.2-5 that could be disruptive and annoying. However, the installation and surrounding area is exposed to frequent loud aircraft operations noise and ground vehicle traffic noise under baseline conditions. Additionally, demolition and construction activities would be conducted during normal business hours. In this context, the temporary and localized noise generated by C&D activities on the installation could be disruptive and annoying but would not be significant.

3.2.2.2.5 Weapons Generation Facility

WGF C&D activities would generate typical construction noise as shown in Table 3.2-5, which would decrease proportionally as the distance from the noise source to the receptor increases. Noise impacts would be temporary and minor and would not adversely affect noise at Dyess AFB.

3.2.2.2.6 Snapshot

Airfield Operations

Noise contours in the vicinity of Dyess AFB under the Dyess AFB Snapshot Scenario are depicted in Figure 3.2-8. Acreage, population, and residential parcels affected by DNL noise contours associated with all aircraft under the Dyess AFB Snapshot Scenario are shown in Table 3.2-13.

Under the Dyess AFB Snapshot Scenario, 7,243 acres and an estimated 869 persons could be exposed to noise levels exceeding 65 dB DNL near Dyess AFB. This represents a decrease of 4,254 acres and 550 persons from the No Action Alternative. The change in noise level is attributable to the fact that the B-21 is projected to be generally quieter than the B-1.

Table 3.2-13. Acreage and Population Affected by Elevated Noise Levels Under the Snapshot Scenario at Dyess AFB

Noise Level (dB DNL)	Acres Off-Installation	No Action Alternative Acres Off-Installation	Change from No Action Acres Off-Installation	Off-Installation Population ¹	No Action Off-Installation Population ¹	Change from No Action Off-Installation Population
65–69	4,762	6,052	-1,290	557	700	-143
70–74	1,751	3,341	-1,590	213	448	-235
75–79	550	1,431	-881	74	180	-106
80–84	153	476	-323	21	64	-43
>85	27	197	-170	4	27	-23
Total	7,243	11,497	-4,254	869	1,419	-550

> = greater than; - = minus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Notes:

1. Population estimates were made based on 2014–2018 ACS 5-Year Estimates data (U.S. Census Bureau, 2018a). The number of persons currently residing in affected areas may differ from what has been stated.

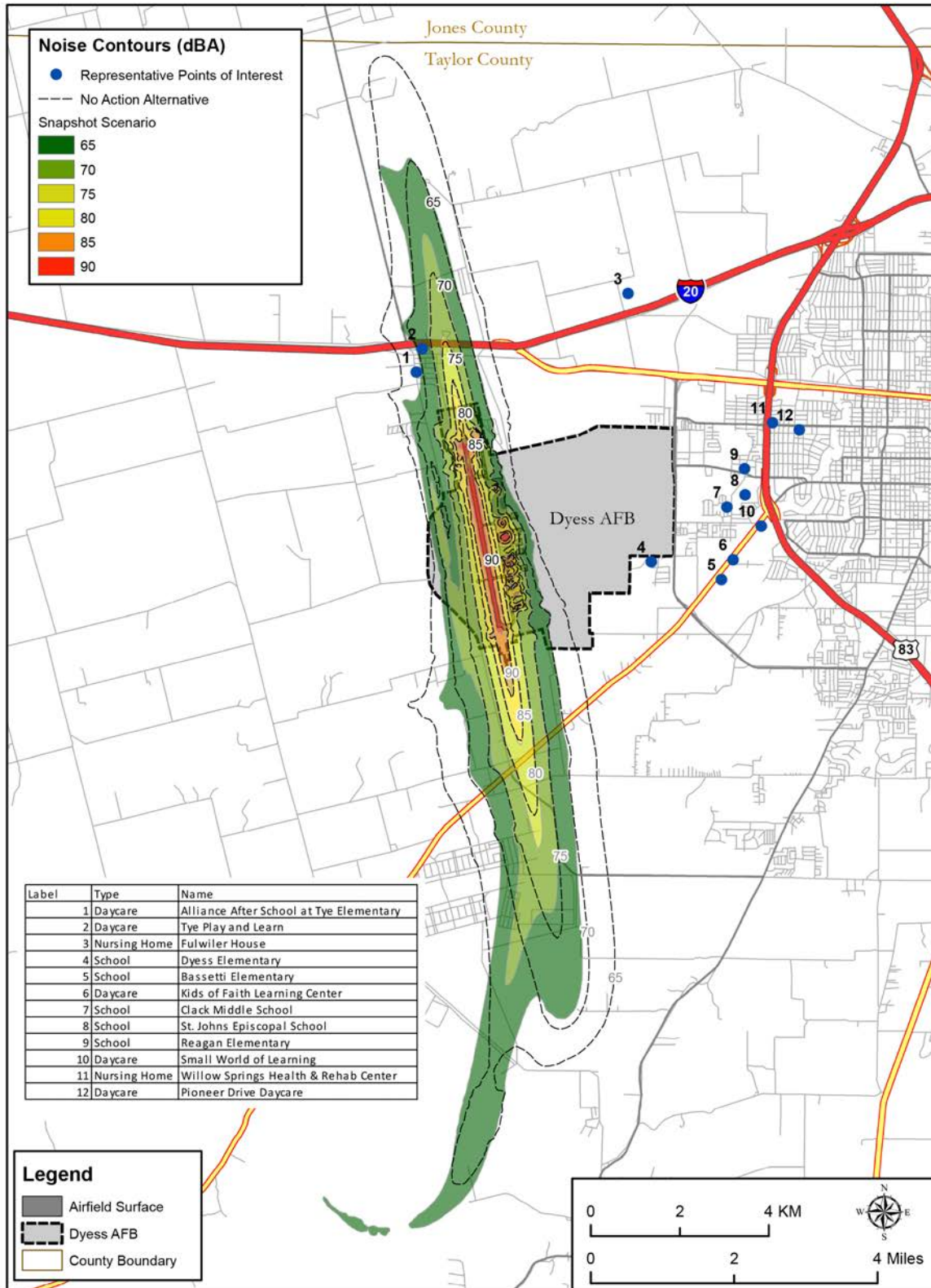


Figure 3.2-8. Noise Contours at Dyess AFB Under the Snapshot Scenario Compared with the No Action Alternative

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Table 3.2-14 describes aircraft noise levels at representative noise-sensitive points of interest under the Snapshot Scenario at Dyess AFB using the DNL metric, which reflects noise over the course of an entire day, and the SEL metric, which reflects the noise generated by a single overflight event. Locations of points are shown in Figure 3.2-8.

Under the Snapshot Scenario at Dyess AFB, the points of interest north of Dyess AFB would continue to experience DNL of up to 67 dB. Individual overflight noise levels (i.e., SEL) could still reach up to 117 dB. However, the DNL noise levels at all representative points would decrease from the No Action Alternative baseline under the Snapshot. However, the SEL_{max} would remain the same at all the representative points.

Table 3.2-14. Noise Impacts at Representative Points of Interest Under the Snapshot Scenario at Dyess AFB

Point of Interest		DNL (dBA)			Maximum SEL (dBA)		
ID	Description	No Action	Dyess AFB Snapshot	Change from No Action	No Action	Dyess AFB Snapshot	Change from No Action
01	Alliance After School at Tye Elementary	68	64	-4	114	114	-
02	Tye Play and Learn	72	67	-5	117	117	-
03	Fulwiler House	49	44	-5	93	93	-
04	Dyess Elementary	54	49	-5	98	98	-
05	Bassetti Elementary	47	42	-5	89	89	-
06	Kids of Faith Learning Center	45	41	-4	88	88	-
07	Clark Middle School	44	40	-4	87	87	-
08	St. John's Episcopal School	43	38	-5	86	86	-
09	Reagan Elementary	42	38	-4	86	86	-
10	Small World of Learning	43	38	-5	88	88	-
11	Willow Springs Health & Rehab Center	47	40	-7	95	95	-
12	Pioneer Drive Daycare	46	40	-6	95	95	-

- = none/minus; AFB = Air Force Base; dBA = A-weighted decibel; DNL = day-night average sound level; ID = identification code; SEL = sound exposure level

Note: Points of Interest presented in this table are provided to help understand the noise environment. As such, this table may not include all noise-sensitive facilities (schools, churches, daycares, etc.) that are affected by noise contours.

Equivalent Sound Level (L_{eq}) and Number of Noise Events Analysis at Representative Points of Interest

Table 3.2-15 lists the outdoor and indoor estimated 8-hour L_{eq} values under the Dyess AFB Snapshot Scenario during a typical school day (7:00 a.m. to 4:00 p.m., Monday through Friday) at points of interest near Dyess AFB. The table also shows the number of events during an average school day at or above an indoor maximum (single event) sound level of 50 dB. For example, an individual attending after-school daycare at

Alliance After School at Tye Elementary (01) would typically experience as many as three disruptive events per hour with the windows open and one event per hour with windows closed under the Proposed Action. That is no change in the number of events per hour from the baseline with windows either open or closed.

Under the Dyess AFB Snapshot Scenario, the two representative schools in Tye to the north of Dyess AFB are expected to continue to exceed the recommended noise guidelines with windows open.

Table 3.2-15. Hourly L_{eq} Noise Levels During the School Day at Representative Points of Interest Near Dyess AFB Under the Snapshot Scenario

Point of Interest		Dyess AFB Snapshot Scenario					Change from No Action				
		Outdoor Leq(8h) (dB)	Indoor				Outdoor Leq(8h) (dB)	Indoor			
			Windows Open		Windows Closed			Windows Open		Windows Closed	
ID	Description		Leq(8h) (dB)	Events per Hour	Leq(8h) (dB)	Events per Hour		Leq(8h) (dB)	Events per Hour	Leq(8h) (dB)	Events per Hour
01	Alliance After School at Tye Elementary	57	42	3	<40	-	-10	-10	-	-10	-1
02	Tye Play and Learn	58	43	3	<40	2	-12	-12	-	-12	-
03	Fulwiler House	<40	<40	-	<40	-	-11	-11	-	-11	-
04	Dyess Elementary	42	<40	-	<40	-	-11	-11	-1	-11	-
05	Bassetti Elementary	<40	<40	-	<40	-	-10	-10	-	-10	-
06	Kids of Faith Learning Center	<40	<40	-	<40	-	-10	-10	-	-10	-
07	Clark Middle School	<40	<40	-	<40	-	-9	-9	-	-9	-
08	St. John's Episcopal School	<40	<40	-	<40	-	-9	-9	-	-9	-
09	Reagan Elementary	<40	<40	-	<40	-	-9	-9	-	-9	-
10	Small World of Learning	<40	<40	-	<40	-	-10	-10	-	-10	-
11	Willow Springs Health & Rehab Center	<40	<40	-	<40	-	-16	-16	-	-16	-
12	Pioneer Drive Daycare	<40	<40	-	<40	-	-16	-16	-	-16	-
Number of Sites with More than 1 Intrusive Event per Hour				2		1			-		-
Lowest Number of Intrusive Events per Hour if More than 1				3		2			0		0
Highest Number of Intrusive Events per Hour if More than 1				3		2			0		0

< = less than; - = none/minus; AFB = Air Force Base; ANSI = American National Standards Institute; dB = decibel; ID = identification code;

$L_{eq(8h)}$ = 8-hour equivalent sound level

Notes:

1. Assumes 15 dB and 25 dB of noise level reductions for windows open and closed, respectively.
2. Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <40 dB.
3. Daycares/schools presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours.

Airspace and Range Utilization

Table 3.2-16 lists the noise levels under the Dyess AFB Snapshot Scenario. Noise levels would remain below 46.1 dB L_{dnmr} and no adverse impacts to noise would be expected. Noise in the Lancer MOA would decrease from the No Action Alternative, but would be slightly higher than the end-state. The noise level would still be only 36.6 dB L_{dnmr} . Noise in the Brownwood MOA would remain below 35 dB L_{dnmr} . Noise in the Pecos MOA would decrease from the No Action Alternative, but would be higher than the end-state. The noise level would still be only 49.2 dB L_{dnmr} in the Pecos MOA. No adverse impacts would be expected in any of the airspace areas under the snapshot conditions.

Table 3.2-16. Dyess AFB Snapshot Scenario Airspace Noise

Location	Special Use Airspace	No Action Alternative (dB)	Dyess AFB Alternative (dB)	Dyess AFB Snapshot (dB)	Change from No Action Alternative (dB)
MOA	Lancer	43.4	<35	36.6	-6.8
	Pecos	55.9	36.9	49.2	-6.7
	Brownwood	<35	<35	<35	0
PRTC	Gap A	44.2	44.2	44.2	0
	Gap B	41.9	41.9	41.9	0
	Gap C	35.5	35.5	35.5	0
	Gateway East	<35	<35	<35	0
	Gateway West	36.4	36.4	36.4	0
	Powder River 1A	42.8	42.8	42.8	0
	Powder River 1B	42.8	42.8	42.8	0
	Powder River 1C	45.7	45.7	45.7	0
	Powder River 1D	39.1	39.1	39.1	0
	Powder River 2	46.1	46.1	46.1	0
	Powder River 3	37.1	37.1	37.1	0
	Powder River 4	<35	<35	<35	0

< = less than; - = minus; AFB = Air Force Base; MOA = Military Operating Area; dB = decibel; PRTC = Powder River Training Complex

3.2.2.2.7 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

Based on the noise analysis in this EIS, no mitigations would be necessary. However, the USAF is responsible for monitoring the predictions (e.g., impact, mitigations) made in its completed NEPA documentation (40 CFR 1505.3, 1505.2(c)). If substantial changes are recognized that are relevant to environmental concerns or that bear on a proposed action or its impacts, the USAF would reevaluate for potential impacts related to those changes. This would include monitoring noise and public noise complaints and developing potential mitigation measures that could be implemented based on USAF monitoring.

3.2.2.3 Ellsworth AFB Alternative (Preferred Alternative)

3.2.2.3.1 Personnel

Additional personnel would not be likely to appreciably contribute to noise in the area. The area near Ellsworth AFB is characterized by aircraft noise and vehicular noise. Personnel would continue to commute on established roads and would not impact noise adversely.

3.2.2.3.2 Airfield Operations

Noise contours in the vicinity of Ellsworth AFB under the Ellsworth AFB Alternative are depicted in Figure 3.2-9 compared with the No Action Alternative. Acreage, population, and residential parcels affected by DNL noise contours associated with all aircraft under the Ellsworth AFB Alternative are shown in Table 3.2-17.

Under the Ellsworth AFB Alternative, 1,610 acres and an estimated 358 persons could be exposed to noise levels exceeding 65 dB DNL near Ellsworth AFB. This represents a decrease of 4,224 acres and 1,627 persons from the No Action Alternative. The change in noise level is attributable to the fact that the B-21 is projected to be generally quieter than the B-1.

Table 3.2-17. Acreage and Population Affected by Elevated Noise Levels Under the Ellsworth AFB Alternative

Noise Level (dB DNL)	Acres Off-Installation	No Action Alternative Acres Off-Installation	Change from No Action Acres Off-Installation	Off-Installation Population ¹	No Action Off-Installation Population ¹	Change from No Action Off-Installation Population
65–69	1,302	4,088	-2,786	340	1,313	-973
70–74	308	1,219	-911	18	391	-373
75–79	0	432	-432	0	190	-190
80–84	0	77	-77	0	78	-78
>85	0	18	-18	0	13	-13
Total	1,610	5,834	-4,224	358	1,985	-1,627

> = greater than; - = minus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Notes:

1. Population estimates were made based on 2014–2018 ACS 5-Year Estimates data (U.S. Census Bureau, 2018a). The number of persons currently residing in affected areas may differ from what has been stated.

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Table 3.2-18 describes aircraft noise levels at representative noise-sensitive points of interest under the Ellsworth AFB Alternative using the DNL metric, which reflects noise over the course of an entire day, and the SEL metric, which reflects the noise generated by a single overflight event. Locations of points are shown in Figure 3.2-9.

Under the Ellsworth AFB Alternative, the points of interest near Ellsworth AFB would decrease to a DNL of up to 59 dB. Individual overflight noise levels (i.e., SEL) could still reach up to 111 dB. However, the DNL noise levels at all representative points would decrease from the No Action Alternative baseline. The SEL_{max} would also decrease at all the representative points.

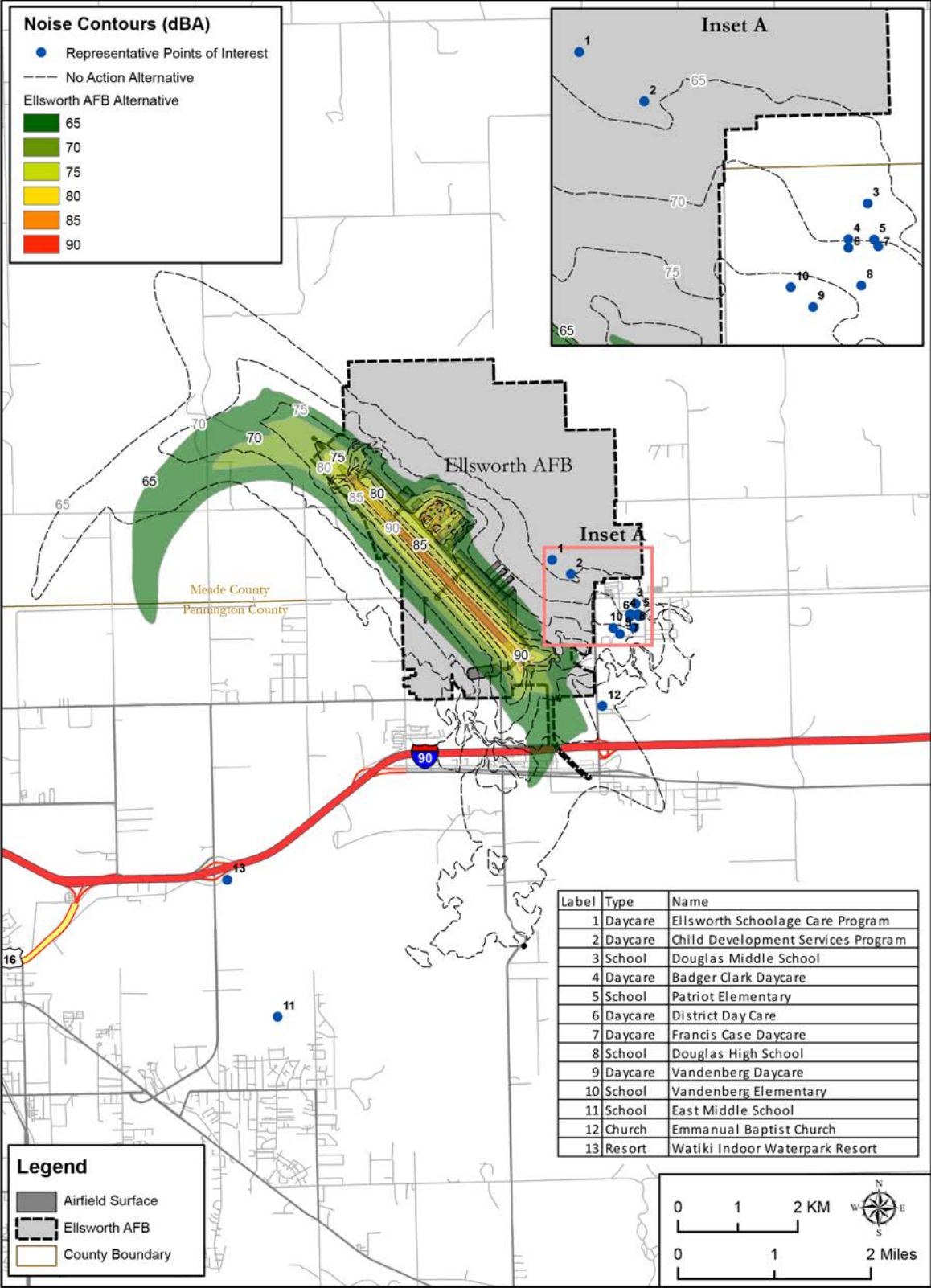


Figure 3.2-9. Noise Contours at Ellsworth AFB Under the Ellsworth AFB Alternative Compared with the No Action Alternative

Table 3.2-18. Noise Impacts at Representative Points of Interest Under the Ellsworth AFB Alternative

Point of Interest		DNL (dBA)			Maximum SEL (dBA)		
ID	Description	No Action	Ellsworth AFB Alternative	Change from No Action	No Action	Ellsworth AFB Alternative	Change from No Action
01	Ellsworth Schoolage Care Program	63	55	-8	107	104	-3
02	Child Development Services Program	64	54	-10	107	103	-4
03	Douglas Middle School	67	51	-16	111	101	-10
04	Badger Clark Daycare	70	53	-17	114	101	-13
05	Patriot Elementary	70	52	-18	115	101	-14
06	District Day Care	71	53	-18	116	101	-15
07	Francis Case Daycare	71	52	-19	115	101	-14
08	Douglas High School	74	55	-19	119	102	-17
09	Vandenberg Daycare	77	58	-19	123	105	-18
10	Vandenberg Elementary	77	57	-20	122	105	-17
11	East Middle School	53	48	-5	96	87	-9
12	Emmanuel Baptist Church	67	59	-8	115	111	-4
13	WaTiki Indoor Waterpark Resort	54	44	-10	100	84	-16

- = minus; AFB = Air Force Base; dBA = A-weighted decibel; DNL = day-night average sound level; ID = identification code; SEL = sound exposure level

Note: Points of Interest presented in this table are provided to help understand the noise environment. As such, this table may not include all noise-sensitive facilities (schools, churches, daycares, etc.) that are affected by noise contours.

Equivalent Sound Level (L_{eq}) and Number of Noise Events Analysis at Representative Points of Interest

Table 3.2-19 lists the outdoor and indoor estimated 8-hour L_{eq} values under the Ellsworth AFB Alternative during a typical school day (7:00 a.m. to 4:00 p.m., Monday through Friday) at points of interest near Ellsworth AFB. The table also shows the number of events during an average school day at or above an indoor maximum (single event) sound level of 50 dB. For example, an individual attending after-school daycare at Ellsworth Schoolage Care Program (01) would typically experience only up to one disruptive event per hour with the windows open and one event per hour with windows closed under the Ellsworth AFB Alternative. That is no change in the number of events per hour from the baseline with windows either open or closed.

Under the Ellsworth AFB Alternative, the DNL levels would be expected to decrease at every representative point, and the number of events would decrease slightly at most points. However, Vandenberg Daycare, Vandenberg Elementary, and Emmanuel Baptist Church would continue to have DNL noise levels exceeding the recommended 40 dB level with windows open.

Table 3.2-19. Hourly L_{eq} Noise Levels During the School Day at Representative Points of Interest Near Ellsworth AFB Under the Ellsworth AFB Alternative

Point of Interest		Ellsworth AFB Alternative					Change from No Action				
		Outdoor Leq(8h) (dB)	Indoor				Outdoor Leq(8h) (dB)	Indoor			
			Windows Open		Windows Closed			Windows Open		Windows Closed	
ID	Description		Leq(8h) (dB)	Events per Hour	Leq(8h) (dB)	Events per Hour		Leq(8h) (dB)	Events per Hour	Leq(8h) (dB)	Events per Hour
01	Ellsworth Schoolage Care Program	52	<40	1	<40	-	-12	-12	-	-12	-1
02	Child Development Services Program	52	<40	1	<40	-	-13	-13	-	-13	-1
03	Douglas Middle School	50	<40	1	<40	-	-18	-18	-	-18	-1
04	Badger Clark Daycare	52	<40	1	<40	-	-19	-19	-	-19	-1
05	Patriot Elementary	52	<40	1	<40	-	-19	-19	-	-19	-1
06	District Day Care	53	<40	1	<40	-	-19	-19	-	-19	-1
07	Francis Case Daycare	52	<40	1	<40	-	-20	-20	-	-20	-1
08	Douglas High School	55	40	1	<40	-	-20	-20	-	-20	-1
09	Vandenberg Daycare	58	43	1	<40	-	-21	-21	-	-21	-1
10	Vandenberg Elementary	58	43	1	<40	-	-20	-20	-	-20	-1
11	East Middle School	41	<40	-	<40	-	-12	-12	-1	-12	-
12	Emmanuel Baptist Church	58	43	1	<40	-	-11	-11	-	-11	-1
13	WaTiki Indoor Waterpark Resort	<40	<40	-	<40	-	-17	-17	-1	-17	-
Number of Sites with More than 1 Intrusive Event per Hour				-		-			-		-
Lowest Number of Intrusive Events per Hour if More than 1				2		2			0		0
Highest Number of Intrusive Events per Hour if More than 1				-		-			0		0

< = less than; - = none/minus; AFB = Air Force Base; ANSI = American National Standards Institute; dB = decibel; ID = identification code; $L_{eq(8h)}$ = 8-hour equivalent sound level

Notes:

1. Assumes 15 dB and 25 dB of noise level reductions for windows open and closed, respectively.
2. Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <40 dB.
3. Daycares/schools presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours.

Potential Hearing Loss

PHL under the Ellsworth AFB Alternative was assessed using the methodology described in Appendix B (Noise). According to census data, no individuals in the vicinity of Ellsworth AFB would be exposed to aircraft noise 80 dB DNL or greater.

3.2.2.3.3 Airspace and Range Utilization

Table 3.2-20 shows the noise levels in the PRTC and under the No Action Alternative and the Ellsworth AFB Alternative as well as the net change. Under the Ellsworth AFB Alternative, noise levels at the PRTC would decrease or remain below 35 dB L_{dnmr} across the board (Figure 3.2-6). Because the B-21 is projected to be generally quieter and tends to fly higher than the B-1, the noise in the PRTC would decrease overall as a result of implementing the Proposed Action at Ellsworth AFB.

Table 3.2-20. Ellsworth AFB Alternative Airspace Noise

Location	Special Use Airspace	No Action Alternative (dB)	Ellsworth AFB Alternative (dB)	Change from No Action Alternative (dB)
PRTC	Gap A	44.2	38.9	-5.3
	Gap B	41.9	36.5	-5.4
	Gap C	35.5	<35	-0.5
	Gateway East	<35	<35	0
	Gateway West	36.4	<35	-1.4
	Powder River 1A	42.8	35.8	-7
	Powder River 1B	42.8	37.1	-5.7
	Powder River 1C	45.7	42.0	-3.7
	Powder River 1D	39.1	<35	-4.1
	Powder River 2	46.1	<35	-11.1
	Powder River 3	37.1	<35	-2.1
	Powder River 4	<35	<35	0

< = less than; - = minus; AFB = Air Force Base; dB = decibel; PRTC = Powder River Training Complex

3.2.2.3.4 Facilities and Infrastructure

As discussed above and in Table 3.2-5, facilities and infrastructure C&D activities would result in temporary, localized increases in noise levels that could be disruptive and annoying. However, the installation and surrounding area is exposed to frequent, loud aircraft operations noise and ground vehicle traffic noise under baseline conditions. Additionally, demolition and construction activities would be conducted during normal business hours. In this context, the temporary and localized noise generated by C&D activities on the installation could be disruptive and annoying but would not be significant.

3.2.2.3.5 Weapons Generation Facility

North WGF Site Subalternative

North WGF Site C&D activities would generate typical construction noise as shown in Table 3.2-5, which would decrease proportionally as the distance from the noise source to the receptor increases. Noise impacts would be temporary and minor and would not adversely affect noise at Ellsworth AFB.

South WGF Site Subalternative (Preferred Subalternative)

South WGF Site C&D activities would generate typical construction noise as shown in Table 3.2-5, which would decrease proportionally as the distance from the noise source to the receptor increases. The South WGF Site is closer to the residential community of Box Elder, but is still over 1,000 feet away from the nearest residence. Therefore, noise levels would be below 65 dB, and annoyance would still be minor and temporary and would not adversely affect noise on or outside Ellsworth AFB.

3.2.2.3.6 Snapshot

Airfield Operations

Noise contours in the vicinity of Ellsworth AFB under the Ellsworth AFB Snapshot Scenario are depicted in Figure 3.2-10. Acreage, population, and residential parcels affected by DNL noise contours associated with all aircraft under the Snapshot Scenario are shown in Table 3.2-21.

Under the Ellsworth AFB Snapshot Scenario, 2,880 acres and an estimated 978 persons could be exposed to noise levels exceeding 65 dB DNL near Ellsworth AFB. This represents a decrease of 2,954 acres and 1,007 persons from the No Action Alternative. The change in noise level is attributable to the fact that the B-21 is projected to be generally quieter than the B-1.

Table 3.2-21. Acreage and Population Affected by Elevated Noise Levels Under the Snapshot Scenario at Ellsworth AFB

Noise Level (dB DNL)	Acres Off-Installation	No Action Alternative Acres Off-Installation	Change from No Action Acres Off-Installation	Off-Installation Population ¹	No Action Off-Installation Population ¹	Change from No Action Off-Installation Population
65–69	2,033	4,088	-2,055	706	1,313	-607
70–74	753	1,219	-466	215	391	-176
75–79	84	432	-348	52	190	-138
80–84	10	77	-67	5	78	-73
>85	0	18	-18	0	13	-13
Total	2,880	5,834	-2,954	978	1,985	-1,007

> = greater than; - = minus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Notes:

1. Population estimates were made based on 2014–2018 ACS 5-Year Estimates data (U.S. Census Bureau, 2018a). The number of persons currently residing in affected areas may differ from what has been stated.

Sound Exposure Level (SEL) at Representative Noise-Sensitive Receptors

Table 3.2-22 describes aircraft noise levels at representative noise-sensitive points of interest under the Snapshot Scenario at Ellsworth AFB using the DNL metric, which reflects noise over the course of an entire day, and the SEL metric, which reflects the noise generated by a single overflight event. Locations of points are shown in Figure 3.2-10.

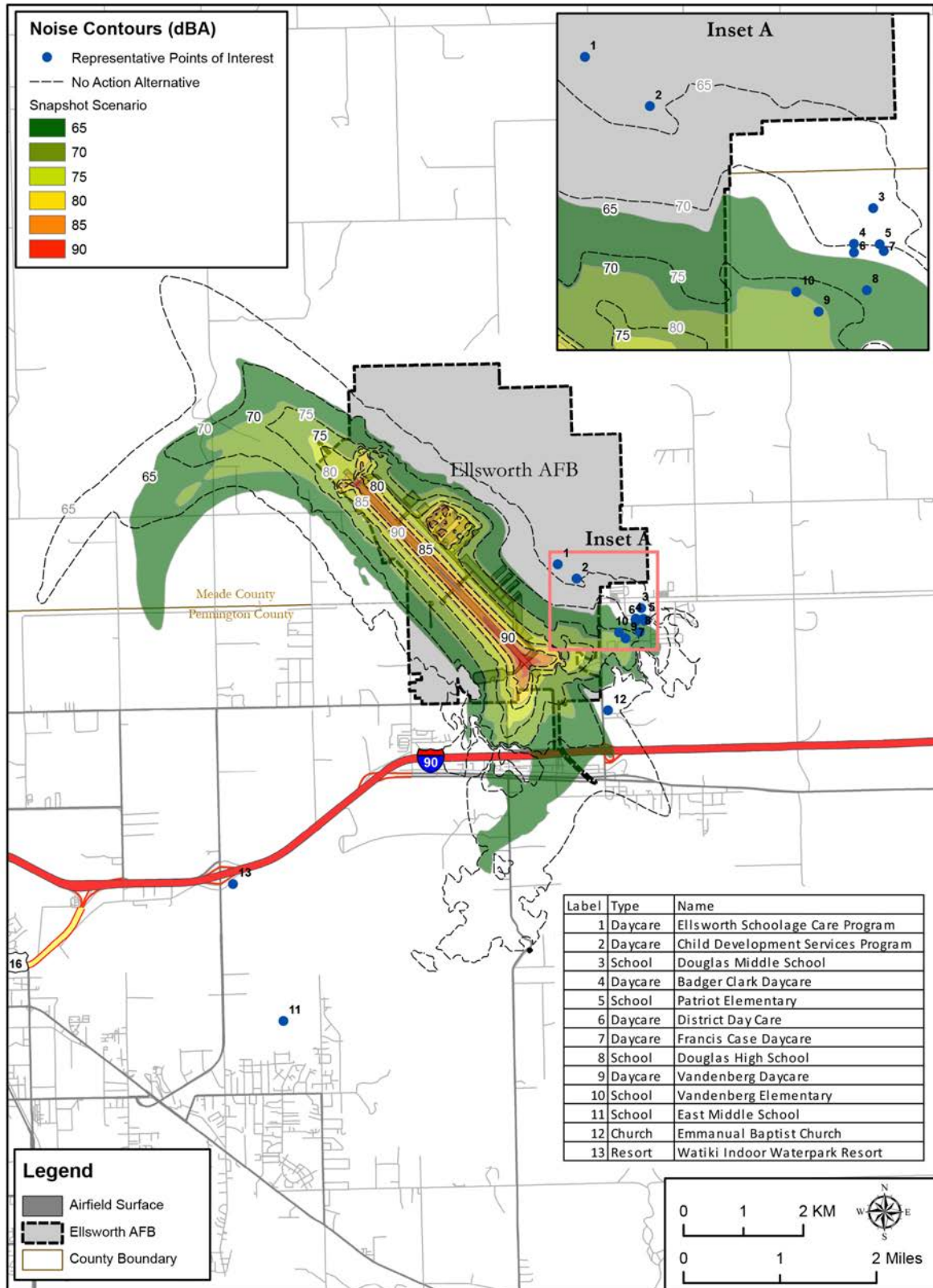


Figure 3.2-10. Noise Contours at Ellsworth AFB Under the Snapshot Scenario Compared with the No Action Alternative

Under the Snapshot Scenario at Ellsworth AFB, the points of interest near Ellsworth AFB would continue to experience DNL of up to 71 dB. Individual overflight noise levels (i.e., SEL) could still reach up to 123 dB. However, the DNL noise levels at all representative points would decrease from the No Action Alternative baseline. The SEL_{max} would remain the same at all the representative points.

Table 3.2-22. Noise Impacts at Representative Points of Interest Under the Snapshot Scenario at Ellsworth AFB

Point of Interest		DNL (dBA)			Maximum SEL (dBA)		
ID	Description	No Action	Ellsworth AFB Snapshot	Change from No Action	No Action	Ellsworth AFB Snapshot	Change from No Action
01	Ellsworth Schoolage Care Program	63	59	-4	107	107	-
02	Child Development Services Program	64	59	-5	107	107	-
03	Douglas Middle School	67	60	-7	111	111	-
04	Badger Clark Daycare	70	63	-7	114	114	-
05	Patriot Elementary	70	63	-7	115	115	-
06	District Day Care	71	64	-7	116	116	-
07	Francis Case Daycare	71	64	-7	115	115	-
08	Douglas High School	74	67	-7	119	119	-
09	Vandenberg Daycare	77	71	-6	123	123	-
10	Vandenberg Elementary	77	70	-7	122	122	-
11	East Middle School	53	50	-3	96	96	-
12	Emmanuel Baptist Church	67	63	-4	115	115	-
13	WaTiki Indoor Waterpark Resort	54	49	-5	100	100	-

- = none/minus; AFB= Air Force Base; dBA = A-weighted decibel; DNL = day-night average sound level; ID = identification code; SEL = sound exposure level

Note: Points of Interest presented in this table are provided to help understand the noise environment. As such, this table may not include all noise-sensitive facilities (schools, churches, daycares, etc.) that are affected by noise contours.

Equivalent Sound Level (L_{eq}) and Number of Noise Events Analysis at Representative Points of Interest

Table 3.2-23 lists the outdoor and indoor estimated 8-hour L_{eq} values under the Snapshot Scenario during a typical school day (7:00 a.m. to 4:00 p.m., Monday through Friday) at points of interest near Ellsworth AFB. The table also shows the number of events during an average school day at or above an indoor maximum (single event) sound level of 50 dB. For example, an individual attending after-school daycare at Ellsworth Schoolage Care Program (01) would typically experience only up to one disruptive event per hour with the windows open and one event per hour with windows closed under the Snapshot Scenario. That is no change in the number of events per hour from the baseline with windows either open or closed.

Table 3.2-23. Hourly L_{eq} Noise Levels During the School Day at Representative Points of Interest Near Ellsworth AFB Under the Snapshot Scenario

Point of Interest		Ellsworth AFB Snapshot Scenario					Change from No Action				
		Outdoor L _{eq(8h)} (dB)	Indoor				Outdoor L _{eq(8h)} (dB)	Indoor			
			Windows Open		Windows Closed			Windows Open		Windows Closed	
ID	Description		L _{eq(8h)} (dB)	Events per Hour	L _{eq(8h)} (dB)	Events per Hour		L _{eq(8h)} (dB)	Events per Hour	L _{eq(8h)} (dB)	Events per Hour
01	Ellsworth Schoolage Care Program	58	43	1	<40	1	-6	-6	-	-6	-
02	Child Development Services Program	59	44	1	<40	1	-6	-6	-	-6	-
03	Douglas Middle School	61	46	1	<40	-	-7	-7	-	-7	-1
04	Badger Clark Daycare	64	49	1	<40	-	-7	-7	-	-7	-1
05	Patriot Elementary	64	49	1	<40	-	-7	-7	-	-7	-1
06	District Day Care	66	51	1	41	-	-7	-7	-	-7	-1
07	Francis Case Daycare	65	50	1	40	-	-7	-7	-	-7	-1
08	Douglas High School	69	54	1	44	-	-7	-7	-	-7	-1
09	Vandenberg Daycare	72	57	1	47	1	-7	-7	-	-7	-
10	Vandenberg Elementary	71	56	1	46	1	-7	-7	-	-7	-
11	East Middle School	47	<40	-	<40	-	-6	-6	-1	-6	-
12	Emmanuel Baptist Church	63	48	1	<40	-	-6	-6	-	-6	-1
13	WaTiki Indoor Waterpark Resort	49	<40	-	<40	-	-7	-7	-1	-7	-
Number of Sites with More than 1 Intrusive Event per Hour				-		-			-		-
Lowest Number of Intrusive Events per Hour if More than 1				-		-			0		0
Highest Number of Intrusive Events per Hour if More than 1				-		-			0		0

< = less than; - = none/minus; AFB = Air Force Base; ANSI = American National Standards Institute; dB = decibel; ID = identification code;

$L_{eq(8h)}$ = 8-hour equivalent sound level

Note:

1. Assumes 15 dB and 25 dB of noise level reductions for windows open and closed, respectively.
2. Schools that meet the 2009 ANSI standard of less than 40 dB L_{eq} are listed as having an L_{eq} of <40 dB.
3. Daycares/schools presented in this table are provided to help understand the noise environment. As such, this table may not include all such facilities that are affected by noise contours.

Under the Ellsworth AFB Snapshot Scenario, the DNL levels would be expected to decrease at every representative point, and the number of events would decrease slightly at several points. However, most points would continue to have DNL noise levels exceeding the recommended 40 dB level with windows open.

Airspace and Range Utilization

Under the Ellsworth AFB Snapshot Scenario, noise levels at the PRTC would decrease from No Action Alternative levels or remain below 35 dB L_{dnmr} across the board (Table 3.2-24). Noise levels under the Snapshot Scenario would be slightly higher than under the Ellsworth AFB Alternative end-state but would be below 43.0 dB in the entire PRTC.

Table 3.2-24. Ellsworth AFB Snapshot Scenario Airspace Noise

Location	Special Use Airspace	No Action Alternative (dB)	Ellsworth AFB Alternative (dB)	Ellsworth AFB Snapshot (dB)	Change from No Action Alternative (dB)
PRTC	Gap A	44.2	38.9	40.6	-3.6
	Gap B	41.9	36.5	38.2	-3.7
	Gap C	35.5	<35	35	-0.5
	Gateway East	<35	<35	<35	0
	Gateway West	36.4	<35	35	-1.4
	Powder River 1A	42.8	35.8	38.4	-4.4
	Powder River 1B	42.8	37.1	39.0	-3.8
	Powder River 1C	45.7	42.0	43.0	-2.7
	Powder River 1D	39.1	<35	35.5	-3.6
	Powder River 2	46.1	<35	39.8	-6.3
	Powder River 3	37.1	<35	35	-2.1
	Powder River 4	<35	<35	<35	0

< = less than; - = minus; dB = decibel; AFB = Air Force Base; PRTC = Powder River Training Complex

3.2.2.3.7 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

Based on the noise analysis in this EIS, no mitigations would be necessary. However, the USAF is responsible for monitoring the predictions (e.g., impact, mitigations) made in its completed NEPA documentation (40 CFR 1505.3, 1505.2(c)). If substantial changes are recognized that are relevant to environmental concerns or that bear on a proposed action or its impacts, the USAF would reevaluate for potential impacts related to those changes. This would include monitoring noise and public noise complaints and developing potential mitigation measures that could be implemented based on USAF monitoring.

3.3 AIR QUALITY

3.3.1 Air Quality, Affected Environment

Air quality in the project area and surrounding region would be affected by emissions from the Proposed Action and alternatives. The following sections describe the existing conditions related to air quality, including the (1) description of air quality as an environmental resource as well as applicable rules and regulations, (2) region of influence, and (3) baseline air quality and emissions.

3.3.1.1 Description of Resource

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 levels of pollutants are generally expressed on a concentration basis in units of parts per million or micrograms per cubic meter.

The baseline standards for pollutant concentrations are the National Ambient Air Quality Standards (NAAQS) and state air quality standards established under the Clean Air Act of 1990. These standards represent the maximum allowable atmospheric concentration that may occur and still protect public health and welfare. The NAAQS provide both short- and long-term standards for the following criteria pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter with a diameter of less than or equal to 10 microns (PM₁₀) or 2.5 microns (PM_{2.5}), ozone, and lead.

Under the Clean Air Act, it is the responsibility of the individual states to achieve and maintain the NAAQS. To accomplish this, states use the EPA-required State Implementation Plan. A State Implementation Plan identifies goals, strategies, schedules, and enforcement actions designed to reduce the level of pollutants in the air and bring the state into compliance with the NAAQS.

All areas of the United States are designated as having air quality better than the NAAQS ("attainment" areas) or worse than the NAAQS ("nonattainment" areas). Areas where there are insufficient air quality data for the EPA to form a basis for attainment status are unclassifiable. Thus, such areas are treated as attainment areas until proven otherwise. "Maintenance areas" are those that were previously classified as nonattainment areas but where air pollution concentrations have been successfully reduced to levels below the standard. Maintenance areas are subject to special maintenance plans to ensure compliance with the NAAQS.

The Proposed Action would occur primarily in one of two separate geographic regions surrounding Dyess AFB, Texas, or Ellsworth AFB, South Dakota. However, aircraft training operations would take place in SUA overlying parts of North and South Dakota, Montana, Wyoming, Texas, and New Mexico.

Within the Texas project region, the Texas Commission on Environmental Quality (TCEQ), Office of Air, has adopted the NAAQS to regulate air pollutant levels within the state. In South Dakota, the South Dakota Department of Environment and Natural Resources (SDDENR) is the responsible regulatory organization, and has also adopted the national standards. The national and state ambient air quality standards are shown in Appendix C (Air Quality).

Prevention of Significant Deterioration

The Clean Air Act established Prevention of Significant Deterioration (PSD) regulations to protect the air quality in regions that already meet the NAAQS. The major requirement of the PSD regulations is that the air quality impacts from new or modified PSD sources in combination with impacts from other PSD sources must not exceed the maximum allowable incremental increases for nitrogen dioxide, PM₁₀, or sulfur dioxide, as identified in Table 3.3-1.

Table 3.3-1. Maximum Allowable Pollutant Concentration Increases Under PSD Regulations

Pollutant	Averaging Time	PSD Increments (µg/m ³)	
		Class I	Class II
Nitrogen dioxide	Annual	2.5	25
PM ₁₀	Annual	4	17
	24-hour	8	30
Sulfur dioxide	Annual	2	20
	24-hour	5	91
	3-hour	25	512

µg/m³ = micrograms per cubic meter; PM₁₀ = particulate matter with a diameter of less than or equal to 10 microns; PSD = Prevention of Significant Deterioration

Certain national parks, monuments, and wilderness areas have been identified as Class I areas, where any appreciable deterioration in air quality is considered significant. Class II areas are those where moderate, well-controlled growth could be permitted. There are no PSD Class I areas within 100 miles of Dyess AFB. Badlands National Park and Wind Cave National Park are each located approximately 37 miles from Ellsworth AFB to the southeast and southwest, respectively.

GHG Emissions/Baseline

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere; the accumulation of these gases in the atmosphere has been attributed to the regulation of Earth's temperature. It is "extremely likely" that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic forcings together. The best estimate of the human-induced contribution to warming is similar to the observed warming over this period (IPCC, 2013).

Any GHG analysis contained in this document was prepared in accordance with the USAF Air Quality EIAP guidance. The six primary GHGs as defined by the EPA under Section 202(a) of the Clean Air Act by rulemaking (see Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Federal

Register 66,495–66,546, December 15, 2009) are carbon dioxide (CO₂), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Each GHG has an estimated global warming potential (GWP), which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from the Earth's surface. The GWP allows GHGs to be compared with each other by converting the GHG quantity into the common unit "carbon dioxide equivalent" (CO₂e). Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are produced in relatively very small quantities and most often by very specific niche industries such as electronic component manufacture. Additionally, the EPA's National Emissions Inventory (NEI) database only tracks the most abundant GHGs (CO₂, nitrous oxide, and methane). Therefore, analysis focuses on these three primary GHGs represented as CO₂e based on their GWP.

3.3.1.2 Region of Influence

3.3.1.2.1 Dyess AFB

Dyess AFB is located in Taylor County, therefore that is the ROI. According to EPA, Taylor County is in attainment for all criteria pollutants (EPA, 2019a), and a conformity determination would not be required.

Emissions that would be generated under the Proposed Action were compared with Taylor County emissions obtained from EPA's 2017 NEI. NEI data are the latest available; these are presented in Table 3.3-2. The county data include emissions amounts from point sources, area sources, and mobile sources. *Point sources* are stationary sources that can be identified by name and location. *Area sources* are point sources from which emissions are too low to track individually, such as a home or small office building, or a diffuse stationary source, such as wildfires or agricultural tilling. *Mobile sources* are any kind of vehicle or equipment with gasoline or diesel engine, an airplane, or a ship. Two types of mobile sources are considered: on-road and nonroad. On-road sources consist of vehicles such as cars, light trucks, heavy trucks, buses, engines, and motorcycles. Nonroad sources are aircraft, locomotives, diesel and gasoline boats and ships, personal watercraft, lawn and garden equipment, agricultural and construction equipment, and recreational vehicles (EPA, 2020b).

Table 3.3-2. Baseline Criteria Pollutant Emissions Inventory for Taylor County, Texas

County	Criteria Pollutant (tons/year)					
	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
Taylor	14,298	4,626	6,598	1,250	50	8,477

Source: (EPA, 2020b)

CO = carbon monoxide; NO_x = nitrogen oxides; PM₁₀ and PM_{2.5} = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO₂ = sulfur dioxide; VOC = volatile organic compound

GHG Emissions/Baseline

Baseline GHG emissions for Taylor County, obtained from EPA's 2017 NEI, are summarized in Table 3.3-3.

**Table 3.3-3. Baseline Greenhouse Gas Emissions Inventory
Taylor County, Texas**

County	Greenhouse Gas (tons/year)			
	CO ₂	CH ₄	N ₂ O	CO ₂ e
Taylor	1,234,529	138	18	1,243,235

Source: (EPA, 2020b)

CH₄ = methane; CO₂ = carbon dioxide; CO₂e = carbon dioxide equivalent; N₂O = nitrous oxide

3.3.1.2.2 Ellsworth AFB

Ellsworth AFB is located in Meade and Pennington Counties, South Dakota. Meade and Pennington Counties, like all of South Dakota, are also in attainment for all pollutants (EPA, 2019b), and a conformity determination would not be required.

Emissions that would be generated under the Proposed Action were compared with Pennington and Meade Counties' emissions obtained from EPA's 2017 NEI. NEI data are the latest available; these are presented in Table 3.3-4.

**Table 3.3-4. Baseline Criteria Pollutant Emissions Inventory for
Pennington and Meade Counties, South Dakota**

County	Criteria Pollutant (tons/year)					
	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
Pennington	35,754	5,734	7,717	2,706	579	23,789
Meade	7,705	2,789	5,484	1,149	36	9,650
Total ROI	43,459	8,523	13,201	3,856	614	33,439

Source: (EPA, 2020b)

CO = carbon monoxide; NO_x = nitrogen oxides; PM₁₀ and PM_{2.5} = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; ROI = region of influence; SO₂ = sulfur dioxide; VOC = volatile organic compound

Note: ROI totals may not sum perfectly due to rounding of significant figures.

Baseline GHG emissions for Pennington and Meade Counties, obtained from EPA's 2017 NEI, are summarized in Table 3.3-5.

**Table 3.3-5. Baseline Greenhouse Gas Emissions Inventory
Pennington and Meade Counties, South Dakota**

County	Greenhouse Gas (tons/year)			
	CO ₂	CH ₄	N ₂ O	CO ₂ e
Pennington	1,932,808	2,416	33	2,003,045
Meade	257,839	66	6	261,269
Total ROI	2,190,647	2,483	39	2,264,313

Source: (EPA, 2020b)

CH₄ = methane; CO₂ = carbon dioxide; CO₂e = carbon dioxide equivalent; ROI = region of influence; N₂O = nitrous oxide

Note: ROI totals may not sum perfectly due to rounding of significant figures.

3.3.1.2.3 Powder River Training Complex

The PRTC airspace covers all or part of 10 counties in North Dakota, 8 in South Dakota, 7 in Montana, and 4 in Wyoming. These counties and their respective baseline (2017 NEI) annual air emissions are provided below in Table 3.3-6. The entire states of North and South Dakota are in attainment for all criteria pollutants, so General Conformity is not applicable to any of the counties in those states. All counties in the PRTC ROI over Montana are in attainment for all pollutants, except for Rosebud County, part of which is in moderate nonattainment for PM₁₀ (1987 standard) (EPA, 2020c).

The Lame Deer nonattainment area in Rosebud County does fall below the PRTC airspace; therefore, a General Conformity applicability evaluation is required for Rosebud County, Montana. However, a General Conformity applicability assessment was performed as part of the 2014 PRTC EIS (USAF, 2014a), and it was determined that emissions would fall below the *de minimis* levels. Therefore, the current activities under the No Action Alternative are presumed to conform as well.

In Wyoming, Campbell and Crook Counties are in attainment for all pollutants. A portion of Sheridan County, Wyoming, was previously in nonattainment for PM₁₀ (1987 standard), but was redesignated to maintenance in May 2018 after achieving attainment (EPA, 2020d). However, the Sheridan maintenance area falls outside the PRTC ROI, so a General Conformity applicability evaluation is not required for Sheridan County (EPA, 2020e).

Table 3.3-6. Baseline Criteria Pollutant and Greenhouse Gas Emissions Inventory for the Powder River Training Complex

State	County	Criteria Pollutants (tons/year)						Greenhouse Gases (tons/year)			
		CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO ₂	CH ₄	N ₂ O	CO _{2e}
ND	Adams	1,512	974	4,349	835	46	2,000	55,766	6	1	56,096
	Billings	2,252	1,463	2,279	418	496	6,602	101,075	37	1	102,160
	Bowman	2,502	1,446	3,831	707	200	9,068	65,848	15	1	66,500
	Grant	2,613	1,236	3,879	797	32	3,077	76,295	38	1	77,474
	Golden Valley	1,758	1,064	1,991	406	35	2,952	59,821	17	1	60,409
	Hettinger	2,219	1,080	4,614	917	52	2,353	82,190	22	1	83,001
	Morton	10,671	5,763	9,593	2,088	3,920	5,487	1,742,055	259	25	1,755,851
	Slope	1,788	961	2,460	483	194	2,682	48,476	20	0	49,043
	Stark	7,383	4,261	8,686	1,562	3,307	8,622	494,164	35	6	496,774
	Sioux	1,596	962	3,250	569	149	2,328	54,246	6	1	54,581
SD	Butte	3,838	1,765	3,106	585	15	4,914	97,991	22	3	99,418
	Corson	2,772	1,742	3,226	664	4	4,485	61,939	19	1	62,654
	Harding	2,519	1,668	2,055	405	12	6,497	48,206	7	0	48,526
	Lawrence	16,730	1,250	4,007	1,524	139	16,242	360,916	583	6	377,195
	Meade	7,705	2,789	5,484	1,149	36	9,650	257,839	66	6	261,269
	Pennington	35,754	5,734	7,717	2,706	579	23,789	1,932,808	2,416	33	2,003,045
	Perkins	3,513	1,953	3,999	757	6	5,353	118,265	8	2	119,034
	Ziebach	1,970	1,239	2,313	467	2	4,040	36,844	10	0	37,180
MT	Big Horn	42,906	5,184	18,507	5,353	438	19,638	856,435	1,705	9	901,797
	Carter	3,471	1,975	4,180	747	8	6,541	54,222	34	1	55,313
	Custer	34,154	3,768	7,605	3,375	315	14,953	603,590	1,467	4	641,432
	Fallon	2,781	1,894	3,146	558	88	9,928	36,724	3	1	37,081
	Powder River	6,076	2,230	5,436	1,043	52	8,431	112,438	148	1	116,362
	Treasure	2,052	1,158	1,160	244	3	2,809	52,772	11	1	53,408
	Rosebud	164,525	18,883	26,695	16,299	10,447	47,744	17,417,446	9,341	263	17,729,306
WY	Campbell	27,732	29,935	103,213	13,038	31,985	31,985	11,782,279	4,599	190	11,953,931
	Crook	31,213	3,737	12,314	3,639	366	17,367	564,579	1,331	4	599,043
	Sheridan	18,361	3,019	10,504	2,369	147	13,207	512,907	628	7	530,760
	Weston	7,028	3,067	7,621	7,621	53	7,426	308,832	234	4	315,833
	ROI Total	449,392	112,200	277,220	71,323	53,123	300,170	37,996,969	23,086	572	38,744,478

Source: (EPA, 2020b)

CO = carbon monoxide; CO₂ = carbon dioxide; CO_{2e} = carbon dioxide equivalent; CH₄ = methane; MT = Montana; N₂O = nitrous oxide; ND = North Dakota; NO_x = nitrogen oxides; PM₁₀ and PM_{2.5} = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; ROI = region of influence; SD = South Dakota; SO₂ = sulfur dioxide; VOC = volatile organic compound; WY = Wyoming

Note: ROI totals may not sum perfectly due to rounding of significant figures.

3.3.1.2.4 Lancer MOA

Lancer MOA airspace covers all or part of eight counties in Texas. These counties and their respective baseline (2017 NEI) annual air emissions are provided below in Table 3.3-7. All the counties under Lancer MOA airspace are in attainment for all criteria pollutants, so General Conformity is not applicable (EPA, 2020f).

Table 3.3-7. Baseline Criteria Pollutant and Greenhouse Gas Emissions Inventory for Lancer MOA

State	County	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO ₂	CH ₄	N ₂ O	CO ₂ e
TX	Borden	1,770	1,128	1,868	364	17	5,491	40,586	7	0	40,799
	Dawson	4,228	1,758	5,293	962	29	7,248	239,101	44	2	240,708
	Fisher	2,378	1,324	3,561	712	22	4,727	148,708	18	1	149,345
	Garza	3,115	1,615	3,574	548	32	5,976	160,431	12	1	161,111
	Kent	1,939	1,596	590	136	7	6,094	100,935	180	0	105,496
	Lynn	2,684	1,408	8,739	1,594	26	4,148	208,516	17	1	209,263
	Scurry	5,315	3,192	5,160	930	69	13,928	919,774	1,531	4	959,202
	Stonewall	2,467	1,109	1,373	314	10	5,486	63,924	38	0	64,947
	ROI Total	23,896	13,129	30,158	5,560	211	53,098	1,881,976	1,846	9	1,930,871

Source: (EPA, 2020b)

CH₄ = methane; CO = carbon monoxide; CO₂ = carbon dioxide; CO₂e = carbon dioxide equivalent; MOA = Military Operating Area; N₂O = nitrous oxide; NO_x = nitrogen oxides; PM₁₀ and PM_{2.5} = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; ROI = region of influence; SO₂ = sulfur dioxide; TX = Texas; VOC = volatile organic compound

Note: ROI totals may not sum perfectly due to rounding of significant figures.

3.3.1.2.5 Brownwood MOA

Brownwood MOA airspace covers all or part of 12 counties in Texas. These counties and their respective baseline (2017 NEI) annual air emissions are provided below in Table 3.3-8. All the counties under Brownwood MOA airspace are in attainment for all criteria pollutants, so General Conformity is not applicable (EPA, 2020f).

Table 3.3-8. Baseline Criteria Pollutant and Greenhouse Gas Emissions Inventory for Brownwood MOA

State	County	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO ₂	CH ₄	N ₂ O	CO ₂ e
TX	Brown	7,093	2,306	3,601	670	27	6,942	412,306	79	6	416,097
	Callahan	4,869	2,099	2,609	518	14	5,019	412,363	53	2	414,333
	Coleman	4,002	1,776	2,869	519	9	7,041	161,485	33	1	162,711
	Comanche	4,726	1,415	3,688	742	19	5,143	201,407	83	2	204,079
	Concho	3,142	1,231	2,617	505	10	5,951	126,416	39	1	127,585
	Eastland	7,447	2,817	2,886	654	31	7,219	534,558	144	4	539,222
	Erath	8,573	2,147	5,758	1,176	48	7,108	456,248	173	5	462,083
	Hamilton	4,130	1,209	2,616	571	22	5,156	177,383	92	1	180,062
	McCulloch	4,189	1,468	3,379	628	22	7,660	223,814	71	1	225,999
	Mills	2,437	1,079	1,722	308	6	4,035	109,638	25	1	110,516
	Runnels	3,883	1,624	4,604	879	12	5,825	199,142	34	2	200,439
	San Saba	5,125	1,243	2,194	593	33	8,808	124,657	145	1	128,552
	ROI Total	59,616	20,416	38,545	7,762	253	75,908	3,139,417	971	27	3,171,677

Source: (EPA, 2020b)

CH₄ = methane; CO = carbon monoxide; CO₂ = carbon dioxide; CO₂e = carbon dioxide equivalent; MOA = Military Operating Area; N₂O = nitrous oxide; NO_x = nitrogen oxides; PM₁₀ and PM_{2.5} = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; ROI = region of influence; SO₂ = sulfur dioxide; TX = Texas; VOC = volatile organic compound

Note: ROI totals may not sum perfectly due to rounding of significant figures.

3.3.1.2.6 Pecos MOA

Pecos MOA airspace covers all or part of five counties in New Mexico. These counties and their respective baseline (2017 NEI) annual air emissions are provided below in Table 3.3-9. All the counties under Pecos MOA airspace are in attainment for all criteria pollutants, so General Conformity is not applicable (EPA, 2020g).

Table 3.3-9. Baseline Criteria Pollutant and Greenhouse Gas Emissions Inventory for Pecos MOA

State	County	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO ₂	CH ₄	N ₂ O	CO ₂ e
NM	Chaves	17,943	4,790	8,880	1,414	80	33,745	478,392	53	13	483,513
	DeBaca	3,842	3,532	1,314	244	3	8,951	49,701	3	1	50,020
	Guadalupe	7,520	4,897	1,674	340	9	9,719	429,783	42	4	432,018
	Lincoln	12,054	2,640	4,122	863	41	21,422	273,909	185	6	280,176
	Roosevelt	5,700	2,827	4,516	771	23	8,530	202,865	14	4	204,347
	ROI Total	47,059	18,687	20,505	3,632	157	82,366	1,434,650	298	27	1,450,075

Source: (EPA, 2020b)

CH₄ = methane; CO = carbon monoxide; CO₂ = carbon dioxide; CO₂e = carbon dioxide equivalent; MOA = Military Operating Area; N₂O = nitrous oxide; NM = New Mexico; NO_x = nitrogen oxides; PM₁₀ and PM_{2.5} = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO₂ = sulfur dioxide; VOC = volatile organic compound

Note: ROI totals may not sum perfectly due to rounding of significant figures.

3.3.1.3 Analysis Methodology

Air quality in the project area and immediately surrounding region would be affected by emissions from sources associated with aircraft operations, ground disturbance (construction, demolition, renovation, etc.), and ground support equipment operations at the two prospective installations. Neither the Texas nor South Dakota State Implementation Plans specify a mixing height; therefore, the default 3,000-foot above ground level (AGL) ceiling was assumed to be the atmospheric mixing height above which any pollutant generated would not contribute to increased pollutant concentrations at ground level. Low-level flights (below the 3,000-foot AGL atmospheric mixing layer) may also impact the air quality of the counties beneath training area airspace. The following sections provide a description of air quality impacts that would occur from each alternative. Emissions from any alternative that cause an exceedance of any state or national ambient air quality standard would result in environmental impacts.

In order to evaluate air emissions and their impact on the overall ROI, the emissions associated with the Proposed Action activities were compared with the total emissions on a pollutant-by-pollutant basis for the ROI's 2017 NEI data, which is the most recent version that has been finalized. Potential impacts to air quality are evaluated with respect to the extent, context, and intensity of the impact in relation to relevant regulations, guidelines, and scientific documentation. The CEQ defines significance in terms of context and intensity in 40 CFR 1508.27. This requires the significance of the action to be analyzed with respect to the setting of a proposed action and based relative to the severity of the impact. The CEQ NEPA regulations (40 CFR 1508.27[b]) provide 10 key factors to consider in determining an impact's intensity. To provide a more conservative analysis, the two counties were selected as the ROI instead of the EPA-designated Air Quality Control Region, which is a much larger area.

The Air Conformity Applicability Model (ACAM) Version 5.0.16 was utilized to provide a level of consistency with respect to emissions factors and calculations. The ACAM provides estimated air emissions from proposed federal actions in areas designated as nonattainment and/or maintenance for each specific criteria and precursor pollutant as defined in the NAAQS. ACAM was utilized to calculate construction emissions. Emission factors for aircraft were also obtained from ACAM. Equations and emission factors can be found in Appendix C (Air Quality). However, it should be noted that since the B-21 is a new airframe and validated emissions factors are not yet available, ACAM emissions factors for the B-2A were used in air quality calculations.

GHGs were included in the analysis. The primary source of CO₂ emissions would be fuel combustion from aircraft emissions during training activities. On June 26, 2019, the CEQ released a new *Draft National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions* (CEQ, 2019). On July 24, 2019, the public comment period was extended to August 26, 2019, and the guidance has yet to be made final. This guidance reinforced many of the principles outlined in the rescinded 2009 guidance. However, this guidance does not include a recommended threshold for consideration similar to the 25,000 metric tons recommended previously, and instead relies on the “rule of reason” and recommends quantification of GHG emissions as a proxy for climate change effects. As such, this document quantifies GHG emissions associated with the Proposed Action and provides the regional air basin baseline GHG annual emissions (per the 2017 NEI) for context and comparison. Additional information regarding calculations for GHG is provided in Appendix C (Air Quality).

However, it should be noted at this time that climate change presents a global problem caused by increasing global atmospheric concentrations of GHG emissions and the current state of the science surrounding it does not support determining the global significance of local or regional emissions of GHGs from a particular action.

3.3.2 Air Quality, Environmental Consequences

3.3.2.1 No Action Alternative Consequences

3.3.2.1.1 No Action at Dyess AFB

Personnel

Under the No Action Alternative, there would be no change to the numbers or types of personnel at Dyess AFB. Emissions associated with worker commutes, home heating, etc. would remain at current historical levels. Taylor County would remain in attainment for all pollutants, and no adverse impacts to air quality would be anticipated. In order to provide a baseline for comparison to the Proposed Action, ACAM 5.0.16 was used to estimate annual emissions associated with personnel commutes at Dyess AFB (Table 3.3-10).

Table 3.3-10. Personnel Emissions at Dyess AFB Under the No Action Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Dyess AFB Personnel Emissions (No Action)	121.37	8.79	0.22	0.19	0.08	10.30	11,109
ROI Baseline ¹	14,298	4,626	6,598	1,250	50.29	8,477	1,243,235
Percentage of ROI	0.85%	0.19%	0.00%	0.02%	0.16%	0.12%	0.89%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Dyess AFB emissions is Taylor County, Texas. See Table 3.3-2 and Table 3.3-3.

Airfield Operations

Impacts to air quality occur from aircraft fossil fuel combustion emissions, and these would continue at Dyess AFB under the No Action Alternative.

However, impacts due to aircraft emissions would be insignificant, since these emission sources would be mobile and intermittent and pollutant emissions would not be large enough in a localized area to cause any exceedance of an ambient air quality standard. Also, the ground-level impact of aircraft emissions released above the atmospheric mixing layer (3,000 feet AGL) would be negligible due to the inability of the released pollutants to penetrate the mixing layer and mix downward to ground level.

Operational activities under the No Action Alternative would not increase from activities that presently occur in this area. Therefore, operational air quality impacts associated with the No Action Alternative were calculated based on historical operational activity to provide a baseline for the installation. These emissions are based on the current aircraft flight operations occurring below the 3,000-foot AGL mixing layer for all aircraft at Dyess AFB. Because Dyess AFB has historically had numerous transient aircraft and these are likely to change frequently, the airframe that has historically had the most operations at Dyess AFB (the T-38) was selected as the representative surrogate airframe for all transient flight operations at Dyess AFB. The number of T-38 operations at Dyess AFB is a result of proximity and use of Dyess AFB for transient training operations out of nearby Sheppard AFB. Annual emissions associated with flight operations at Dyess AFB are provided in Table 3.3-11.

Table 3.3-11. Annual Aircraft Emissions Under the No Action Alternative at Dyess AFB

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Dyess AFB Aircraft Emissions (No Action)	268.54	268.39	45.82	31.58	29.27	50.07	88,475
ROI Baseline ¹	14,298	4,626	6,598	1,250	50.2947	8,477	1,243,235
Percentage of ROI	1.88%	5.80%	0.69%	2.53%	58.20%	0.59%	7.12%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Dyess AFB emissions is Taylor County, Texas. See Table 3.3-2 and Table 3.3-3.

Airspace and Range Utilization

Analyses were also conducted to assess the annual air emissions of criteria pollutants and GHGs occurring below 3,000 feet AGL within the various training airspace regions (Table 3.3-12 through Table 3.3-14). There are no flight operations that occur below the 3,000-foot AGL mixing layer in the Brownwood MOA. Therefore, there is no impact or contribution to the regional air quality beneath the Brownwood MOA under the No Action Alternative.

Table 3.3-12. Annual Aircraft Emissions in the PRTC Under the No Action Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
PRTC Aircraft Emissions (No Action)	9.04	87.55	10.12	6.11	6.23	0.60	18,820
ROI Baseline ¹	449,392	112,200	277,220	71,323	53,123	300,170	38,744,478
Percentage of ROI	0.00%	0.08%	0.00%	0.01%	0.01%	0.00%	0.05%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PRTC = Powder River Training Complex; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for PRTC emissions includes portions of 29 counties across four states. See Table 3.3-6.

Table 3.3-13. Annual Aircraft Emissions in Lancer MOA Under the No Action Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Lancer MOA Emissions (No Action)	2.21	2.56	0.34	0.24	0.19	0.08	589
ROI Baseline ¹	23,896	13,129	30,158	5,560	211	53,098	1,930,871
Percentage of ROI	0.01%	0.02%	0.00%	0.00%	0.09%	0.00%	0.03%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; MOA = Military Operating Area; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Lancer MOA emissions includes portions of eight counties in Texas. See Table 3.3-7.

Table 3.3-14. Annual Aircraft Emissions in Pecos MOA Under the No Action Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Pecos MOA Emissions (No Action)	155.09	371.83	101.43	99.86	19.65	12.81	147,894
ROI Baseline ¹	47,059	18,687	20,505	3,632	156.67	82,366	1,450,075
Percentage of ROI	0.33%	1.99%	0.49%	2.75%	12.54%	0.02%	10.20%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; MOA = Military Operating Area; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Pecos MOA emissions includes portions of five counties in New Mexico. See Table 3.3-9.

Facilities and Infrastructure

There are no construction, demolition, or renovation activities included under the No Action Alternative. However, it is likely that these types of activities would be ongoing at Dyess AFB as components of other actions that are either covered in other NEPA documents or categorically excluded from the need for detailed NEPA analysis. These activities would continue to contribute air emissions to the study area from fossil fuel combustion of equipment. However, these activities would be temporary and minor in nature. These types of activities have been ongoing and typical of the installation and the region for years, and Taylor County has remained classified as being in attainment for all criteria pollutants.

Summary of No Action at Dyess AFB

Table 3.3-15 shows the estimated annual emissions under the No Action Alternative, or baseline conditions. Emissions associated with the No Action Alternative are minimal for all criteria pollutants but sulfur oxides. However, it is important to note that these activities have been ongoing at Dyess AFB for many years and have not adversely impacted the air quality of the region. Taylor County continues to be in attainment with the NAAQS for all criteria pollutants, including sulfur oxides. GHG emissions in the region (approximately 1 million tons annually for Taylor County) are trivial in the context of the nearly 6.7 trillion metric tons CO₂e emitted annually in the United States (EPA, 2020h) and approximately 49 gigatonnes CO₂e worldwide (IPCC, 2014). Therefore, there would be no adverse impacts to regional air quality under the No Action Alternative at Dyess AFB.

Table 3.3-15. Summary of No Action Alternative Emissions at Dyess AFB

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO ₂ e
Dyess AFB Personnel Emissions (No Action)	121.37	8.79	0.22	0.19	0.08	10.30	11,109
Dyess AFB Aircraft Emissions (No Action)	268.54	268.39	45.82	31.58	29.27	50.07	88,475
Total Dyess AFB No Action Alternative Emissions	389.91	277.18	46.04	31.77	29.35	60.37	99,584
ROI Baseline ¹	14,298	4,626	6,598	1,250	50.30	8,477	1,243,235
Percentage of ROI	2.73%	5.99%	0.70%	2.54%	58.36%	0.71%	8.01%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO₂e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Dyess AFB emissions is Taylor County, Texas. See Table 3.3-2 and Table 3.3-3.

3.3.2.1.2 No Action at Ellsworth AFB

Personnel

Under the No Action Alternative, there would be no change to the numbers or types of personnel at Ellsworth AFB. Emissions associated with worker commutes, home heating, etc. would remain at current historical levels. Meade and Pennington Counties would remain in attainment for all pollutants, and no adverse impacts to air quality would be anticipated. To provide a baseline for comparison with the Proposed Action, ACAM 5.0.16 was used to estimate annual emissions associated with personnel commutes at Ellsworth AFB (Table 3.3-16).

Table 3.3-16. Personnel Emissions at Ellsworth AFB Under the No Action Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Ellsworth AFB Personnel Emissions (No Action)	115.61	8.96	0.30	0.26	0.06	10.22	9,068
ROI Baseline ¹	43,459	8,523	13,201	3,856	614.18	33,439	2,264,313
Percentage of ROI	0.27%	0.11%	0.00%	0.01%	0.01%	0.03%	0.40%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Ellsworth AFB emissions includes Meade and Pennington Counties in South Dakota. See Table 3.3-4 and Table 3.3-5.

Airfield Operations

Under the No Action Alternative at Ellsworth AFB, there would continue to be annual emissions associated with flight operations. Similar to the approach used for air quality analysis for the Dyess AFB Alternative, historical air operations activities at Ellsworth AFB were used to create a baseline. Because the number of transient aircraft at Ellsworth AFB is much lower than at Dyess AFB, no surrogate was required and actual aircraft emission factors were used for transients at Ellsworth AFB. Annual emissions associated with flight operations at Ellsworth AFB are provided in Table 3.3-17.

Table 3.3-17. Annual Aircraft Emissions Under the No Action Alternative at Ellsworth AFB

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Ellsworth AFB Aircraft Emissions (No Action)	220.84	191.32	49.46	35.48	21.11	4.27	63,813
ROI Baseline ¹	43,459	8,523	13,201	3,856	614.18	33,439	2,264,313
Percentage of ROI	0.51%	2.24%	0.37%	0.92%	3.44%	0.01%	2.82%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Ellsworth AFB emissions includes Meade and Pennington Counties in South Dakota. See Table 3.3-4 and Table 3.3-5.

Airspace and Range Utilization

Under the No Action Alternative, annual emissions of criteria pollutants and GHGs at the PRTC are shown in Table 3.3-18.

Table 3.3-18. Annual Aircraft Emissions in the PRTC Under the No Action Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
PRTC Aircraft Emissions (No Action)	9.04	87.55	10.12	6.11	6.23	0.60	18,820
ROI Baseline ¹	449,392	112,200	277,220	71,323	53,123	300,170	38,744,478
Percentage of ROI	0.00%	0.08%	0.00%	0.01%	0.01%	0.00%	0.05%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; PRTC = Powder River Training Complex; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for PRTC emissions includes portions of 29 counties across four states. See Table 3.3-6.

Facilities and Infrastructure

There are no construction, demolition, or renovation activities included under the No Action Alternative. However, it is likely that these types of activities would be ongoing at Ellsworth AFB as components of other actions that are either covered in other NEPA documents or categorically excluded from the need for detailed NEPA analysis. These activities would continue to contribute air emissions to the ROI from fossil fuel combustion of equipment. However, these activities would be temporary and minor in nature. These types of activities have been ongoing and typical of the installation and the region for years, and Meade and Pennington Counties have remained classified as being in attainment for all criteria pollutants.

Summary of No Action at Ellsworth AFB

Table 3.3-19 shows the estimated annual emissions under the No Action Alternative, or baseline conditions. Emissions associated with the No Action Alternative are minimal for all criteria pollutants. It is also worth noting that these activities have been ongoing at Ellsworth AFB for many years and have not adversely impacted the air quality of the region. Pennington and Meade Counties continue to be in attainment with the NAAQS for all criteria pollutants. GHG emissions in the region (approximately 2.3 million tons annually for Meade and Pennington Counties combined) are trivial in the context of the nearly 6.7 trillion metric tons CO_{2e} emitted annually in the United States (EPA, 2020h) and approximately 49 gigatonnes CO_{2e} worldwide (IPCC, 2014). Therefore, there would be no adverse impacts to regional air quality under the No Action Alternative at Ellsworth AFB.

Table 3.3-19. Summary of No Action Alternative Emissions at Ellsworth AFB

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Ellsworth AFB Personnel Emissions (No Action)	115.61	8.96	0.30	0.26	0.06	10.22	9,068
Ellsworth AFB Aircraft Emissions (No Action)	220.84	191.32	49.46	35.48	21.11	4.27	63,813
Total Ellsworth AFB No Action Alternative Emissions	336.45	200.28	49.76	35.74	21.17	14.49	72,881
ROI Baseline ¹	43,459	8,523	13,201	3,856	614	33,439	2,264,313
Percentage of ROI	0.77%	2.35%	0.38%	0.93%	3.45%	0.04%	3.22%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Ellsworth AFB emissions includes Meade and Pennington Counties in South Dakota. See Table 3.3-4 and Table 3.3-5.

3.3.2.2 Dyess AFB Alternative

3.3.2.2.1 Personnel

Under the Dyess AFB Alternative, it was estimated that the B-21 program would require approximately 3,500 military personnel (Table 2.3-1). ACAM estimates the potential air emissions introduced to the region by personnel commuter vehicles. Table 3.3-20 shows the potential emissions associated with the end-state personnel under the Dyess AFB Alternative compared with the baseline emissions, as well as the net change resulting from subtraction of B-1B personnel and addition of B-21 personnel at Dyess AFB compared to the ROI baseline annual emissions.

Table 3.3-20. Personnel Emissions with the Dyess AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Dyess AFB Alternative Personnel Emissions	161.03	11.66	0.29	0.25	0.10	13.67	14,740
Dyess AFB No Action Alternative Personnel Emissions	121.37	8.79	0.22	0.19	0.08	10.30	11,109
Change from No Action Alternative	39.66	2.87	0.07	0.06	0.02	3.37	3,630
ROI Baseline ¹	14,298	4,626	6,598	1,250	50	8,477	1,243,235
Net Change as Percentage of ROI	0.28%	0.06%	0.00%	0.00%	0.04%	0.04%	0.29%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Dyess AFB emissions is Taylor County, Texas. See Table 3.3-2 and Table 3.3-3.

3.3.2.2.2 Airfield Operations

Under the Dyess AFB Alternative, B-1 aircraft would be phased out and replaced by B-21 aircraft. Table 3.3-21 shows the potential change (increase or decrease) in criteria pollutant and GHG emissions associated with the Dyess AFB Alternative from the No Action Alternative and the ROI baseline. Emissions of the following criteria pollutants nitrogen oxides, PM₁₀, PM_{2.5}, and sulfur oxides would increase by a nominal 3.52 percent, 0.15 percent, 1.13 percent, and 2.66 percent, respectively, from the baseline levels per year as illustrated in Table 3.3-2.

Table 3.3-21. Air Operations Emissions with the Dyess AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO ₂ e
Dyess AFB Alternative Aircraft Emissions	191.56	431.35	55.59	45.75	30.61	48.26	92,527
Dyess AFB No Action Alternative Aircraft Emissions	268.54	268.39	45.82	31.58	29.27	50.07	88,475
Change from No Action Alternative	-76.97	162.96	9.77	14.17	1.34	-1.80	4,053
ROI Baseline ¹	14,298	4,626	6,598	1,250	50.30	8,477	1,243,235
Net Change as Percentage of ROI	-0.54%	3.52%	0.15%	1.13%	2.66%	-0.02%	0.33%

Source: (EPA, 2020b)

% = percent; - = minus; AFB = Air Force Base; CO = carbon monoxide; CO₂e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Dyess AFB emissions is Taylor County, Texas. See Table 3.3-2 and Table 3.3-3.

3.3.2.2.3 Airspace and Range Utilization

Powder River Training Complex

Table 3.3-22 shows the change in criteria pollutant and GHG emissions associated with aircraft operations occurring below the 3,000-foot AGL mixing layer within the PRTC compared to the ROI No Action Alternative baseline emissions.

Table 3.3-22. PRTC Air Operations Emissions with the Dyess AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO ₂ e
Dyess AFB Alternative PRTC Emissions	5.25	31.31	2.75	0.85	1.54	0.07	4,649
No Action Alternative PRTC Emissions	9.04	87.55	10.12	6.11	6.23	0.60	18,820
Change from No Action Alternative Emissions	-3.80	-56.24	-7.36	-5.26	-4.69	-0.53	-14,171
ROI Baseline ¹	449,392	112,200	277,220	71,323	53,123	300,170	38,744,478
Net Change as Percentage of ROI	0.00%	-0.05%	0.00%	-0.01%	-0.01%	0.00%	-0.04%

Source: (EPA, 2020b)

% = percent; - = minus; AFB = Air Force Base; CO = carbon monoxide; CO₂e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; PRTC = Powder River Training Complex; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for PRTC emissions includes portions of 29 counties across four states. See Table 3.3-6.

Emissions associated with the Dyess AFB Alternative represents a net decrease from No Action Alternative levels for all criteria pollutants, which are presumed to continue to meet General Conformity requirements, based on the 2014 PRTC EIS's determination that *de minimis* levels would not be exceeded (USAF, 2014a); therefore, a General Conformity determination would not be required.

Lancer MOA

Under the Dyess AFB Alternative, there would be no emissions below the 3,000-foot AGL mixing layer. Therefore, emissions would decrease by the quantities shown in Section 3.3.2.1.1 (Air Quality, No Action at Dyess AFB) (Table 3.3-13).

Brownwood MOA

There would not be any operations in the Brownwood MOA occurring below the 3,000-foot AGL mixing layer. Therefore, there would not be any impact to the regional air quality from B-21 flight operations in the Brownwood MOA.

Pecos MOA

Table 3.3-23 shows the change in criteria pollutant and GHG emissions associated with aircraft operations occurring below the 3,000-foot AGL mixing layer within the Pecos MOA under the Dyess AFB Alternative compared with the No Action Alternative baseline emissions.

Table 3.3-23. Pecos MOA Air Operations Emissions with the Dyess AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Dyess AFB Alternative Pecos MOA Emissions	141.20	364.73	100.32	98.98	19.17	12.34	146,437
No Action Alternative Pecos MOA Emissions	155.09	371.83	101.43	99.86	19.65	12.81	147,894
Change from No Action Alternative Emissions	-13.89	-7.10	-1.11	-0.88	-0.48	-0.47	-1,457
ROI Baseline ¹	47,059	18,687	20,505	3,632	156.67	82,366	1,450,075
Net Change as Percentage of ROI	-0.03%	-0.04%	-0.01%	-0.02%	-0.31%	0.00%	-0.10%

Source: (EPA, 2020b)

% = percent; - = minus; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; MOA = Military Operating Area; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Pecos MOA emissions includes portions of five counties in New Mexico. See Table 3.3-9.

3.3.2.2.4 Facilities and Infrastructure

Under the Dyess AFB Alternative, there would be a number of new facilities constructed to support the B-21 mission (Table 2.4-1). ACAM 5.0.16 was used to calculate the emissions associated with construction, demolition, and renovation activities under the Dyess AFB Alternative (Table 3.3-24).

Emissions associated with facilities construction, demolition, and renovation would be minor and temporary, and there would be no adverse impacts associated with these activities under the Dyess AFB Alternative. Additionally, construction would likely be phased, which would serve to further minimize impacts over the length of the construction timeframe. PM₁₀ emissions could be further reduced by implementation of standard construction best management practices (BMPs) such as watering and/or covering of piles, loads, and temporary access roads. Facilities operations in the end-state would not be likely to impact Dyess AFB's status as a synthetic minor source, as restrictions would remain in place. However, should their permit require updating or revision, Dyess AFB would comply with all TCEQ requirements.

Table 3.3-24. Facilities and Infrastructure Emissions with the Dyess AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Dyess AFB Alternative Construction/Demolition/Renovation	16.64	22.16	684.36	0.86	0.06	36.05	5,886
ROI Baseline ¹	14,298	4,626	6,598	1,250	50.30	8,477	1,243,235
Percentage of ROI	0.12%	0.48%	10.37%	0.07%	0.12%	0.43%	0.47%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Dyess AFB emissions is Taylor County, Texas. See Table 3.3-2 and Table 3.3-3.

3.3.2.2.5 Weapons Generation Facility

Construction of the WGF would generate criteria pollutants and GHGs from the combustion of fossil fuels in construction equipment and worker commutes. Table 3.3-25 shows emissions from WGF construction at Dyess AFB compared with the ROI baseline. Emissions would be minor and temporary, representing less than 0.2 percent of the ROI annual emissions baseline. No adverse impacts to regional air quality would be anticipated.

Table 3.3-25. Weapons Generation Facility Construction Emissions with the Dyess AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Dyess AFB Alternative WGF Construction Emissions	3.92	3.69	12.57	0.15	0.01	1.20	944
ROI Baseline ¹	14,298	4,626	6,598	1,250	50.30	8,477	1,243,235
Percentage of ROI	0.03%	0.08%	0.19%	0.01%	0.02%	0.01%	0.08%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Dyess AFB emissions is Taylor County, Texas. See Table 3.3-2 and Table 3.3-3.

Summary of Dyess AFB Alternative Air Quality Environmental Consequences

Table 3.3-26 shows the estimated annual emissions under the Dyess AFB Alternative.

Table 3.3-26. Summary of Dyess AFB Alternative Emissions

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Dyess AFB Alternative Personnel Emissions	161.03	11.66	0.29	0.25	0.10	13.67	14,740
Dyess AFB Alternative Aircraft Emissions	191.56	431.35	55.59	45.75	30.61	48.26	92,527
Dyess AFB Alternative Facilities Construction and Demolition Emissions	16.64	22.16	684.36	0.86	0.06	36.05	5,886
Dyess AFB Alternative WGF Construction Emissions	3.92	3.69	12.57	0.15	0.01	1.20	944
Total Dyess AFB Alternative Emissions	373.15	468.86	752.81	47.01	30.78	99.18	114,097
Total Dyess AFB No Action Alternative Emissions	389.91	277.18	46.04	31.77	29.35	60.37	99,584
Net Change from No Action Alternative	-16.76	191.68	706.77	15.24	1.43	38.81	14,514
ROI Baseline ¹	14,298	4,626	6,598	1,250	50.30	8,477	1,243,235
Net Change as Percentage of ROI	-0.12%	4.14%	10.71%	1.22%	2.84%	0.46%	1.17%

Source: (EPA, 2020b)

% = percent; - = minus; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound; WGF = Weapons Generation Facility

Note:

1. The ROI for Dyess AFB emissions is Taylor County, Texas. See Table 3.3-2 and Table 3.3-3.

3.3.2.2.6 Snapshot

Personnel

Under the Snapshot Scenario at Dyess AFB, it was estimated that the total number of personnel, including B-21 personnel (Table 2.3-1) and 10 percent of B-1 personnel, would be approximately 6,200 military personnel, 665 civilians, and 200 contractors.

Table 3.3-27 shows the potential emissions associated with the Snapshot Scenario, the net change from the No Action Alternative, and the change (increase/decrease) as compared with the ROI baseline annual emissions.

Table 3.3-27. Personnel Emissions for the Snapshot Scenario with the Dyess AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO ₂ e
Dyess AFB Alternative Personnel Emissions (Snapshot)	165.52	11.98	0.30	0.26	0.10	14.05	15,150
Dyess AFB No Action Alternative Personnel Emissions	121.37	8.79	0.22	0.19	0.08	10.30	11,109
Change from No Action Alternative	44.15	3.20	0.08	0.07	0.03	3.75	4,041
ROI Baseline ¹	14,298	4,626	6,598	1,250	50.30	8,477	1,243,235
Net Change as Percentage of ROI	0.31%	0.07%	0.00%	0.01%	0.06%	0.04%	0.33%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO₂e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Dyess AFB emissions is Taylor County, Texas. See Table 3.3-2 and Table 3.3-3.

Airfield Operations

Table 3.3-28 shows the potential change (increase or decrease) in criteria pollutant and GHG emissions associated with the Dyess AFB Snapshot Scenario from the baseline. Emissions of all criteria pollutants would increase from the baseline levels except for carbon monoxide, which would decrease by 76.25 tons per year. The highest increase would be for sulfur oxides, which would increase by 18.67 percent over the ROI baseline for Taylor County.

Table 3.3-28. Air Operations Emissions for the Snapshot Scenario with the Dyess AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO ₂ e
Dyess AFB Alternative Aircraft Emissions (Snapshot)	192.29	435.44	96.90	82.84	38.66	53.59	104,895
Dyess AFB No Action Alternative Aircraft Emissions	268.54	268.39	45.82	31.58	29.27	50.07	88,475
Change from No Action Alternative	-76.25	167.05	51.08	51.26	9.39	3.53	16,421
ROI Baseline ¹	14,298	4,626	6,598	1,250	50.30	8,477	1,243,235
Net Change as Percentage of ROI	-0.53%	3.61%	0.77%	4.10%	18.67%	0.04%	1.32%

Source: (EPA, 2020b)

% = percent; - = minus; AFB = Air Force Base; CO = carbon monoxide; CO₂e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Dyess AFB emissions is Taylor County, Texas. See Table 3.3-2 and Table 3.3-3.

Airspace and Range Utilization

Powder River Training Complex

Table 3.3-29 shows the change in criteria pollutant and GHG emissions associated with aircraft operations occurring below the 3,000-foot AGL mixing layer within the PRTC airspace under the Snapshot Scenario compared with the ROI No Action Alternative baseline emissions. Since the B-21 would not fly below the mixing layer, emissions would decrease as B-1 operations are decreased.

Table 3.3-29. PRTC Air Operations Emissions for the Snapshot Scenario with the Dyess AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO ₂ e
Dyess AFB Alternative PRTC Emissions (Snapshot)	6.01	42.56	4.23	1.91	2.48	0.17	7,483
No Action Alternative PRTC Emissions	9.04	87.55	10.12	6.11	6.23	0.60	18,820
Change from No Action Alternative	-3.04	-44.99	-5.89	-4.21	-3.75	-0.42	-11,337
ROI Baseline ¹	449,392	112,200	277,220	71,323	53,123	300,170	38,744,478
Net Change as Percentage of ROI	0.00%	-0.04%	0.00%	-0.01%	-0.01%	0.00%	-0.03%

Source: (EPA, 2020b)

% = percent; - = minus; AFB = Air Force Base; CO = carbon monoxide; CO₂e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; PRTC = Powder River Training Complex; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for PRTC emissions includes portions of 29 counties across four states. See Table 3.3-6.

Lancer MOA

Under the Dyess AFB Snapshot Scenario, emissions below the 3,000-foot AGL mixing layer would decrease, since the B-21 would not fly below the mixing layer in the Lancer MOA. Therefore, emissions would decrease by the quantities shown below in Table 3.3-30.

Table 3.3-30. Lancer MOA Air Operations Emissions for the Snapshot Scenario with the Dyess AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO ₂ e
Dyess AFB Alternative Lancer MOA Emissions (Snapshot)	0.44	0.51	0.07	0.05	0.04	0.02	118
No Action Alternative Lancer MOA Emissions	2.21	2.56	0.34	0.24	0.19	0.08	588.65
Change from No Action Alternative	-1.77	-2.05	-0.27	-0.19	-0.16	-0.06	-470.92
ROI Baseline ¹	23,896	13,129	30,158	5,560	211	53,098	1,930,871

Table 3.3-30. Lancer MOA Air Operations Emissions for the Snapshot Scenario with the Dyess AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO ₂ e
Net Change as Percentage of ROI	-0.01%	-0.02%	0.00%	0.00%	-0.08%	0.00%	-0.02%

Source: (EPA, 2020b)

% = percent; - = minus; AFB = Air Force Base; CO = carbon monoxide; CO₂e = carbon dioxide equivalent; MOA = Military Operating Area; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for the Lancer MOA includes portions of eight counties in Texas. See Table 3.3-7.

Brownwood MOA

There would not be any B-1 or B-21 operations in the Brownwood MOA occurring below the 3,000-foot AGL mixing layer under the Dyess AFB Snapshot Scenario. Therefore, there would not be any impact to the regional air quality from B-21 flight operations in the Brownwood MOA.

Pecos MOA

Under the Dyess AFB Snapshot Scenario, emissions below the 3,000-foot AGL mixing layer would decrease, since the B-21 would not fly below the mixing layer in the Pecos MOA. Therefore, emissions would decrease by the quantities shown below in Table 3.3-31.

Table 3.3-31. Pecos MOA Air Operations Emissions for the Snapshot Scenario with the Dyess AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO ₂ e
Dyess AFB Alternative Pecos MOA Emissions (Snapshot)	141.20	364.73	100.32	98.98	19.17	12.34	146,437
No Action Alternative Pecos MOA Emissions	155.09	371.83	101.43	99.86	19.65	12.81	147,894
Change from No Action Alternative	-13.89	-7.10	-1.11	-0.88	-0.48	-0.47	-1,458
ROI Baseline ¹	47,059	18,687	20,505	3,632	156.67	82,366	1,450,075
Net Change as Percentage of ROI	-0.03%	-0.04%	-0.01%	-0.02%	-0.31%	0.00%	-0.10%

Source: (EPA, 2020b)

% = percent; - = minus; AFB = Air Force Base; CO = carbon monoxide; CO₂e = carbon dioxide equivalent; MOA = Military Operating Area; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Pecos MOA emissions includes portions of five counties in New Mexico. See Table 3.3-9.

Summary of Dyess AFB Snapshot Scenario

Table 3.3-32 shows the estimated annual emissions under the Dyess AFB Snapshot Scenario.

Table 3.3-32. Summary of Dyess AFB Snapshot Scenario Emissions

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Dyess AFB Alternative Personnel Emissions (Snapshot)	165.52	11.98	0.3	0.26	0.1	14.05	15,150
Dyess AFB Alternative Aircraft Emissions (Snapshot)	192.29	435.44	96.9	82.84	38.66	53.59	104,895
Dyess AFB Alternative Facilities Construction and Demolition Emissions	16.64	22.16	684.36	0.86	0.06	36.05	5,886
Dyess AFB Alternative WGF Construction Emissions	3.92	3.69	12.57	0.15	0.01	1.20	944
Total Dyess AFB Alternative Emissions (Snapshot)	378.37	473.27	794.13	84.11	38.83	104.89	126,875
Total Dyess AFB No Action Alternative Emissions	389.91	277.18	46.04	31.77	29.35	60.37	99,584
Net Change from No Action Alternative	-11.54	196.09	748.09	52.34	9.48	44.52	27,291
ROI Baseline ¹	14,298	4,626	6,598	1,250	50.30	8,477	1,243,235
Net Change as Percentage of ROI	-0.08%	4.24%	11.34%	4.19%	18.85%	0.53%	2.20%

Source: (EPA, 2020b)

% = percent; - = minus; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound; WGF = Weapons Generation Facility

Note:

1. The ROI for Dyess AFB emissions is Taylor County, Texas. See Table 3.3-2 and Table 3.3-3.

3.3.2.2.7 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

Construction activities would employ standard management measures for construction such as watering of graded areas, covering of soil stockpiles, and contour grading (if necessary), to minimize temporary generation of dust and particulate matter. This would serve to minimize air emissions associated with the elements of the Proposed Action.

3.3.2.3 Ellsworth AFB Alternative (Preferred Alternative)

3.3.2.3.1 Personnel

It has been estimated that the B-21 program would require approximately 3,500 military personnel (Table 2.3-1). ACAM estimates the potential air emissions introduced to the Ellsworth AFB Alternative region by personnel commuter vehicles. Table 3.3-33 shows the potential emissions associated with additional B-21 personnel at Ellsworth AFB, the net change from the No Action Alternative, and the change compared with the ROI baseline annual emissions. Additionally, construction would likely be phased, which would serve to further minimize impacts over the length of the construction timeframe. Facilities operations in the end-state would not be likely to impact Ellsworth AFB's status as a synthetic minor source as restrictions would remain in place. However, should their

permit require updating or revision, Ellsworth AFB would comply with all SDDENR requirements.

Table 3.3-33. Personnel Emissions with the Ellsworth AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Ellsworth AFB Alternative Personnel Emissions	160.71	12.45	0.41	0.36	0.09	14.21	12,606
Ellsworth AFB No Action Alternative Personnel Emissions	115.61	8.96	0.30	0.26	0.06	10.22	9,068
Change from No Action Alternative	45.11	3.50	0.12	0.10	0.03	3.99	3,538
ROI Baseline ¹	43,459	8,523	13,201	3,856	614	33,439	2,264,313
Net Change as Percentage of ROI	0.10%	0.04%	0.00%	0.00%	0.00%	0.01%	0.16%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Ellsworth AFB emissions includes Meade and Pennington Counties in South Dakota. See Table 3.3-4 and Table 3.3-5.

3.3.2.3.2 Airfield Operations

Under the Ellsworth AFB Alternative, B-1 aircraft would be phased out and replaced by B-21 aircraft. Table 3.3-34 shows the potential change (increase or decrease) in criteria pollutant and GHG emissions associated with the Ellsworth AFB Alternative from the baseline. Emissions of all criteria pollutants would decrease from the baseline levels except for nitrogen oxides, which would increase by 131.55 tons per year. This represents only 1.54 percent of the ROI baseline for Meade and Pennington Counties.

Table 3.3-34. Air Operations Emissions with the Ellsworth AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Ellsworth AFB Alternative Aircraft Emissions	144.57	322.87	42.60	31.20	20.07	2.56	60,682
Ellsworth AFB No Action Alternative Aircraft Emissions	220.84	191.32	49.46	35.48	21.11	4.27	63,813
Change from No Action Alternative	-76.27	131.55	-6.86	-4.28	-1.04	-1.72	-3,131
ROI Baseline ¹	43,459	8,523	13,201	3,856	614	33,439	2,264,313
Net Change as Percentage of ROI	-0.18%	1.54%	-0.05%	-0.11%	-0.17%	-0.01%	-0.14%

Source: (EPA, 2020b)

% = percent; - = minus; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Ellsworth AFB emissions includes Meade and Pennington Counties in South Dakota. See Table 3.3-4 and Table 3.3-5.

3.3.2.3.3 Airspace and Range Utilization

Table 3.3-35 shows the change in criteria pollutant and GHG emissions associated with aircraft operations occurring below the 3,000-foot AGL mixing layer within the PRTC compared to the ROI No Action Alternative baseline emissions.

Table 3.3-35. PRTC Air Operations Emissions with the Ellsworth AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Ellsworth AFB Alternative PRTC Emissions	5.25	31.31	2.75	0.85	1.54	0.07	4,649
No Action Alternative PRTC Emissions	9.04	87.55	10.12	6.11	6.23	0.60	18,820
Change from No Action Alternative	-3.80	-56.24	-7.36	-5.26	-4.69	-0.53	-14,171
ROI Baseline ¹	449,392	112,200	277,220	71,323	53,123	300,170	38,744,478
Net Change as Percentage of ROI	0.00%	-0.05%	0.00%	-0.01%	-0.01%	0.00%	-0.04%

Source: (EPA, 2020b)

% = percent; - = minus; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; PRTC = Powder River Training Complex; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for PRTC emissions includes portions of 29 counties among four states. See Table 3.3-6.

Emissions associated with the Ellsworth AFB Alternative represents a net decrease from No Action Alternative levels for all criteria pollutants, which is presumed to continue to meet General Conformity requirements, based on the determinations of the 2014 PRTC EIS (USAF, 2014a); therefore, a General Conformity determination would not be required.

3.3.2.3.4 Facilities and Infrastructure

Under the Ellsworth AFB Alternative, there would be a number of new facilities constructed to support the B-21 mission (Table 2.5-1). ACAM 5.0.16 was used to calculate the emissions associated with construction, demolition, and renovation activities under the Ellsworth AFB Alternative (Table 3.3-36).

Table 3.3-36. Facilities and Infrastructure Emissions with the Ellsworth AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Ellsworth AFB Alternative Construction/Demolition/Renovation	18.08	25.49	806.37	0.91	0.06	41.43	6,266
ROI Baseline ¹	43,459	8,523	13,201	3,856	614.18	33,439	2,264,313
Percentage of ROI	0.04%	0.30%	6.11%	0.02%	0.01%	0.12%	0.28%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Ellsworth AFB emissions includes Meade and Pennington Counties in South Dakota. See Table 3.3-4 and Table 3.3-5.

Emissions associated with facilities construction, demolition, and renovation would be minor and temporary, and there would be no adverse impacts associated with these activities under the Ellsworth AFB Alternative. Additionally, construction would likely be phased, which would serve to further minimize impacts over the length of the construction timeframe.

3.3.2.3.5 Weapons Generation Facility

North WGF Site Subalternative

Construction of the WGF at Ellsworth AFB under the North WGF Site Subalternative would generate criteria pollutants and GHGs from the combustion of fossil fuels in construction equipment and worker commutes. Table 3.3-37 shows emissions from WGF construction at Ellsworth AFB under the North WGF Site Subalternative compared with the ROI baseline. Emissions would be minor and temporary, representing less than one-tenth of 1 percent of the ROI annual emissions baseline for all criteria pollutants. No adverse impacts to regional air quality would be anticipated.

Table 3.3-37. North Weapons Generation Facility Subalternative Construction Emissions with the Ellsworth AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Ellsworth AFB Alternative North WGF Site Construction Emissions	5.05	5.29	12.61	0.19	0.01	1.41	1,416
ROI Baseline ¹	43,459	8,523	13,201	3,856	614	33,439	2,264,313
Percentage of ROI	0.01%	0.05%	0.08%	0.00%	0.00%	0.00%	0.06%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound; WGF = Weapons Generation Facility

Note:

1. The ROI for Ellsworth AFB emissions includes Meade and Pennington Counties in South Dakota. See Table 3.3-4 and Table 3.3-5.

South WGF Site Subalternative (Preferred Subalternative)

Construction of the WGF at Ellsworth AFB under the South WGF Site Subalternative would generate criteria pollutants and GHGs from the combustion of fossil fuels in construction equipment and worker commutes. Table 3.3-38 shows emissions from WGF construction at Ellsworth AFB under the South WGF Site Subalternative compared with the ROI baseline. Emissions would be minor and temporary, representing less than 0.32 percent of the ROI annual emissions baseline for all criteria pollutants. No adverse impacts to regional air quality would be anticipated.

Table 3.3-38. South Weapons Generation Facility Subalternative Construction Emissions with the Ellsworth AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Ellsworth AFB Alternative South WGF Site Construction Emissions	11.62	11.18	42.67	0.46	0.03	2.39	2809.80
ROI Baseline ¹	43,459	8,523	13,201	3,856	614.1815	33,439	2,264,313
Percentage of ROI	0.03%	0.13%	0.32%	0.01%	0.00%	0.01%	0.12%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound; WGF = Weapons Generation Facility

Note:

1. The ROI for Ellsworth AFB emissions includes Meade and Pennington Counties in South Dakota. See Table 3.3-4 and Table 3.3-5.

Summary of Ellsworth AFB Alternative Air Quality Environmental Consequences

Table 3.3-39 shows the estimated annual emissions under the Ellsworth AFB Alternative.

Table 3.3-39. Summary of Ellsworth AFB Alternative Emissions¹

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Ellsworth AFB Alternative Personnel Emissions	160.71	12.45	0.41	0.36	0.09	14.21	12,606
Ellsworth AFB Alternative Aircraft Emissions	144.57	322.87	42.6	31.2	20.07	2.56	60,682
Ellsworth AFB Alternative Facilities Construction and Demolition Emissions	18.08	25.49	806.37	0.91	0.06	41.43	6,266
Ellsworth AFB Alternative WGF Construction Emissions	11.62	11.18	42.67	0.46	0.03	2.39	2,810
Total Ellsworth AFB Alternative Emissions	334.97	372.00	892.06	32.93	20.25	60.58	82,363
Total Ellsworth AFB No Action Alternative Emissions	336.45	200.28	49.76	35.74	21.17	14.49	72,881
Net Change from No Action Alternative	-1.48	171.72	842.30	-2.81	-0.92	46.09	9,483
ROI Baseline ²	43,459	8,523	13,201	3,856	614	33,439	2,264,313
Net Change as Percentage of ROI	0.00%	2.01%	6.38%	-0.07%	-0.15%	0.14%	0.42%

Source: (EPA, 2020b)

% = percent; - = minus; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound; WGF = Weapons Generation Facility

Notes:

1. Construction emissions for the Preferred Subalternative (the South WGF Site) are reflected in the summary Table 3.3-39.

2. The ROI for Ellsworth AFB emissions includes Meade and Pennington Counties in South Dakota. See Table 3.3-4 and Table 3.3-5.

3.3.2.3.6 Snapshot

Personnel

It was estimated that the B-21 program would require approximately 3,500 military personnel (Table 2.3-1). Table 3.3-40 shows the potential emissions associated with

additional B-21 personnel for the Snapshot Scenario at Ellsworth AFB, compared to the ROI baseline annual emissions.

Table 3.3-40. Personnel Emissions for the Snapshot Scenario with the Ellsworth AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO ₂ e
Ellsworth AFB Alternative Personnel Emissions (Snapshot)	171.12	13.26	0.44	0.38	0.10	15.13	13,422
Ellsworth AFB No Action Alternative Personnel Emissions	115.61	8.96	0.30	0.26	0.06	10.22	9,068
Change from No Action Alternative	55.51	4.30	0.14	0.12	0.03	4.91	4,354
ROI Baseline ¹	43,459	8,523	13,201	3,856	614	33,439	2,264,313
Net Change as Percentage of ROI	0.13%	0.05%	0.00%	0.00%	0.00%	0.01%	0.19%

Source: (EPA, 2020b)

% = percent; AFB = Air Force Base; CO = carbon monoxide; CO₂e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Ellsworth AFB emissions includes Meade and Pennington Counties in South Dakota. See Table 3.3-4 and Table 3.3-5.

Airfield Operations

Table 3.3-41 shows the potential change (increase or decrease) in criteria pollutant and GHG emissions associated with the Ellsworth AFB Snapshot Scenario from the baseline. Emissions of carbon monoxide and volatile organic compounds would decrease slightly and all other criteria pollutants would increase from the baseline levels. The greatest increase would be for nitrogen oxides, which would increase by 169.81 tons per year. This represents only 1.99 percent of the ROI baseline for Meade and Pennington Counties.

Table 3.3-41. Air Operations Emissions for the Snapshot Scenario with the Ellsworth AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO ₂ e
Ellsworth AFB Alternative Aircraft Emissions (Snapshot)	188.73	361.13	52.49	38.30	24.30	3.41	73,444
Ellsworth AFB No Action Alternative Aircraft Emissions	220.84	191.32	49.46	35.48	21.11	4.27	63,813
Change from No Action Alternative	-32.10	169.81	3.03	2.82	3.19	-0.86	9,631
ROI Baseline ¹	43,459	8,523	13,201	3,856	614	33,439	2,264,313
Net Change as Percentage of ROI	-0.07%	1.99%	0.02%	0.07%	0.52%	0.00%	0.43%

Source: (EPA, 2020b)

% = percent; - = minus; CO = carbon monoxide; CO₂e = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Ellsworth AFB emissions includes Meade and Pennington Counties in South Dakota. See Table 3.3-4 and Table 3.3-5.

Airspace and Range Utilization

Table 3.3-42 shows the change in criteria pollutant and GHG emissions associated with aircraft operations occurring below the 3,000-foot AGL mixing layer within the PRTC airspace under the Snapshot Scenario compared with the ROI No Action Alternative

baseline emissions. Since the B-21 would not fly below the mixing layer, emissions would decrease as B-1 operations are decreased.

Table 3.3-42. PRTC Air Operations Emissions for the Snapshot Scenario with the Ellsworth AFB Alternative

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Ellsworth AFB Alternative PRTC Emissions (Snapshot)	6.01	42.56	4.23	1.91	2.48	0.17	7,483
No Action Alternative PRTC Emissions	9.04	87.55	10.12	6.11	6.23	0.60	18,820
Change from No Action Alternative	-3.04	-44.99	-5.89	-4.21	-3.75	-0.42	-11,337
ROI Baseline ¹	449,392	112,200	277,220	71,323	53,123	300,170	38,744,478
Net Change as Percentage of ROI	0.00%	-0.04%	0.00%	-0.01%	-0.01%	0.00%	-0.03%

Source: (EPA, 2020b)

% = percent; - = minus; AFB = Air Force Base; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; PRTC = Powder River Training Complex; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for PRTC emissions includes portions of 29 counties across four states. See Table 3.3-6.

Summary of Ellsworth AFB Snapshot Scenario

Table 3.3-43 shows the estimated annual emissions under the Ellsworth AFB Snapshot Scenario.

Table 3.3-43. Summary of Ellsworth AFB Snapshot Scenario Emissions

Source	Pollutants (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO _{2e}
Ellsworth AFB Alternative Personnel Emissions (Snapshot)	171.12	13.26	0.44	0.38	0.1	15.13	13,422
Ellsworth AFB Alternative Aircraft Emissions (Snapshot)	188.73	361.13	52.49	38.3	24.3	3.41	73,444
Ellsworth AFB Alternative Facilities Construction and Demolition Emissions	18.08	25.49	806.37	0.91	0.06	41.43	6,266
Ellsworth AFB Alternative WGF Construction Emissions	11.62	11.18	42.67	0.46	0.03	2.39	2,810
Total Ellsworth AFB Alternative Emissions (Snapshot)	389.55	411.07	901.98	40.05	24.48	62.36	95,943
Total Ellsworth AFB No Action Alternative Emissions	336.45	200.28	49.76	35.74	21.17	14.49	72,881
Net Change from No Action Alternative	53.10	210.79	852.22	4.31	3.30	47.87	23,062
ROI Baseline ¹	43,459	8,523	13,201	3,856	614	33,439	2,264,313
Net Change as Percentage of ROI	0.12%	2.47%	6.46%	0.11%	0.54%	0.14%	1.02%

Source: (EPA, 2020b)

% = percent; - = minus; CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxides; PM₁₀ or PM_{2.5} = particulate matter with a diameter less than or equal to 10 or 2.5 microns, respectively; ROI = region of influence; SO_x = sulfur oxides; VOC = volatile organic compound

Note:

1. The ROI for Ellsworth AFB emissions includes Meade and Pennington Counties in South Dakota. See Table 3.3-4 and Table 3.3-5.

3.3.2.3.7 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

Construction activities would employ standard management measures for construction such as watering of graded areas, covering of soil stockpiles, and contour grading (if necessary), to minimize temporary generation of dust and particulate matter. This would serve to minimize air emissions associated with the elements of the Proposed Action.

3.4 LAND USE

3.4.1 Land Use, Affected Environment

3.4.1.1 Description of Resource

Land use refers to the management and use of land by people. Attributes of land use include general land use patterns, land ownership, land management plans, and special use areas. Typical land uses include residential, commercial, industrial, agricultural, transportation, communication/utilities, military, public/institutional, and recreational. Land use also includes areas set aside for preservation or protection of natural resources or unique features. Management plans, policies, ordinances, zoning, and regulations determine the types of uses that are allowable or that protect specially designated or environmentally sensitive uses. Typically, the primary objectives of land use planning are to ensure managed growth and compatible uses relative to adjacent properties.

Land use adjacent to military installations that support aircraft operations is typically considered in terms of noise and accident potential. Aircraft noise zones, APZs, and height restrictions for nearby structures are usually identified in AICUZ studies prepared for such installations. The studies provide information on off-base land uses and identify uses that are compatible, incompatible, or conditionally compatible (may require noise attenuation measures) with noise and accident zones. Use zones included in this document consist of the CZ, APZ I, APZ II, and four noise zones.

The CZ, APZ I, and APZ II are zones classified by the military that are located immediately off the end of runways. These zones delineate areas with the highest potential for accidents based on historical accident data. The CZ, which is nearest the runway, presents a risk that is generally high enough for the DoD to acquire or control the land through purchase or easement. Although aircraft accident potential in APZs I and II does not warrant acquisition, land use planning and controls are strongly encouraged for protection of the public.

AICUZ noise zones are typically defined as 65 to 69 dB DNL, 70 to 74 dB DNL, 75 to 79 dB DNL, and greater than 80 dB DNL. Noise levels may also be stated in dBA, which emphasizes the frequencies of best human hearing. Typically, there are no land use restrictions or planning recommendations in areas with noise levels below 65 dB DNL, but residential use is not recommended where noise levels are above 75 dB DNL. There is no general consensus on residential compatibility in areas with noise levels of 65 to 74 dB DNL, but residential use is often not recommended (Dyess AFB, 2015). In the

remainder of the Land Use section, unless stated otherwise, the term “accident zone” refers to the area encompassed by the CZ, APZ I, and APZ II, while the term “noise zone” refers to the area encompassed by noise levels of 65 dB DNL or greater.

Height restrictions for objects near military airfields prevent structures from creating a safety hazard (Dyess AFB, 2015; Ellsworth AFB, 2008). Aircraft approach and depart airfields along a diagonal line that increases in altitude with distance from the runway. Therefore, taller structures are generally permitted at increasing distance from an airfield. USAF obstruction criteria are contained in Unified Facilities Criteria 3-260-01 and are based in part on criteria provided in Federal Aviation Regulation Part 77, *Objects Affecting Navigable Airspace*. The criteria incorporate numerous planes and surfaces at various distances and altitudes from runways or other applicable areas such as drop zones and landing zones. Height criteria are used to develop imaginary surfaces, which define the three-dimensional airspace that is free of obstacles at and around airfields. Federal Aviation Regulation Part 77 provides guidance on submittal of FAA Form 7460-1, *Notice of Proposed Construction or Alteration*, which is used to notify FAA of construction or alteration of structures near imaginary surfaces. Although FAA establishes height criteria, it does not have the authority to prevent incompatible construction. Therefore, it is important that state and local governments enforce height restrictions around military airfields. Imaginary surfaces are depicted in AICUZ studies prepared for each installation.

3.4.1.2 Region of Influence

The ROI for land use includes all existing areas within the alternative MOB 1 locations (Dyess AFB and Ellsworth AFB), as well as adjacent off-base land areas that would potentially be affected by noise and safety risks associated with B-21 operations. The ROI also includes all land areas under the airspace of the PRTC and the Brownwood, Lancer, and Pecos MOAs.

3.4.1.2.1 Dyess AFB

On-Base Land Use

Existing land use on Dyess AFB is described in the Installation Development Plan (IDP) (Dyess AFB, 2018b) and is shown on Figure 3.4-1. The area west of the flightline consists of airfield pavements, clearance areas, and open space. All routinely inhabited facilities occur east of the airfield. Existing land use follows a tiered pattern extending east from the aircraft parking apron. First tier land uses are directly related to aircraft operations and maintenance. Second tier facilities, which are mostly located between 2nd Street and 3rd Street, consist primarily of industrial and logistics functions. The third tier is a mix of land uses that include unaccompanied housing, temporary lodging, outdoor recreation, community service, administrative, and community commercial. Much of this tier forms “downtown” Dyess AFB. An area of mostly open space occurs at the south end of the installation. This area includes ERP sites, security forces and expeditionary training areas, and ecological restoration areas.

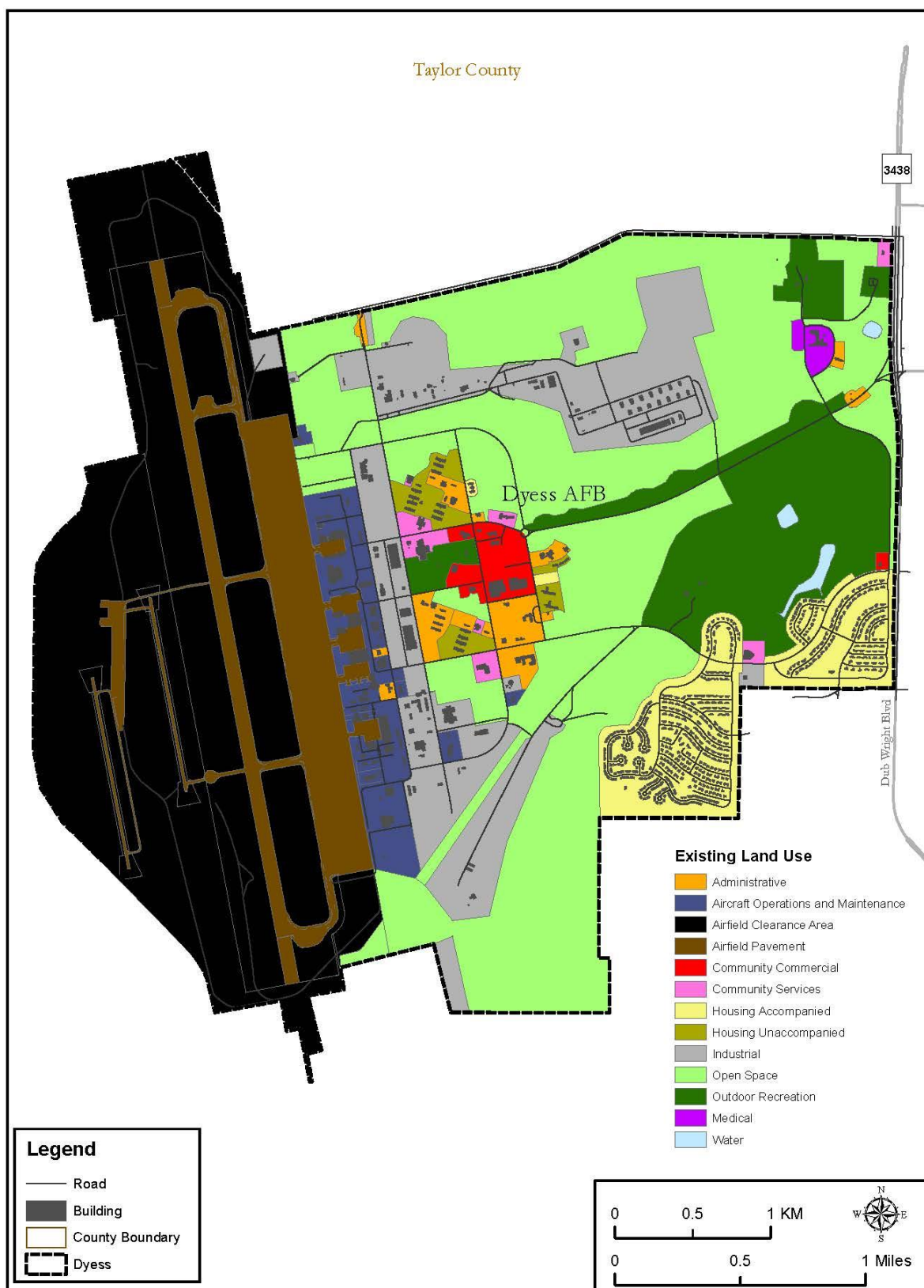


Figure 3.4-1. Land Use on Dyess AFB

Some open space areas potentially affected by construction associated with the Proposed Action are designated as “prime farmland soils” under the Farmland Protection Policy Act (FPPA). The purpose of the FPPA is to minimize the extent to which federal actions contribute to unnecessary and irreversible conversion of farmland to nonagricultural uses. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food and other plant-based products. Acquisition or use of farmland by a federal agency for national defense purposes is exempt from the FPPA.

With the exception of clearance areas (e.g., safety arcs, APZs, and noise zones) and floodplains, development constraints are relatively minor on the base (Dyess AFB, 2018b). The installation is divided into nine districts, based in part on land use patterns, for development planning purposes. Because previous land use decisions were made with the goal of maximizing aircraft mission effectiveness, future land use designations are expected to require only minor changes to accommodate potential growth. To minimize on-base sprawl and increase compact infill development, a growth boundary that incorporates the main cantonment area and flightline has been established. To the extent feasible, most new development is limited to areas within the boundary.

Off-Base Land Use

Dyess AFB is located in Taylor County, Texas, within the city limits of Abilene. The city of Tye is adjacent to the installation to the north. The community of Caps is located approximately 1.5 miles south. Off-base land use categories that potentially occur in these areas were defined in the 2015 Dyess AFB AICUZ Study (Dyess AFB, 2015) and include residential, commercial, industrial, public/quasi-public, recreational, and open space/low density. Definitions of these categories are provided in Appendix D (Land Use) of this EIS.

In the context of the AICUZ study definitions, land use in most areas adjacent to the base consists primarily of open space/low density, with a small amount of residential, commercial, and industrial. A mix of residential, commercial, industrial, and other uses occur in developed portions of Abilene, Tye, and Caps. A detailed description of off-base land use is provided in the 2015 AICUZ study’s Section 4.1 through Section 4.4 and is summarized in Appendix D (Land Use) of this EIS. Current off-base land use is shown on Figure 3.4-2. Note that land use categories have been updated since publication of the 2015 AICUZ study. Definitions of the revised categories are provided in Appendix D (Land Use). In the context of current definitions, most adjacent land use outside of developed portions of Abilene consists of shrub/scrub, herbaceous, cultivated crops, and forest.

Off-base land use adjacent to Dyess AFB may potentially be affected by noise and safety issues associated with aircraft operations. Noise contours, CZs, and APZs extend in an approximately north-south axis along the primary runway centerline. The off-base area exposed to various noise levels (outside of CZs and APZs) and accident zones for each land use type, based on geographic information system (GIS) data available at the time, is provided in the 2015 AICUZ study’s Section 4.3.

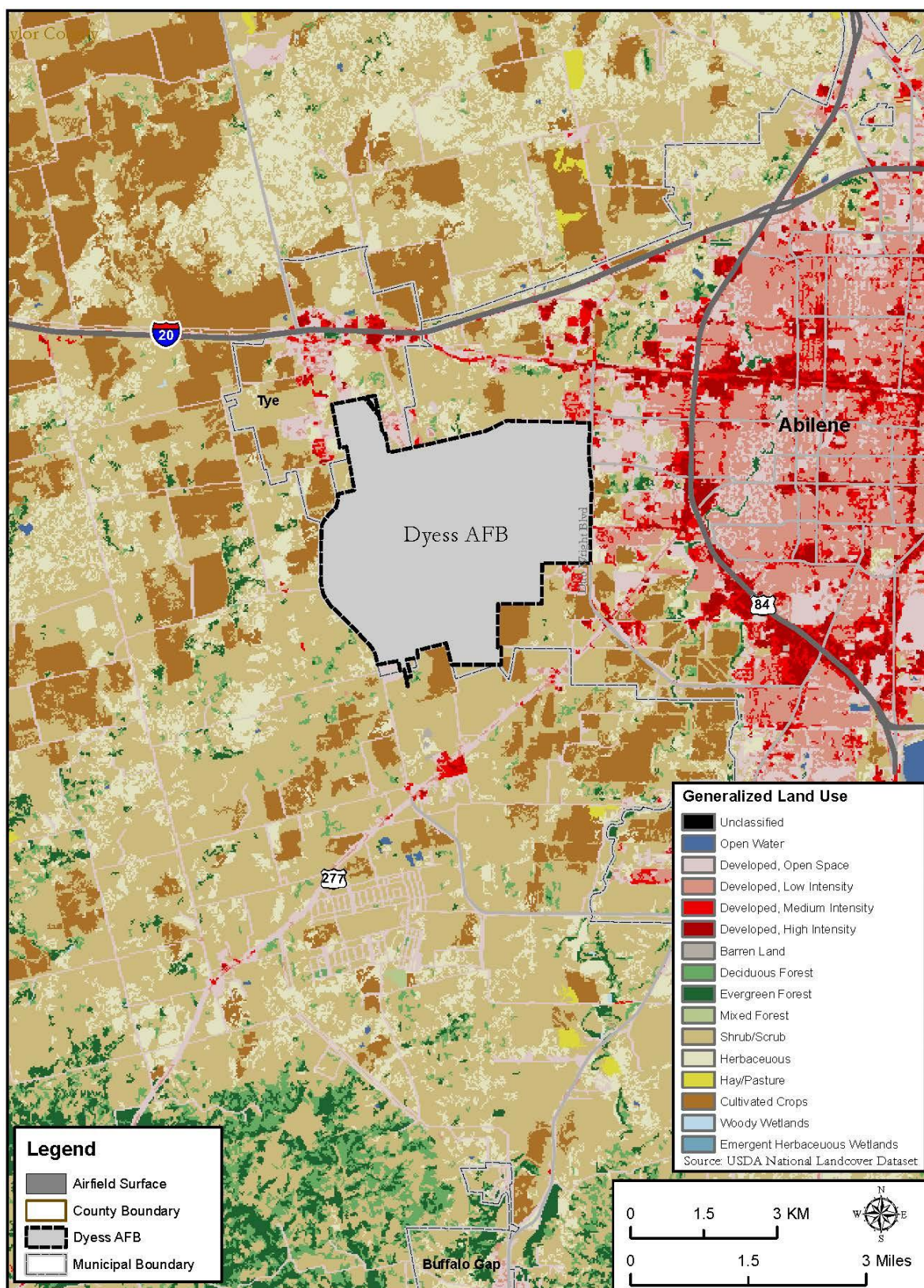


Figure 3.4-2. Land Use Adjacent to Dyess AFB

A total of 9,009 acres were associated with various noise zones, and a total of 1,688 acres were associated with the accident zones (Dyess AFB, 2015, pp. 4-6). Approximately 96 percent of the noise zone area and 87 percent of the accident zone area was identified as open space/low density use, with the remainder of each area consisting of a mix of residential, commercial, industrial, and public/quasi-public use. Detailed descriptions of the areas located within the noise zones and APZs are provided in the 2015 AICUZ study's Section 4.5, Section 4.2.3 of the Installation Complex Encroachment Management Action Plan (ICEMAP) (Dyess AFB, 2014, pp. 4-9 & 4-12), and summarized in Appendix D (Land Use) of this EIS.

Of the total land area encompassed by noise and APZs, a relatively small portion (163 acres) was considered incompatible based on guidelines presented in the 2015 AICUZ study (Dyess AFB, 2015, pp. 4-12). Table 3.4-1 presents these off-base incompatible land use areas. Note that the 30 acres of noise zone/accident zone overlap are not included in the total, to prevent double counting of that area.

Table 3.4-1. Off-Base Incompatible Land Use Area Identified in the 2015 Dyess AICUZ Study

Land Use Category	Incompatible Area (acres)		
	Noise (65 dB DNL or greater)	CZ/APZ	Overlap of Noise/CZ/APZ
Residential	108	39	28
Commercial	1	0	0
Industrial	0	0	0
Public/Quasi-Public	10	2	2
Open Space/Low-Density	33	0	0
Recreational	0	0	0
Total	152	41	30

Source: (Dyess AFB, 2015)

APZ = accident potential zone; CZ = clear zone; dB = decibel; DNL = day-night average sound level

3.4.1.2.2 Ellsworth AFB

On-Base Land Use

Existing land use on Ellsworth AFB is described in the IDP (Ellsworth AFB, 2017) and is shown on Figure 3.4-3. The base's strategy of grouping compatible land uses and separating conflicting uses has resulted in an efficient consolidation of industrial and maintenance areas that avoid incompatibility with other uses. Land use on the installation is largely concentrated in the center portion, east of the runway. Land use adjacent to the airfield and parking apron includes mostly aircraft operations/maintenance and industrial. To the east of this area, in the developed cantonment area, land use is a mix of administrative, community commercial, community service, and unaccompanied housing. Accompanied housing is located farthest from the airfield. The northern section of the base is largely open space that supports munitions storage and weapons training. Land to the west of the runway is also mostly undeveloped but could support future operational/industrial uses. Areas of open space that are adjacent to and within developed areas provide opportunities for infill development.

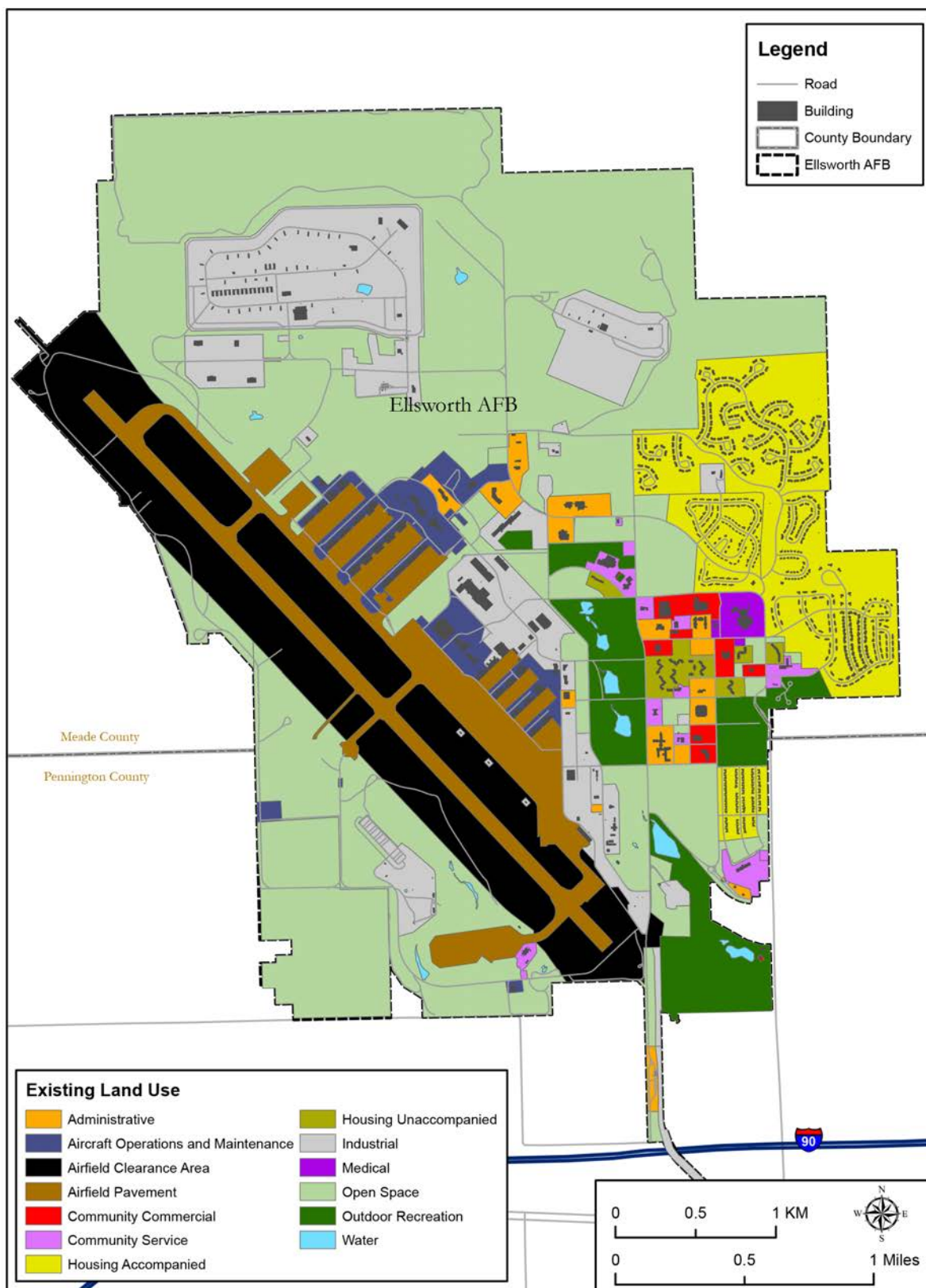


Figure 3.4-3. Land Use on Ellsworth AFB

Some open space areas potentially affected by construction associated with the Proposed Action are designated as “soils of statewide importance” under the FPPA. This designation refers to land that is important to the state in the production of food and other plant-based products. Acquisition or use of farmland by a federal agency for national defense purposes is exempt from the FPPA.

Development constraints are considered minor on Ellsworth AFB (Ellsworth AFB, 2017). The base is divided into four districts, based in part on land use patterns, for development planning purposes. The base’s future land use plan provides guidance on installation development, including consideration of land use compatibility. A major emphasis of the installation’s long-range development plan is to continue to consolidate land uses and co-locate similar functions.

Off-Base Land Use

Ellsworth AFB is located in Meade and Pennington Counties in southwestern South Dakota. The installation is adjacent to the city of Box Elder and is about 7 miles northeast of Rapid City. Off-base land use categories that potentially occur in these areas were defined in the 2008 Ellsworth AFB AICUZ study (Ellsworth AFB, 2008) and include residential, commercial, industrial, public/quasi-public, recreational, open space/low density, and transportation. Definitions of these categories are provided in Appendix D (Land Use) of this EIS.

In the context of the AICUZ study definitions, land use adjacent to the base consists primarily of open space/low density, with a small amount of residential, commercial, and industrial. A mix of residential, commercial, industrial, and other uses occur in developed portions of Box Elder and Rapid City. A detailed description of off-base land use is provided in the 2008 AICUZ Study’s Section 4.1 through Section 4.5 and is summarized in Appendix D (Land Use) of this EIS. Current off-base land use is shown on Figure 3.4-4). Note that land use categories have been updated since publication of the 2008 AICUZ study. Definitions of the revised categories are provided in Appendix D (Land Use). In the context of current definitions, most adjacent land use consists of herbaceous, shrub/scrub, cultivated crops, wetlands, and developed areas associated with Box Elder and Rapid City.

Off-base land use adjacent to Ellsworth AFB may potentially be affected by noise and safety issues associated with aircraft operations. Noise contours, CZs, and APZs extend approximately northwest and southeast along the runway centerline.

The off-base area exposed to various noise levels and accident zones for each land use type, based on GIS data available at the time, is provided in the 2008 AICUZ study. A total of 16,921 acres were associated with various noise zones (Ellsworth AFB, 2008, pp. 4-4), and a total of 1,759 acres were associated with accident zones (Ellsworth AFB, 2008, pp. 4-15). Approximately 86 percent of the noise zone area was identified as open space/low density use, while 9 percent was identified as residential. The remainder consisted of a mix of commercial, industrial, and public/semi-public, recreational, and transportation use.

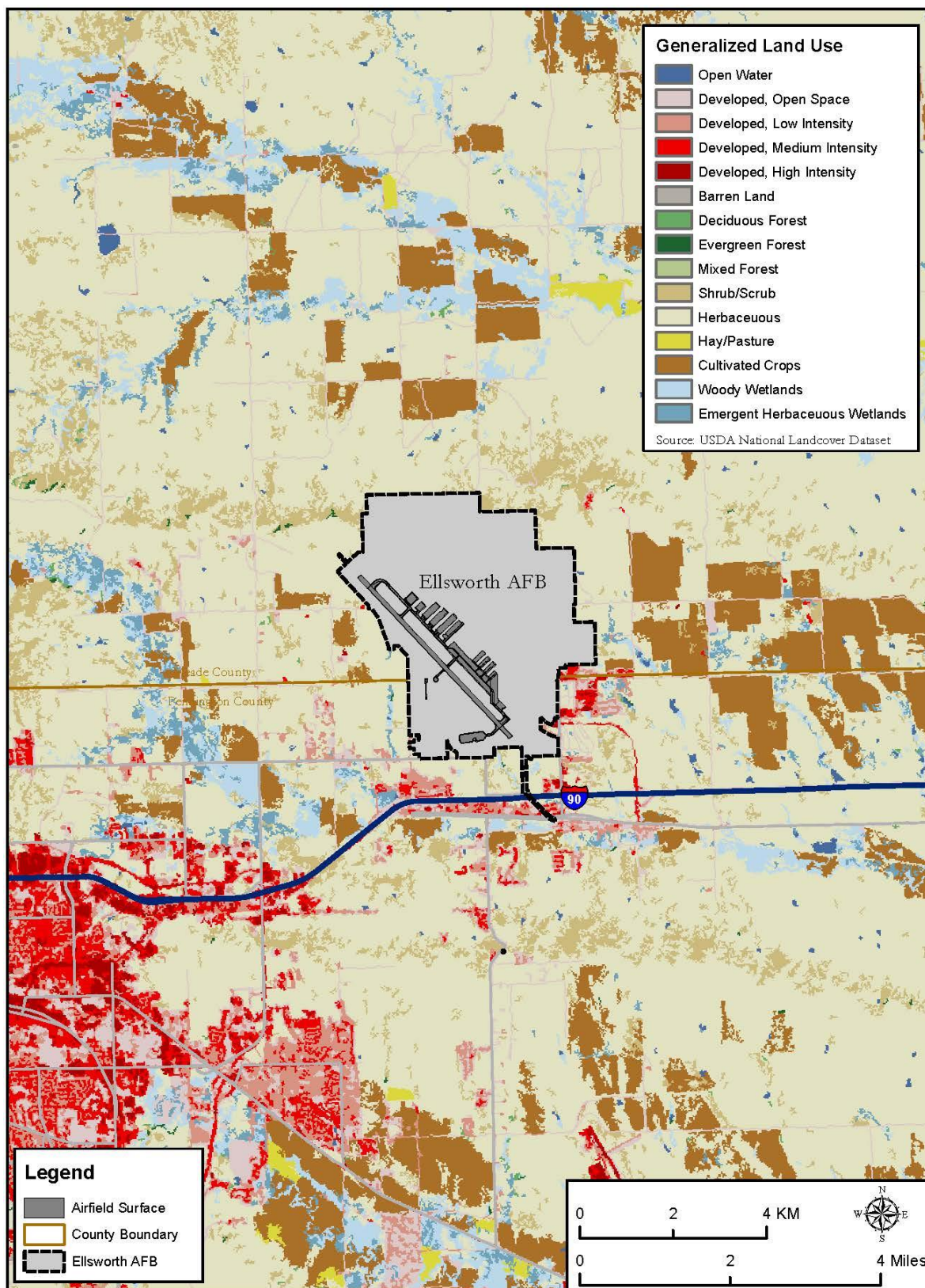


Figure 3.4-4. Land Use Adjacent to Ellsworth AFB

Specific land use categories were not provided for the accident zones. Detailed descriptions of the areas located within noise zones and accident zones are provided in the 2008 AICUZ Study's Section 4.6 and summarized in Appendix D (Land Use) of this EIS.

Of the total land area encompassed by noise and APZs, a small portion (191 acres) was considered incompatible based on guidelines presented in the AICUZ study (Ellsworth AFB, 2008, pp. 4-13 & 4-15) (see Table 3.4-2 in this EIS). The 2008 AICUZ study provides the total number of acres considered incompatible due to noise zones and accident zones, but does not provide the specific land use categories associated with these zones. The State of South Dakota has taken steps to address the incompatible use within APZ I.

Table 3.4-2. Off-Base Incompatible Land Use Area Identified in the 2008 Ellsworth AICUZ Study

Incompatibility Factor	Land Use Area Affected (acres)
65–69 dBA Noise Zone	0
70–74 dBA Noise Zone	0
75–79 dBA Noise Zone	135
80+ dBA Noise Zone	17
Clear Zone	0
Accident Potential Zone I	39*
Accident Potential Zone II	0

Source: (Ellsworth AFB, 2008)

+ = plus; dBA = A-weighted decibel

Note: *Plans exist to remove the incompatible use in Accident Potential Zone I.

3.4.1.2.3 Airspace and Military Operating Areas

Land use under the PRTC airspace is shown on Figure 3.4-5. Land use categories and areas are presented in Table 3.4-3. The PRTC airspace overlies at least a portion of 29 counties in four states.

About 80 percent of land under the airspace is privately held, with the remainder managed by federal entities (primarily the Bureau of Land Management and U.S. Fish and Wildlife Service [USFWS]) or consisting of Native American reservation (USAF, 2014a). Land use controls (LUCs) (e.g., zoning) are generally only used within incorporated cities. Land uses on Native American reservations are determined by tribal decisions.

As shown in Table 3.4-3, most land use consists of herbaceous, shrub/scrub, cultivated crops, and evergreen forest, and is primarily associated with rangeland and agriculture. Overall, cattle ranching, dispersed recreation and hunting, and other resource-productive uses are the predominant land uses. Numerous special use areas occur under the PRTC airspace, including all or portions of various national parks, national forests, state parks, and national monuments.

Land use under the airspace of the Lancer MOA is shown on Figure 3.4-6. Most land use consists of shrub/scrub, herbaceous, and cultivated crops. Overall, the land area under the Lancer MOA airspace is characterized by large, sparsely inhabited areas with scattered, isolated towns, small communities, and homesteads (USAF, 2000). About 86 percent of the land is privately held rangeland used for grazing livestock, with the

remainder overseen by a variety of state and federal entities. Land use categories and areas are presented in Table 3.4-3.

Table 3.4-3. Land Use Area Under the Powder River Training Complex and Military Operating Areas

Land Use Category	Area Under the PRTC (square miles)	Area Under the Lancer MOA (square miles)	Area Under the Brownwood MOA (square miles)	Area Under the Pecos MOA (square miles)
Open Water	128	12	43	3
Developed, Open Space	323	139	240	14
Developed, Low Intensity	52	13	13	2
Developed, Medium Intensity	8	2	6	0.5
Developed, High Intensity	1	0.7	3	0.05
Barren Land	74	31	1	4
Deciduous Forest	66	6	115	0
Evergreen Forest	2,527	12	207	0.2
Mixed Forest	6	5	0.3	0
Shrub/Scrub	6,948	1,726	2,275	1,459
Herbaceous	19,271	1,387	883	2,674
Hay/Pasture	1,192	1	110	0.03
Cultivated Crops	3,236	931	309	18
Woody Wetlands	345	2	14	2
Emergent Herbaceous Wetlands	124	7	6	4
Total	34,302	4,274	4,225	4,180

Land use under the airspace of the Brownwood MOA is shown on Figure 3.4-6. Land use categories and areas are presented in Table 3.4-3. Most land consists of shrub/scrub and herbaceous, which is generally used for rangeland and agriculture. Due to the close proximity, overall land use conditions are probably similar to that of the Lancer MOA, where land under the airspace is characterized by large, sparsely inhabited areas with scattered, isolated towns, small communities, and homesteads. Compared to the Lancer MOA, there are larger forested and developed (open space) land areas.

Land use under the airspace of the Pecos MOA is shown on Figure 3.4-6. Land use categories and areas are presented in Table 3.4-3. Nearly all land consists of herbaceous and shrub/scrub, which is generally used for rangeland and agriculture. About 78 percent of land under the airspace is privately held, with the remainder overseen by a variety of state, Native American, military, and other federal entities (USAF, 2006).

3.4.1.3 Analysis Methodology

Potential on-base impacts at Dyess AFB and Ellsworth AFB were determined based on whether the Proposed Action would result in changes to land use compatibility due to facility and infrastructure placement or on-base noise levels. Potential impacts to off-base areas adjacent to Dyess AFB and Ellsworth AFB were determined based on whether changes in noise exposure or accident potential would affect land use compatibility.



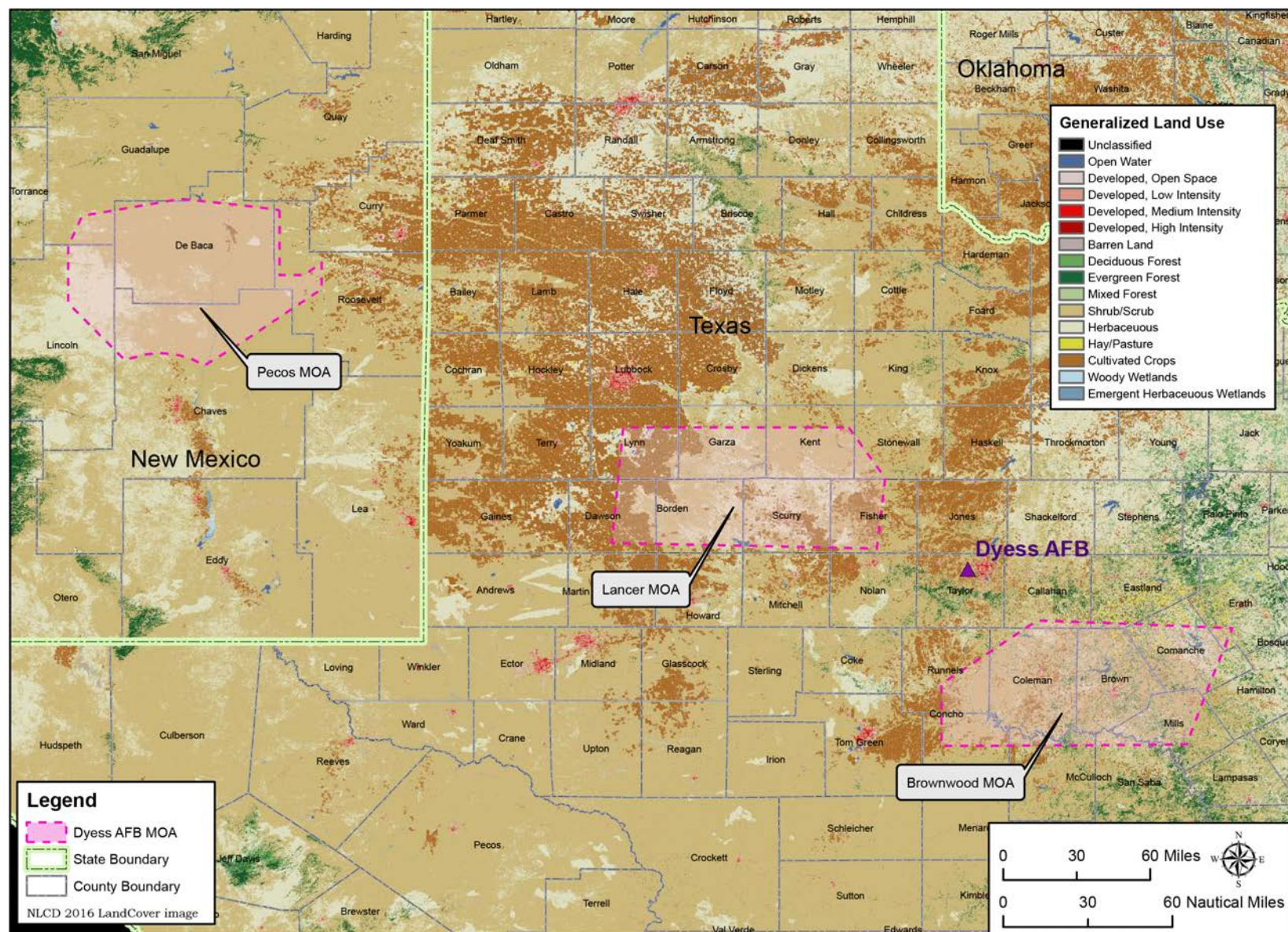


Figure 3.4-6. Land Use Associated with the Lancer, Brownwood, and Pecos MOAs

As discussed in Section 3.4.1.2 (Land Use, Region of Influence), AICUZ studies prepared for Dyess AFB and Ellsworth AFB describe the off-base land use area affected by noise zones. However, for this EIS, noise modeling was conducted for current operations and the results are considered to represent baseline conditions under the No Action Alternative. Noise modeling was also conducted for the Proposed Action (i.e., the Dyess AFB Alternative and the Ellsworth AFB Alternative). Refer to Section 3.2 (Noise) for a detailed description of the modeling method.

For analysis under the No Action Alternative, acreage associated with baseline noise contours and accident zones is compared to acreages presented in the respective AICUZ studies to determine the extent to which current operations affect on-base and off-base land use relative to analyses conducted in 2015 (Dyess AFB) and 2008 (Ellsworth AFB). Land use analysis for the Proposed Action compares potential changes to noise exposure, APZs, and land use compatibility to baseline conditions presented under the No Action Alternative.

There would be no development or associated potential changes to land use compatibility at the PRTC or the Lancer, Brownwood, or Pecos MOAs; therefore, impacts were evaluated based on projected changes in noise levels under these airspace areas.

3.4.2 Land Use, Environmental Consequences

3.4.2.1 No Action Alternative Consequences

Under the No Action Alternative, the B-21 would not be beddown at either Dyess AFB or Ellsworth AFB, and there would be no associated personnel changes; construction, demolition, or renovation activities; or changes to existing noise and APZs resulting from B-21 aircraft operations. On-base land use would continue to adhere to existing plans and guidelines. Future development that is not associated with the B-21 beddown would continue to be evaluated and implemented as appropriate. The IDPs prepared for each base provide information on potential future development and construction projects. It is anticipated that future development would occur in accordance with guidance in each base's IDP, Joint Land Use Study (JLUS), AICUZ study, ICEMAP, and future land use plan, as applicable, and adverse impacts would, therefore, not be expected. Note that any future development projects would be subject to project-specific environmental review under the EIAP. Potential impacts related to noise levels and APZs are discussed in the following subsections.

3.4.2.1.1 No Action Alternative at Dyess AFB

On-base land use and noise contours under the No Action Alternative are shown on Figure 3.4-7. The on-base land use area encompassed by each noise zone is shown in Table 3.4-4.

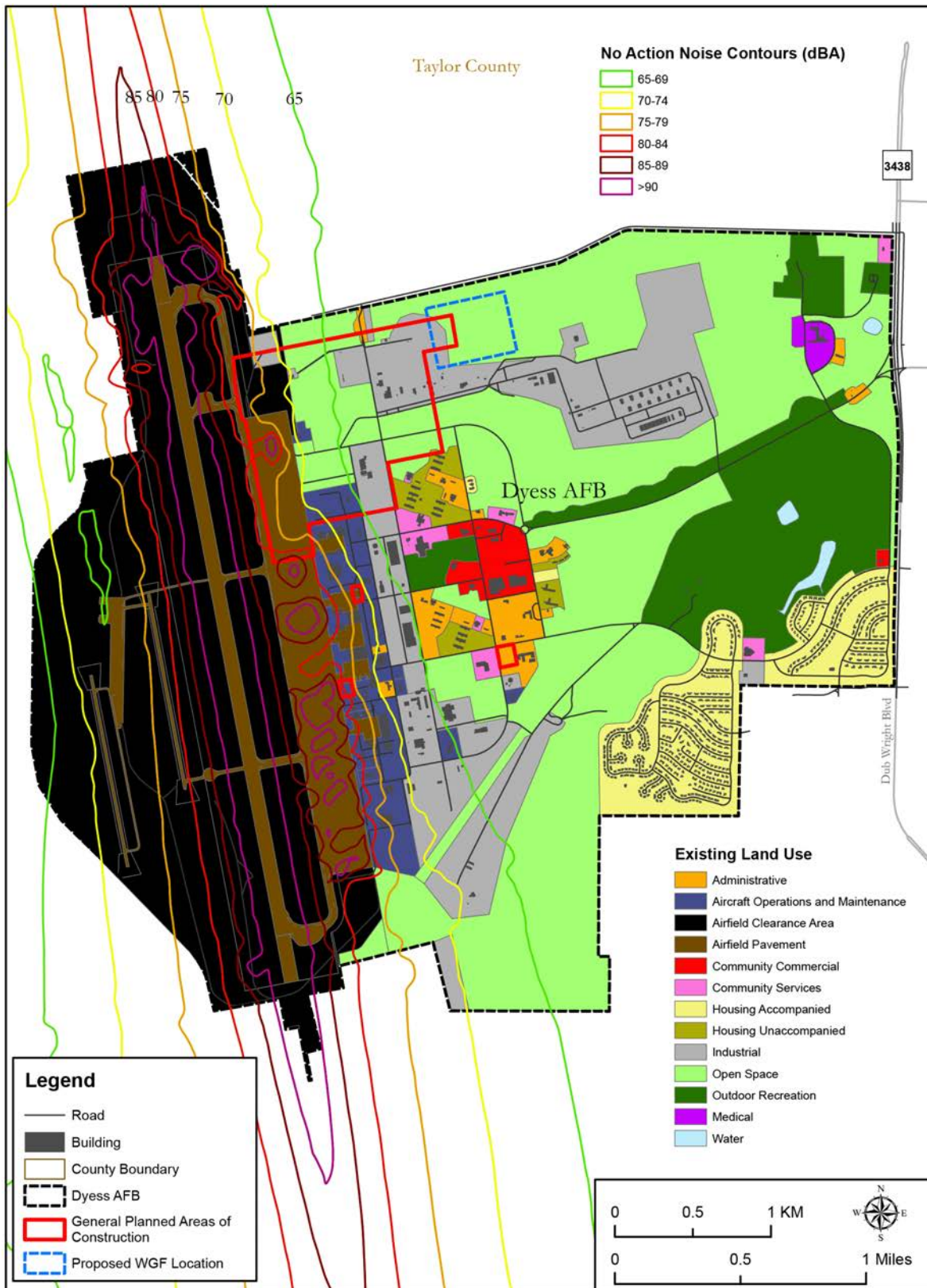


Figure 3.4-7. On-Base Land Use and Noise Contours on Dyess AFB, No Action Alternative

Table 3.4-4. On-Base Area Exposed to Noise Zones on Dyess AFB, No Action Alternative

On-Base Land Use Category	On-Base Acres within Noise Zones (dB DNL)						Total
	65–69	70–74	75–79	80–84	85–89	>90	
Administrative	3	0.6	0	0	0	0	4
Airfield Operations/Maintenance	57	75	40	16	0.4	0	188
Airfield Pavement	2	68	72	79	87	147	455
Airfield Clearance Area	108	286	250	272	268	256	1,440
Industrial	151	41	1	0	0	0	192
Open Space	164	40	17	2	0	0	223
Total	485	510	380	369	355	403	2,502

> = greater than; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

The on-base 65 dB DNL noise contour is mostly limited to industrial, aircraft operations and maintenance, open space, and airfield use categories on the eastern portion of the base, which are compatible uses. The 75 dB DNL noise contour is almost entirely limited to the airfield and aircraft operations and maintenance functions along the flightline. The 80 dB DNL contour is mostly confined to the runway, ramps, and taxi areas, but also extends to some aircraft operations and maintenance functions as well. Air Force Handbook 32-7084, *AICUZ Program Manager's Guide*, considers these land use activities compatible with implementation of noise attenuation measures. Noise attenuation is incorporated into building design in the flightline area. Sensitive noise receptors are outside the 65 dB DNL noise contour. There would be no significant impacts due to on-base noise levels under the No Action Alternative.

Off-base land use and noise contours under the No Action Alternative are shown on Figure 3.4-8. The off-base area encompassed by each noise zone is shown in Table 3.4-5. Approximately 96 percent of the land use associated with noise contours is undeveloped (e.g., shrub/scrub and herbaceous) or developed (open space). Exceptions include low and medium intensity developed areas in Tye and Caps that likely contain residential, commercial, and industrial functions.

Table 3.4-5. Off-Base Land Use Area Exposed to Noise Zones near Dyess AFB, No Action Alternative

Off-Base Land Use Category	Off-Base Acres within Noise Zones (dB DNL)						Total
	65–69	70–74	75–79	80–84	85–89	>90	
Open Water	9	10	7	0	0	0	26
Developed, Open Space	587	419	237	84	15	8	1,350
Developed, Low Intensity	83	75	30	11	1	0	200
Developed, Medium Intensity	72	64	53	9	0	0	198
Developed, High Intensity	34	23	6	4	0	0	67
Barren Land	0	0	0	11	2	0	13
Deciduous Forest	241	68	16	3	3	1	332
Evergreen Forest	107	28	10	1	1	0	147
Mixed Forest	29	0	0	0	0	0	29
Shrub/Scrub	3,656	1,883	801	266	112	33	6,751
Herbaceous	826	498	119	72	20	0	1,535
Cultivated Crops	407	273	152	15	1	0	848
Woody Wetlands	1	0	0	0	0	0	1
Total	6,052	3,341	1,431	476	155	42	11,497

> = greater than; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

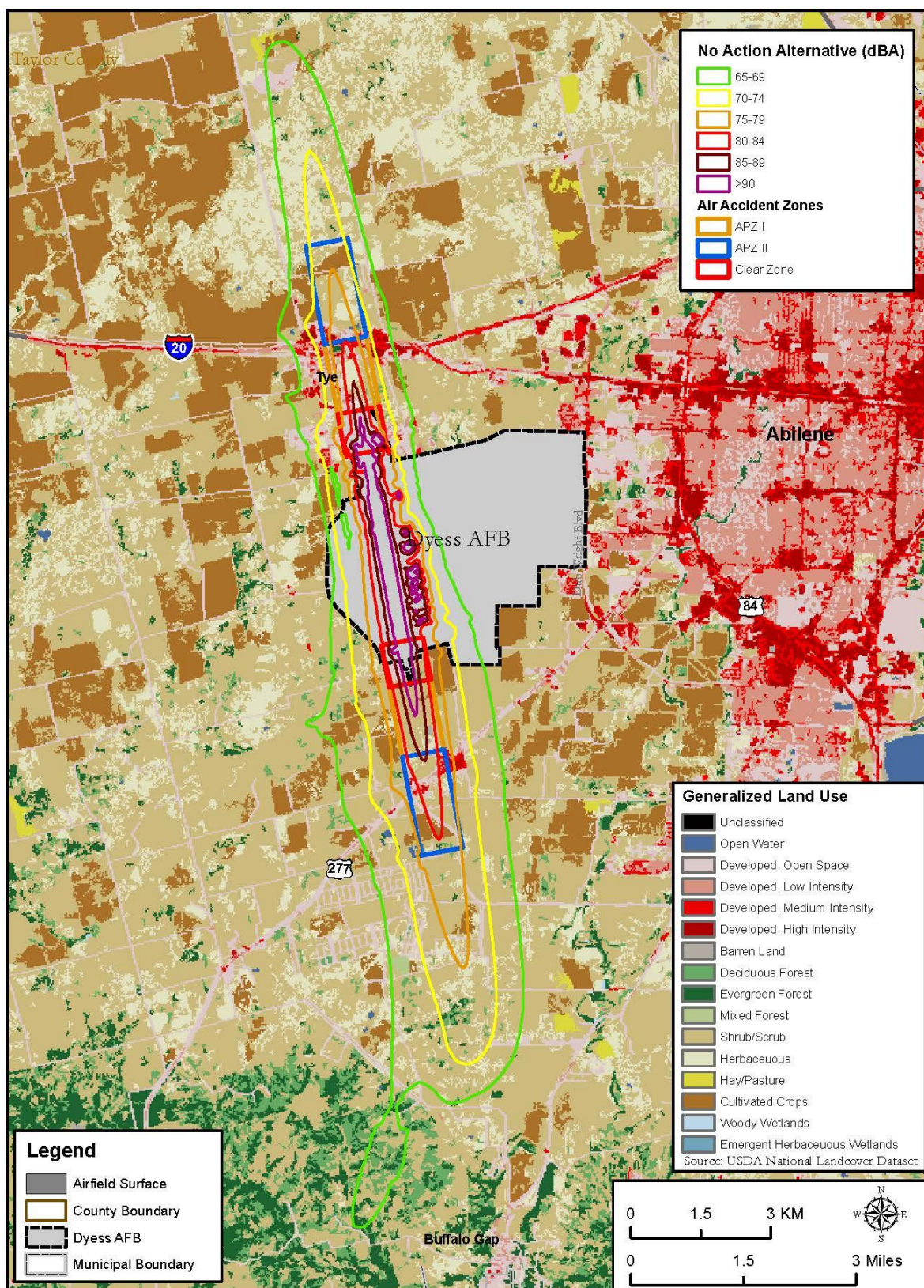


Figure 3.4-8. Off-Base Land Use, Noise Contours, and Accident Potential Zones Adjacent to Dyess AFB, No Action Alternative

The total off-base area shown in Table 3.4-5 is 2,488 acres more than the total area presented in the 2015 AICUZ study. However, the areas may not be directly comparable due to differences in land use classifications and source GIS data. Off-base land use acreage in the 2015 AICUZ study was determined based on a combination of three GIS datasets produced between 2001 and 2013, while the acreage presented in this EIS is based on the U.S. Department of Agriculture (USDA) National Landcover Dataset produced in 2016. The percentage of land use categorized as open space/low density in the 2015 AICUZ study (96 percent) is the same as the percentage categorized as undeveloped or developed/open space under the No Action Alternative. These categories describe similar land use, and the similarity of percent coverage suggests there has been no substantial change in use since the 2015 AICUZ study was prepared. There would be no significant impacts due to off-base noise levels under the No Action Alternative.

The off-base land use associated with APZs is shown on Figure 3.4-8, and the off-base area encompassed by each APZ is shown in Table 3.4-6. Most land use associated with APZs is undeveloped (e.g., shrub/scrub and herbaceous) and developed (open space). The total off-base area shown in Table 3.4-6 is 77 acres more than the total area presented in the 2015 AICUZ study. All the additional acreage is associated with the APZ I and APZ II zones. As discussed above, it is uncertain whether the areas are directly comparable due to the different classifications and GIS data used. However, compared to acreages presented in the 2015 AICUZ, there is less area associated with developed land use (e.g., residential, commercial, industrial) under the No Action Alternative.

Table 3.4-6. Off-Base Land Use Area Exposed to the Clear Zone and Accident Potential Zones at Dyess AFB, No Action Alternative

Off-Base Land Use Category	Off-Base Acres within Clear Zone and Accident Potential Zones			
	Clear Zone	Accident Potential Zone I	Accident Potential Zone II	Total
Barren Land	0	11	3	14
Cultivated Crops	1	8	132	141
Deciduous Forest	5	9	5	19
Developed, High Intensity	0	5	4	9
Developed, Low Intensity	0	30	27	57
Developed, Medium Intensity	0	28	36	64
Developed, Open Space	44	94	155	293
Evergreen Forest	1	7	2	10
Herbaceous	1	108	121	230
Open Water	0	0	8	8
Shrub/Scrub	60	388	472	920
Total	112	688	965	1,765

The area encompassed by noise zones and accident zones may be considered in the context of land use compatibility. As discussed in Section 3.4.1.2.1 (Land Use, Region of Influence, Dyess AFB) the 2015 AICUZ study identified the incompatible acreages shown in Table 3.4-1. Due to revised land use categories and definitions, the 2015 compatibility table is not directly applicable to analysis under the No Action Alternative. A revised compatibility table was developed by comparing previous and updated land use definitions, as well as considering compatibility guidance for commercial airports (Texas DOT, 2003; Landrum and Brown Team, 2013) (see Appendix D, Land Use). Based on a comparison

of the revised table and the noise and accident zone areas provided above, potentially incompatible use acreages under the No Action Alternative are shown in Table 3.4-7. A total of 207 acres and 58 acres are associated with noise and accident zones, respectively, while a total of 152 acres and 41 acres were associated with these respective zones in the 2015 AICUZ study. Because of some uncertainties associated with comparing the 2015 and current land use definitions, as well as varying GIS source data, differences in the acreages should be considered notional and for general comparative purposes only. Although any incompatible land use is undesirable, the area considered incompatible is small compared to the total land area associated with noise and accident zones. Significant impacts would not be anticipated under the No Action Alternative.

Table 3.4-7. Notional Off-Base Incompatible Land Use Area near Dyess AFB, No Action Alternative

Off-Base Land Use Category	Incompatible Area (Acres)			
	Noise (dB DNL)		Accident Potential	
	75-79	80+	CZ	APZ I
Developed, Open Space	0	103	0	0
Developed, Low Intensity	42	0	0	30
Developed, Medium Intensity	62	0	0	28
Developed, High Intensity	0	4	0	0
Total	104	103	0	58

+ = plus; AFB = Air Force Base; APZ = Accident Potential Zone; CZ = clear zone; dB = decibel; DNL = day-night average sound level

Airspace and Range Utilization

Under the No Action Alternative, there are no known USAF initiatives that would result in ground-disturbing activities that would cause changes to land use under the PRTC, Lancer MOA, Brownwood MOA, or Pecos MOA airspace. Aircraft operations would continue at current levels because the B-21 MOB 1 beddown would not occur. Based on previous NEPA analyses, ongoing airspace use under current operational parameters would remain compatible with designated land uses. Summaries of the land use evaluation in the applicable NEPA documents for those airspaces are provided below.

Analysis of aircraft operations at the PRTC in the context of land use is provided in Section 4.8 of the 2014 PRTC EIS (USAF, 2014a). The USAF determined that operations would not restrict land use in the PRTC, including placement of structures, and that potential impacts would only result from noise, safety issues, and the possibility of wildfires. Analysis of the preferred alternative in the 2014 PRTC EIS concluded that average noise levels would be below 65 dB DNL, which is the level associated with human annoyance, sleep disturbance, and interference with conversation (USAF, 2014a, pp. 4-110). Additionally, overflights have occurred under the PRTC and in other areas in the western United States for decades without disruption of ranching and other livestock land uses, indicating that military training and ranching are not inherently incompatible (USAF, 2014a, pp. 4-110).

Analysis of flight operations at the Lancer MOA is provided in Section 4.2 of the *Realistic Bomber Training Initiative EIS* (USAF, 2000). Analysis concluded that noise levels would be below 65 dB DNL (USAF, 2000, pp. 4-60). Therefore, overall, flight operations would not be expected to affect land use, recreation resources, or visual settings in areas under

the airspace (pp. 4-68). In addition, flight operations would not likely preclude existing land uses or continued use or occupation of an area, preempt recreational uses, threaten public health and safety, or be inconsistent with applicable regulations. Flight operations would not change features of the physical environment or block aesthetic landscape features from view. Nevertheless, flight operations could be perceived by the public as negatively affecting quality of life. For example, a startle effect, which occurs when a loud noise is experienced in a setting where it is not expected and when there is no visual or audible warning, can negatively affect wilderness and solitude experiences (pp. 4-69).

The Brownwood MOA supports aircraft operations similar to that of the Lancer MOA, with the exception that supersonic flight is permitted in airspace above the Brownwood MOA at altitudes of 30,000 feet MSL or higher. Under the No Action Alternative, average noise levels would be less than 65 dB DNL and human annoyance would therefore generally not be expected. Perception of noise produced by aircraft overflight could at times diminish the value of outdoor recreational activities. Aircraft operations would continue to comply with minimum altitude (floor) requirements. Some individuals may be annoyed by sonic booms produced during supersonic flight, but most sonic booms generated at or above 30,000 feet MSL do not reach the ground.

Analysis of aircraft operations at the Pecos MOA is provided in Sections 3.2 and 4.7 of the *New Mexico Training Range Initiative EIS* (USAF, 2006). Analysis concluded that noise levels would be below 65 dB DNL (USAF, 2006, pp. 3-54), and human annoyance would generally not be likely. However, some individuals may be annoyed by sonic booms (pp. 4-19 & 4-46). In general, supersonic operations would not change land use patterns, land ownership, land management plans, or special use areas under the airspace (pp. 4-46). The USAF has established special operating procedures to avoid overflight of specific locations considered to be sensitive to aircraft noise, including residences, ranches, resorts, communities, churches, and schools (pp. 3-52).

Based on noise modeling of the current affected environment, noise levels under the airspace of the PRTC and MOAs are presented in Table 3.4-8.

Table 3.4-8. Noise Levels Under the PRTC and Military Operating Areas Airspace with the No Action Alternative

Noise Level (dB DNL)			
Powder River Training Complex ¹	Lancer MOA	Brownwood MOA	Pecos MOA
<35 to 46.1	43.4	<35	55.9

< = less than; dB = decibel; DNL = day-night average sound level; MOA = Military Operating Area; PRTC = Powder River Training Complex

Notes:

1. Noise levels were determined for multiple areas within the Powder River Training Complex.

Refer to Section 3.2 (Noise) of this EIS for details of the modeling. With the exception of the PRTC, noise levels are considered to be uniform across the operating areas. Noise levels below 65 dB DNL are not likely to cause significant public annoyance, including speech interference and sleep disturbance, or impact land use. Therefore, no adverse impacts to land use resulting from aircraft noise have been identified for the PRTC, Lancer MOA, Brownwood MOA, and Pecos MOA, and there would be no significant impacts under the No Action Alternative at Dyess AFB.

3.4.2.1.2 No Action Alternative at Ellsworth AFB

On-base land use at Ellsworth AFB and noise contours under the No Action Alternative are shown on Figure 3.4-9. The on-base land use area encompassed by each noise zone is presented in Table 3.4-9.

Table 3.4-9. On-Base Area Exposed to Noise Zones on Ellsworth AFB, No Action Alternative

On-Base Land Use Category	On- Base Acres within Noise Zones (dB DNL)						Total
	65–69	70–74	75–79	80–84	85–89	>90	
Administrative	36	17	2	2	0	0	57
Airfield Operations/Maintenance	20	55	23	28	25	5	157
Airfield Clearance Area	0	0	55	255	185	141	636
Airfield Pavement	0.2	38	116	79	62	116	411
Community Commercial	11	1	0	0	0	0	12
Community Service	9	0	7	7	3	0	26
Housing – Accompanied	12	28	5	0	0	0	44
Industrial	144	109	52	12	6	7	330
Open Space	381	303	295	62	33	3	1,077
Outdoor Recreation	122	58	31	20	0	0	230
Water	10	2	7	1	0.2	0	21
Total	744	611	593	466	314	271	2,999

> = greater than; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

The on-base 65 dB DNL noise contour overlaps most land use categories, including airfield, aircraft operations and maintenance, industrial, open space, administrative, accompanied and unaccompanied housing, community service, and community commercial. These categories are considered to be either compatible or, in the case of housing (residential) and community service (public/quasi-public), conditionally compatible uses.

The 75 dB DNL noise contour is primarily limited to airfield and aircraft operations and maintenance functions, which are compatible, but also includes small areas of open space, recreation, administrative, community service, and accompanied housing functions. Some sensitive noise receptors (e.g., schools) are located within the 65 and 75 dB DNL noise contours. Noise levels of 75 to 79 dB DNL are compatible with open space, incompatible with residential and community service, and conditionally compatible with the remaining affected land uses.

The 80 dB DNL contour is mostly confined to the runway, ramps, and taxi areas, but also extends to some aircraft operations and maintenance, industrial, open space, recreation, administrative, and community service functions as well. The open space and (with attenuation measures) aircraft operations and maintenance areas are compatible uses. Noise attenuation is incorporated into building design in the flightline area. The remaining functions are either conditionally compatible (industrial) or incompatible use. There would be no significant impacts due to on-base noise levels under the No Action Alternative.

Off-base land use and noise contours under the No Action Alternative are shown on Figure 3.4-10. The off-base area encompassed by each noise zone is shown in Table 3.4-10. Approximately 88 percent of the land use associated with noise contours is undeveloped (e.g., shrub/scrub, herbaceous, and cultivated crops) or developed (open space). However, various areas of Box Elder contain low, medium, and high intensity developed land use.

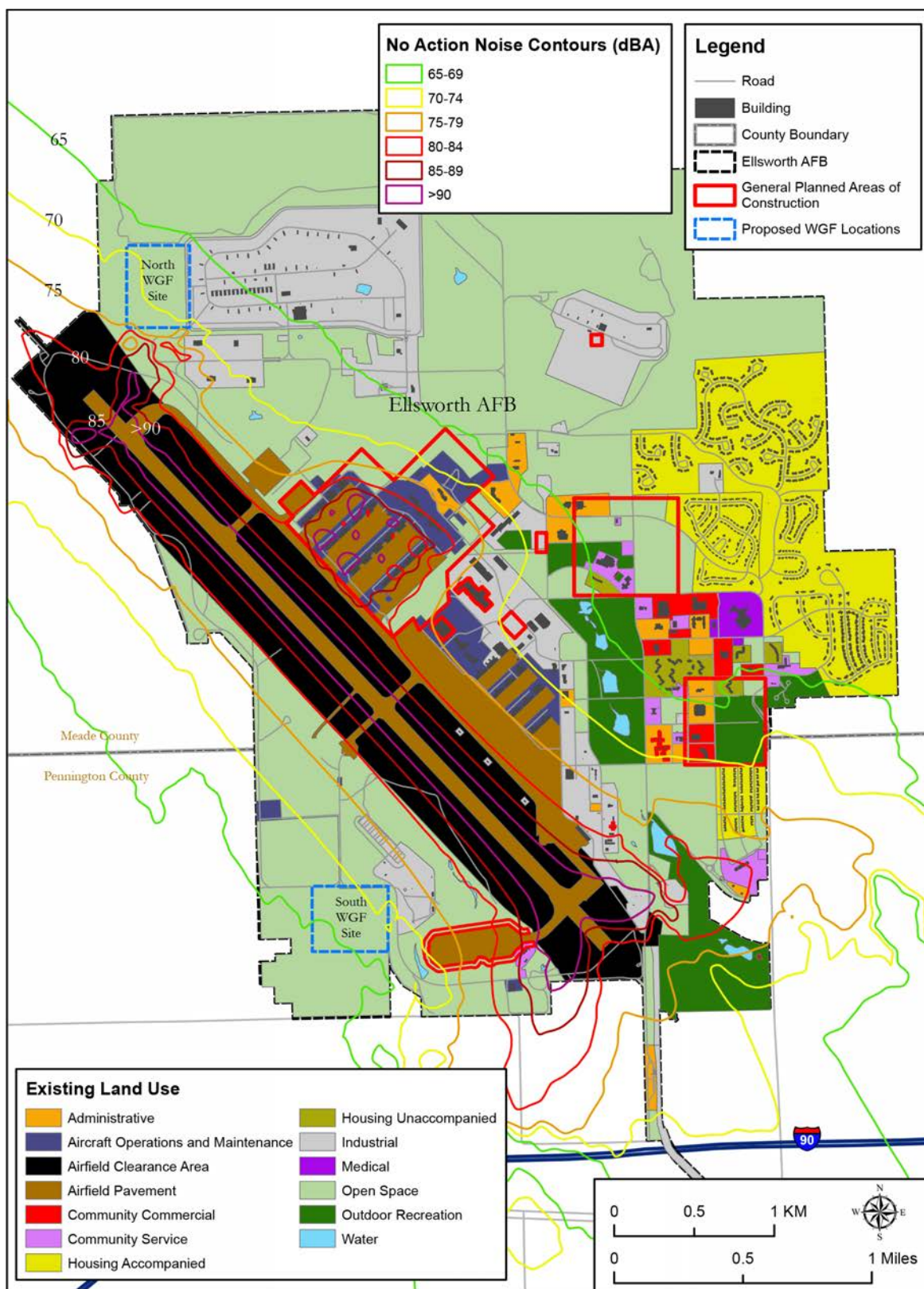


Figure 3.4-9. On-Base Land Use and Noise Contours on Ellsworth AFB, No Action Alternative

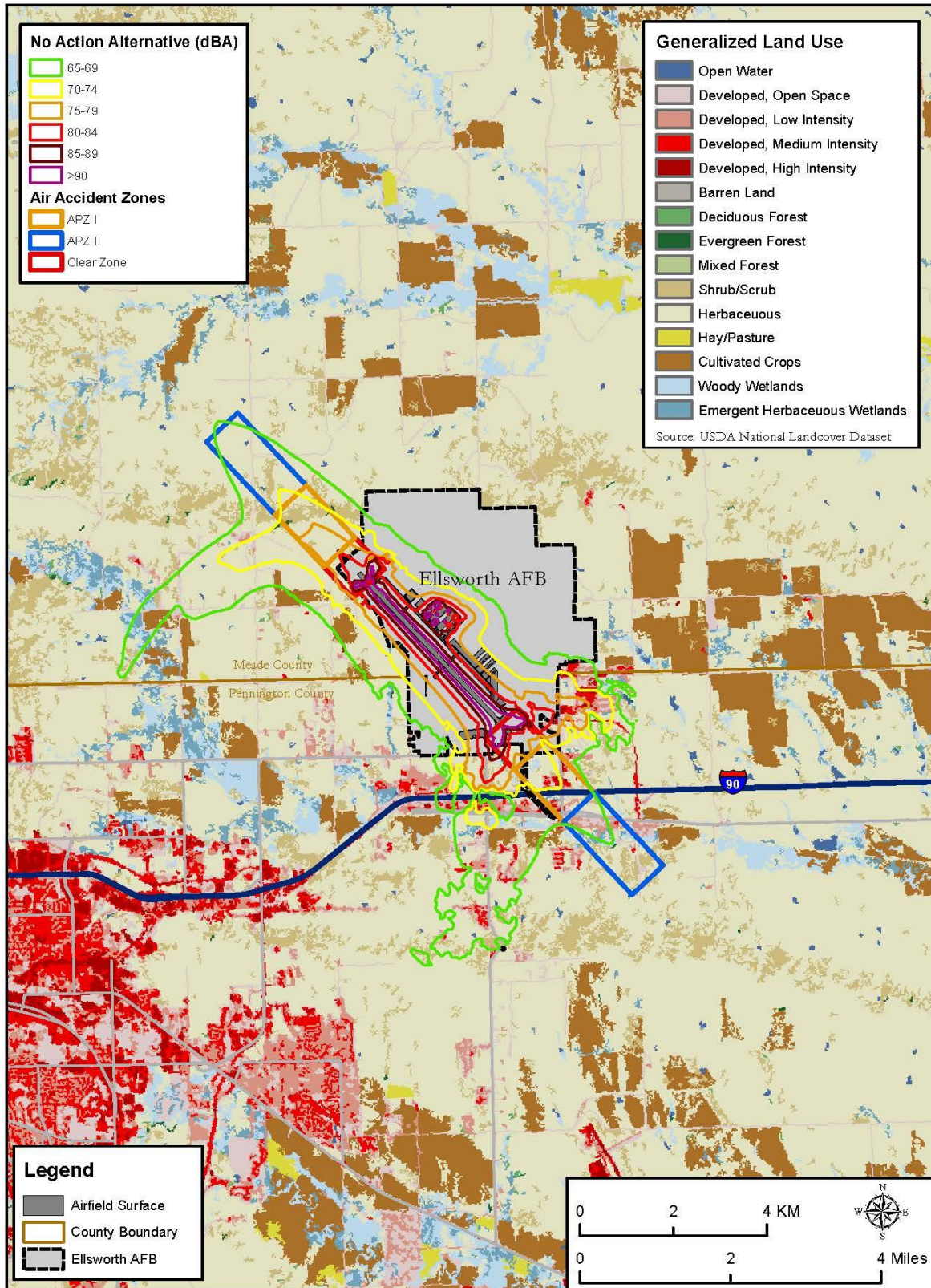


Figure 3.4-10. Off-Base Land Use, Noise Contours, and Accident Potential Zones Adjacent to Ellsworth AFB, No Action Alternative

Table 3.4-10. Off-Base Land Use Area Exposed to Noise Zones near Ellsworth AFB, No Action Alternative

Off-Base Land Use Category	Off-Base Acres within Noise Zones (dB DNL)						Total
	65–69	70–74	75–79	80–84	85–89	>90	
Open Water	10	0	0	0	0	0	10
Developed, Open Space	407	97	24	11	0	0	539
Developed, Low Intensity	324	62	22	3	0	0	411
Developed, Medium Intensity	130	39	19	0	0	0	188
Developed, High Intensity	15	12	10	0	0	0	37
Barren Land	2	0	0	0	0	0	2
Evergreen Forest	2	6	0	1	0	0	9
Shrub/Scrub	367	89	18	13	5	1	493
Herbaceous	2,444	876	337	46	8	1	3,713
Cultivated Crops	240	8	0	0	0	0	247
Woody Wetlands	76	24	2	3	3	0	108
Emergent Herbaceous Wetlands	71	6	0	0	0	0	77
Total	4,088	1,219	432	77	16	2	5,834

> = greater than; dB = decibel; DNL = day-night average sound level

The total off-base area shown in Table 3.4-10 is substantially less than the total area presented in the 2008 Ellsworth AFB AICUZ study, which was 16,921 acres. The reasons for the difference are uncertain but could potentially include changes in aircraft operations or in noise modeling methods. Also, there are differences in land use classifications and source GIS data. Off-base land use acreage in the 2008 AICUZ study was determined based on GIS datasets produced in 2001 and 2003, and for this EIS, the acreage for the No Action Alternative for Ellsworth AFB was calculated based on the 2016 USDA National Landcover Dataset. The percentage of land use categorized as open space/low density in the 2008 AICUZ study (86 percent) is very similar to the percentage categorized as undeveloped or developed (open space) under the No Action Alternative (89 percent), suggesting that there has been no substantial change in overall land use. There would be no significant impacts due to off-base noise levels under the No Action Alternative.

The off-base land use associated with APZs is shown on Figure 3.4-10, and the off-base area encompassed by each APZ is shown in Table 3.4-11. Most land use associated with APZs is undeveloped (e.g., shrub/scrub and herbaceous) and developed (open space and low intensity). The off-base area shown in Table 3.4-11 is the same as the area presented in the 2008 AICUZ study.

The area encompassed by noise zones and accident zones may be considered in the context of land use compatibility. Due to revised land use categories and definitions, the compatibility table provided in the Ellsworth 2008 AICUZ study is not directly applicable to analysis under the No Action Alternative. A revised compatibility table was developed by comparing previous and updated land use definitions, as well as considering compatibility guidance for commercial airports (Texas DOT, 2003; Landrum and Brown Team, 2013) (see Appendix D, Land Use). Based on a comparison of the revised table with the noise and accident zone areas provided above, potentially incompatible use

acreages are shown in Table 3.4-12. A total of 55 acres and 93 acres are associated with noise and accident zones, respectively, while a total of 152 acres and 39 acres were associated with these respective zones in the 2008 AICUZ study. Because of some uncertainties associated with comparing land use definitions, as well as varying GIS source data, differences in the acreages should be considered notional and for general comparative purposes only. Although any incompatible land use is undesirable, the area considered incompatible is small compared to the total land area associated with noise and accident zones. Significant impacts would not be anticipated under the No Action Alternative.

Table 3.4-11. Off-Base Land Use Area Exposed to the Clear Zone and Accident Potential Zones at Ellsworth AFB, No Action Alternative

Off-Base Land Use Category	Off-Base Acres within Clear Zone and Accident Potential Zones			
	Clear Zone	Accident Potential Zone I	Accident Potential Zone II	Total
Developed, High Intensity	0	10	0	10
Developed, Low Intensity	0	64	53	117
Developed, Medium Intensity	0	29	4	33
Developed, Open Space	1	36	84	120
Emergent Herbaceous Wetlands	0	3	24	27
Evergreen Forest	0	3	2	5
Herbaceous	121	421	634	1,176
Open Water	0	0	3	3
Shrub/Scrub	8	88	138	234
Woody Wetlands	1	8	24	33
Total	131	662	966	1,759

Table 3.4-12. Notional Off-Base Incompatible Land Use Area near Ellsworth AFB, No Action Alternative

Off-Base Land Use Category	Incompatible Area (Acres)			
	Noise (dB DNL)		Accident Potential	
	75-79	80+	CZ	APZ I
Developed, Open Space	0	11	0	0
Developed, Low Intensity	25	0	0	64
Developed, Medium Intensity	19	0	0	29
Total	44	11	0	93

+ = plus; APZ = Accident Potential Zone; CZ = clear zone; dB = decibel; DNL = day-night average sound level

Airspace and Range Utilization

Under the No Action Alternative at Ellsworth AFB, there are no known USAF initiatives that would result in ground-disturbing activities under the PRTC airspace. Aircraft operations would continue at current levels (2,778 annual operations) because the B-21 MOB 1 beddown would not occur.

Based on previous NEPA analysis, ongoing airspace use under current operational parameters would remain compatible with designated land uses. Analysis of aircraft operations at the PRTC is provided in Section 4.8 of the 2014 PRTC EIS (USAF, 2014a). The USAF determined that operations would not restrict land use in the PRTC, including placement of structures, and that potential impacts would only result from noise, safety issues, and the possibility of wildfires. Analysis of the preferred alternative concluded that average noise levels would be below 65 dB DNL, which is the level associated with human annoyance, sleep disturbance, and interference with conversation (USAF, 2014a, pp. 4-110). Additionally, overflights have occurred under the PRTC and in other areas in the western United States for decades without disruption of ranching and other livestock land uses, indicating that military training and ranching are not inherently incompatible (pp. 4-110). Therefore, baseline aircraft operations within the PRTC would not have significant impacts to land use under the No Action Alternative at Ellsworth AFB.

3.4.2.2 Dyess AFB Alternative

3.4.2.2.1 Personnel

Under the Dyess AFB Alternative, there would be a net increase of 3,953 personnel, including dependents, and a resulting increase in demand for on-base and off-base housing and services. The increase in personnel could be accommodated by existing supply to some extent. However, some development could potentially occur. Any on-base development resulting from the beddown (e.g., community services, community commercial land use) would occur in accordance with the established tiering system and with guidance in the base's IDP, JLUS, AICUZ study, ICEMAP, and future land use plan. Incorporation of the installation's development strategies would prevent incompatible land uses. Potential increased demand for on-base housing is discussed in Section 3.5 (Socioeconomics). It is expected that any adjacent off-base development associated with the beddown would occur with consideration of aircraft noise, APZs, height restrictions, and corresponding land use compatibility. The City of Abilene's land use and development strategies include establishment of land use standards near Dyess AFB (Dyess AFB, 2015). In addition, the City of Tye recognizes the noise zones and APZs of Dyess AFB as a development constraint. There would be no significant impacts due to a personnel increase under the Dyess AFB Alternative.

3.4.2.2.2 Airfield Operations

On-base land use and noise contours under the Dyess AFB Alternative are shown on Figure 3.4-11. The on-base land use area encompassed by each noise zone is shown in Table 3.4-13. Compared to the No Action Alternative, the total overall on-base area encompassed by noise levels greater than 65 dB DNL would decrease by 561 acres (Table 3.4-14). All on-base land use would be compatible with the associated noise levels. Sensitive noise receptors would be located outside the 65 dB DNL noise contour.

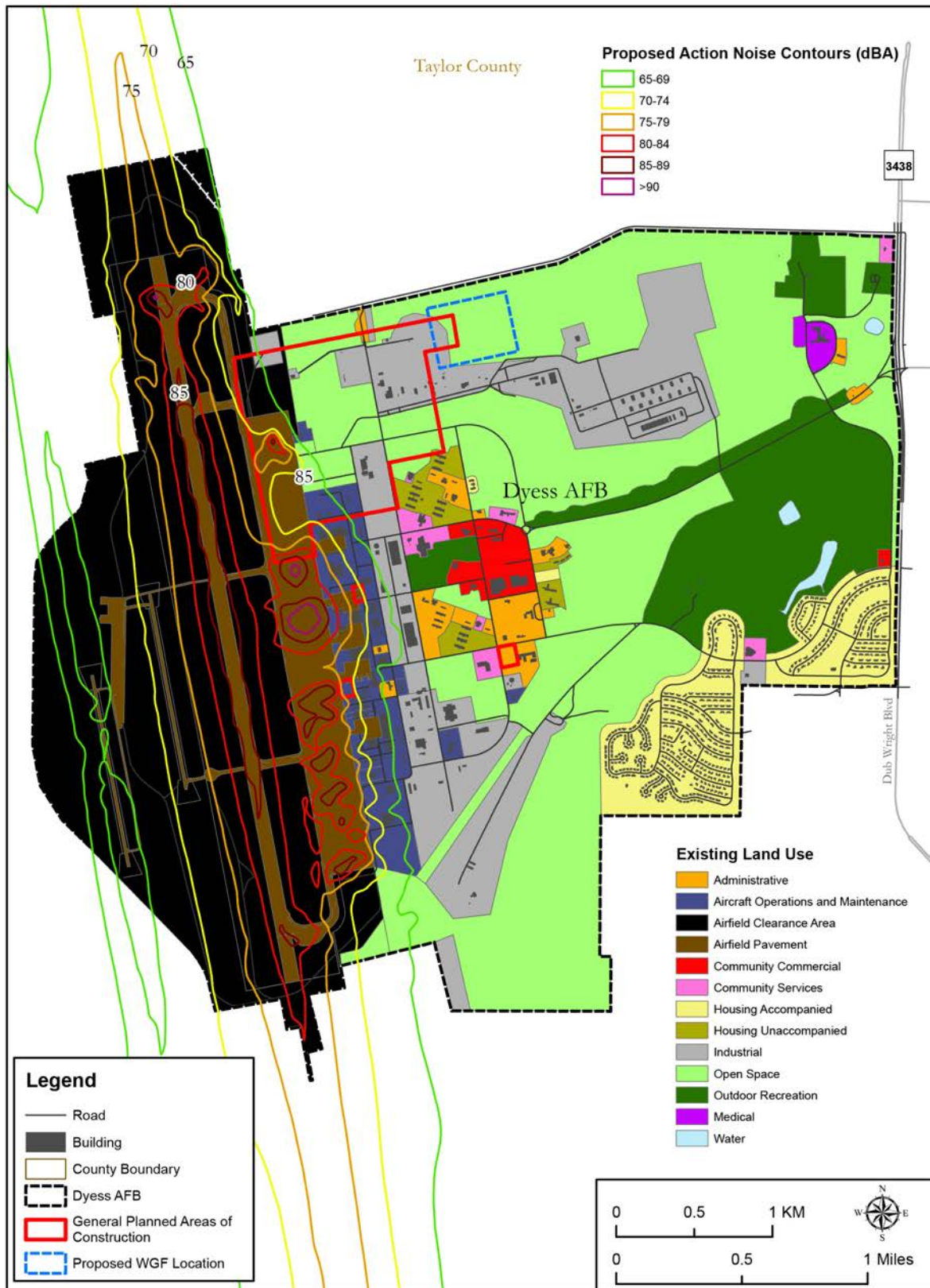


Figure 3.4-11. On-Base Land Use and Noise Contours on Dyess AFB, Dyess AFB Alternative

Table 3.4-13. On-Base Area Exposed to Noise Zones at Dyess AFB, Dyess AFB Alternative

On-Base Land Use Category	On-Base Acres within Noise Zones (dB DNL)						Total
	65–69	70–74	75–79	80–84	85–89	>90	
Administrative	2	0	0	0	0	0	2
Airfield Operations/Maintenance	90	39	11	3	0.1	0	143
Airfield Pavement	68	64	96	123	90	7	448
Airfield Clearance Area	389	359	365	170	13	0.07	1,296
Industrial	12	0	0	0	0	0	12
Open Space	36	4	0	0	0	0	40
Total	597	466	472	296	103	7	1,941

> = greater than; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Table 3.4-14. Comparison of Total On-Base Area Exposed to Noise Zones at Dyess AFB Under the No Action Alternative and the Dyess AFB Alternative

Noise Zones (dB DNL)	On-Base Acres within Noise Zones		
	No Action Alternative	Dyess AFB Alternative	Change from No Action
65–69	485	597	112
70–74	510	466	-44
75–79	380	472	92
80–84	369	296	-73
85–89	355	103	-252
>90	403	7	-396
Total	2,502	1,941	-561

> = greater than; - = minus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Off-base land use and noise contours under the Dyess AFB Alternative are shown on Figure 3.4-12. The off-base land use area encompassed by each noise zone is shown in Table 3.4-15. Potentially incompatible land use area is shown in Table 3.4-17. Approximately 96 percent of off-base land use associated with the noise zones is undeveloped (e.g., shrub/scrub and herbaceous) or developed/open space. Compared to the No Action Alternative, the total off-base land area encompassed by noise levels greater than 65 dB DNL would decrease by 7,140 acres (Table 3.4-16). There would be no off-base area, including any portion of Tye or Caps, exposed to noise levels above 80 dB DNL. The area of these communities encompassed by noise levels between 65 and 79 dB DNL would decrease substantially to just 1.4 acres (Table 3.4-17). The total area of off-base land use notionally considered incompatible with noise levels would decrease to 59.4 acres, resulting in an approximate 206-acre reduction from the No Action Alternative (Table 3.4-18). There would be no change in the area of incompatible use associated with accident zones because those areas have fixed dimensions.

Due to the overall reduction in on-base and off-base noise levels, there would be no adverse impacts to land use resulting from the B-21 beddown under the Dyess AFB Alternative. Potentially, there would be beneficial impacts in the context of land use compatibility in developed portions of Tye and Caps.

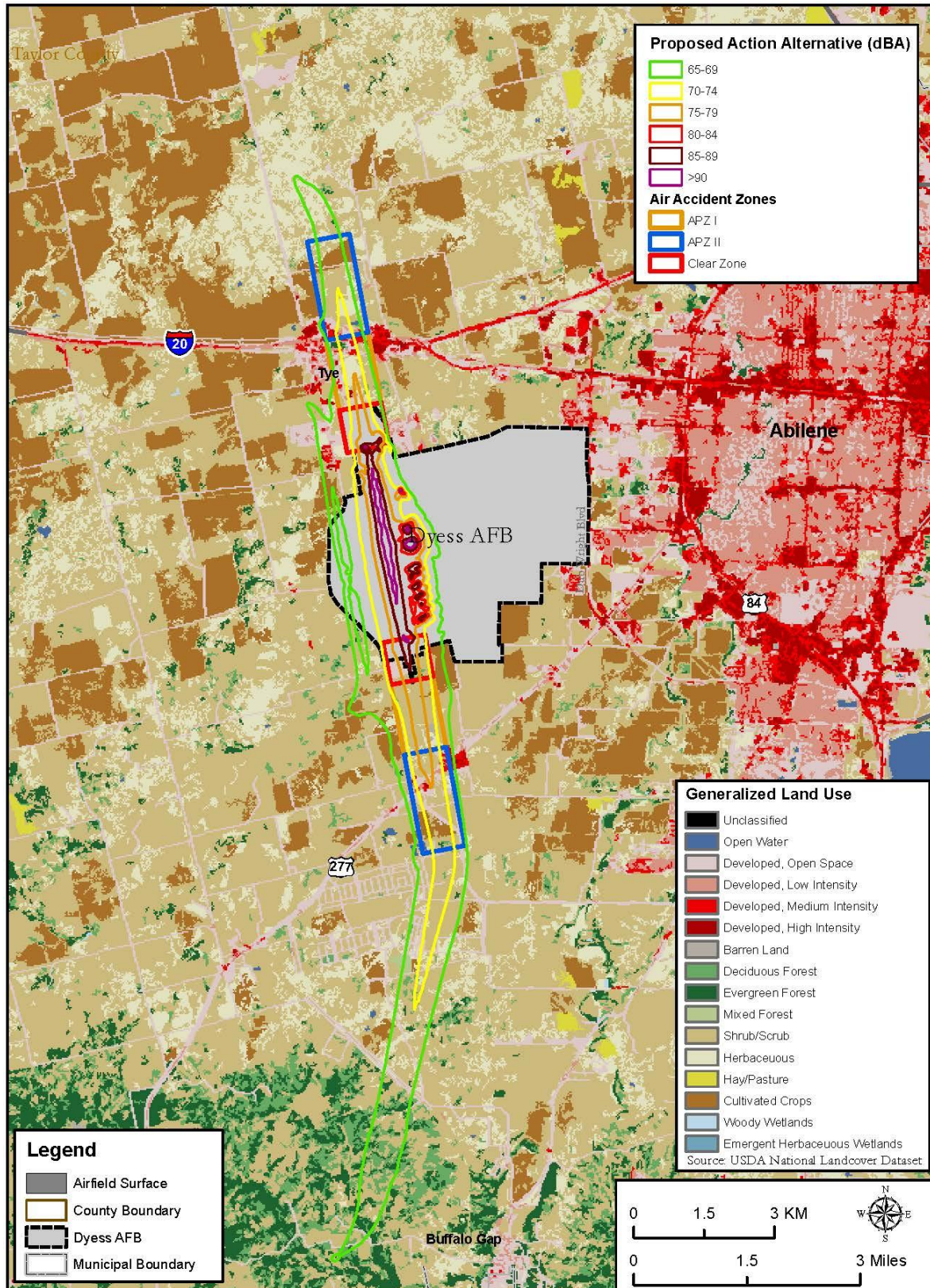


Figure 3.4-12. Off-Base Land Use, Noise Contours, and Accident Potential Zones Adjacent to Dyess AFB, Dyess AFB Alternative

Table 3.4-15. Off-Base Land Use Area Exposed to Noise Zones under the Dyess AFB Alternative

Off-Base Land Use Category	Off-Base Acres within Noise Zones (dB DNL)						Total
	65–69	70–74	75–79	80–84	85–89	>90	
Open Water	15	0	0	0	0	0	15
Developed, Open Space	403	156	25	0	0	0	584
Developed, Low Intensity	47	22	1	0	0	0	70
Developed, Medium Intensity	71	20	0.4	0	0	0	91
Developed, High Intensity	12	4	0	0	0	0	16
Barren Land	0	12	2	0	0	0	14
Deciduous Forest	213	14	3	0	0	0	230
Evergreen Forest	119	6	0.02	0	0	0	125
Mixed Forest	15	0	0	0	0	0	15
Shrub/Scrub	1,677	543	151	0	0	0	2,371
Herbaceous	390	109	24	0	0	0	523
Cultivated Crops	262	40	1	0	0	0	303
Total	3,224	926	207	0	0	0	4,357

> = greater than; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Table 3.4-16. Comparison of Total Off-Base Area Adjacent to Dyess AFB Exposed to Noise Zones Under the No Action Alternative and the Dyess AFB Alternative

Noise Zones (dB DNL)	Off-Base Acres within Noise Zones		
	No Action Alternative	Dyess AFB Alternative	Change from No Action
65–69	6,052	3,224	-2,828
70–74	3,341	926	-2,415
75–79	1,431	207	-1,224
80–84	476	0	-476
85–89	155	0	-155
>90	42	0	-42
Total	11,497	4,357	-7,140

> = greater than; - = minus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Table 3.4-17. Notional Off-Base Incompatible Land Use Area with the Dyess AFB Alternative

Off-Base Land Use Category	Off-Base Incompatible Area (Acres)			
	Noise (dB DNL)		Accident Potential	
	75–79	80+	CZ	APZ I
Developed, Open Space	0	0	0	0
Developed, Low Intensity	1	0	0	30
Developed, Medium Intensity	0.4	0	0	28
Developed, High Intensity	0	0	0	0
Total	1.4	0	0	58

+ = plus; AFB = Air Force Base; APZ = Accident Potential Zone; CZ = clear zone; dB = decibel; DNL = day-night average sound level

Table 3.4-18. Comparison of Total Off-Base Incompatible Land Use Area Under the No Action Alternative and Dyess AFB Alternative

Incompatible Land Use Effector	Off-Base Incompatible Area (Acres)		
	No Action Alternative	Dyess AFB Alternative	Change from No Action
75–79 dB DNL Noise Zone	104	1.4	-102.6
80+ dB DNL Noise Zone	103	0	-103
Clear Zone	0	0	0
Accident Potential Zone I	58	58	0
Total	265	59.4	-205.6

- = minus; + = plus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

3.4.2.2.3 Airspace and Range Utilization

There are no known USAF initiatives that would result in ground-disturbing activities that would affect land use under the PRTC, Lancer MOA, Brownwood MOA, or Pecos MOA airspace. As described for the No Action Alternative, analyses presented in the *Realistic Bomber Training Range EIS*, the *New Mexico Training Range Initiative EIS*, and the 2014 PRTC EIS indicate there are no adverse impacts to land use due to aircraft operations in the Lancer MOA, Pecos MOA, and the PRTC airspace (USAF, 2006; USAF, 2014a; USAF, 2000). Additionally, land use under the Brownwood MOA is compatible with aircraft operations, as average noise levels are below those associated with human annoyance. Based on the results of modeling described in Section 3.2 (Noise), noise levels under the airspace of the PRTC and the Lancer, Brownwood, and Pecos MOAs (Table 3.4-19) would either decrease or remain the same relative to the No Action Alternative as discussed in Section 3.2.2.1.1 (Noise, No Action at Dyess AFB). Noise levels in all operating areas would be well below 65 dB DNL and would not adversely affect land use. There would be no significant impacts due to airspace and range utilization under the Dyess AFB Alternative.

Table 3.4-19. Noise Levels Under the PRTC and Military Operating Areas Airspace with the Dyess AFB Alternative

Noise Level (dB DNL)			
Powder River Training Complex ¹	Lancer MOA	Brownwood MOA	Pecos MOA
<35 to 46.1	<35	<35	36.9

< = less than; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level; MOA = Military Operating Area; PRTC = Powder River Training Complex

Notes:

1. Noise levels were determined for multiple areas within the Powder River Training Complex.

3.4.2.2.4 Facilities and Infrastructure

Land use associated with facilities and infrastructure projects consists mostly of airfield pavement, aircraft operations and maintenance, industrial, and open space (Figure 3.4-13). It is expected that all renovation and new construction would be consistent with the existing land use tiering system and that all functions would be located within acceptable noise zones and would incorporate noise attenuation features as necessary. It is further expected that siting of new facilities and infrastructure would occur in accordance with existing safety arcs and the potential future WGF safety arc. No significant impacts to land use would be anticipated.

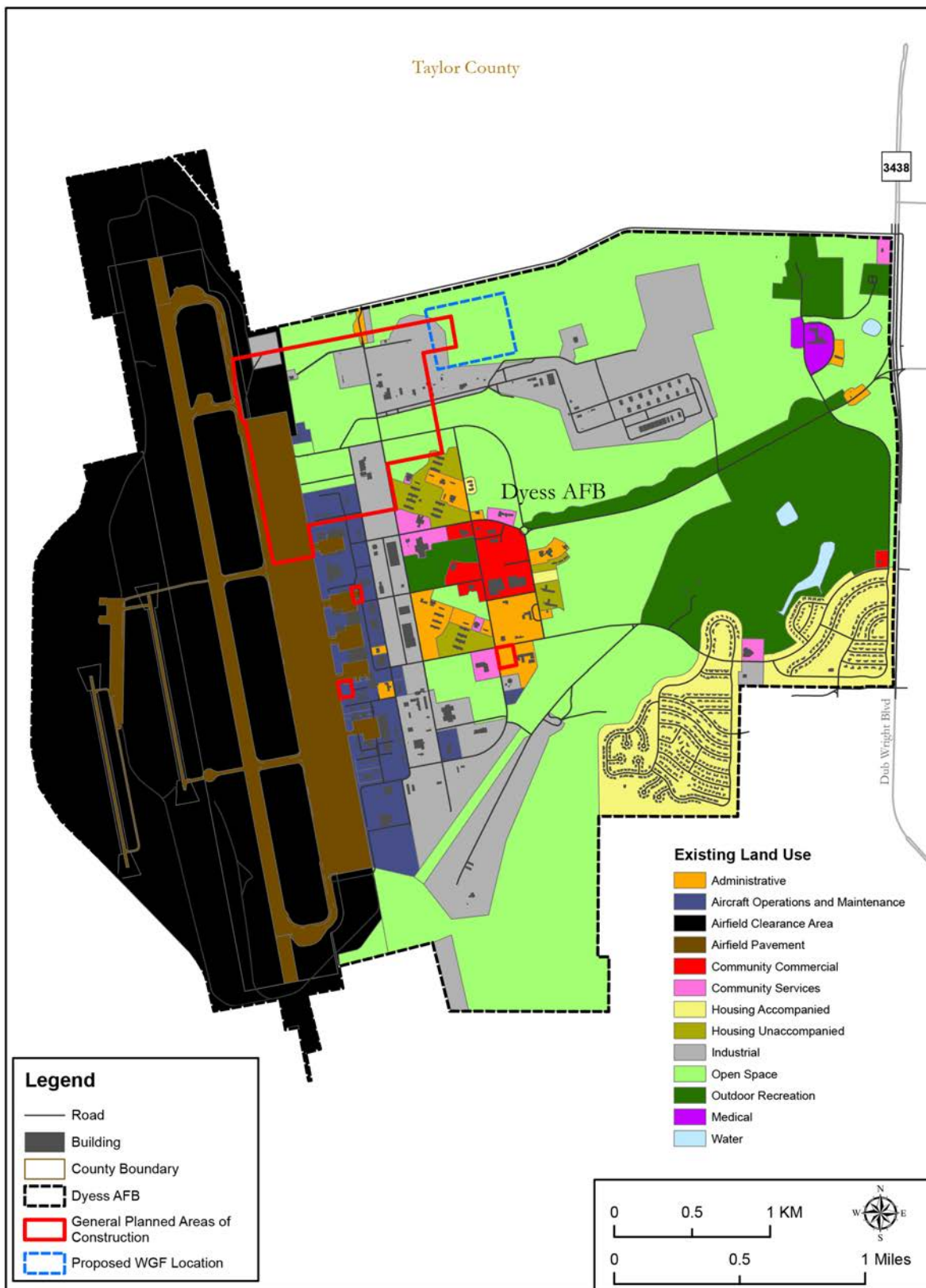


Figure 3.4-13. Land Use at the Facilities and Infrastructure Projects Locations for the Dyess AFB Alternative

3.4.2.2.5 Weapons Generation Facility

Land use associated with the WGF consists of industrial and open space (Figure 3.4-13). The site is located in an area of generally compatible land use, near the existing munitions storage compound and explosives cargo area, and slightly overlapping the munitions storage quantity-distance (QD) safety arc. It is expected that WGF placement would be integrated with existing safety arcs, and that incompatible functions, if present, would be relocated outside of the WGF safety arc. No significant impacts to land use would be anticipated.

3.4.2.2.6 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

No mitigations would be necessary to implement the Dyess AFB Alternative.

3.4.2.3 Ellsworth AFB Alternative (Preferred Alternative)

3.4.2.3.1 Personnel

Under the Proposed Action, there would be a net increase of 3,147 personnel at Ellsworth AFB, including dependents. Increased population would result in increased demand for on-base and off-base housing and services and could result in some new development. Any on-base development resulting from the beddown would occur in accordance with guidance in the base's IDP, JLUS, and AICUZ study, and incompatible land use would not be expected. Potential increased demand for on-base housing is discussed in Section 3.5 (Socioeconomics). Adjacent off-base development associated with the beddown would likely occur with consideration of aircraft noise, APZs, height restrictions, and corresponding land use compatibility. The Box Elder Planning and Zoning Commission, the Pennington County Board of County Commissioners, and the Rapid City Planning Commission have enacted zoning ordinances that regulate land use adjacent to Ellsworth AFB. There would be no significant impacts due to a personnel increase under the Ellsworth AFB Alternative.

3.4.2.3.2 Airfield Operations

On-base land use and noise contours under the Ellsworth AFB Alternative are shown on Figure 3.4-14. The on-base land use area encompassed by each noise zone is shown in Table 3.4-20. Compared to the No Action Alternative, the total overall on-base area encompassed by noise levels greater than 65 dB DNL would decrease by 1,274 acres (Table 3.4-21). The 65 dB DNL noise contour would be limited to mostly airfield pavement, aircraft operations and maintenance, industrial, and open space uses. The 75 dB contour would not extend to any residential, community service, or administrative use areas. Sensitive noise receptors would be located outside the 65 dB DNL noise contour. All on-base land use would be compatible with the associated noise levels.

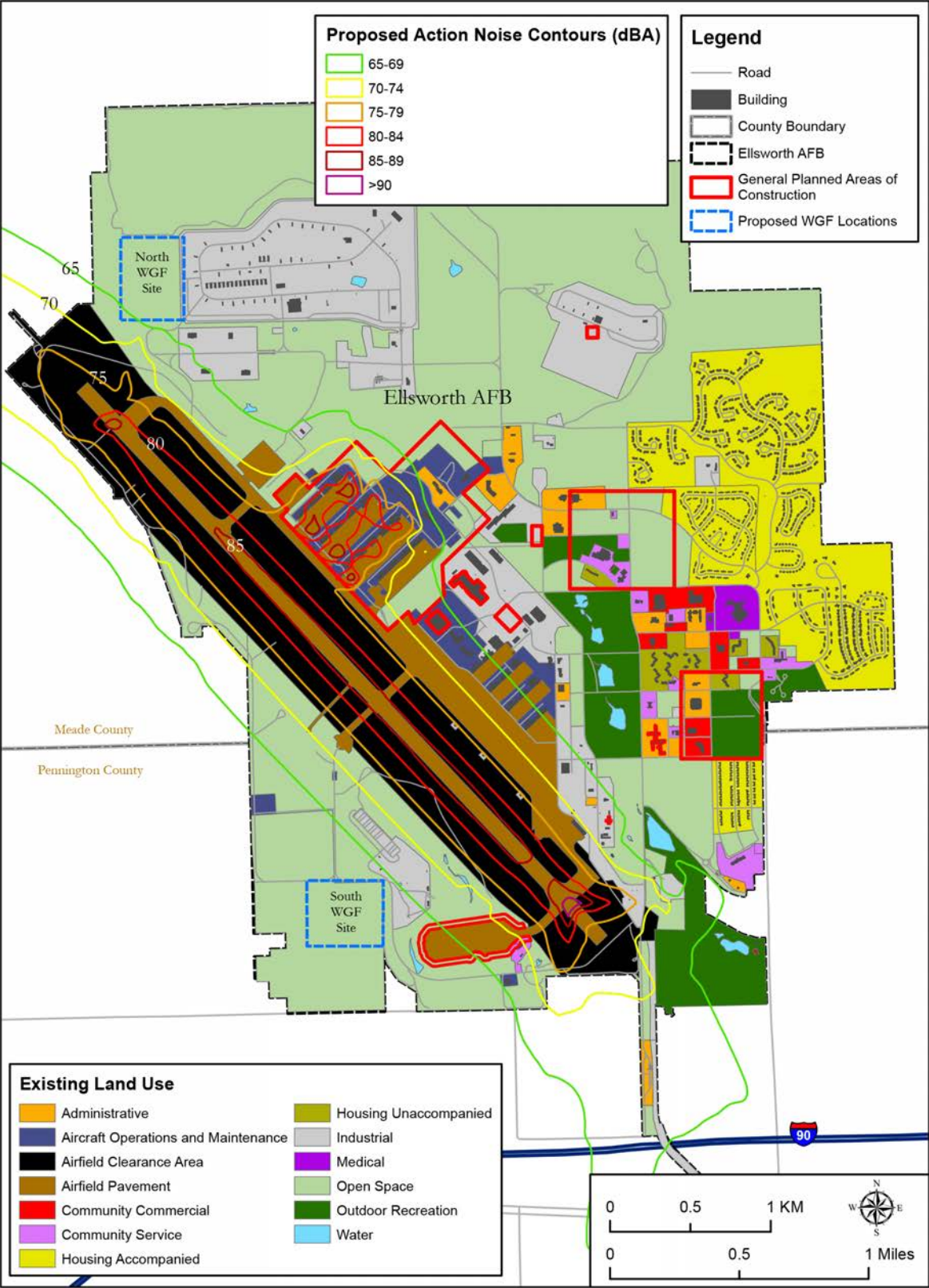


Figure 3.4-14. On-Base Land Use and Noise Contours on Ellsworth AFB, Ellsworth AFB Alternative

Table 3.4-20. On-Base Area Exposed to Noise Zones at Ellsworth AFB, Ellsworth AFB Alternative

On-Base Land Use Category	On-Base Acres within Noise Zones (dB DNL)						Total
	65–69	70–74	75–79	80–84	85–89	>90	
Administrative	8	0	0	0	0	0	8
Airfield Operations/Maintenance	46	19	26	9	0.1	0	100
Airfield Clearance Area	12	169	285	153	17	0.2	636
Airfield Pavement	83	118	55	61	73	1	391
Community Service	3	1	0	0	0	0	4
Industrial	79	17	3	0	0	0	99
Open Space	284	152	5	0	0	0	441
Outdoor Recreation	45	0	0	0	0	0	45
Water	0.3	1	0	0	0	0	1
Total	560	477	374	223	90	1	1,725

> = greater than; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Table 3.4-21. Comparison of Total On-Base Area Exposed to Noise Zones at Ellsworth AFB Under the No Action Alternative and Ellsworth AFB Alternative

Noise Zones (dB DNL)	On-Base Acres within Noise Zones		
	No Action Alternative	Ellsworth AFB Alternative	Change from No Action
65–69	744	560	-184
70–74	611	477	-134
75–79	593	374	-219
80–84	466	223	-243
85–89	314	90	-224
>90	271	1	-270
Total	2,999	1,725	-1,274

> = greater than; - = minus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Off-base land use and noise contours under the Ellsworth AFB Alternative are shown on Figure 3.4-15. The off-base land use area encompassed by each noise zone is shown in Table 3.4-22. Potentially incompatible off-base land use area is shown in Table 3.4-24. Approximately 98 percent of off-base land use associated with the noise zones is undeveloped (e.g., herbaceous and shrub/scrub) or developed/open space. Compared to the No Action Alternative, the total off-base land area encompassed by noise levels greater than 65 dB DNL would decrease by 4,224 acres (Table 3.4-23). There would be no off-base area exposed to noise levels above 75 dB DNL. Very little area of Box Elder would be exposed to noise levels greater than 65 dB DNL. There would be no off-base land use area notionally considered incompatible with noise levels under the Ellsworth AFB Alternative, which would eliminate all off-base incompatible land uses from noise identified under the No Action Alternative (Table 3.4-25). However, there would be no change in the area of incompatible use associated with accident zones because these areas have fixed dimensions.

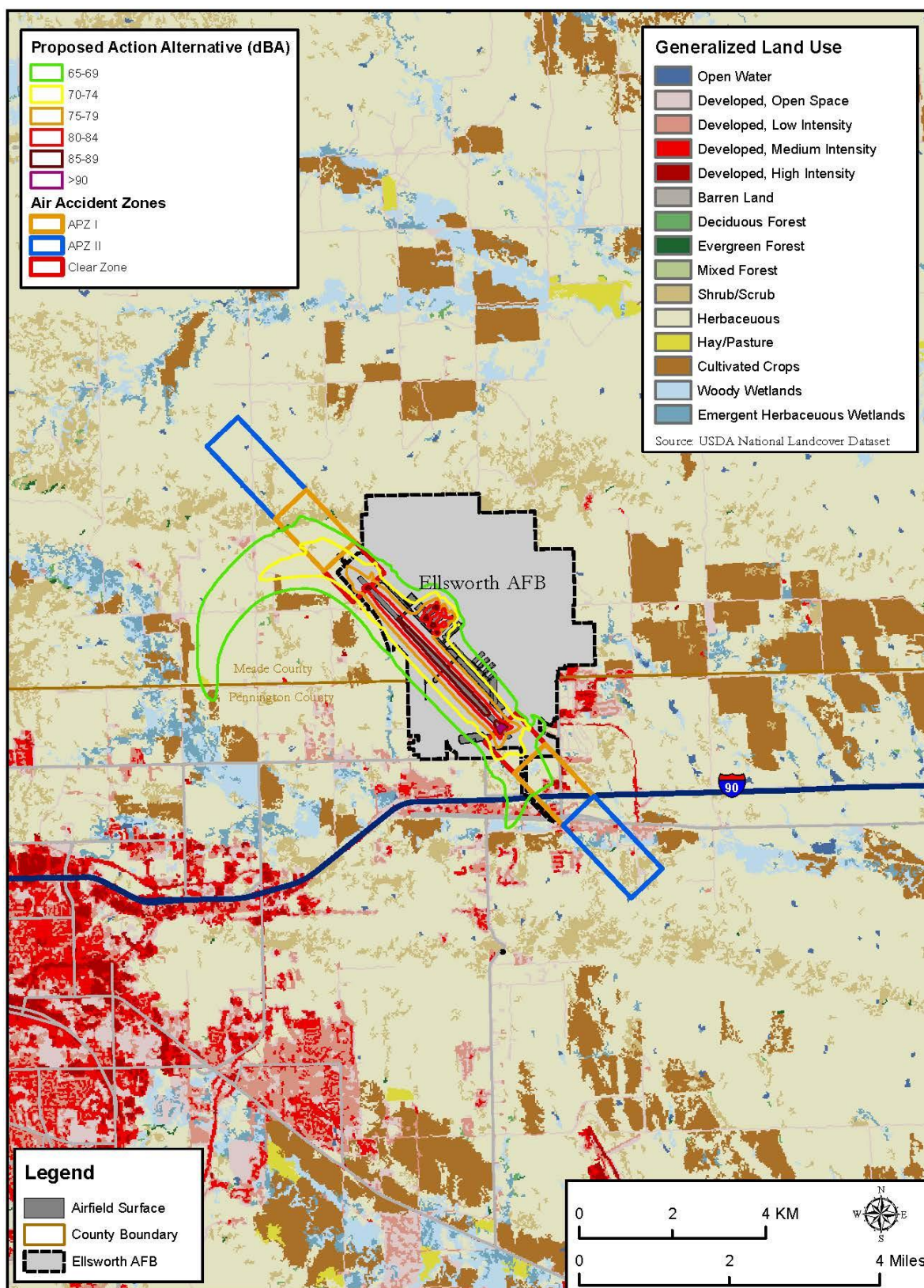


Figure 3.4-15. Off-Base Land Use, Noise Contours, and Accident Potential Zones Adjacent to Ellsworth AFB, Ellsworth AFB Alternative

Due to the overall reduction in on-base and off-base noise levels, there would be no adverse impacts to off-base land use resulting from the B-21 beddown under the Ellsworth AFB Alternative. There would potentially be beneficial impacts in the context of off-base land use compatibility in developed portions of Box Elder and other adjacent communities.

Table 3.4-22. Off-Base Land Use Area Exposed to Noise Zones Under the Ellsworth AFB Alternative

Off-Base Land Use Category	Off-Base Acres within Noise Zones (dB DNL)						Total
	65–69	70–74	75–79	80–84	85–89	>90	
Open Water	0.1	0	0	0	0	0	0.1
Developed, Open Space	68	7	0	0	0	0	75
Developed, Low Intensity	28	0	0	0	0	0	28
Developed, Medium Intensity	9	1	0	0	0	0	10
Evergreen Forest	2	0	0	0	0	0	2
Shrub/Scrub	49	10	0	0	0	0	59
Herbaceous	1,096	285	0	0	0	0	1,381
Pasture/Hay	9	0	0	0	0	0	9
Cultivated Crops	20	3	0	0	0	0	23
Woody Wetlands	19	2	0	0	0	0	21
Emergent Herbaceous Wetlands	2	0	0	0	0	0	2
Total	1,302	308	0	0	0	0	1,610

> = greater than; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Table 3.4-23. Comparison of Total Off-Base Area Adjacent to Ellsworth AFB Exposed to Noise Zones Under the No Action Alternative and the Ellsworth AFB Alternative

Noise Zones (dB DNL)	Off-Base Acres within Noise Zones		
	No Action Alternative	Ellsworth AFB Alternative	Change from No Action
65–69	4,088	1,302	-2,786
70–74	1,219	308	-911
75–79	432	0	-432
80–84	77	0	-77
85–89	16	0	-16
>90	2	0	-2
Total	5,834	1,610	-4,224

> = greater than; - = minus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Table 3.4-24. Notional Off-Base Incompatible Land Use Area with the Ellsworth AFB Alternative

Off-Base Land Use Category	Off-Base Incompatible Area (Acres)			
	Noise (dB DNL)		Accident Potential	
	75–79	80+	CZ	APZ I
Developed, Open Space	0	0	0	0
Developed, Low Intensity	0	0	0	64
Developed, Medium Intensity	0	0	0	29
Total	0	0	0	93

+ = plus; AFB = Air Force Base; APZ = Accident Potential Zone; CZ = clear zone; dB = decibel; DNL = day-night average sound level

Table 3.4-25. Comparison of Total Off-Base Incompatible Land Use Area Under the No Action Alternative and Ellsworth AFB Alternative

Incompatible Land Use Effector	Off-Base Incompatible Area (Acres)		
	No Action Alternative	Ellsworth AFB Alternative	Change from No Action
75–79 dB DNL Noise Zone	44	0	-44
80+ dB DNL Noise Zone	11	0	-11
Clear Zone	0	0	0
Accident Potential Zone I	93	93	0
Total	148	93	-55

- = minus; + = plus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

3.4.2.3.3 Airspace and Range Utilization

Under the Ellsworth AFB Alternative, there are no known USAF initiatives that would result in ground-disturbing activities under the PRTC airspace. As described for the No Action Alternative, the 2014 PRTC EIS indicates there are no adverse impacts to land use within the PRTC due to aircraft operations under baseline conditions (USAF, 2014a). Based on the results of modeling described in Section 3.2 (Noise) of this B-21 EIS, noise levels under the airspace of the PRTC would remain unchanged relative to the No Action Alternative, ranging from less than 35 to 46.1 dB DNL. The Lancer, Brownwood, and Pecos MOAs would not be utilized under the Ellsworth AFB Alternative. There would be no significant impacts due to airspace and range utilization under the Ellsworth AFB Alternative.

3.4.2.3.4 Facilities and Infrastructure

Most types of existing on-base land use would be associated with some portion of the facilities and infrastructure projects footprint, including airfield pavement, aircraft operations and maintenance, industrial, community commercial, community service, unaccompanied housing, administrative, outdoor recreation, and open space (Figure 3.4-16). It is expected that all renovation and new construction would be consistent with existing land use policies and strategies. It is further expected that all functions would be located within acceptable noise zones, incorporating noise attenuation features as necessary, and that siting would occur in accordance with existing and potential future safety arcs. No significant impacts to on-base land use would be anticipated under the Ellsworth AFB Alternative.

3.4.2.3.5 Weapons Generation Facility

North WGF Site Subalternative

Land use associated with the North WGF Site consists of open space (Figure 3.4-16). The site is located in an area of compatible land use, within the existing munitions storage area QD arc and near the northern CZ. It is expected that WGF placement would be integrated with existing safety arcs and that incompatible functions, if present, would be relocated outside of the WGF arc. No significant impacts to land use would be anticipated.

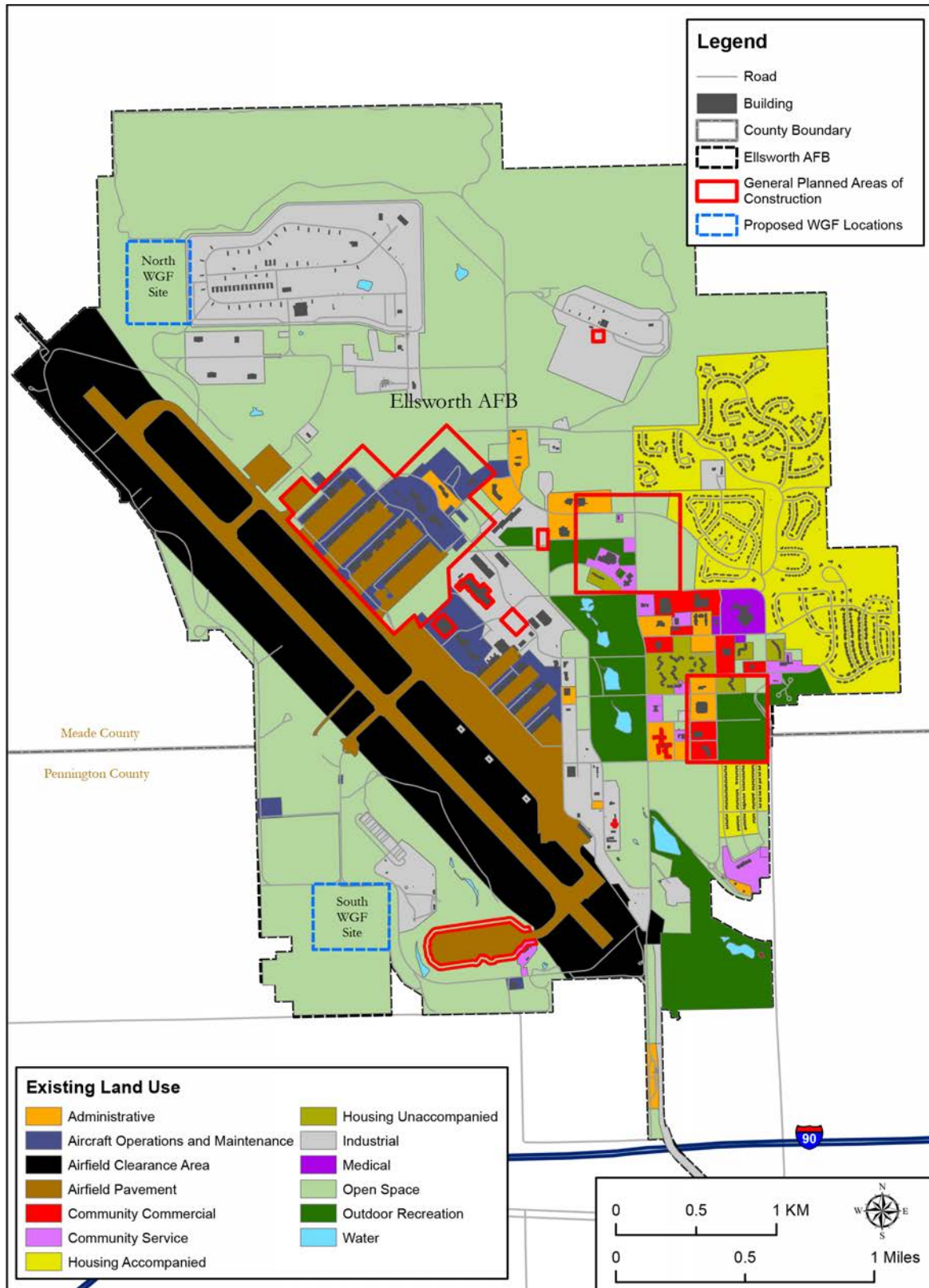


Figure 3.4-16. On-Base Land Use at the Facilities and Infrastructure Projects Locations for the Ellsworth AFB Alternative

South WGF Site Subalternative (Preferred Subalternative)

Land use associated with the South WGF Site consists of open space (Figure 3.4-16). Land use in the potential bridge footprint, which occurs between the WGF and alert apron, is designated as open space and industrial. The site is located in an area of compatible land use, near the QD arc west of the airfield.

It is expected that WGF placement would occur in accordance with existing and potential future safety arcs, and any incompatible functions would be relocated. No significant impacts to land use would be anticipated.

3.4.2.3.6 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

No mitigations would be necessary to implement the Ellsworth AFB Alternative.

3.5 SOCIOECONOMICS

3.5.1 Socioeconomics, Affected Environment

3.5.1.1 Description of Resource

Socioeconomic resources are defined as the basic attributes associated with human activities. Of particular interest are the population characteristics; economic factors including employment and income; and public services including schools, law enforcement, and emergency services. Actions that impact these socioeconomic indicators may have effects on other socioeconomic factors such as housing availability.

3.5.1.2 Region of Influence

The ROI for the socioeconomics analysis focuses on the area most affected by the action alternative. Dyess AFB is located immediately west of Abilene, Texas. The ROI for Dyess AFB is the Abilene Metropolitan Statistical Area, which includes Taylor, Jones, and Callahan Counties. Ellsworth AFB is located in Meade and Pennington Counties in South Dakota. The two counties comprise the ROI for Ellsworth AFB.

As described in Section 2.3.3 (Airspace and Range Utilization), for military aircraft flying out of Dyess AFB, the Lancer MOA and the Pecos MOA and all associated ATCAAs are the most cost-effective and convenient training areas to use. Dyess AFB-based aircraft would utilize the PRTC and the Brownwood MOA as supplemental training airspaces. The primary training area for B-21 aircraft operating out of Ellsworth AFB would be the PRTC.

3.5.1.3 Analysis Methodology

Potential impacts to the number and dollar value of indirect jobs created as a result of the B-21 beddown follow the method used for the respective Economic Impact Statements for Dyess AFB and Ellsworth AFB. The total number of indirect jobs created was calculated by taking the total number of new USAF base jobs, by personnel type, and multiplying the numbers by the multiplier reported in the respective base's Economic Impact Statement (see Table 3.5-1). The sum of the indirect jobs was then multiplied by the average annual pay for the local community as shown in Table 3.5-1.

Cost estimates for construction, demolition, and remodeling of facilities and infrastructure are not yet available for purposes of quantitative analyses; as a result, a qualitative assessment of the potential impacts associated with these activities is provided.

Table 3.5-1. Numbers Used to Determine the Indirect Jobs and Dollar Value of Air Force Personnel Associated with the B-21 MOB 1 Beddown

Type of Personnel	Multiplier	
	Dyess AFB	Ellsworth AFB
Active Duty Military	0.29	0.35
Reserve/ANG/Trainees	0.13	0.15
Appropriated Fund Civilians	0.43	0.44
Other Civilians	0.43	0.44
Average Annual Pay for the Local Community	\$41,810 ^a	\$41,000 ^b

Source: (Dyess AFB, 2018a)

AFB = Air Force Base; ANG = Air National Guard; MOB = Main Operating Base

Notes:

a. Average annual pay for all occupations from the Metropolitan Area Occupational Employment and Wage Estimates Abilene, Texas, May 2018 (U.S. Bureau of Labor Statistics, 2019a).

b. Average annual pay for all occupations from the Metropolitan Area Occupational Employment and Wage Estimates for Rapid City, South Dakota, May 2018 (U.S. Bureau of Labor Statistics, 2019b)

Demand for housing is calculated by determining the total number of USAF personnel and applying the percentages of active military personnel that live on base and off base, as reported by the most recent Economic Impact Statement from each base. The Dyess AFB Alternative and the Ellsworth AFB Alternative would include construction of new dormitory facilities. It is assumed that the new units would be able to sustain the existing distribution percentages. To determine the number of housing demanded by USAF personnel residing off base, the number of incoming personnel was divided by 1.09 to account for the percent of active military married to another active military. Percentages are based on the most recent military demographics reported by the Air Force Personnel Center (AFPC) in which approximately 9 percent (29,789) of the total USAF active duty members (328,255) are reported to be married to another active duty member (AFPC, 2020).

For the purposes of the Snapshot Scenario analysis, the number of personnel residing on base is expected to remain as calculated for the Dyess AFB Alternative and the Ellsworth AFB Alternative with the remaining USAF personnel residing off base.

Changes in the frequency, number, duration, and type of military aircraft associated with military bases near residential areas causes concern to some residents regarding the

potential impacts to property values and safety. Potential impacts to property values from aircraft noise were assessed by reviewing available literature and comparing changes in the population affected by noise levels of 65 dB DNL or greater, the threshold at which residential land use is not compatible with that noise level.

To determine the impact on education resources in the ROI, the number of incoming school-aged children was based on the information provided in Table 2.3-1. Based on the most recent DoD demographic statistics (DoD, 2018b), it would be assumed that 96.5 percent of all dependent children (ranging in ages of 0 to 22 years) would be between the ages of 0 to 18 and, of those, approximately 53.7 percent would be of school age (5 to 18 years of age).

Changes in the demand for public services, such as law enforcement, fire emergency services and medical services associated with any in-migration or out-migration of people to the area under the alternatives were evaluated. These changes were determined based on the existing level of service or the number of professionals per capita.

3.5.2 Socioeconomics, Environmental Consequences

This section presents the potential environmental consequences to socioeconomic resources under the alternatives. An impact common to all action alternatives is the potential impact to property values from aircraft noise. Aircraft noise is known to result in adverse health and environmental impacts that have the potential to result in shifts in population trends and density, decline in property values, decline in economic activity (i.e. agriculture), and safety concerns at education facilities and other noise sensitive areas. Noise levels of 65 dB DNL and greater associated with the B-21 aircraft would be less than the B-1 aircraft. As such and as indicated in Section 3.6.2 (Environmental Justice, Environmental Consequences), the number of people residing within the 65 dB DNL and greater noise contours would decrease under the Dyess AFB Alternative and the Ellsworth AFB Alternative compared to the No Action Alternative at each location. Therefore, the number of homes within noise levels that could potentially adversely impact property values would be less under each alternative compared to the No Action Alternative.

3.5.2.1 No Action Alternative Consequences

3.5.2.1.1 No Action at Dyess AFB

Under the No Action Alternative, the B-21 would not be based at Dyess AFB and there would be no associated personnel changes or construction, demolition, or renovation activities.

Under this alternative, approximately 1,419 residents are affected by aircraft noise of 65 dB DNL or greater in the ROI (see Table 3.6-3 in Section 3.6, Environmental Justice).

The most recent economic impact statement from Dyess AFB reported annual expenditures and contracts of over \$80.8 million. Construction, demolition, and renovation of facilities and infrastructure are a regular activity of an operational USAF base and contribute to the base's overall economic impact to the local region from the

use of labor and supplies. Expenditures for facilities and infrastructure would continue to be required as facilities and infrastructure age and need to be replaced or upgraded.

Population

As of 2018, the population in the three-county ROI totaled 171,142 people. As shown in Table 3.5-2, Taylor County comprises the largest proportion of the population in the Abilene Metropolitan Statistical Area and is projected to experience the largest increase in population out of the three counties that comprise the Abilene Metropolitan Statistical Area.

Table 3.5-3 presents the total number of military, dependents, and civilian employees supported by Dyess AFB. In addition to the 10,145 personnel at Dyess AFB, there are approximately 3,579 military retirees also supported by the base.

Table 3.5-2. Population Estimates and Projections for Dyess AFB Region of Influence

Geographic Area	Census 2010	Estimated 2018	Projected 2025	Average Annual Change 2010–2018	Projected Average Annual Change 2018–2025
Callahan County	13,544	13,437	13,508	-0.1%	0.1%
Jones County	20,202	19,790	19,544	-0.3%	-0.2%
Taylor County	131,506	137,915	143,012	0.6%	0.5%
Abilene MSA (ROI)	165,252	171,142	176,064	0.4%	0.4%
State of Texas	25,145,561	28,716,123	32,204,920	1.7%	1.7%

Sources: (U.S. Census Bureau, 2010; U.S. Census Bureau, 2018a; Texas Demographic Center, 2018)

- = minus; % = percent; AFB = Air Force Base; MSA = Metropolitan Statistical Area; ROI = region of influence

Table 3.5-3. Personnel Estimates at Dyess AFB, Fiscal Year 2018

Personnel ¹	Number of Individuals
Active Military	4,369
Civilian ²	665
Contractor	NA
Spouses ³	2,769
Children ³	2,342
Total	10,145

Source: (Dyess AFB, 2018a)

AFB = Air Force Base; NA = not available

Notes:

1. Does not include private businesses on base (branch banks/credit union) or retirees
2. Includes appropriated and non-appropriated fund civilians
3. Numbers of spouses and children were extrapolated from the total dependent number of 5,111, assuming 55 percent of military and civilian personnel are married and the remaining dependents are children.

Economy, Employment, and Income

Dyess AFB has a major influence on the regional economy. As of FY18, the total annual economic impact of Dyess AFB to the local Abilene area was over \$532 million. The *2018 Economic Impact Statement for Dyess AFB* calculated payroll, expenditures and indirect jobs associated with the base (see Table 3.5-4) (Dyess AFB, 2018a). In 2018, there were 105,026 jobs throughout the Abilene Metropolitan Statistical Area (Taylor, Jones, and Callahan Counties). This is approximately 8,217 more jobs than in 2010, indicating a

1-percent average annual increase in the number of full-time and part-time jobs in the ROI (Bureau of Economic Analysis, 2019). Table 3.5-5 shows that the largest employment sectors in terms of the number of jobs were the government and government enterprises sector, the health care and social assistance sector, and the retail trade sector.

Table 3.5-4. Economic Impact of Dyess AFB, Fiscal Year 2018

Category	Total
Annual Payrolls By Classification	
Appropriated Fund Military	\$251,100,487
Appropriated Fund Civilians	\$29,814,440
Non-Appropriated Fund, Contract, Civilians, and Private Business	\$10,932,013
Military Retirees	\$89,287,611
Total Annual Payroll	\$381,134,551
Annual Expenditures	
Total Annual Expenditures and Contracts	\$86,337,341
Value of Indirect Jobs	
Estimated Number of Indirect Jobs Created	1,574
Average Annual Pay for the Local Community	\$41,350
Total Annual Dollar Value of Jobs Created	\$65,084,900
Total Economic Impact of Dyess AFB	\$532,556,792

Source: (Dyess AFB, 2018a)

Table 3.5-5. Total Full-Time and Part-Time Employment (Number of Jobs) by Industry in the Abilene Metropolitan Statistical Area, 2018

Industry	Total Number of Jobs	Percent of Total Employment
Forestry, Fishing, and related activities	NA	NA
Mining, quarrying, and oil and gas extraction	4,859	5%
Utilities	NA	NA
Construction	6,402	6%
Manufacturing	3,607	3%
Wholesale Trade	NA	NA
Retail Trade	10,928	10%
Transportation and Warehousing	2,903	3%
Information	D	NA
Finance and Insurance	6,066	6%
Real Estate and rental and leasing	3,677	4%
Professional, scientific, and technical services	3,924	4%
Management of companies and enterprises	NA	NA
Administrative and support and waste management and remediation services	NA	NA
Educational Services	3,086	3%
Health care and social assistance	12,476	12%
Arts, entertainment, and recreation	D	NA
Accommodation and food services	D	NA
Other Services	6,455	6%
Government and government enterprises	17,495	17%
Total Employment	105,026	100%

Source: (Bureau of Economic Analysis, 2019)

% = percent; D = Not shown to avoid disclosure of confidential information but included in total; NA = not available but included in total

Table 3.5-6 compares several economic characteristics in the Abilene Metropolitan Statistical Area with the State of Texas and the nation.

Table 3.5-6. Selected Economic Characteristics, Dyess AFB Region of Influence

Geographic Area	Average Annual Unemployment Rate	Per Capita Income	Median Household Income	Percent of Population with Incomes Below Poverty Level
Taylor County	4.3%	\$26,469	\$50,818	15.6%
Jones County	3.9%	\$17,673	\$45,694	14.3%
Callahan County	3.3%	\$24,537	\$44,602	14.1%
Abilene MSA (ROI)	4.2%	\$25,284	\$49,945	15.3%
State of Texas	5.4%	\$30,143	\$59,570	15.5%
United States	5.9%	\$32,621	\$60,293	14.1%

Source: (U.S. Census Bureau, 2018b)

% = percent; AFB = Air Force Base; MSA = Metropolitan Statistical Area; ROI = region of influence

Housing

Approximately 22.4 percent (977 people) appropriated fund military personnel live on base while the remaining 77.6 percent (3,392 people) live off base. As of FY18, there were 11 dormitory facilities with 686 beds/rooms (Dyess AFB, 2018a). A Dormitory Master Plan report is currently under revision, which would identify the unaccompanied Airmen housing capacity (Dyess AFB, 2018b). Dyess Family Housing includes over 650 military family housing units. The housing units are located on base in seven neighborhoods for officer and enlisted personnel (Dyess Family Homes, 2020). There are also over 400 apartment, duplex, and townhome-style homes located off base in Abilene within the Quail Hollow Family Housing for active duty members and civilians.

The communities that support the off-base personnel include the Abilene Metropolitan Statistical Area, which comprises Taylor, Jones, and Callahan Counties, and portions of Shackelford, Fisher, Nolan, Runnels, and Coleman Counties. Table 3.5-7 displays several housing characteristics in the Abilene Metropolitan Statistical Area as of 2018.

Table 3.5-7. Selected Housing Characteristics, Dyess AFB Region of Influence

Geographic Area	Total Housing Units	Occupied Units	Vacant Units	Owner Occupied Units	Renter Occupied Units	Homeowner Vacancy Rate	Median Value of Owner Occupied Units	Median Gross Rent
Taylor County	57,257	49,482	7,775	58.6%	41.4%	2.2%	\$119,100	\$912
Jones County	7,335	5,593	1,742	73.3%	26.7%	2.5%	\$75,400	\$713
Callahan County	6,667	5,319	1,348	82.8%	17.2%	0.9%	\$89,000	\$748
Total Abilene MSA (ROI)	71,259	60,394	10,865	62.1%	37.9%	2.1%	\$110,100	\$893

Source: (U.S. Census Bureau, 2018c)

% = percent; AFB = Air Force Base; MSA = Metropolitan Statistical Area; ROI = region of influence

The median price for a single-family home in January 2020 was \$179,938 representing a 22.45 percent year-over-year increase (Texas A & M University, 2020). During the same time, the months of inventory in the Abilene Metropolitan Statistical Area decreased from 3.4 months to 3.2 months (Texas A & M University, 2020). The months of inventory refers to the number of months it would take for all homes currently on the market to sell if sales continue at the average pace over the last 12 months, assuming no new listing on the market. A market with months of inventory below 6 months is indicative of a seller's market (Kramer, 2018).

Education

There are no public schools located on Dyess AFB. Dependents of USAF personnel would be expected to attend one of the schools in the ROI. Table 3.5-8 lists the school districts within the three-county ROI, the total enrollment, full-time teachers employed, and the number of students per teacher for each district.

Table 3.5-8. Schools, Dyess AFB Region of Influence

County	School District	Number of Schools	Total Enrollment ¹	Total Teacher FTE ²	Number of Students Per Teacher ^{2,3}
Taylor	Texas College Preparatory Academies	36	13,067	747	17
Taylor	Abilene ISD	29	16,760	1,109	15
Taylor	Merkel ISD	3	1,168	94	12
Taylor	Trent ISD	1	165	21	8
Taylor	Jim Ned CISD	4	1,216	93	13
Taylor	Wylie ISD	6	4,405	277	16
Jones	Anson ISD	3	771	68	11
Jones	Hamlin ISD	2	397	32	13
Jones	Hawley ISD	3	737	74	10
Jones	Leuders-Avoca ISD	2	106	16	7
Jones	Stamford ISD	3	670	57	12
Callahan	Baird ISD	3	305	35	9
Callahan	Clyde CISD	4	1433	112	13
Callahan	Cross Plains ISD	2	368	36	10
Callahan	Eula ISD	3	414	38	11
Total ROI		104	41,982	2,809	15

Source: (TEA, 2019)

AFB = Air Force Base; CISD = Consolidated Independent School District; FTE = full-time employee; ISD = Independent School District;

ROI = region of influence

Notes:

1. Total enrollment during the 2018-2019 school year.

2. Rounded to nearest whole number.

3. Number of students per teacher is calculated by the total enrollment divided by the total full-time teachers in each district.

Public Services

Public services include emergency, police, and medical services and are provided by the county and city governments in the ROI and other government agencies. Expenditures and revenues define the level of service that may be provided as well as specific service

metrics. Changes in the population would affect the demand for these services as well as the ability to fund them.

In 2020, the national average of the number of active primary care physicians per 1,000 population is estimated at 1.596. Active care physicians include physicians in general practice, family practice, obstetrics and gynecology, pediatrics, geriatrics and internal medicine (America's Health Rankings, 2020). As of 2017, the population-to-primary care physician ratio in Taylor County was 1,140:1; Jones County had a ratio of 3,330:1 and Callahan County had a ratio of 13,950:1. The state of Texas had a population-to-primary care physician ratio of 1,640:1 (County Health Rankings and Roadmaps, 2020).

The average number of officers per county agency in 2018 was 2.8 per 1,000 inhabitants, as reported to the Federal Bureau of Investigation's Uniform Crime Reporting Program (U.S. Department of Justice, 2018a). In 2018, there were 233 total law enforcement employees (officers and civilians) in Taylor County and 15 total law enforcement employees in Callahan County. Based on 2018 population estimates (as shown in Table 3.5-2), this equates to total law enforcement personnel per 1,000 residents of approximately 1.7 in Taylor County and 1.1 in Callahan County (U.S. Department of Justice, 2018b). Compared to other counties, Jones County had a high number of workers working as law enforcement. Law enforcement employees for Jones County totaled 177 law enforcement workers, including supervisors (Data USA, 2020).

A report on fire departments within the United States estimated the national average of career firefighters per 1,000 residents at 1.81, with the average number of volunteers per 1,000 residents at 6.06 (Evarts and Stein, 2020). The ratios are not intended to provide a threshold or recommendation of personnel per residents, but rather identify conditions on average throughout the nation.

Airspace and Range Utilization

As stated in Section 2.3.3 (Airspace and Range Utilization), the Lancer MOA and the Pecos MOA airspace would be the primary training area for B-21 aircraft operations at Dyess AFB. Aircraft based at Dyess AFB would also utilize the PRTC and the Brownwood MOA as supplemental training airspaces.

Socioeconomic impacts resulting from the use of the Lancer MOA are described in detail in the 2000 *Realistic Bomber Training Initiative EIS* (USAF, 2000). Potential impacts to economic pursuits and land values from the use of the Lancer MOA were addressed in the EIS (USAF, 2000, pp. 4-111). The *Realistic Bomber Training Initiative EIS* concluded that national and regional economic trends have substantially more impact than supersonic or subsonic overflights and would not affect the general economies of the communities (USAF, 2000, pp. 4-111). The EIS also determined that there was little to suggest that land values would be impacted since the random nature of operations and the wide altitude structure within the MOA made it unlikely that any one location would be repeatedly overflown (USAF, 2000). Overall, no significant adverse consequences to economic activities were identified from aircraft operations (USAF, 2000, pp. 4-113). Under the No Action Alternative, noise levels for the Lancer MOA would be 43.4 dB L_{dnmr} and it is not anticipated that adverse socioeconomic effects would occur.

Potential socioeconomic impacts resulting from airspace use at the Pecos MOA are evaluated in the *New Mexico Training Range Initiative EIS* (USAF, 2006). The potential socioeconomic effects were evaluated for airspace use, noise conditions, and fire hazards in the affected area. The EIS determined that expanded airspace and low-altitude flights would not be expected to result in any significant impacts to humans, livestock, economic pursuits, or land values in the region (USAF, 2006, pp. 2-40). Noise levels in the Pecos MOA for the No Action Alternative would be 55.9 dB L_{dnmr} . Therefore, adverse socioeconomic impacts are not anticipated.

Noise levels in the Brownwood MOA would be less than 35 dB DNL (Section 3.2.2.1.1, No Action at Dyess AFB) which is less than the EPA level of 55 dB DNL below which no effects to public health and welfare would occur (EPA, 1974). In addition operations in the Brownwood MOA would decrease by 13 operations annually (see Section 3.1.2.2.2, Dyess AFB Alternative, Airspace and Range Utilization). Since noise levels would remain unchanged and operations are decreasing, no significant economic impacts would occur in the Brownwood MOA.

Socioeconomic impacts resulting from the use of the PRTC are described in detail in the 2014 PRTC EIS and associated ROD (USAF, 2014a). These impacts include property values, civil aviation, energy resource development, noise disturbances, and a risk of fire from chaff and flares.

Interviews conducted during the development of the 2014 PRTC EIS revealed that the existence of the Powder River A or B MOAs was not used in determining the value of a property. The complex nature of property valuation factors makes any estimation of the potential effects of airspace modifications on land values highly speculative. Ranching operations, communities, and private airports all exist and function under the existing Powder River MOAs. Other socioeconomic factors, such as business activity, employment, interest rates, and land scarcity (or availability) are much more likely to affect property values. Training flight activity associated with the PRTC is not expected to affect the value of property under the airspace (USAF, 2014a, pp. 4-118).

As indicated in the 2014 PRTC EIS, civil aviation and public airports have the potential to be impacted as a result of communication requirements by private pilots. The extent of impacts would be dependent on scheduling, the duration of the ground holds, and the amount of time that the MOAs were active (USAF, 2014a, pp. 4-123). If all the airspace were activated, the airspace use and related activities associated with the PRTC could result in delay, uncertainty, or other impacts. A change in airspace use for military training could be seen by civil airspace users as an adverse impact on the human, social, or economic resources of the region (USAF, 2014a, pp. 4-123).

Based on the 2014 PRTC EIS, no impacts to elevated ground structures, wind farms, oil and gas, or mining are expected (USAF, 2014a, pp. 4-128). Therefore, there are no anticipated impacts to energy resource development under the PRTC.

As indicated in the 2014 PRTC EIS, the EPA has identified a DNL of 55 dB to be the level below which no effects on public health and welfare would occur (USAF, 2014a; EPA, 1974). Noise levels in areas under the PRTC airspace are below this level. The relatively low acoustical effect is attributed to the dispersion of training flights into a large volume

of airspace (USAF, 2014a, pp. 4-125). Although noise is below the EPA-identified level, the sudden and unexpected nature of infrequent, low-level or supersonic events during low-flying exercises could cause surprise and annoyance. Due to the low population density under PRTC low-level airspace and the infrequent number of annual events, the 2014 PRTC EIS concluded that it is highly unlikely that flight activity associated with the PRTC would result in significant social or economic impacts to the region. Under the No Action Alternative, noise levels in the PRTC would range from less than 35 to 46.1 dB L_{dnmr} . However, B-1 operations would be ongoing; therefore, there is still the potential for impacts from low-level flights.

Another potential socioeconomic impact evaluated in the 2014 PRTC EIS was the potential economic loss associated with a fire, particularly with flare use. There are minimum deployment altitude restrictions of 2,000 feet AGL and no flare use during extreme fire conditions. The USAF has established procedures for claims in the unlikely event that a USAF-caused fire should occur and subsequently damage livestock or infrastructure (USAF, 2014a, pp. 4-129).

3.5.2.1.2 No Action at Ellsworth AFB

Under the No Action Alternative, the B-21 would not be based at Ellsworth AFB and there would be no associated personnel changes or construction, demolition, or renovation activities. Under this alternative, approximately 1,985 residents are affected by aircraft noise in the ROI (see Table 3.6-4 in Section 3.6, Environmental Justice).

The most recent economic impact statement from Ellsworth AFB reported annual expenditures and contracts of over \$58.9 million. Construction, demolition, and renovation of facilities and infrastructure are a regular activity of an operational USAF base and contribute to the base's overall economic impact to the local region from the use of labor and supplies. Expenditures for facilities and infrastructure would continue to be required as facilities and infrastructure age and need to be replaced or upgraded.

Population

As of 2018, the population in the two-county ROI totaled 136,718 people. As shown in Table 3.5-9, Pennington County comprises the largest proportion of the population in the ROI and is projected to experience the largest increase in population out of the two counties that comprise the ROI. Table 3.5-10 presents the total number of military, dependents, and civilian employees supported by Ellsworth AFB.

Table 3.5-9. Population Estimates and Projections for Ellsworth AFB Region of Influence

Geographic Area	Census 2010	Estimated 2018	Projected 2025	Average Annual Change	
				2010–2018	2018–2025
Meade County	25,434	27,424	27,805	0.9%	0.2%
Pennington County	100,948	109,294	119,876	1.0%	1.3%
Total ROI	126,382	136,718	147,681	1.0%	1.1%
South Dakota	814,180	864,289	922,748	0.7%	0.9%

Source: (U.S. Census Bureau, 2010; U.S. Census Bureau, 2018a; South Dakota Department of Labor and Regulation, 2016)

% = percent; AFB = Air Force Base; ROI = region of influence

Table 3.5-10. Personnel Estimates at Ellsworth AFB, Fiscal Year 2016

Personnel ¹	Number of Individuals
Active Military	3,196
Civilian ²	930
Contractor	139
Spouses ³	2,346
Children ³	3,985
Total	10,596

Source: (Ellsworth AFB, 2016a)

AFB = Air Force Base

Notes:

1. Does not include private businesses on base (branch banks/credit union) or retirees
2. Includes appropriated and non-appropriated fund civilians
3. Numbers of spouses and children were extrapolated from the total dependent number of 5,111, assuming 55 percent of military and civilian personnel are married and the remaining dependents are children.

Economy, Employment, and Income

Ellsworth AFB has a major influence on the regional economy. As of FY16, the total annual economic impact of Ellsworth AFB to the local area was over \$359 million. The 2016 *Economic Impact Statement for Ellsworth AFB* calculated payroll, expenditures and indirect jobs associated with the base (see Table 3.5-11) (Ellsworth AFB, 2016a).

Table 3.5-11. Economic Impact of Ellsworth AFB, Fiscal Year 2016

Category	Total
Annual Payrolls By Classification	
Appropriated Fund Military	\$191,341,005
Appropriated Fund Civilians	\$34,207,504
Non-Appropriated Fund, Contract, Civilians, and Private Business	\$10,625,197
Total Annual Payroll	\$236,173,707
Annual Expenditures	
Total Annual Expenditures and Contracts	\$58,971,998
Value of Indirect Jobs	
Estimated Number of Indirect Jobs Created	1,601
Average Annual Pay for the Local Community	40,181
Total Annual Dollar Value of Jobs Created	\$64,329,781
Total Economic Impact of Ellsworth AFB	\$359,475,486

Source: (Ellsworth AFB, 2016a)

AFB = Air Force Base

Notes:

1. Values rounded to nearest whole number

In 2018, there were 93,844 jobs throughout the Ellsworth AFB ROI (Meade and Pennington Counties combined) approximately 8,909 more jobs than in 2010. This indicates a 1.25-percent average annual increase in the number of full-time and part-time jobs in the ROI (Bureau of Economic Analysis, 2019). As shown in Table 3.5-12, the largest employment sectors in terms of the number of jobs were the government and government enterprises sector, the health care and social assistance sector, and the retail trade sector.

Table 3.5-13 compares several economic characteristics in Meade and Pennington County with the state of South Dakota and the nation.

Table 3.5-12. Total Full-Time and Part-Time Employment (Number of Jobs) by Industry in Meade County and Pennington County, 2018

Industry	Total Number of Jobs			Percent of Total Employment in the ROI
	Meade County	Pennington County	Total ROI	
Forestry, Fishing, and related activities	NA	346	NA	NA
Mining, quarrying, and oil and gas extraction	NA	292	NA	NA
Utilities	NA	220	NA	NA
Construction	1,362	5,417	6,779	7.2
Manufacturing	403	2,792	3,195	3.4
Wholesale Trade	NA	2,342	NA	NA
Retail Trade	1,279	10,116	11,395	12.1
Transportation and Warehousing	526	1,995	2,521	2.7
Information	81	937	1,018	1.1
Finance and Insurance	527	4,353	4,880	5.2
Real Estate and rental and leasing	754	4,032	4,786	5.1
Professional, scientific, and technical services	NA	3,518	NA	NA
Management of companies and enterprises	NA	987	NA	NA
Administrative and support and waste management and remediation services	408	2,889	3,297	3.5
Educational Services	78	1,546	1,624	1.7
Health Care and Social Assistance	699	11,288	11,987	12.8
Arts, Entertainment, and Recreation	237	1,952	2,189	2.3
Accommodation and Food Services	973	8,493	9,466	10.1
Other Services	864	4,602	5,466	5.8
Government and Government Enterprises	3,101	11,930	15,031	16.0
Total Employment	13,237	80,607	93,844	100.0

Source: (Bureau of Economic Analysis, 2019)

NA = not available but included in total; ROI = region of influence

Table 3.5-13. Selected Economic Characteristics, Ellsworth AFB Region of Influence

Geographic Area	Average Annual Unemployment Rate	Per Capita Income	Median Household Income	Percent of Population with Incomes Below Poverty Level
Meade County	1.4%	\$28,654	\$59,218	7.4%
Pennington County	3.8%	\$30,518	\$55,024	13.4%
South Dakota	3.5%	\$29,801	\$56,499	13.6%
United States	5.9%	\$32,621	\$60,293	14.1%

Source: (U.S. Census Bureau, 2018b)

% = percent; AFB = Air Force Base

Housing

Approximately 33.7 percent (1,076 people) appropriated fund military personnel live on base while the remaining 66.3 percent (2,120 people) live off base. As of 2016, there were 435 on-base privatized housing units and 641 dorm rooms at Ellsworth AFB (Ellsworth AFB, 2016a). The communities that support the off-base personnel include the city of Box Elder, the unincorporated area of Ashland Heights, and Rapid City. Table 3.5-14 displays several housing characteristics in the two-county ROI.

Table 3.5-14. Selected Housing Characteristics, Ellsworth AFB Region of Influence

Geographic Area	Total Housing Units	Occupied Units	Vacant Units	Owner Occupied Units	Renter Occupied Units	Homeowner Vacancy Rate	Median Value of Owner Occupied Units	Median Gross Rent
Meade County	11,931	10,912	1,019	73.8	26.2	1.9	\$180,500	\$860
Pennington County	48,151	43,598	4,553	68.8	31.2	0.8	\$179,900	\$824

Source: (U.S. Census Bureau, 2018c)

AFB = Air Force Base

The Rapid City housing market, which includes Rapid City, Box Elder, Piedmont, Elk Creek and Nemo Road and Hermosa, is currently characterized by high demand, low inventory and rising prices. Strong demand for housing is attributed to the growth in the number of jobs and younger couples entering the market (U.S. News, 2019). As of March 2020, the median value of a home in Rapid City was \$212,403, representing an increase of 5.0 percent from the previous year (Zillow, 2020a). The median rent in the city in March was approximately \$1,175 (Zillow, 2020a). The city of Box Elder also experienced an increase in the median value of homes over the past year. As of March 2020, the median home value in Box Elder was approximately \$229,632, representing an increase of 3.9 percent over the previous year (Zillow, 2020b).

Education

There are no public schools located on Ellsworth AFB. Dependents of USAF personnel would be expected to attend one of the schools in the ROI. Table 3.5-15 lists the school districts within the two-county ROI, the total enrollment, full-time teachers employed, and the number of students per teacher for each district.

Table 3.5-15. Schools, Ellsworth AFB Region of Influence

County	School District ¹	Number of Schools	Total Enrollment ²	Total Teacher FTE ³	Number of Students Per Teacher ^{3,4}
Meade	Meade School District 46-1	12	2,877	200	14
Meade	Faith School District 46-2	4	177	15	12
Pennington	Douglas School District 51-1	5	2,927	184	16
Pennington	Hill City School District 51-2	3	457	34	14
Pennington	New Underwood School District 51-3	3	236	17	14
Pennington	Rapid City Area School District 51-4	25	13,832	859	16
Pennington	Wall School District 51-5	4	271	23	12
Total ROI		56	20,777	1,330	16

Source: (National Center for Education Statistics, 2019)

AFB = Air Force Base; FTE = full-time employee

Notes:

1. Does not include Black Hills Special Services Cooperative in Meade County as there was 0 total enrollment during the 2018-2019 school year.

2. Total enrollment during the 2018-2019 school year.

3. Rounded to nearest whole number.

4. Number of students per teacher is calculated by the total enrollment divided by the total full-time teachers in each district.

The Rapid City Area School (RCAS) district is the second largest district in the state (RCAS, 2020a). The Rapid City Six Year Plan includes construction of a new elementary school and middle school and renovations to local elementary and high schools. District-wide renovations and upgrades are estimated to cost over \$12.5 million (RCAS, 2020b). Several long-term closures include Canyon Lake, Robbinsdale, Wilson, and Horace Mann (RCAS, 2020b). The student to teacher ratio in South Dakota schools is 14:1 (Public School Review, 2020).

Public Services

Public services include emergency, police, and medical services and are provided by the county and city governments in the ROI and other government agencies. Expenditures and revenues define the level of service that may be provided as well as specific service metrics. Changes in the population would affect the demand for these services as well as the ability to fund them.

In 2020, the national average of the number of active primary care physicians per 1,000 population is estimated at 1.596. Active care physicians include physicians in general practice, family practice, obstetrics and gynecology, pediatrics, geriatrics and internal medicine (America's Health Rankings, 2020).

The average number of officers per county agency in 2018 was 2.8 per 1,000 inhabitants, as reported to the Federal Bureau of Investigation's Uniform Crime Reporting Program (U.S. Department of Justice, 2018a). In 2018, there were 50 total law enforcement employees (officers and civilians) in Meade County and 406 total law enforcement employees in Pennington. Based on the 2018 population estimates (as shown in Table 3.5-9), the estimated total law enforcement per 1,000 residents would equate to approximately 1.5 in Meade County and 3.7 in Pennington County (U.S. Department of Justice, 2018c).

A report on fire departments within the United States estimated the national average of career firefighters per 1,000 residents at 1.81, with the average number of volunteers per 1,000 residents at 6.06 (Evarts and Stein, 2020). The ratios are not intended to provide a threshold or recommendation of personnel per residents, but rather identify conditions on average throughout the nation.

Airspace and Range Utilization

As stated in Section 2.3.3 (Airspace and Range Utilization), the PRTC airspace would be the primary training area for B-21 aircraft operations at Ellsworth AFB. Socioeconomic impacts resulting from the use of the PRTC are described in detail in the 2014 PRTC EIS and associated ROD (USAF, 2014a). These impacts include property values, civil aviation, energy resource development, noise disturbances, and a risk of fire from chaff and flares.

Interviews conducted during the development of the 2014 PRTC EIS revealed that the existence of the Powder River A or B MOAs was not used in determining the value of a property. The complex nature of property valuation factors makes any estimation of the potential effects of airspace modifications on land values highly speculative. Ranching operations, communities, and private airports all exist and function under the existing Powder River MOAs. Other socioeconomic factors, such as business activity, employment, interest rates, and land scarcity (or availability) are much more likely to affect property values than training airspace. Training flight activity associated with the PRTC is not expected to affect the value of property under the airspace (USAF, 2014a, pp. 4-118).

As indicated in the 2014 PRTC EIS, civil aviation and public airports have the potential to be impacted as a result of communication requirements by private pilots. The extent of impacts would be dependent on scheduling, the duration of the ground holds, and the amount of time that the MOAs were active (USAF, 2014a, pp. 4-123). If all the airspace were activated, the airspace use and related activities associated with the PRTC could result in delay, uncertainty, or other impacts. A change in airspace use for military training could be seen by civil airspace users as an adverse impact on the human, social, or economic resources of the region (pp. 4-123).

Based on the 2014 PRTC EIS, no impacts to elevated ground structures, wind farms, oil and gas, or mining are expected (USAF, 2014a, pp. 4-128). Therefore, there are no anticipated impacts to energy resource development under the PRTC airspace.

As indicated in the 2014 PRTC EIS, the EPA has identified a DNL of 55 dB to be the level below which no effects on public health and welfare would occur (USAF, 2014a; EPA, 1974). Noise levels in areas under the PRTC are below this level. The relatively low acoustical effect is attributed to the dispersion of training flights into a large volume of airspace (USAF, 2014a, pp. 4-125). Although noise is below the EPA-identified level, the sudden and unexpected nature of infrequent, low-level or supersonic events during low-flying exercises could cause surprise and annoyance. Due to the low population density under the PRTC low-level airspace and the infrequent number of annual events, the 2014 PRTC EIS concluded that it is highly unlikely that flight activity associated with the PRTC would result in significant social or economic impacts to the region. Under the No Action Alternative, noise levels in the PRTC would range from less than 35 to 46.1 dB L_{dnmr} . However, B-1 operations would be ongoing; therefore, there is still the potential for impacts from low-level flights.

Another potential socioeconomic impact evaluated in the 2014 PRTC EIS was the potential economic loss associated with a fire, particularly with flare use. There are minimum deployment altitude restrictions of 2,000 feet AGL and no flare use during extreme fire conditions. The USAF has established procedures for claims in the unlikely event that a USAF-caused fire should occur and subsequently damage livestock or infrastructure (USAF, 2014a, pp. 4-129).

3.5.2.2 Dyess AFB Alternative

3.5.2.2.1 Personnel

Table 3.5-16 presents the approximate end state of personnel for the Dyess AFB Alternative. Under this alternative, there would be an additional 1,645 military personnel at Dyess for a total end state of 6,014 active military personnel and 665 civilian personnel.

Table 3.5-16. Personnel Estimates in the Region of Influence Under the Dyess AFB Alternative

Personnel	Number of Individuals				
	No Action Alternative	B-1 Departing	B-21 Incoming	End State	Change
Active Military	4,369	1,855	3,500	6,014	1,645
Civilian	665	0	0	665	0
Contractor	0	0	0	0	0
Spouses	2,769	1,020	1,925	3,674	905
Children	2,342	872	2,275	3,745	1,403
Total	10,145	3,747	7,700	14,098	3,953

There would be approximately 4,200 dependents accompanying the 3,500 active military personnel associated with the B-21 beddown. Once the personnel and dependents associated with the B-1 aircraft depart, there would be a total change in the ROI population of 3,953 people (see Table 3.5-17). Additional personnel and dependents associated with this alternative would result in an increase in the average annual percentage growth rate to the region which is currently projected at 0.4 percent through 2025. The incoming and outgoing personnel would be anticipated to occur in phases over multiple years and would not be anticipated to occur all at once.

Table 3.5-17. Population Estimates in the Region of Influence Under the Dyess AFB Alternative

No Action Alternative (as of 2025)	End State (as of 2025)	Change in Population ¹
176,064	180,017	3,953

Note:

1. Based on the assumption that the 3,953 personnel and dependents associated with the Dyess AFB Alternative would arrive by 2025.

The increased employment and payroll of 1,645 new USAF jobs would be expected to have a positive, long-term economic impact on the regional economy. The direct employment of USAF personnel would result in indirect and induced employment. Estimates for the total change in the number of direct jobs associated with this alternative and the number of indirect jobs and income generated are shown in Table 3.5-18. The total active duty and civilian personnel under the Dyess AFB Alternative would result in approximately 2,232 indirect jobs with an estimated total value of \$93,320,338.

Table 3.5-18. Estimated Indirect Jobs and Value in the Region of Influence Under the Dyess AFB Alternative

Type of Personnel	No Action Alternative	End State	Change
Active Military	4,369	6,014	1,645
Civilian	665	665	0
Total Base Direct Jobs¹	5,034	6,679	1,645
Total Indirect Jobs	1,553	2,232	477
Value of Indirect Jobs	\$64,929,258	\$84,874,718	\$19,945,461

Note:

1. Total base direct jobs include active military and civilian employed by the Air Force and does not include contractors.

There would be an increase in housing demand in the Abilene Metropolitan Statistical Area as a result of the additional personnel. On base housing and dorms would be expected to continue to accommodate 977 military personnel. Construction of a new 62,000 square foot dorm would be part of this alternative which would house enlisted personnel on the base.

It is assumed that with the additional dormitory, the distribution of personnel living on base and off base would be the same as under baseline conditions in which 22.4 percent of active military members would reside on base and the remaining 77.6 percent active military personnel would reside off base. Based on this assumption, approximately 1,347 military personnel would reside on base and 4,667 personnel would reside off base. Taking into consideration the 9 percent of military personnel that are married to other military personnel, there would be an estimated demand for 4,282 housing units associated with an end state of 6,014 active military personnel. The number of homes in the community to support off base military members would be approximately 1,170 more than under the No Action Alternative. The estimated demand for housing associated with the USAF personnel under this alternative is shown in Table 3.5-19.

Table 3.5-19. Estimated Housing Units Demanded in the Region of Influence Under the Dyess AFB Alternative

Type of Personnel and Unit	No Action Alternative ^a	End State	Change
Active Military	4,369	6,014	1,645
Personnel On Base	977	1,347 ^b	370
Personnel Off Base	3,392	4,667	1,275
Total Off-Base Housing Units Demanded^{c,d}	3,112	4,282	1,170

Notes:

a. Based on actual personnel numbers living on base and off base as reported in Dyess AFB *Economic Impact Statement* in which 22.4 percent appropriated fund military live on base and 77.6 percent live off base (Dyess AFB, 2018a).

b. The construction of a new 62,000-square-foot dormitory as part of the Dyess AFB Alternative would be anticipated to result in additional rooms for active military personnel and the distribution of military personnel on- and off base would remain as under existing conditions in which 22.4 percent of active military reside on base and 77.6 percent of active military reside off base.

c. Takes into consideration 9 percent of the active military members married to another active military member (AFPC, 2020).

d. Does not take into consideration housing demanded from migration of population fulfilling indirect jobs created by the direct Air Force personnel.

The increased cost of housing and the availability of jobs would be expected to increase the average number of people per household. Housing costs could continue to rise as supply tries to catch up with demand before leveling off as new housing is constructed. As indicated in Table 3.5-7, there are approximately 10,865 vacant housing units throughout the three-county ROI (U.S. Census Bureau, 2018c). Any lack of affordable homes in the interim may require homebuyers to expand their search to include areas outside their desired location and price range.

Any direct, indirect, and induced employment (number of jobs) associated with construction activities would likely require an in-migration of workers. Workers would be anticipated to require lodging and housing during the term of their employment which would last for the duration of the construction activity. It would be anticipated that once the activity is complete, workers would leave the ROI. Therefore, the demand for housing would be even greater during construction activity in the short term.

The estimated total number of children dependents (ranging in ages of 0 to 22 years) associated with the Dyess AFB Alternative at the end state would be 3,745 children. Based on the assumptions described in Section 3.5.1.3 (Socioeconomics, Analysis Methodology), there would be an estimated end state of 1,940 school-aged children associated with USAF personnel assigned to Dyess AFB representing an additional 726 school-aged students to school districts within the ROI compared to the No Action Alternative. Table 3.5-20 shows the estimated number of incoming students as a result of the beddown at Dyess AFB. A maximum of 49 teachers could potentially be required to maintain the average student to teacher ratio in the ROI of 15:1. Students would be of varying ages and would attend one of the many schools throughout the ROI. Additional students may result in larger class sizes and additional pressure on school resources and expenditures. However, additional students would also contribute to revenue generated.

Table 3.5-20. Total School Age Children Enrolling in the Region of Influence Under the Dyess AFB Alternative

Dependent Age Range	No Action Alternative	End State	Change
0 to 5 years	1,046	1,674	628
5 to 18 years (i.e., school age)	1,214	1,940	726
18 to 22 years	82	131	49
Total Children Dependents	2,342	3,745	1,403

A total end state of 14,098 personnel and dependents under this alternative would result an increase of 3,953 personnel and dependents compared to the No Action Alternative. The additional population would result in increased demand for public services such as police, fire, and medical services. Public service personnel would also be needed to support indirect workers and their families during construction. Public service personnel would compete with all others for housing in the ROI.

Table 3.5-21 shows the estimated maximum number of additional public service professionals that may be associated with the additional population to meet the existing national level of service average by personnel type. The level of service, such as response times, could potentially be impacted in the short run if there is a large influx of

personnel in a short period of time but would adjust as more public service personnel jobs become available and positions are filled.

Table 3.5-21. Estimated Number of Public Service Professionals in the Region of Influence Under the Dyess AFB Alternative

Profession	Multiplier (per 1,000 capita)	No Action Alternative	End State	Change
Medical Professionals	1.59	16	22	6
Career Fire Fighters	1.81	18	26	7
Volunteer Fire Fighters	6.06	61	85	24
Law Enforcement	2.80	28	39	11

3.5.2.2.2 Airfield Operations

Under this alternative, approximately 496 people are estimated to reside within noise levels of 65 dB DNL or greater. This represents a decrease of 922 people residing within the 65 dB DNL and greater noise contours than the No Action Alternative in which an estimated 1,419 people reside within the 65 dB DNL and greater noise contours. As such, the number of homes whose property values are adversely impacted by aircraft noise would decrease under this alternative.

3.5.2.2.3 Airspace and Range Utilization

Socioeconomic resources in areas under airspace can be impacted by increased noise. However, noise levels in Lancer MOA would be less than 35 dB L_{dnmr} and the conclusions associated with the 2000 *Realistic Bomber Training Initiative EIS* (USAF, 2000) would continue to be valid. Additionally, as stated in Section 3.2.2(Noise, Environmental Consequences), noise levels in the Lancer MOA would be reduced by 8.4 dB L_{dnmr} from the No Action Alternative baseline.

Potential socioeconomic impacts resulting from airspace use at the Pecos MOA are evaluated in the *New Mexico Training Range Initiative EIS* (USAF, 2006). The EIS determined that expanded airspace and low-altitude flights would not be expected to result in any significant impacts to humans, livestock, economic pursuits, or land values in the region (USAF, 2006, pp. 2-40). Noise analysis did not exceed thresholds for adverse noise impacts (USAF, 2006). The *New Mexico Training Range Initiative EIS* used the EPA level of 55 dB (EPA, 1974) to determine potential impacts. Noise levels in the Pecos MOA would be 36.9 dB L_{dnmr} and the conclusions associated with the New Mexico Training Range Initiative EIS would continue to be valid. Additionally, as stated in Section 3.2.2(Noise, Environmental Consequences), noise levels in the Pecos MOA would be reduced by 19 dB L_{dnmr} from the No Action Alternative baseline.

Noise levels in the Brownwood MOA would be less than 35 dB DNL (Section 3.2.2.2.3, Noise, Dyess AFB Alternative, Airspace and Range Utilization), which is less than the EPA level of 55 dB DNL below which no effects to public health and welfare would occur (EPA, 1974). In addition, operations in the Brownwood MOA would decrease by 13 operations annually (see Section 3.1.2.2.2, Airspace, Airspace and Range Utilization). Since noise levels would remain unchanged and operations are decreasing, no significant economic impacts would occur in the Brownwood MOA.

Socioeconomic impacts resulting from the use of the PRTC are described in detail in the 2014 PRTC EIS and associated ROD (USAF, 2014a). These impacts include property values, civil aviation, energy resource development, and noise disturbances.

As stated in Section 3.5.2.1.1 for the No Action Alternative, interviews conducted during the development of the 2014 PRTC EIS revealed that the existence of the Powder River A or B MOAs was not used in determining the value of a property. The complex nature of property valuation factors makes any estimation of the potential effects of airspace modifications on land values highly speculative. Ranching operations, communities, and private airports all exist and function under the existing Powder River MOAs. Other socioeconomic factors, such as business activity, employment, interest rates, and land scarcity (or availability) are much more likely to affect property values than training airspace. Training flight activity under the PRTC is not expected to affect the value of property under the airspace (USAF, 2014a, pp. 4-118). However, if noise was used as a component to determine property values, the range of noise levels across the PRTC is 35 to 46.1 dB L_{dnmr} , which is the same range as the No Action Alternative. In either case, noise levels are well below the EPA level of 55 dB DNL below which no effects to public health and welfare would occur (EPA, 1974).

Impacts associated with civil aviation and public airports described under the No Action Alternative would continue to occur under the Dyess AFB Alternative. As stated in the 2014 PRTC EIS, the extent of impacts would be dependent on scheduling, the duration of the ground holds, and the amount of time that the MOAs were active (USAF, 2014a, pp. 4-123). If all the airspace were activated, the airspace use and related activities associated with the PRTC could result in delay, uncertainty, or other impacts. A change in airspace use for military training could be seen by civil airspace users as an adverse impact on the human, social, or economic resources of the region (USAF, 2014a, pp. 4-123). Annual operations within the PRTC for the Dyess AFB Alternative would be 2,760 operations, which is 18 fewer operations than the No Action Alternative. Additionally, PRTC-related B-21 air operations would adhere to the legal descriptions for the PRTC MOAs published in the National Flight Data Digest (effective date: September 17, 2015). As a result, it is anticipated that civil aviation issues under the Dyess AFB Alternative would be minimal.

Since PRTC-related B-21 air operations would adhere to the legal descriptions for the PRTC MOAs published in the National Flight Data Digest (effective date: September 17, 2015), it is anticipated that the conclusions from the 2014 PRTC EIS would remain valid. The 2014 PRTC EIS states, "No impacts to elevated ground structures, wind farms, oil and gas, or mining are expected," (USAF, 2014a, pp. 4-128). Consequently, there are no anticipated impacts to energy resource development under the PRTC.

Noise levels in areas under the PRTC airspace range from less than 35 to 46.1 dB L_{dnmr} . As indicated in the 2014 PRTC EIS, the EPA has identified a DNL of 55 dB to be the level below which no effects on public health and welfare would occur (USAF, 2014a; EPA, 1974). As the B-1 retires, low-level flights would be greatly reduced. Since the B-21 generally would not fly at low altitudes, concerns regarding the sudden and unexpected nature of infrequent, low-level or supersonic events during low-flying exercises and associated surprise and annoyance impacts would be alleviated.

3.5.2.2.4 Facilities and Infrastructure

New construction, demolition, and modifications to facilities and infrastructure would result in direct, indirect, and induced economic impacts in the ROI. Cost details regarding the facilities and infrastructure are not available at the time of this EIS. However, it would be anticipated that construction, demolition, and renovations for base facilities and infrastructure would result in near-term economic benefits to the ROI driven by an increase in construction spending. Construction-related impacts would last for the duration of the activities.

3.5.2.2.5 Weapons Generation Facility

Potential impacts to socioeconomic resources from the construction of the WGF would result in direct, indirect, and induced economic impacts in the ROI. Cost details regarding the facility and infrastructure are not available at the time of this EIS. However, it would be anticipated that construction would result in near-term economic benefits to the ROI driven by an increase in construction spending. Construction-related impacts would last for the duration of the activities.

3.5.2.2.6 Snapshot

The snapshot analysis presents a maximum case scenario in which it would be assumed that a portion of the personnel and dependents associated with the B-1 aircraft are still present in the community and have yet to migrate out of the area. Therefore, the number of people would be greater under this scenario than under the Dyess AFB Alternative resulting in greater potential impacts but that would only be temporary until the transition is final.

There would be 14,673 USAF personnel (active duty and civilians), contractors, and dependents under this scenario, representing an increase of 4,528 people compared to the No Action Alternative at Dyess AFB. There would also be an increase of an estimated 2,497 dependents over baseline levels of which approximately 772 would be children of school age (i.e., 5 to 18 years old) entering the local area schools. The crowding of students would likely increase the student to teacher ratio and put additional pressure on school resources but would be temporary during the transition. The direct employment of 6,022 military and 665 civilian personnel jobs would create indirect and induced employment of an additional 531 jobs for a total additional value of \$22,200,692 compared to the No Action Alternative. However, this impact would also be temporary during the transition period. The 6,200 USAF military personnel associated with the Snapshot Scenario would result in approximately 4,853 military personnel residing off base and demand for 4,452 housing units, approximately 1,340 more housing units compared to under the No Action Alternative. Construction workers and secondary workers would also require housing and compete for affordable housing. There would be a demand for additional public service personnel throughout the Abilene Metropolitan Statistical Area, which may or may not require a temporary hire of additional public service personnel. For example, an additional 4,528 people to the population in the ROI may require up to an additional 7 medical professionals, 8 career firefighters, 27 volunteer firefighters, and 13 law enforcement professionals to keep the personnel per capita ratios similar to the existing national averages.

3.5.2.2.7 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

The USAF would work with the local community to assist in any way possible with the planning for increased population and increased requirements for support.

3.5.2.3 Ellsworth AFB Alternative (Preferred Alternative)

3.5.2.3.1 Personnel

Table 3.5-22 presents the approximate end state of personnel for the Ellsworth AFB Alternative. Under this alternative, there would be an additional 1,664 military personnel at Ellsworth AFB for a total end state of 4,860 active military personnel, 930 civilian personnel, and 139 contractors.

Table 3.5-22. Personnel Estimates in the Region of Influence Under the Ellsworth AFB Alternative

Personnel	Number of Individuals				
	No Action Alternative	B-1 Departing	B-21 Incoming	End State	Change
Active Military	3,196	1,836	3,500	4,860	1,664
Civilian	930	0	0	930	0
Contractor	139	0	0	139	0
Spouses	2,346	1,010	1,925	3,261	915
Children	3,985	1,707	2,275	4,553	568
Total	10,596	4,553	7,700	13,743	3,147

There would be approximately 4,200 dependents accompanying the 3,500 active military personnel associated with the B-21 beddown. Once the personnel and dependents associated with the B-1 aircraft depart, there would be a total change in the ROI population of 3,147 people (see Table 3.5-23). Additional personnel and dependents associated with this alternative would result in an increase in the average annual percentage growth rate to the region which is currently projected at 1.1 percent through 2025. The incoming and outgoing personnel would be anticipated to occur in phases over multiple years and would not be anticipated to occur all at once.

Table 3.5-23. Population Estimates in the Region of Influence Under the Ellsworth AFB Alternative

No Action Alternative (as of 2025)	End State (as of 2025)	Change in Population ¹
147,681	150,828	3,147

Note:

1. Based on the assumption that the 3,147 personnel and dependents associated with the Ellsworth AFB Alternative would arrive by 2025.

The increased employment and payroll of 1,664 new USAF jobs would be expected to have a positive, long-term economic impact on the regional economy. The direct employment of USAF personnel would result in indirect and induced employment. Estimates for the total change in the number of direct jobs associated with this alternative and the number of indirect jobs and income generated are shown in Table 3.5-24. The

total active duty and civilian personnel under this alternative would result in approximately 2,110 indirect jobs with a total value of \$86,518,200.

Table 3.5-24. Estimated Indirect Jobs and Value in the Region of Influence Under the Ellsworth AFB Alternative

Type of Personnel	No Action Alternative	End State	Change
Active Military	3,196	4,860	1,664
Civilian	930	930	0
Total Base Direct Jobs¹	4,126	5,790	1,664
Total Indirect Jobs	1,528	2,110	582
Value of Indirect Jobs	\$62,639,800	\$86,518,200	\$23,878,400

Note:

1. Total base direct jobs include active military and civilian employed by the USAF and does not include contractors.

There would be an increase in housing demand in Meade and Pennington Counties as a result of the additional personnel. On base housing and dorms would be expected to continue to accommodate 1,076 military personnel. Construction of additional dormitories would be part of this alternative which would house enlisted personnel on the base. It is assumed that with the additional dormitories, the distribution of personnel living on base and off base would be the same as baseline conditions in which 33.7 percent of active military members would reside on base and the remaining 66.3 percent active military personnel would reside off base. Therefore, approximately 1,638 military personnel would reside on base and 3,222 personnel would reside off base. Taking into consideration the 9 percent of military personnel that are married to other military personnel, there would be demand for 2,956 housing units associated with an end state of 4,860 active military personnel. The number of homes in the community to support off base military members would be approximately 1,011 more than under the No Action Alternative.

The estimated demand for housing associated with the USAF personnel under this alternative is shown in Table 3.5-25.

Table 3.5-25. Estimated Housing Units Demanded in the Region of Influence Under the Ellsworth AFB Alternative

Type of Personnel and Unit	No Action Alternative ¹	End State	Change
Active Military	3,196	4,860	1,664
Personnel On Base ²	1,076	1,638	562
Personnel Off Base	2,120	3,222	1,102
Total Off-Base Housing Units Demanded^{3,4}	1,945	2,956	1,011

Notes:

1. Based on actual personnel numbers living on base and off base as reported in Ellsworth AFB *Economic Impact Statement* in which 33.7 percent appropriated fund military live on base and 66.3 percent live off base (Ellsworth AFB, 2016a).

2. Construction of additional dormitories as part of the Ellsworth AFB Alternative would be anticipated to result in additional rooms for active military personnel and the distribution of military personnel on- and off base would remain as under existing conditions in which 33.7 percent of active military reside on base and 66.3 percent of active military reside off base.

3. Takes into consideration 9 percent of the active military members married to another active military member (AFPC, 2020).

4. Does not take into consideration housing demanded from migration of population fulfilling indirect jobs created by the direct Air Force personnel.

The increased cost of housing and the availability of jobs would be expected to increase the average number of people per household. Housing costs could continue to rise as supply tries to catch up with demand before leveling off as new housing is constructed. As indicated in Table 3.5-14, there are approximately 5,572 vacant housing units throughout the two-county ROI (U.S. Census Bureau, 2018c). Any lack of affordable homes in the interim may require homebuyers to expand their search to include areas outside their desired location and price range.

Any direct, indirect, and induced employment (number of jobs) associated with construction activities would likely require an in-migration of workers. Workers would be anticipated to require lodging and housing during the term of their employment which would last for the duration of the construction activity. It would be anticipated that once the activity is complete, workers would leave the ROI. Therefore, the demand for housing would be even greater during construction activity in the short term.

The estimated total number of children dependents (ranging in ages of 0 to 22 years) associated with the Ellsworth AFB Alternative at the end state would be 4,553 children. Based on the assumptions described in Section 3.5.1.3 (Socioeconomics, Analysis Methodology), there would be an estimated end state of 2,359 school-aged children associated with USAF personnel assigned to Ellsworth AFB representing an additional 294 school-aged students to the surrounding school districts compared to the No Action Alternative. Table 3.5-26 shows the estimated number of students that would be entering the local school districts as a result of the beddown at Ellsworth AFB. A maximum of 18 teachers could potentially be required to maintain a student to teacher ratio of 16:1. Students would be of varying ages and would attend one of the many schools throughout the ROI. Additional students may result in larger class sizes and additional pressure on school resources and expenditures. However, additional students would also contribute to revenue generated.

Table 3.5-26. Total School Age Children Enrolling in the Region of Influence Under the Ellsworth AFB Alternative

Dependent Age Range	No Action Alternative	End State	Change
0 to 5 years	1,781	2,035	254
5 to 18 years (i.e., school age)	2,065	2,359	294
18 to 22 years	139	159	20
Total Children Dependents	3,985	4,553	568

A total end state of 13,743 personnel and dependents under this alternative would result in an increase of 3,147 personnel and dependents compared to the No Action Alternative. The additional population would result in increased demand for public services such as police, fire, and medical services. Public service personnel would also be needed to support indirect workers and their families and during construction. Public service personnel would compete with all others for housing in the ROI.

Table 3.5-27 shows the estimated number of public service professionals that may be associated with the additional population to meet the existing national level of service average by personnel type. The level of service, such as response times, could potentially be impacted in the short run if there is a large influx of personnel in a short period of time but would adjust as more public service personnel jobs become available and positions are filled.

Table 3.5-27. Estimated Number of Public Service Professionals in the Region of Influence Under the Ellsworth AFB Alternative

Profession	Multiplier (per 1,000 capita)	No Action Alternative	End State	Change
Medical Professionals	1.59	17	22	5
Career Fire Fighters	1.81	19	25	6
Volunteer Fire Fighters	6.06	64	83	19
Law Enforcement	2.80	30	38	9

3.5.2.3.2 Airfield Operations

Under this alternative, approximately 358 people are estimated to reside within noise levels of 65 dB DNL or greater. This represents a decrease of 1,627 people residing within the 65 dB DNL and greater noise contours than the No Action Alternative in which an estimated 1,985 people reside within the 65 dB DNL and greater noise contours. As such, there would be a less number of homes whose property values are adversely impacted by aircraft noise under this alternative.

3.5.2.3.3 Airspace and Range Utilization

Socioeconomic impacts resulting from the use of the PRTC are described in detail in the 2014 PRTC EIS and associated ROD (USAF, 2014a). These impacts include property values, civil aviation, energy resource development, noise disturbances.

As stated in Section 3.5.2.1.2 (No Action at Ellsworth AFB), interviews conducted during the development of the 2014 PRTC EIS revealed that the existence of the Powder River A or B MOAs was not used in determining the value of a property. The complex nature of property valuation factors makes any estimation of the potential effects of airspace modifications on land values highly speculative. Ranching operations, communities, and private airports all exist and function under the existing Powder River MOAs. Other socioeconomic factors, such as business activity, employment, interest rates, and land scarcity (or availability) are much more likely to affect property values than training airspace. Training flight activity associated with the PRTC is not expected to affect the value of property under the airspace (USAF, 2014a, pp. 4-118). However, if noise was used as a component to determine property values, the range of noise levels across the PRTC is 35 to 42 dB L_{dnmr} , which is less than the No Action Alternative. In either case, noise levels are well below the EPA level of 55 dB DNL below which no effects to public health and welfare would occur (EPA, 1974).

Impacts associated with civil aviation and public airports described under the No Action Alternative would continue to occur under the Ellsworth AFB Alternative. As stated in the 2014 PRTC EIS, the extent of impacts would be dependent on scheduling, the duration of the ground holds, and the amount of time that the MOAs were active (USAF, 2014a, pp. 4-123). If all the airspace were activated, the airspace use and related activities associated with the PRTC could result in delay, uncertainty, or other impacts. A change in airspace use for military training could be seen by civil airspace users as an adverse impact on the human, social, or economic resources of the region (USAF, 2014a, pp. 4-123). Annual operations within the PRTC for the Ellsworth AFB Alternative would be 3,921 operations, which is 1,143 more operations than the No Action Alternative. Typically, civil aviation would be impacted by this level of increase; however, PRTC-related B-21 air operations would adhere to the legal descriptions for the PRTC MOAs published in the National Flight Data Digest (effective date: September 17, 2015). As a result, it is anticipated that civil aviation issues under the Ellsworth AFB Alternative would be minimal.

Noise levels in areas under the PRTC would range from less than 35 to 42 dB L_{dnmr} . As indicated in the 2014 PRTC EIS, the EPA has identified a DNL of 55 dB to be the level below which no effects on public health and welfare would occur (USAF, 2014a; EPA, 1974). As the B-1 retires, low-level flights would be greatly reduced. Since the B-21 generally would not fly at low altitudes, concerns regarding the sudden and unexpected nature of infrequent, low-level or supersonic events during low-flying exercises and associated surprise and annoyance impacts would be alleviated.

3.5.2.3.4 Facilities and Infrastructure

New construction, demolition, and modifications to facilities and infrastructure would result in direct, indirect, and induced economic impacts in the ROI. Cost details regarding the facilities and infrastructure are not available at the time of this EIS. However, it would be anticipated that construction, demolition, and renovations for base facilities and infrastructure would result in near-term economic benefits to the ROI driven by an increase in construction spending. Construction-related impacts would last for the duration of the activities.

3.5.2.3.5 Weapons Generation Facility

Potential impacts to socioeconomic resources from the construction of the WGF would result in direct, indirect, and induced economic impacts in the ROI. Cost details regarding the facility and infrastructure are not available at the time of this EIS. However, it would be anticipated that construction would result in near-term economic benefits to the ROI driven by an increase in construction spending. Construction-related impacts would last for the duration of the activities.

3.5.2.3.6 Snapshot

The snapshot analysis presents a maximum case scenario in which it would be assumed that a portion of the personnel and dependents associated with the B-1 aircraft are still present in the community and have yet to migrate out the area. Therefore, the number of people would be greater under this scenario than under the Ellsworth AFB Alternative resulting in greater potential impacts but that would only be temporary until the transition is final.

There would be 14,398 USAF personnel (active duty and civilians), contractors, and dependents under this scenario, representing an increase of 3,802 people compared to the No Action Alternative at Ellsworth AFB. There would also be an increase of an estimated 1,755 dependents over baseline levels of which approximately 383 would be children of school age (i.e., 5 to 18 years old) and would be enrolled in the local school districts within the ROI. The crowding of students would likely increase the student to teacher ratio and put additional pressure on school resources but would be temporary during the transition. The direct employment of 5,044 military and 930 civilian personnel jobs would create indirect and induced employment of an additional 647 jobs for a total additional value of \$26,535,200 compared to the No Action Alternative. However, this impact would also be temporary during the transition period. The 5,044 USAF military personnel under the Snapshot Scenario would result in approximately 3,406 military personnel residing off base and demand for 3,125 housing units, approximately 1,180 more housing units compared to under the No Action Alternative. Construction workers and secondary workers would also require housing and compete for affordable housing. There would be a demand for additional public service personnel throughout Meade and Pennington Counties which may or may not require a temporary hire of additional public service personnel. For example, an additional 3,786 people to the population in the ROI may require up to an additional 6 medical professionals, 7 career firefighters, 23 volunteer firefighters, and 11 law enforcement professionals to keep the personnel per capita ratios similar to the existing national averages. However, it would be anticipated that extended work hours and extra volunteer hours of existing personnel would cover the temporary peak in demand.

3.5.2.3.7 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

The USAF would work with the local community to assist in any way possible with the planning for the increased population and increased requirements for support.

3.6 ENVIRONMENTAL JUSTICE

3.6.1 Environmental Justice, Affected Environment

3.6.1.1 Description of Resource

Analysis of environmental justice and other sensitive receptors is conducted pursuant to EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. Environmental justice addresses impacts to minority and low-income populations. If there is a potential for the Proposed Action to result in adverse impacts to resource areas that may affect human populations, analysis is conducted to determine whether environmental justice Communities of Comparison (COCs) would be disproportionately impacted. This analysis focuses on increased aircraft noise resulting from the Proposed Action as the primary impact to these populations. Noise from construction activities is not applicable because all construction would occur within installation boundaries and noise would be intermittent and temporary. Per USAF guidelines for environmental justice analysis, Census data (i.e., percentages of populations identifying themselves as minority, low-income, etc.) was used to determine potential impacts to these populations. The guidelines also address youth (under 18) and elderly (65 and older) as additional sensitive populations.

This analysis is completed to determine if implementation of the Proposed Action would result in disproportionate noise impacts to environmental justice populations (i.e., DNL of 65 dB or greater).

3.6.1.2 Region of Influence

Environmental justice analysis overlays the 65 dB DNL contour on the census data polygons. The smallest census data segment that has the information necessary for analysis of potential impacts to environmental justice populations is used to determine potential impacts. The smallest group of census data which contain the needed information for this analysis is the census “block group.” Each block group that is partially or wholly encompassed by the 65 dB DNL contour is defined as an ROI. There could be few or many ROIs for a specific environmental justice analysis, depending on the extent of the noise contour and the size of the block groups. The next higher level of census data is the census tract. Each census tract contains a number of block groups (ROIs).

For Dyess AFB, there are five census tracts containing six block groups, which are partially or wholly exposed to DNL of 65 dB or greater under baseline conditions (Figure 3.6-1). For Ellsworth AFB, there are seven census tracts containing 11 block groups which are partially or wholly exposed to DNL of 65 dB or greater under baseline conditions (Figure 3.6-2).

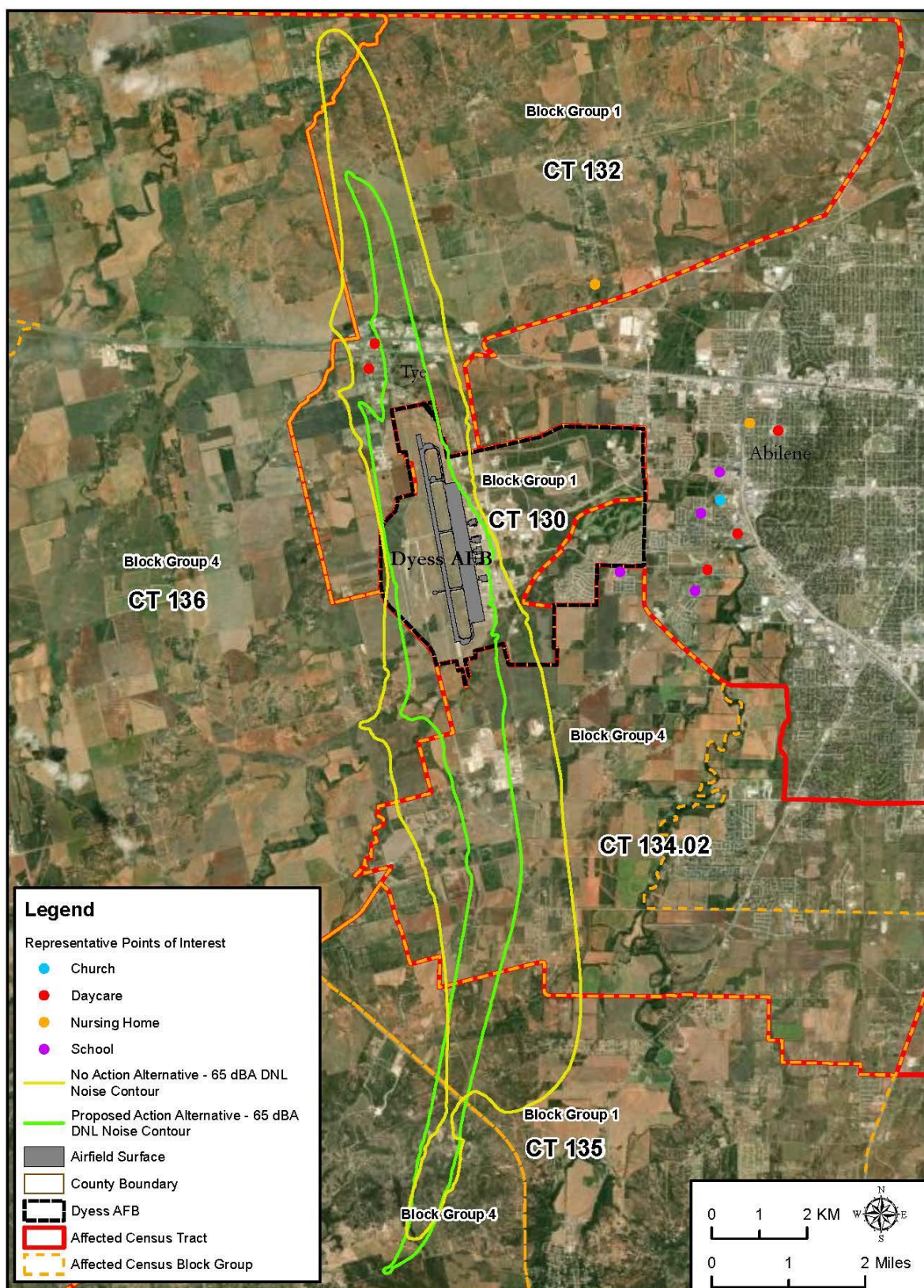


Figure 3.6-1. Dyess AFB Census Tracts and Block Groups Exposed to DNL of 65 dB or Greater Under Baseline and Proposed Action

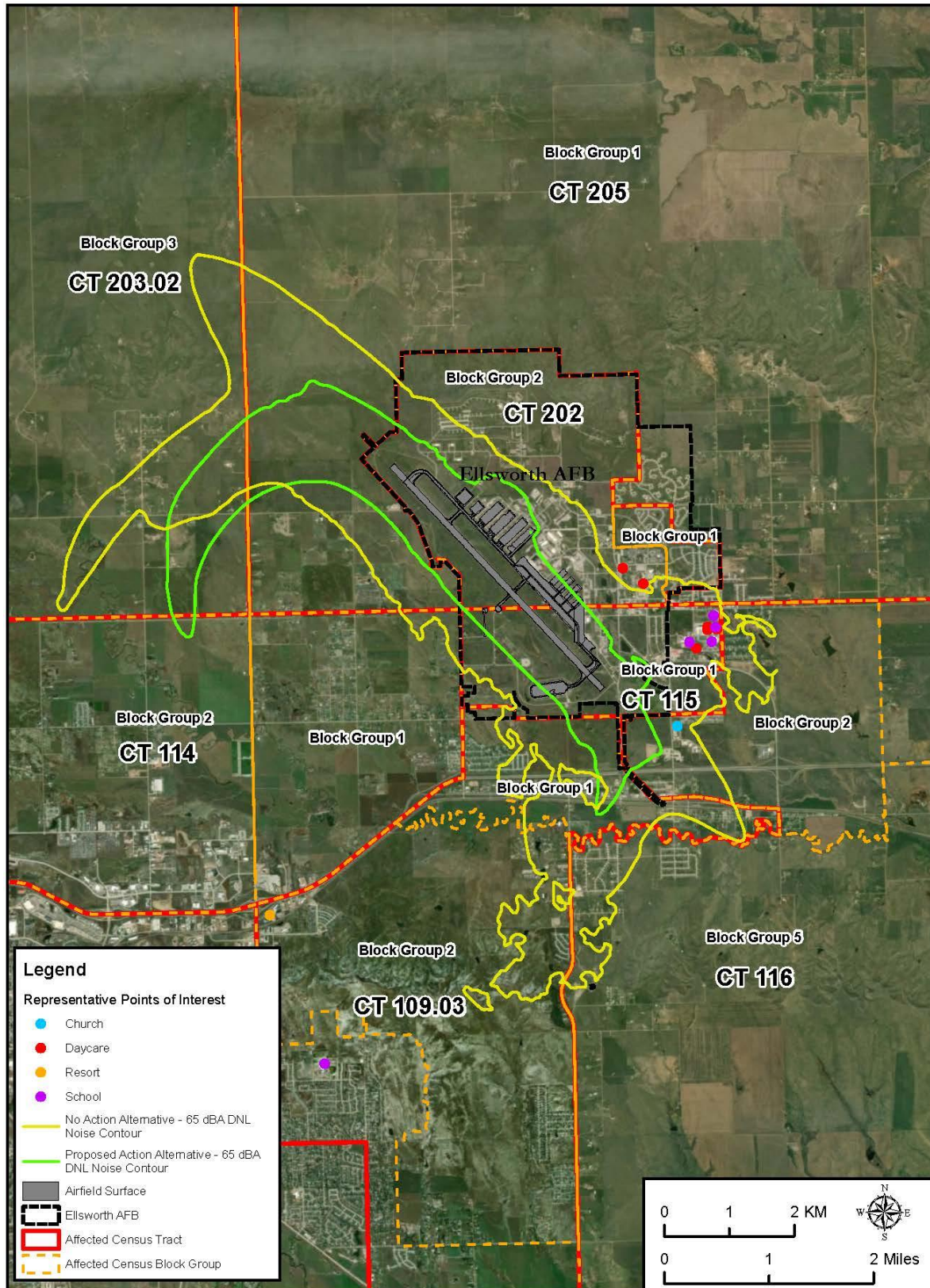


Figure 3.6-2. Ellsworth AFB Census Tracts and Block Groups Exposed to DNL of 65 dB or Greater Under Baseline and Proposed Action

3.6.1.2.1 Dyess AFB

Table 3.6-1 provides baseline demographic conditions in Taylor County, where Dyess AFB is located. Also shown in Table 3.6-1 is the existing proportion of environmental justice populations in the four census tracts located in the ROI at Dyess AFB (Figure 3.6-1). The four census tracts compose the COC for the environmental justice analysis. As identified in Table 3.6-1, the COC has a lower proportion of minority and low-income populations than Taylor County, the state of Texas, or the nation.

Under baseline conditions, two child care facilities (Alliance After School at the former Tye Elementary School and Tye Play and Learn) are currently exposed to DNL of 65 dB or greater (Figure 3.2-1). Alliance After School is within the DNL contour of 65 to 69 dB and Tye Play and Learn is within the DNL contour of 70 to 74 dB. Rister Park is located within the DNL contour of 70 to 74 dB. No hospitals or libraries are exposed to DNL of 65 dB or greater under baseline conditions.

3.6.1.2.2 Ellsworth AFB

Table 3.6-2 provides baseline demographic conditions in Meade and Pennington Counties, where Ellsworth AFB is located. Also shown in Table 3.6-2 is the existing proportion of environmental justice populations in the seven census tracts located in the ROI at Ellsworth AFB (Figure 3.6-2). The seven census tracts are the COC for the environmental justice analysis. As identified in Table 3.6-2, the COC has a higher proportion of minority populations than Meade County or the State of South Dakota. The COC has a higher proportion of low-income populations than Meade County. Under baseline conditions, eight daycare facilities or schools are exposed to DNL of 65 dB or greater. Figure 3.2-4 identifies these schools and the location within the various noise contours. Exposure ranges from the Douglas Middle School, which is located in the DNL contour of 65 to 69 dB to the Vandenberg Elementary School, which is located in the DNL contour of 75 to 79 dB. No hospitals or off-base libraries are exposed to DNL of 65 dB or greater under baseline conditions. Boykin Park is partially located within the DNL contour of 65 to 69 dB.

3.6.1.2.3 Airspace and Range Utilization

As described in Section 2.3 (Commonalities), the PRTC would be the primary training area for B-21 aircraft at Ellsworth AFB for aircraft operations. For Dyess AFB, the primary airspaces would be the Lancer and Pecos MOAs, as well as the PRTC and the Brownwood MOA for supplemental training. PRTC-related B-21 air operations would adhere to the legal descriptions for the PRTC MOAs published in the National Flight Data Digest (effective date: September 17, 2015).

As described in the 2014 PRTC EIS and associated ROD (USAF, 2014a), four reservations (Northern Cheyenne, Crow, Standing Rock, and Cheyenne River Reservations) are located under the PRTC airspace.

The alternative selected in the ROD for the 2014 PRTC EIS excludes overflights below 12,000 feet MSL over the Northern Cheyenne Reservation under portions of PR-1D. Therefore, disproportionately high and adverse impacts to minority persons on the Northern Cheyenne Reservation were not expected.

Table 3.6-1. Environmental Justice Communities and Sensitive Populations – Baseline Conditions (Dyess AFB)

Geographic Unit	Total Population	Population for Whom Poverty is Determined	Minority		Low-Income		Youth		Elderly	
			Number	Percent	Number	Percent	Number	Percent	Number	Percent
Census Tract 130	1,101	0	550	54.94 ^a	0	0	0	0	0	0
Census Tract 132	1,954	1,954	497	25.4	360	18.4	495	25.3	314	16.1
Census Tract 134.02	8,245	8,075	2,977	36.1	800	9.9	2,731	33.1	1,258	15.3
Census Tract 135	7,972	7,972	919	11.52	441	5.53	2,071	25.97	1,317	16.52
Census Tract 136	4,934	4,851	833	16.9	590	12.2	1,207	24.5	939	19.0
COC	24,206	22,852	5,776	23.86	2,191	9.59	6,504	26.87	3,828	15.81
Taylor County	136,348	130,211	49,223	36.1	20,272	15.6	33,679	24.7	19,155	14.0
State of Texas	27,885,195	27,264,694	16,077,932	57.7	4,213,938	15.5	7,292,686	26.2	3,337,814	12.0
United States	322,903,030	314,943,184	125,720,853	39.0	44,257,979	14.1	73,553,240	22.8	49,238,581	15.2

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e)

AFB = Air Force Base; COC = Community of Comparison; ROI = region of influence

Note:

a. Shading indicates a census tract where the ROI percentages for minority or low-income populations are higher than the COC.

Table 3.6-2. Environmental Justice Communities and Sensitive Populations – Baseline Conditions (Ellsworth AFB)

Geographic Unit	Total Population	Population for Whom Poverty is Determined	Minority		Low-Income		Youth		Elderly	
			Number	Percent	Number	Percent	Number	Percent	Number	Percent
Census Tract 109.03	9,286	9,275	1,377	14.82	843	9.08	2,662	28.66	866	9.32
Census Tract 114	7,833	7,668	2,142	27.34 ^a	1,294	16.87	2,062	26.32	1,277	16.3
Census Tract 115	821	821	450	54.81	216	26.30	461	56.15	29	3.53
Census Tract 116	7,823	7,757	1,190	15.21	428	5.51	1,950	24.92	934	11.93
Census Tract 202	1,390	851	499	35.89	124	14.57	346	24.89	0	0
Census Tract 203.02	5,884	5,819	344	5.84	383	6.58	1,290	21.92	962	16.34
Census Tract 205	4,635	4,613	743	16.03	272	5.89	1,122	24.2	337	7.27
COC	37,672	36,804	6,745	17.90	3,560	9.67	9,893	26.26	4,405	11.69
Meade County	27,424	26,595	3,358	12.2	1,979	7.4	6,517	23.8	18,279	16.7
Pennington County	109,294	106,509	21,591	19.8	14,222	13.4	25,597	23.4	3,870	14.1
State of South Dakota	864,289	834,921	153,479	17.8	113,144	13.6	213,066	24.7	136,808	15.8
United States	322,903,030	314,943,184	125,720,853	39.0	44,257,979	14.1	73,553,240	22.8	49,238,581	15.2

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e)

AFB = Air Force Base; COC = Community of Comparison; ROI = region of influence

Note:

a. Shading indicates a census tract where the ROI percentages for minority or low-income populations are higher than the COC.

At any given location within the portions of the Crow Reservation under PR-1A, PR-1C, and PR-1D, there would be the potential for disproportionately high and adverse effects to minority populations from the uncertainty, startle effect, and noise produced by an estimated average of six to nine low-level overflights per year if adequate or acceptable mitigations were not applied. However, the mitigations identified and committed to in the 2014 PRTC EIS ROD resulted in impacts that are not significant in the context of NEPA (USAF, 2014a). With respect to the PRTC, neither alternative would result in disproportionately high and adverse human health or environmental effects in the context of environmental justice.

Evaluations of impacts related to environmental justice in the Lancer MOA were considered in the *Realistic Bomber Training Initiative EIS*. That EIS concluded, “no adverse impacts would occur because none of the proposed airspace exceeds a noise level over 65 DNL” (USAF, 2000). Since noise analysis in Section 3.2.2 (Noise, Environmental Consequences) indicates that neither the No Action Alternative (43.4 dB L_{dnmr}) nor the Dyess AFB Alternative (less than 35 dB L_{dnmr}) would exceed 65 dB L_{dnmr} , this conclusion would still apply.

Noise levels in the Brownwood MOA would be less than 35 dB L_{dnmr} (Section 3.2.2.1.1, Noise, No Action at Dyess AFB) which is less than the EPA level of 55 dB DNL below which no effects to public health and welfare would occur (EPA, 1974). Therefore, no impacts related to environmental justice are anticipated in the Brownwood MOA.

The *New Mexico Training Range Initiative EIS* evaluated the Pecos MOA and concluded that “no impacts related to environmental justice issues are anticipated” since the results of the noise analysis did not exceed thresholds for adverse noise impacts (USAF, 2006). The New Mexico Training Range Initiative EIS used the EPA level of 55 dB (EPA, 1974) to determine potential impacts. While noise analysis in Section 3.2.2 (Noise, Environmental Consequences) indicates that the No Action Alternative noise level is 55.9 dB L_{dnmr} , the Dyess AFB Alternative noise levels would be 36.9 dB L_{dnmr} ; therefore, this conclusion still applies for the Dyess AFB Alternative.

No additional impacts to environmental justice or sensitive populations are anticipated from the use of the PRTC or the Brownwood MOA, Lancer MOA, and Pecos MOA airspace and ranges by the B-21 aircraft, so those areas are not discussed in further detail in this section.

3.6.1.3 Analysis Methodology

In order to identify disproportionate impacts from baseline or Proposed Action noise levels, a COC is needed. The COC is defined by summing the population in all the census tracts that contain any part of an ROI exposed to the 65 dB DNL contour. The percentages of minority and low-income residents are calculated for each ROI (i.e., block group). In accordance with the USAF guidelines for environmental justice analysis, if no adverse impacts are identified within the ROI, then there would be no potential for disproportionate impacts on environmental justice or sensitive populations (USAF, 2014b). If there is a potential for disproportionate impacts, the ROI and COC percentages are then compared. If the percentage of minorities or low-income residents in an ROI is equal to or greater than

the percentage of minorities or low-income residents in the COC, there is a disproportionate impact to the environmental justice population in that ROI (USAF, 2014b).

3.6.2 Environmental Justice, Environmental Consequences

3.6.2.1 No Action Alternative Consequences

Under the No Action Alternative, the B-21 would not be beddown at either Dyess AFB or Ellsworth AFB. This would mean that each alternative installation would continue their individual missions at current levels, which is used as the baseline for the analysis.

3.6.2.1.1 No Action at Dyess AFB

Under the No Action at Dyess AFB aircraft operations and the resulting noise levels would continue at existing levels. Table 3.6-3 identifies the number of environmental justice and sensitive populations currently impacted under the No Action Alternative.

Table 3.6-3. Number of Residents Exposed to Aircraft Noise in the Region of Influence Under Existing Conditions (No Action – Dyess AFB)

Average Noise Levels	Total Affected Off-Base Population	Minority	Low-Income	Youth	Elderly
65–69 dB	700	202	49	189	94
70–74 dB	448	142	28	122	60
75–79 dB	180	76	8	49	24
80–84 dB	64	28	2	17	8
85+ dB	27	12	1	8	3
Total >65 dB DNL¹	1,419	460	88	385	189

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e) Block group data used.

> = greater than; + = plus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Note:

1. During data analysis, numbers were rounded and then totaled.

3.6.2.1.2 No Action at Ellsworth AFB

Under the No Action at Ellsworth AFB aircraft operations and the resulting noise levels would continue at existing levels. Table 3.6-4 identifies the number of environmental justice and sensitive populations currently impacted under the No Action Alternative.

Table 3.6-4. Number of Residents Exposed to Aircraft Noise in the Region of Influence Under Existing Conditions (No Action – Ellsworth AFB)

Average Noise Levels	Total Affected Off-Base Population	Minority	Low-Income	Youth	Elderly
65–69 dB	1,313	186	166	418	114
70–74 dB	391	75	59	136	28
75–79 dB	190	43	39	79	12
80–84 dB	78	10	15	29	6
85+ dB	13	4	3	6	1
Total >65 dB DNL¹	1,985	318	282	668	161

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e) Block group data used.

> = greater than; + = plus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Note:

1. During data analysis, numbers were rounded and then totaled.

3.6.2.2 Dyess AFB Alternative

The number of residents exposed to aircraft noise in the 65 dB DNL or greater contours would decrease under the Dyess AFB Alternative (Table 3.6-5). Under the No Action Alternative, a total of 1,419 residents are exposed to noise levels greater than 65 dB. This would decrease by 65 percent to 496 residents under the Dyess AFB Alternative. The number of minority and low-income residents exposed to noise levels greater than 65 dB would decrease by 63 and 73 percent, respectively, as compared to the No Action Alternative (Table 3.6-5). Table 3.6-6 shows populations of minority and low-income populations by block group. The number of residents affected by aircraft related noise in the total off base population is less than the number of residents affected under the No Action Alternative. Therefore, there are no adverse disproportionate impacts anticipated to environmental justice populations.

With regard to sensitive residential populations, the number of youth and elderly residents exposed to noise levels greater than 65 dB would decrease by 70 and 66 percent, respectively (Table 3.6-7). Table 3.6-8 shows which census tracts have a higher percent of youth (under 18 years) and elderly (65 years and older) than the COC they are located within. Since the number of sensitive residents exposed to noise in the 65 dB DNL or greater contour is less than the number of people affected under the No Action Alternative, the Dyess AFB Alternative would have an overall positive impact and there would be no adverse impacts to sensitive residential populations anticipated.

Only two sensitive receptor locations (Alliance After School and Tye Play and Learn) were identified in the 65 dB DNL or greater contour under the No Action Alternative. Both of these receptors are located outside of the 65 dB DNL contour (see Figure 3.2-5) under the Dyess AFB Alternative. Additionally, Rister Park, which was located within the 70 to 74 dB DNL contour under the No Action Alternative, would be located within the 65 to 69 dB DNL contour under the Dyess AFB Alternative.

3.6.2.2.1 Snapshot

The number of residents exposed to aircraft noise in the 65 dB DNL or greater contours would decrease under the Snapshot Scenario at Dyess AFB (Table 3.6-9). Under the No Action, 1,419 residents are exposed to noise levels greater than 65 dB. This would decrease by 39 percent to 869 residents under the Snapshot Scenario at Dyess AFB (see Table 3.0-1). Additionally, the number of minority and low-income residents exposed to noise levels greater than 65 dB would decrease by 38 and 44 percent, respectively (Table 3.6-9). Table 3.6-10 shows populations of minority and low-income populations by block group. The number of people affected by aircraft related noise in the total off base population is less than the number of people affected under the No Action Alternative. Therefore, there are no adverse disproportionate impacts anticipated to environmental justice populations. For sensitive populations, the number of youth and elderly residents exposed to noise levels greater than 65 dB would decrease by 39 and 37 percent, respectively, as compared to the No Action Alternative (Table 3.6-11). Table 3.6-12 shows which census tracts have a higher percent of youth (under 18 years) and elderly (65 years and older) than the COC they are located within.

Table 3.6-5. Environmental Justice Populations Exposed to Aircraft Noise Under the Dyess AFB Alternative

Average Noise Levels	Total Affected Off-Base Population			Minority			Low-Income		
	No Action Alternative	Dyess AFB Alternative	Change	No Action Alternative	Dyess AFB Alternative	Change	No Action Alternative	Dyess AFB Alternative	Change
65–69 dB	700	341	-359	202	106	-96	49	20	-29
70–74 dB	448	126	-322	142	53	-89	28	3	-25
75–79 dB	180	29	-151	76	13	-63	8	1	-7
80–84 dB	64	0	-64	28	0	-28	2	0	-2
85+ dB	27	0	-27	12	0	-12	1	0	-1
Total¹	1,419	496	-923	460	172	-288	88	24	-64

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e) Block group data used.

- = minus; + = plus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Note:

1. During data analysis, numbers were rounded and then totaled.

Table 3.6-6. Environmental Justice Populations Exposed to Aircraft Noise by Block Group (Dyess AFB Alternative)

County	Geographic Unit	Total Off Base Population Affected (65 dB DNL or greater)	Minority		Disproportionate Impact ¹	Population for Whom Poverty is Determined	Low-Income		Disproportionate Impact ¹
			Number	Percent			Number	Percent	
Taylor	BG 1, CT 130	4	2	49.95	No	0	0	0	No
Taylor	BG 1, CT 132	117	30	25	No	95	18	18.42	No
Taylor	BG 1, CT 135	105	16	15.26	No	105	4	3.83	No
Taylor	BG 4, CT 134.02	265	124	47	No	265	2	0.94	No
Taylor	BG 4, CT 135	2	1	2.68	No	2	1	2.52	No
Taylor	BG 4, CT 136	3	1	10	No	3	0	0	No

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e)

AFB = Air Force Base; BG = Block Group; COC = Community of Comparison; CT = Census Tract; dB = decibel; DNL = day-night average sound level

Note:

1. Although census tracts (see Table 3.6-1) were identified as having a percentage of minority/low-income populations higher than the COC, no disproportionate adverse impacts would occur as the number of people affected by aircraft-related noise in the total off-base population is less than the number of people affected under the No Action Alternative. See Table 3.6-5.

Table 3.6-7. Sensitive Populations Exposed to Aircraft Noise Under the Dyess AFB Alternative

Average Noise Levels	Total Affected Off-Base Population			Youth			Elderly		
	No Action Alternative	Dyess AFB Alternative	Change	No Action Alternative	Dyess AFB Alternative	Change	No Action Alternative	Dyess AFB Alternative	Change
65–69 dB	700	341	-359	189	92	-97	94	45	-49
70–74 dB	448	126	-322	122	35	-87	60	16	-44
75–79 dB	180	29	-151	49	8	-41	24	4	-20
80–84 dB	64	0	-64	17	0	-17	8	0	-8
85+ dB	27	0	-27	8	0	-8	3	0	-3
Total	1,419	496	-923	385	135	-250	189	65	-124

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e) Block group data used.

- = minus; + = plus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Note:

1. During data analysis, numbers were rounded and then totaled.

Table 3.6-8. Sensitive Populations Exposed to Aircraft Noise by Block Group (Dyess AFB Alternative)

County	Geographic Unit	Total Off Base Population Affected (65 dB DNL or greater)	Youth		ROI>COC	Elderly		ROI>COC
			Number	Percent		Number	Percent	
Taylor	BG 1, CT 130	4	0	0	No	0	0	No
Taylor	BG 1, CT 132	117	30	25.33	No	19	16.06	Yes
Taylor	BG 1, CT 135	105	29	27.13	Yes	14	13.52	No
Taylor	BG 4, CT 134.02	265	75	28.41	Yes	31	11.64	No
Taylor	BG 4, CT 135	2	1	18.96	No	1	36.81	Yes
Taylor	BG 4, CT 136	3	1	26.65	No	1	21.67	Yes

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e)

> = greater than; AFB = Air Force Base; BG = Block Group; COC = Community of Comparison; CT = Census Tract; ROI = Region of Influence

Table 3.6-9. Environmental Justice Populations Exposed to Aircraft Noise in the Region of Influence Under the Dyess AFB Snapshot Scenario

Average Noise Levels	Total Affected Off-Base Population			Minority			Low-Income		
	No Action Alternative	Dyess AFB Snapshot	Change	No Action Alternative	Dyess AFB Snapshot	Change	No Action Alternative	Dyess AFB Snapshot	Change
65–69 dB	700	557	-143	202	159	-43	49	36	-13
70–74 dB	448	213	-235	142	85	-57	28	10	-18
75–79 dB	180	74	-106	76	32	-44	8	3	-5
80–84 dB	64	21	-43	28	10	-18	2	1	-1
85+ dB	27	4	-23	12	2	-10	1	1	0
Total¹	1,419	869	-550	460	288	-172	88	51	-37

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e) Block group data used.

- = minus; + = plus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Note:

1. During data analysis, numbers were rounded and then totaled.

Table 3.6-10. Environmental Justice Populations Exposed to Aircraft Noise by Block Group (Dyess AFB Alternative Snapshot)

County	Geographic Unit	Total Off Base Population Affected (65 dB DNL or greater)	Minority		Disproportionate Impact ¹	Population for Whom Poverty is Determined	Low-Income		Disproportionate Impact ¹
			Number	Percent			Number	Percent	
Taylor	BG 1, CT 130	5	2	49.95	No	5	0.00	0	No
Taylor	BG 1, CT 132	197	50	25.43	No	197	36	18.42	No
Taylor	BG 1, CT 135	234	36	15.26	No	234	9	3.83	No
Taylor	BG 4, CT 134.02	425	199	46.76	No	425	4	0.94	No
Taylor	BG 4, CT 135	3	1	2.68	No	3	1	2.52	No
Taylor	BG 4, CT 136	5	1	9.51	No	5	1	0	No

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e)

AFB = Air Force Base; BG = Block Group; COC = Community of Comparison; CT = Census Tract; dB = decibel; DNL = day-night average sound level

Note:

1. Although census tracts (see Table 3.6-1) were identified as having a percentage of minority/low-income populations higher than the COC, no disproportionate impacts would occur as the number of people affected by aircraft-related noise in the total off-base population is less than the number of people affected under the No Action Alternative. See Table 3.6-9.

Table 3.6-11. Sensitive Populations Exposed to Aircraft Noise Under the Dyess AFB Alternative Snapshot

Average Noise Levels	Total Affected Off-Base Population			Youth			Elderly		
	No Action Alternative	Dyess AFB Alternative Snapshot	Change	No Action Alternative	Dyess AFB Alternative Snapshot	Change	No Action Alternative	Dyess AFB Alternative Snapshot	Change
65–69 dB	700	557	-143	189	151	-38	94	75	-19
70–74 dB	448	213	-235	122	56	-66	60	30	-30
75–79 dB	180	74	-106	49	20	-29	24	10	-14
80–84 dB	64	21	-43	17	6	-11	8	3	-5
85+ dB	27	4	-23	8	1	-7	3	1	-2
Total¹	1,419	869	-550	385	234	-151	189	119	-70

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e) Block group data used.

- = minus; + = plus; AFB = Air Force Base; dB = decibel

Note:

1. During data analysis, numbers were rounded and then totaled.

Table 3.6-12. Sensitive Populations Exposed to Aircraft Noise by Block Group (Dyess AFB Alternative Snapshot)

County	Geographic Unit	Total Off Base Population Affected (65 dB DNL or greater)	Youth		ROI>COC	Elderly		ROI>COC
			Number	Percent		Number	Percent	
Taylor	BG 1, CT 130	5	0	0	No	0	0	No
Taylor	BG 1, CT 132	197	50	25.33	No	32	16.06	Yes
Taylor	BG 1, CT 135	425	115	27.13	Yes	57	13.52	Yes
Taylor	BG 4, CT 134.02	234	67	28.41	Yes	27	11.64	No
Taylor	BG 4, CT 135	3	1	18.96	No	1	36.81	Yes
Taylor	BG 4, CT 136	5	1	26.65	Yes	1	21.67	Yes

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e)

> = greater than; AFB = Air Force Base; BG = Block Group; CT = Census Tract; COC = Community of Comparison; dB = decibel; DNL = day-night average sound level; ROI = Region of Influence

Since the number of sensitive residents impacted is less than the number of people affected under the No Action Alternative, the Snapshot Scenario at Dyess AFB would have an overall positive impact as less residents are exposed to noise in the 65 dB DNL or greater contour. Therefore, there are no adverse impacts to sensitive populations anticipated.

Two sensitive receptor locations were located in the 65 dB DNL or greater contour under the No Action Alternative. Under the Snapshot Scenario at Dyess AFB, only one sensitive receptor location (Alliance After School) was identified within the 65 to 69 dB DNL contour (Figure 3.2-8). Once the B-21 has replaced the B-1, noise levels would decrease and the Alliance After School would no longer be within the 65 dB DNL contour.

3.6.2.2.2 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

No mitigations would be necessary to implement the Dyess AFB Alternative.

3.6.2.3 Ellsworth AFB Alternative (Preferred Alternative)

The number of residents exposed to aircraft noise in the 65 dB DNL or greater contours would decrease under the Ellsworth AFB Alternative (Table 3.2-17). Under the No Action Alternative, 1,985 residents are exposed to noise levels greater than 65 dB. This would decrease by 82 percent to 358 residents under the Ellsworth AFB Alternative. Additionally, the number of minority and low-income residents exposed to noise levels greater than 65 dB would decrease by 86 and 82 percent, respectively (Table 3.6-13). Table 3.6-14 shows populations of minority and low-income populations by block group. The number of people affected by aircraft related noise in the total off base population is less than the number of people affected under the No Action Alternative. Therefore, there are no adverse disproportionate impacts anticipated to environmental justice populations.

For sensitive populations, the number of youth and elderly residents exposed to noise levels greater than 65 dB would decrease by 83 and 81 percent, respectively, as compared to the No Action Alternative (Table 3.6-15). Table 3.6-16 shows which census tracts have a higher percent of youth (under 18 years) and elderly (65 years and older) than the COC they are located within. The Ellsworth AFB Alternative would have an overall positive impact as less residents are exposed to noise in the 65 dB DNL or greater contour than under the No Action Alternative. Therefore, no adverse impacts to sensitive residential populations are anticipated. Additionally, no sensitive receptor locations were identified in the 65 dB DNL or greater contour under the Ellsworth AFB Alternative (see Figure 3.2-9).

3.6.2.3.1 Snapshot

The number of residents exposed to aircraft noise in the 65 dB DNL or greater contours would decrease under the Snapshot Scenario at Ellsworth AFB (Table 3.2-21, Figure 3.2-10). Under the No Action Alternative, 1,985 residents are exposed to noise levels greater than 65 dB. This would decrease by 51 percent to 978 residents under the Snapshot Scenario at Ellsworth AFB. Additionally, the number of minority and low-income residents exposed to noise levels greater than 65 dB would decrease by 52 and 43 percent, respectively (Table 3.6-17). Table 3.6-18 shows populations of minority and low-income populations by block group. The number of people affected by aircraft related noise in the total off base population is less than the number of people affected under the No Action Alternative. Therefore, there are no adverse disproportionate impacts anticipated to environmental justice populations.

With regard to sensitive populations, the number of youth and elderly residents exposed to noise levels greater than 65 dB would decrease by 48 and 52 percent, respectively (Table 3.6-19). Table 3.6-20 shows which census tracts have a higher percent of youth (under 18 years) and elderly (65 years and older) than the COC they are located within. The Snapshot Scenario at Ellsworth AFB would have an overall positive impact as less residents are exposed to noise in the 65 dB DNL or greater contour than under the No Action Alternative. Therefore, there would be no adverse impacts to sensitive residential populations.

Under the No Action Alternative, nine sensitive receptors (eight daycare facilities or schools and one park) are exposed to DNL of 65 dB or greater (Figure 3.2-10). Under the Snapshot Scenario at Ellsworth AFB, three sensitive receptor locations would be exposed to DNL of 65 dB or greater. Douglas High School and Vandenberg Elementary School are located within the 65 to 69 dB DNL contour and the Vandenberg Daycare is located within the 70 to 74 dB DNL contour. All three of these locations are located in noise contours with lower levels of noise exposure when compared to the No Action Alternative. No other sensitive receptors are located within the 65 dB DNL or greater contours (Figure 3.2-10). Once the B-21 has replaced the B-1, noise levels would decrease and Douglas High School, Vandenberg Elementary School, and Vandenberg Daycare would no longer be within the 65 dB DNL or greater noise contour.

3.6.2.3.2 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

No mitigations would be necessary to implement the Ellsworth AFB Alternative.

Table 3.6-13. Environmental Justice Populations Exposed to Aircraft Noise in the Region of Influence Under the Ellsworth AFB Alternative

Average Noise Levels	Total Affected Off-Base Population			Minority			Low-Income		
	No Action Alternative	Ellsworth AFB Alternative	Change	No Action Alternative	Ellsworth AFB Alternative	Change	No Action Alternative	Ellsworth AFB Alternative	Change
65–69 dB	1,313	340	-973	186	36	-150	166	47	-119
70–74 dB	391	18	-373	75	8	-67	59	4	-55
75–79 dB	190	0	-190	43	0	-43	39	0	-39
80–84 dB	78	0	-78	10	0	-10	15	0	-15
85+ dB	13	0	-13	4	0	-4	3	0	-3
Total¹	1,985	358	-1,627	318	44	-274	282	51	-231

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e) Block group data used.

- = minus; + = plus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Note:

1. During data analysis, numbers were rounded and then totaled.

Table 3.6-14. Environmental Justice Populations Exposed to Aircraft Noise by Block Group (Ellsworth AFB Alternative)

County	Geographic Unit	Total Off Base Population Affected (65 dB DNL or greater)	Minority		Disproportionate Impact ¹	Population for Whom Poverty is Determined	Low-Income		Disproportionate Impact ¹
			Number	Percent			Number	Percent	
Pennington	BG 1, CT 109.03	219	19	8.64	No	219	40	18.46	No
Pennington	BG 1, CT 115	18	10	54.81	No	18	5	26.31	No
Meade	BG 1, CT 205	14	3	24.67	No	14	1	5.1	No
Pennington	BG 2, CT 114	6	1	12.00	No	6	1	6.42	No
Pennington	BG 2, CT 116	49	9	17.82	No	49	1	2.45	No
Pennington	BG 2, CT 202	1	1	35.17	No	0	0	0	No
Meade	BG 3, CT 203.02	51	2	4.15	No	51	3	5.05	No

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e)

AFB = Air Force Base; BG = Block Group; COC = Community of Comparison; CT = Census Tract; dB = decibel; DNL = day-night average sound level

Note:

1. Although census tracts (see Table 3.6-2) were identified as having a percentage of minority/low-income populations higher than the COC, no disproportionate adverse impacts would occur as the number of people affected by aircraft related noise in the total off-base population is less than the number of people affected under the No Action Alternative. See Table 3.6-13.

Table 3.6-15. Sensitive Populations Exposed to Aircraft Noise Under the Ellsworth AFB Alternative

Average Noise Levels	Total Affected Off-Base Population			Youth			Elderly		
	No Action Alternative	Ellsworth AFB Alternative	Change	No Action Alternative	Ellsworth AFB Alternative	Change	No Action Alternative	Ellsworth AFB Alternative	Change
65–69 dB	1,313	340	-973	418	108	-310	114	29	-85
70–74 dB	391	18	-373	136	8	-128	28	1	-27
75–79 dB	190	0	-190	79	0	-79	12	0	-12
80–84 dB	78	0	-78	29	0	-29	6	0	-6
85+ dB	13	0	-13	6	0	-6	1	0	-1
Total¹	1,985	358	-1,627	668	116	-552	161	30	-131

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e) Block group data used.

- = minus; + = plus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Note:

1. During data analysis, numbers were rounded and then totaled.

Table 3.6-16. Sensitive Populations Exposed to Aircraft Noise by Block Group (Ellsworth AFB Alternative)

County	Geographic Unit	Total Off Base Population Affected (65 dB DNL or greater)	Youth		ROI>COC	Elderly		ROI>COC
			Number	Percent		Number	Percent	
Pennington	BG 1, CT 109.03	219	79	35.93	No	17	7.81	No
Pennington	BG 1, CT 115	18	10	56.15	No	1	3.53	No
Meade	BG 1, CT 205	14	3	21.19	No	1	3.36	No
Pennington	BG 2, CT 114	6	2	26.58	No	1	10	No
Pennington	BG 2, CT 116	49	10	20.13	No	4	7.95	No
Pennington	BG 2, CT 202	1	0	0.0	No	0	0.0	No
Meade	BG 3, CT 203.02	51	13	25.45	No	7	14.14	No

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e)

> = greater than; AFB = Air Force Base; BG = Block Group; COC = Community of Comparison; CT = Census Tract; dB = decibel; DNL = day-night average sound level; ROI = Region of Influence

Table 3.6-17. Environmental Justice Populations Exposed to Aircraft Noise in the Region of Influence Under the Ellsworth AFB Alternative Snapshot

Average Noise Levels	Total Affected Off-Base Population			Minority			Low-Income		
	No Action Alternative	Ellsworth AFB Alternative Snapshot	Change	No Action Alternative	Ellsworth AFB Alternative Snapshot	Change	No Action Alternative	Ellsworth AFB Alternative Snapshot	Change
65–69 dB	1,313	706	-607	186	104	-82	166	107	-59
70–74 dB	391	215	-176	75	40	-35	59	41	-18
75–79 dB	190	52	-138	43	7	-36	39	11	-28
80–84 dB	78	5	-73	10	2	-8	15	1	-14
85+ dB	13	0	-13	4	0	-4	3	0	-3
Total¹	1,985	978	-1,007	318	153	-165	282	160	-122

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e) Block group data used.

- = minus; + = plus; AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

Note:

1. During data analysis, numbers were rounded and then totaled.

**Table 3.6-18. Environmental Justice Populations Exposed to Aircraft Noise by Block Group
(Ellsworth AFB Alternative Snapshot)**

County	Geographic Unit	Total Off Base Population Affected (65 dB DNL or greater)	Minority		Disproportionate Impact ¹	Population for Whom Poverty is Determined	Low-Income		Disproportionate Impact ¹
			Number	Percent			Number	Percent	
Pennington	BG 1, CT 109.03	622	54	8.64	No	622	115	18.46	No
Pennington	BG 1, CT 114	2	1	13.82	No	2	0	22.02	No
Pennington	BG 1, CT 115	119	65	54.81	No	119	31	26.31	No
Meade	BG 1, CT 202	0	0	36.19	No	0	0	14.57	No
Meade	BG 1, CT 205	20	5	24.67	No	20	1	5.10	No
Pennington	BG 2, CT 109.03	28	6	22.02	No	28	5	18.46	No
Pennington	BG 2, CT 114	7	1	12.00	No	7	2	22.02	No
Pennington	BG 2, CT 116	113	20	17.82	No	113	3	2.45	No
Meade	BG 2, CT 202	1	1	35.17	No	0	0	0	No
Meade	BG 3, CT 203.02	66	3	4.15	No	66	3	5.05	No
Pennington	BG 5, CT 116	1	1	12.52	No	1	1	6.14	No

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e)

AFB = Air Force Base; BG = Block Group; COC = Community of Comparison; CT = Census Tract; dB = decibel; DNL = day-night average sound level

Note:

1. Although census tracts (see Table 3.6-2) were identified as having a percentage of minority/low-income populations higher than the COC, no disproportionate adverse impacts would occur as the number of people affected by aircraft-related noise in the total off-base population is less than the number of people affected under the No Action Alternative. See Table 3.6-17.

Table 3.6-19. Sensitive Populations Exposed to Aircraft Noise Under the Ellsworth AFB Alternative Snapshot

Average Noise Levels	Total Affected Off-Base Population			Youth			Elderly		
	No Action Alternative	Ellsworth AFB Alternative Snapshot	Change	No Action Alternative	Ellsworth AFB Alternative Snapshot	Change	No Action Alternative	Ellsworth AFB Alternative Snapshot	Change
65–69 dB	1,313	706	-607	418	239	-179	114	57	-57
70–74 dB	391	215	-176	136	83	-53	28	15	-13
75–79 dB	190	52	-138	79	20	-59	12	4	-8
80–84 dB	78	5	-73	29	3	-26	6	1	-5
85+ dB	13	0	-13	6	0	-6	1	0	-1
Total¹	1,985	978	-1,007	668	345	-323	161	77	-84

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e) Block group data used.

- = minus; + = plus; AFB = Air Force Base; dB = decibel

Note:

1. During data analysis, numbers were rounded and then totaled.

Table 3.6-20. Sensitive Populations Exposed to Aircraft Noise by Block Group (Ellsworth AFB Alternative Snapshot)

County	Geographic Unit	Total Off Base Population Affected (65 dB DNL or greater)	Youth		ROI>COC	Elderly		ROI>COC
			Number	Percent		Number	Percent	
Pennington	BG 1, CT 109.03	622	223	35.94	Yes	49	7.8	No
Pennington	BG 1, CT 114	2	1	23.99	No	1	17.83	Yes
Pennington	BG 1, CT 115	119	67	56.15	Yes	4	3.53	No
Meade	BG 1, CT 202	0	0	34.87	Yes	0	0	No
Meade	BG 1, CT 205	20	4	21.19	No	1	3.36	No
Pennington	BG 2, CT 109.03	28	8	29.2	Yes	3	10.75	No
Pennington	BG 2, CT 114	113	23	20.13	No	9	7.95	No
Pennington	BG 2, CT 116	1	0	0	No	0	0	No
Meade	BG 2, CT 202	66	17	25.45	No	9	14.14	Yes
Meade	BG 3, CT 203.02	1	1	27.49	Yes	1	8.04	No
Pennington	BG 5, CT 116	7	2	26.58	Yes	0.73	9.85	No

Source: (U.S. Census Bureau, 2018d; U.S. Census Bureau, 2018e)

> = greater than; AFB = Air Force Base; BG = Block Group; CT = Census Tract; COC = Community of Comparison; dB = decibel; DNL = day-night average sound level; ROI = region of influence

3.7 BIOLOGICAL RESOURCES

3.7.1 Biological Resources, Affected Environment

3.7.1.1 Description of Resource

Biological resources include the plant and animal species, habitats, and ecological relationships of the land and water areas within the ROI, which is defined as the area directly or indirectly affected by the Proposed Action described in Chapter 2 (Description of Proposed Action and Alternatives). Particular consideration is given to sensitive species, which are those species protected under federal or state law, including threatened and endangered species, migratory birds, and bald and golden eagles.

For the purposes of this EIS, sensitive and protected biological resources include plant and animal species that are federally listed or state-listed for protection. Identifying which species occur in an area affected by an action may be accomplished through literature reviews and coordination with appropriate federal and state regulatory agency representatives, resource managers, and other knowledgeable experts.

3.7.1.2 Region of Influence

The ROI for biological resources for beddown actions at either basing location occurs within the installation boundaries, specifically areas that encompass the construction footprints for proposed facilities and infrastructure projects listed in Table 2.4-1 and Table 2.5-1 and as shown in Figure 2.4-3, Figure 2.4-4, Figure 2.5-3, and Figure 2.5-4. Descriptions of biological resources at the proposed beddown locations are based on information provided in the most recent Integrated Natural Resources Management Plan (INRMP) for Dyess AFB (Dyess AFB, 2016) and Ellsworth AFB (Ellsworth AFB, 2020a). The INRMP summarizes the natural resources that are present on each installation and outlines strategies to adequately manage those resources. This EIS utilizes other USAF NEPA documents and GIS data from the USFWS to identify and describe biological resources under the airspace and ranges.

For B-21 aircraft operations, the ROI for biological resources includes the lands under the PRTC airspace and associated range boundaries. For aircraft operations out of Dyess AFB, the ROI also includes the lands under the Brownwood MOA, Lancer MOA, and the Pecos MOA (which includes the associated ATCAAs) (Figure 2.3-1). Because no ground disturbance would occur under the existing airspace during B-21 aircraft operations, vegetation and aquatic species (i.e., fish) were excluded from further analysis. Additionally, wildlife habitat areas would not be impacted by aircraft operations and are not considered further in this EIS. Therefore, the ROI for biological resources under the airspace only applies to various wildlife species known to occur in these areas and that have the

potential to be impacted by noise and bird-aircraft collisions associated with B-21 aircraft operations.

3.7.1.2.1 Dyess AFB

Vegetation

Dyess AFB is located within the Southwest Plateau and Plains Dry Steppe and Shrub ecoregion (Bailey, 1995a). Specifically, the base is located within the Rolling Plains section and the Central Lowlands geomorphic province, and the Kansan biotic province. Subsection classification is the Mesquite Plains (Dyess AFB, 2016).

Vegetation at Dyess AFB consists of local grasslands, deciduous mesquite woodlands, riparian vegetation, and turf and landscaped areas. Common species include honey mesquite trees (*Prosopis glandulosa*), blueberry juniper (*Juniperus asheii*) and redberry juniper (*J. pinchotti*). Shade-tolerant Texas wintergrass (*Nassella leucotricha*) is the dominant groundcover plant within the mesquite woodlands. What remains of local grasslands are short to mid-grass grasslands, which include silver bluestem (*Bothriochloa saccharoides*), perennial threeawn (*Aristida purpurea*), buffalograss (*Bouteloua dactyloides*), Texas grama (*B. rigidiseta*), sideoats grama (*B. curtipendula*), and white tridens (*Tridens albescens*) (Dyess AFB, 2016).

Of the total acreage at Dyess AFB, almost half (2,645 acres, or 49 percent) of the land includes grounds that are either previously developed or are maintained (including grass areas subject to mowing and scheduled landscape maintenance). Approximately 1,000 acres (or 18 percent) consist of turf and landscaped areas including the golf course, Airplane Park, picnic grounds, industrial and administrative facilities, base housing, and the hospital. The predominant turf grass is Bermuda grass (*Cynodon dactylon*); common shrubs include red tip photinia (*Photinia fraseri*) and holly (*Ilex aquifolium*); and trees consist mostly of Afghan pine (*Pinus eldarica*), live oak (*Quercus virginiana*), red oak (*Q. rubra*), pecan (*Carya illinoensis*), bur oak (*Q. macrocarpa*), green ash (*Fraxinus pennsylvanica*), desert willow (*Chilopsis linearis*) and mesquite (*Prosopis* sp.). Mesquite is a major component of all plant communities present at Dyess AFB. Ongoing mesquite reduction projects are employed through the Natural Resource Management program to suppress mesquite encroachment and restore native grasses and forbs on base (Dyess AFB, 2016).

Wildlife

The turf and landscaped areas on base provide little to no habitat for wildlife species, but may support small animals accustomed to human activity. Mature mesquite woodlands and old growth mesquite/scrub communities support most of the terrestrial wildlife habitat found at Dyess AFB. Resident wildlife associated with mature mesquite woodlands commonly includes the eastern cottontail rabbit (*Sylvilagus floridanus*), black-tailed jackrabbit (*Lepus californicus*), southern plains woodrat (*Neotoma micropus*), hispid cotton rat (*Sigmodon hispidus*), striped skunk (*Mephitis mephitis*), nine-banded armadillo

(*Dasypus novemcinctus*), porcupine (*Erethizon dorsatum*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), and badger (*Taxidea taxus*) (Dyess AFB, 2016).

Common avian species observed on Dyess AFB include golden-fronted woodpecker (*Melanerpes aurifrons*), ladder-backed woodpecker (*Dryobates scalaris*), curved-billed thrasher (*Toxostoma curvirostre*), cactus wren (*Campylorhynchus brunneicapillus*), canyon towhee (*Melospiza fusca*), northern cardinal (*Cardinalis cardinalis*), pyrrhuloxia (*C. sinuatus*), mockingbird (*Mimus polyglottos*), Bewick's wren (*Thryomanes bewickii*), and greater roadrunner (*Geococcyx californianus*). Resident game birds present on Dyess AFB include the mourning dove (*Zenaidura macroura*), white-winged dove (*Z. asiatica*), northern bobwhite quail (*Colinus virginianus*), and wild turkey (*Meleagris gallopavo*). Many migrant bird species utilize the old growth mesquite forests as nesting habitat in spring and summer. These include the yellow-billed cuckoo (*Coccyzus americanus*), eastern bluebird (*Sialia sialis*), ash-throated flycatcher (*Myiarchus cinerascens*), Bell's vireo (*Vireo bellii*), painted bunting (*Passerina ciris*), scissor-tailed flycatcher (*Tyrannus forficatus*), and western kingbird (*T. verticalis*) (Dyess AFB, 2016).

Raptors commonly observed at Dyess AFB include the American kestrel (*Falco sparverius*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*A. striatus*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*B. swainsoni*), northern harrier (*Circus cyaneus*), Mississippi kite (*Ictinia mississippiensis*), barn owl (*Tyto alba*), great horned owl (*Bubo virginianus*), turkey vulture (*Cathartes aura*), and black vulture (*Coragyps atratus*) (Dyess AFB, 2016).

Special Status Species

Special status plant and wildlife species are subject to regulations under the authority of federal and state agencies. The Endangered Species Act (ESA) (16 U.S.C. 1532 et seq.) of 1973, as amended, was enacted to protect and recover imperiled species and the ecosystems upon which they depend. The USFWS maintains a list of special status species considered endangered, threatened, or candidate.

"Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future. Candidate species are plants and animals for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. All federal agencies are required to implement protection programs for endangered and threatened species and to use their authority to further the purposes of the act.

USFWS and Texas Parks and Wildlife Department (TPWD) special status species lists, by county, were obtained to identify species with the potential to occur within the ROI. The USFWS Information for Planning and Consultation (IPaC) system was accessed online to request an *Official Species List* to identify species protected under Section 7(c) of the ESA that could occur within the ROI (Consultation Code: 02ETAU00-2020-SLI-0810) (Appendix E, Biological Resources) (USFWS, 2020a). Table 3.7-1 presents these

species. The TPWD list of rare species commonly found in Taylor County, Texas, is included in Appendix E (TPWD, 2020a).

Table 3.7-1. Federally Listed Species with Potential to Occur at Dyess AFB

Common Name	Scientific Name	Protection Status	Potential for Occurrence at Dyess AFB
Fish			
Smalleye Shiner	<i>Notropis buccula</i>	Endangered	None. Suitable habitat not present.
Sharpnose Shiner	<i>Notropis oxyrhynchus</i>	Endangered	None. Suitable habitat not present.
Clams			
Texas Fawnsfoot	<i>Truncilla macrodon</i>	Candidate	None. Suitable habitat not present.

Source: (USFWS, 2020a; Dyess AFB, 2016)

AFB = Air Force Base

No federally listed plant or animal species are known to occur on Dyess AFB (Laurence, 2020; Dyess AFB, 2016). Additionally, there is no federally designated critical habitat on base (USFWS, 2020a). The TPWD indicates that two reptile species of state significance are known to occur or have the potential to occur within Taylor County. These species include the spot-tailed earless lizard (*Holbrookia lacerata*) (no status) and the Texas horned lizard (*Phrynosoma cornutum*) (state threatened) (Dyess AFB, 2016).

The spot-tailed earless lizard prefers habitat consisting of rocky desert flats, areas with sparse vegetation or mesquite-prickly pear associations, and uplands of the Edwards Plateau in central Texas (Dyess AFB, 2016). Although potential habitat for the spot-tailed earless lizard exists in most parts of Dyess AFB, there have been no confirmed observations to date (Laurence, 2020).

The Texas horned lizard inhabits open, sandy to gravelly grasslands and deserts which support grass, mesquite, and cactus. Potential habitat for this species exists throughout the installation; however, the prevalence of tight clay soils may inhibit or limit reproduction. The Texas horned lizard has been occasionally observed by base employees (Dyess AFB, 2016).

Migratory Birds

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703–712) of 1918 prohibits actions resulting in the pursuit, capture, killing, and/or possession of any protected migratory bird, nest, egg, or parts thereof. The USFWS maintains a list of designated migratory birds occurring in various regions of the United States. The USFWS regulations allow for the incidental take of migratory birds for military readiness activities.

It is DoD policy to promote and support Partners in Flight in the protection and conservation of neo-tropical migratory birds and their habitat by protecting vital habitat, enhancing biodiversity, and maintaining healthy and productive natural systems consistent with the military mission. Birds of Conservation Concern (BCC) are a subset of MBTA-protected species identified by the USFWS as those in the greatest need of additional conservation action to avoid future listing under the ESA. BCC have been identified at three geographic scales: National, USFWS Regions, and Bird Conservation Regions (BCRs). BCRs are the smallest geographic scale at which BCC have been

identified, and the lists of BCC species at this scale are expected to be the most useful for governmental agencies to consider in complying with the MBTA and EO 13186 (USFWS, 2008).

According to the *USFWS Birds of Conservation Concern* (USFWS, 2008), Dyess AFB is located within BCR 19 Central Mixed-grass Prairie Region, under the Central Flyway migration route (Figure 3.7-1). Twenty-seven BCC occur within the BCR 19 (Appendix E, Biological Resources) (USFWS, 2008).

Of the 27 listed BCC species for BCR 19 (Appendix E, Biological Resources), TPWD and Partners in Flight identified five species with breeding populations on Dyess AFB. These include the loggerhead shrike (*Lanius ludovicianus*), Bell's vireo, Cassin's sparrow (*Aimophila cassinii*), Mississippi kite, and scissor-tailed flycatcher (Dyess AFB, 2016). Migratory birds are known to commonly traverse the area and may present bird/wildlife-aircraft strike hazard (BASH) concerns; however, the 7 BW Flight Safety Office implements the BASH plan to reduce this risk to aircraft (Dyess AFB, 2019a). See Section 3.11 (Health and Safety) for an additional discussion of BASH safety methods.

Bald and Golden Eagle Protection Act

The bald eagle (*Haliaeetus leucocephalus*) is protected by the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668c; 50 CFR 22.3) of 1942 even though it has been delisted under the ESA. Occurrences of bald eagles at Dyess AFB may include overflights during their spring and fall migrations; however, any occasional presence would be transient in nature. Preferred suitable habitat for the bald eagle does not occur at Dyess AFB.

While golden eagles (*Aquila chrysaetos*) are year-round residents in Texas, there are no known nests in central Texas or near Dyess AFB (Texas Breeding Bird Atlas, 2007).

3.7.1.2.2 Ellsworth AFB

Vegetation

Ellsworth AFB is located within the Great Plains Palouse Dry Steppe Province ecoregion (Bailey, 1995b). This area is characterized primarily by mixed-grass and shortgrass prairies with scattered trees and shrubs, primarily sagebrush (*Artemisia* spp.) and rabbitbrush (*Chrysothamnus* spp.) (Bailey, 1995b).

Ellsworth AFB is composed of three main vegetation types: disturbed or improved areas (approximately 81 percent of the land area), unimproved areas that consist of remnant mixed-grass prairie (17 percent), and mixed wetlands (2 percent) (Ellsworth AFB, 2020a). The disturbed areas on base primarily consist of Kentucky bluegrass (*Poa pratensis*) and common weedy species, such as hairy crabgrass (*Digitaria sanguinalis*), field bindweed (*Convolvulus arvensis*), and common dandelion (*Taraxacum officinale*).

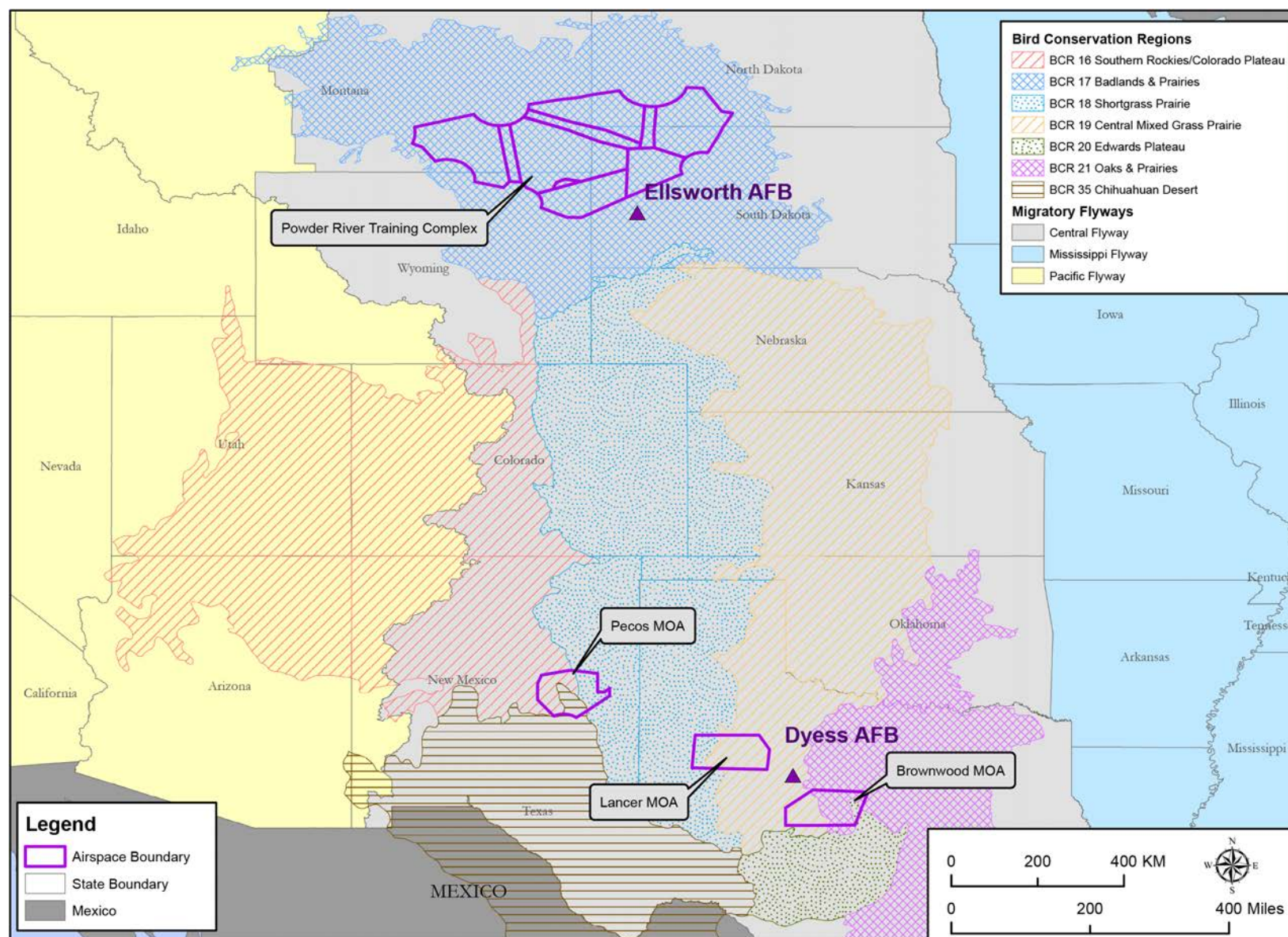


Figure 3.7-1. Bird Conservation Regions and Migratory Flyways

Riparian vegetation occurs along the mixed wetlands associated with the base lakes as well as the north and south sloughs on the west side of the airstrip. Riparian vegetation is characterized by the presence of plains cottonwood (*Populus deltoids*), narrowleaf cattail (*Typha angustifolia*), sandbar willow (*Salix exigua*), and sedges (*Carex* spp.) (Ellsworth AFB, 2020a). Remnant mixed-grass prairie habitat is comprised of western wheatgrass (*Pascopyrum smithii*), green needle-grass (*Stipa viridula*), crested wheatgrass (*Agropyron cristatum*), and other numerous grasses and forbs (native and introduced). The mixed wetland areas primarily include obligate and facultative wetland species such as cattails (*Typha* spp.), willows (*Salix* spp.), sedges (*Carex* spp.), and spikerushes (*Eleocharis* spp.) that occur in drainage channels, impoundments and swales (Ellsworth AFB, 2020a).

Wildlife

Wildlife species characteristic of the Great Plains are present on Ellsworth AFB. According to the installation's *Integrated Natural Resource Management Plan*, a total of 109 vertebrate species, including 16 mammals, 69 birds, 7 reptiles, 6 amphibians, and 11 fishes have been documented on base (Ellsworth AFB, 2020a).

Because the majority of the base includes disturbed or improved areas, wildlife within the installation are generally made up of species tolerant of human activity. Mammals commonly observed on and near the base include mice (various species), skunks (*Mephitis mephitis*), raccoons (*Procyon lotor*), squirrels (*Sciurus niger*), rabbits and hares (*Lepus townsendii*, *Sylvilagus floridanus*), prairie dogs (*Cynomys ludovicianus*), deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), coyotes (*Canis latrans*), foxes (*Vulpes* spp.), and bats (various species). At Ellsworth AFB, deer, coyotes, fox, jackrabbits, and prairie dogs pose wildlife aircraft strike hazards. As a result, airfields and runways are monitored for the presence of wildlife activity (Ellsworth AFB, 2020a). See Section 3.11 (Health and Safety) for an additional discussion of BASH safety.

Common reptiles and amphibians include various species of turtles, snakes, frogs and toads. Fish species within the lakes and ponds include bass (*Ambloplites rupestris*, *Micropterus salmoides*), bluegill (*Lepomis macrochirus*), sunfish (*Lepomis* spp.), crappie (*Pomoxis nigromaculatus*), and trout (*Oncorhynchus mykiss*, *Salmo trutta*), catfish (*Ictalurus punctatus*), and shiner (*Notemigonus crysoleucas*) (Ellsworth AFB, 2020a).

Ellsworth AFB lies within the Central Flyway, a migratory bird corridor used by large populations of passerines, raptors, shorebirds, and water fowl.

Special Status Species

USFWS and South Dakota Game, Fish, and Parks (SDGFP) special status species lists, by county, were obtained to identify species with the potential to occur within the ROI. The USFWS IPaC system was accessed online to request an *Official Species List* to identify species protected under Section 7(c) of the ESA that could occur within the ROI (Consultation Code: 06E14000-2020-SLI-0406) (Appendix E, Biological Resources) (USFWS, 2020b). Table 3.7-2 presents these species. The SDGFP lists of rare species

found in Meade and Pennington Counties, South Dakota, are included in Appendix E (SDGFP, 2016).

Table 3.7-2. Federally Listed Species with Potential to Occur at Ellsworth AFB

Common Name	Scientific Name	Protection Status	Potential for Occurrence at Ellsworth AFB
Mammals			
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Threatened	None. Suitable habitat not present.
Birds			
Least Tern	<i>Sterna antillarum</i>	Endangered	None. Suitable habitat not present.
Red Knot	<i>Calidris canutus rufa</i>	Threatened	None. Suitable habitat not present.
Whooping Crane	<i>Grus Americana</i>	Endangered	None. Suitable habitat not present.

Source: (Ellsworth AFB, 2020a; USFWS, 2020b)

AFB = Air Force Base

No federally listed plant or animal species are known to occur on Ellsworth AFB (Ellsworth AFB, 2020a). Additionally, there are no federally designated critical habitat areas (USFWS, 2020b). Seven state-listed species have been documented on base. These include the swift fox (*Vulpes velox*) (state threatened), ferruginous hawk (*Buteo regalis*) (Species of Greatest Conservation Need [SGCN], as identified in the South Dakota Wildlife Action Plan [Title 34A, Section 34A-8-4]), burrowing owl (*Athene cunicularia*) (SGCN), lark bunting (*Calamospiza melanocorys*) (SGCN), Blanchard's cricket frog (*Acris crepitans*) (SGCN), bumble bees (*Bombus* spp.) and Monarch butterflies (*Danux plexippus*) (both species with petitions filed with the USFWS for ESA listing) (Ellsworth AFB, 2020a).

Migratory Birds

According to the *USFWS Birds of Conservation Concern* (2008), Ellsworth AFB is located within BCR 17 Badlands and Prairies Region, under the Central Flyway migration route (Figure 3.7-1). Twenty-eight BCC occur within BCR 17 (Appendix E, Biological Resources) (USFWS, 2008).

At Ellsworth AFB, migratory birds present strike hazards and safety risks; however, the 28 BW Flight Safety Office implements the BASH plan to reduce this risk to aircraft (Ellsworth AFB, 2019a). See Section 3.11 (Health and Safety) for an additional discussion of BASH safety.

Bald and Golden Eagle Protection Act

In South Dakota, bald eagles occupy the state year round (USFWS, 2014). Although rare, bald eagle flyovers have been reported at Ellsworth AFB on occasion throughout the winter, but no nests are present (Brundige, 2020a; Ellsworth AFB, 2020a).

In South Dakota, golden eagles are found in a few select areas of the far western part of the state where suitable nesting sites are found. They are spread more widely in winter, where they can be found patrolling the grasslands of the central part of the state (South Dakota Birds and Birding, n.d.). At Ellsworth AFB, golden eagle flyovers have been

documented during USDA wildlife surveys conducted by flight safety. There are no nests onsite (Brundige, 2020a; Ellsworth AFB, 2020a).

3.7.1.2.3 Powder River Training Complex

Wildlife

Wildlife underlying the PRTC airspace and associated range boundaries is widely diverse across the multiple ecoregions. Species include those habituated to arid desert climates, forested mountains, and grassland plains habitat. Small and large mammal species include mice, prairie dogs, jackrabbits, cottontail, bears, coyotes, deer, elk, raccoons, opossums, and various species of bats, squirrels, and foxes. Reptiles and amphibians are numerous, and include various species of snakes, lizards, skinks, turtles, salamanders, frogs, and toads. Refer to the 2014 PRTC EIS and associated ROD (USAF, 2014a) for further analysis of wildlife under the PRTC airspace.

The PRTC airspace is located within the North American Central Flyway, a migration route used by over 400 bird species annually (Audubon, 2020a).

Special Status Species

For B-21 aircraft operations under the PRTC airspace and associated range boundaries, USFWS special status species lists, by county, were obtained to identify species with the potential to occur within the 28 counties across four states (Montana, North Dakota, South Dakota, and Wyoming) within the ROI (USFWS, 2020c). Federally listed threatened, endangered, and/or candidate mammal and bird species with potential to occur under the PRTC airspace are presented in Table 3.7-3. GIS data queries verified that there is no federally designated critical habitat under the PRTC airspace and associated range boundaries.

Table 3.7-3. Federally Listed Species Known to Occur or with Potential to Occur Under the PRTC Airspace and Associated Range Boundaries

Common Name	Scientific Name	Protection Status	Counties	USFWS Designated Critical Habitat Under the Airspace?	Potential for Occurrence Under PRTC Airspace and Associated Range Boundaries
Birds					
Least Tern	<i>Sterna antillarum</i>	Endangered	North Dakota: Morton, Sioux Montana: Custer South Dakota: Corson, Meade, Ziebach	none	Potential during migration. Least terns nest along Missouri and Cheyenne rivers and may occur along Moreau River. Utilize sandbars, islands, and shorelines.

Table 3.7-3. Federally Listed Species Known to Occur or with Potential to Occur Under the PRTC Airspace and Associated Range Boundaries

Common Name	Scientific Name	Protection Status	Counties	USFWS Designated Critical Habitat Under the Airspace?	Potential for Occurrence Under PRTC Airspace and Associated Range Boundaries
Piping Plover	<i>Charadrius melodus</i>	Threatened	North Dakota: Morton, Sioux Montana: Fallon South Dakota: Corson, Perkins, Ziebach	none	Potential during migration. Piping plovers nest along Missouri and Cheyenne rivers and may occur along Moreau River. Utilize sandbars, islands, and shorelines.
Red Knot	<i>Calidris canutus rufa</i>	Threatened	North Dakota: Morton, Sioux South Dakota: Butte, Corson, Harding, Lawrence, Meade, Perkins, Ziebach	none	Potential during migration. Red knots are long-distance migrants flying more than 9,300 miles. Stopover habitat includes aquatic areas. Breeding occurs outside of the ROI in the central Canadian Arctic.
Whooping Crane	<i>Grus americana</i>	Endangered	North Dakota: Adams, Billings, Bowman, Golden Valley, Grant, Hettinger, Morton, Sioux, Slope, Stark Montana: Carter, Custer, Fallon, Powder River, Rosebud South Dakota: Butte, Corson, Harding, Lawrence, Meade, Perkins, Ziebach	none	Potential during migration. Whooping cranes utilize sloughs, marshes, rivers, lakes, ponds, croplands, and pastures.
Mammals					
Black-footed Ferret	<i>Mustela nigripes</i>	Endangered	Montana: Big Horn, Rosebud	none	Yes. Historical occurrence across ROI, however all current populations have been reintroduced.

Table 3.7-3. Federally Listed Species Known to Occur or with Potential to Occur Under the PRTC Airspace and Associated Range Boundaries

Common Name	Scientific Name	Protection Status	Counties	USFWS Designated Critical Habitat Under the Airspace?	Potential for Occurrence Under PRTC Airspace and Associated Range Boundaries
Canada Lynx	<i>Lynx canadensis</i>	Threatened	<u>Wyoming</u> : Sheridan	none	Unlikely. Known habitat is outside of the ROI, however species' historical occurrence includes the western border of Sheridan County (adjacent to, but outside of the ROI).
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Threatened	<u>North Dakota</u> : Adams, Billings, Bowman, Golden Valley, Grant, Hettinger, Morton, Sioux, Slope, Stark <u>Montana</u> : Carter, Custer, Fallon, Powder River <u>South Dakota</u> : Butte, Corson, Harding, Lawrence, Meade, Perkins, Ziebach <u>Wyoming</u> : Campbell, Crook, Weston	none	Yes. Historical occurrence within the ROI. Species range includes 39 states. Roost in caves, mines, and both live and dead trees.

Source: (USFWS, 2020c)

PRTC = Powder River Training Complex; ROI = region of influence; USFWS = U.S. Fish and Wildlife Service

Note:

The ROI for federally listed species under the airspace only applies to various bird and mammal species known to occur or with potential to occur in these areas and that have the potential to be impacted by noise associated with B-21 aircraft operations.

Migratory Bird Treaty Act

The PRTC airspace and associated range boundaries are located within the USFWS designated BCR 17 Badlands and Prairies (see Appendix E, Biological Resources, for a full list of species), under the Central Flyway migration route (Figure 3.7-1) (USFWS, 2008).

Bald and Golden Eagle Protection Act

Bald and golden eagle habitats are present under the PRTC airspace and associated range boundaries. Bald eagles utilize aquatic habitats (coastal areas, river, lakes, and

reservoirs) with forested shorelines or cliffs in North America (USFWS, 2015). Throughout their range they select large roost trees that are open and accessible. Bald eagles winter primarily in coastal estuaries and river systems. Golden eagles are less likely to occur, but may be observed as rare migrants or possible winter residents in small numbers. Preferred habitats include open mountains, foothills, plains, open country (Audubon, 2020b).

3.7.1.2.4 Lancer MOA

Wildlife

Common wildlife within the Southwest Plateau and Plains Dry Steppe and Shrub Province ecoregion includes pronghorn, coyote, swift fox (*Vulpes velox*), ringtail (*Bassariscus astutus*), whitetail deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), armadillo (*Dasypus* spp.), black-tailed prairie dog (*Cynomys ludovicianus*), yellow-faced pocket gopher (*Cratogeomys castanops*), various mice, and various bat species (U.S. Forest Service, n.d.a).

Birds species that typically occur in the ecoregion include red-tailed hawk (*Buteo jamaicensis*), killdeer (*Charadrius vociferus*), house sparrow (*Passer domesticus*), brown-headed cowbird (*Molothrus ater*), roadrunner (*Geococcyx californianus*), house finch (*Haemorrhous mexicanus*), yellow warbler (*Setophaga petechia*), cedar waxwing (*Bombycilla cedrorum*), western kingbird (*Tyrannus verticalis*), and barn swallow (*Hirundo rustica*). Wild turkey, mourning dove, scaled quail, and bobwhite are common game birds, and several species of hawks and owls are present (U.S. Forest Service, n.d.b).

Common amphibians include plains spadefoot toad (*Spea bombifrons*), western spadefoot toad (*Spea hammondi*), plains leopard frog (*Lithobates blairi*), Great Plains toad (*Anaxyrus cognatus*), and spotted chorus frog (*Pseudacris clarkii*). Reptiles include species such as Texas horned lizard, round-tailed horned lizard (*Phrynosoma modestum*), Great Plains skink (*Plestiodon obsoletus*), western diamondback rattlesnake (*Crotalus atrox*), western cottonmouth (*Agkistrodon piscivorus leucostoma*), and plains black-headed snake (*Tantilla nigriceps*).

Special Status Species

For B-21 aircraft operations within the Lancer MOA airspace, USFWS special status species lists were obtained to identify species with the potential to occur within eight counties in Texas (USFWS, 2020c). Federally listed threatened, endangered, and/or candidate mammal and bird species with potential to occur under the airspace associated with the Proposed Action are presented in Table 3.7-4. GIS data queries verified that there is no federally designated critical habitat under the Lancer MOA.

Table 3.7-4. Federally Listed Species Known to Occur or with Potential to Occur Under the Lancer MOA Airspace

Common Name	Scientific Name	Protection Status	Counties	USFWS Designated Critical Habitat Under the Airspace?	Potential for Occurrence Under the Lancer MOA Airspace
Birds					
Least Tern	<i>Sterna antillarum</i>	Endangered	Texas: Borden, Dawson, Fisher, Kent, Garza, Lynn, Scurry, Stonewall	none	Potential during migration. Least terns arrive in the eastern two-thirds of Texas as uncommon to rare migrants between mid-March and mid-June. Breed from early April to early August. Fall migrants start departing in early July and are gone by mid-December.
Piping Plover	<i>Charadrius melodus</i>	Threatened	Texas: Borden, Dawson, Fisher, Kent, Garza, Lynn, Scurry, Stonewall	none	Potential during migration, piping plover's winter in Texas along the coast.
Red Knot	<i>Calidris canutus rufa</i>	Threatened	Texas: Borden, Dawson, Fisher, Kent, Garza, Lynn, Scurry, Stonewall	none	Potential during migration. Red knots are long-distance migrants flying more than 9,300 miles. Stopover habitat includes aquatic areas. Breeding does not occur within the ROI.
Whooping Crane	<i>Grus americana</i>	Endangered	Texas: Borden, Dawson, Fisher, Kent, Garza, Lynn, Scurry, Stonewall	none	Potential during migration. Whooping cranes utilize sloughs, marshes, rivers, lakes, ponds, croplands, and pastures.

Source: (USFWS, 2020c)

MOA = Military Operating Area; ROI = region of influence; USFWS = U.S. Fish and Wildlife Service

Note:

The ROI for federally listed species under the airspace only applies to various bird and mammal species known to occur or with potential to occur in these areas and that have the potential to be impacted by noise associated with B-21 aircraft operations.

Migratory Bird Treaty Act

The Lancer MOA is located within the USFWS designated BCR 18 Shortgrass Prairie and BCR 19 Central Mixed-Grass Prairie (see Appendix E, Biological Resources, for a full list of species), under the Central Flyway migration route (Figure 3.7-1) (USFWS, 2008).

Bald and Golden Eagle Protection Act

Bald and golden eagle habitats are present under the Lancer MOA airspace. The Texas bald eagle population is divided into two populations: breeding birds and nonbreeding or wintering birds. Breeding populations occur primarily in the eastern half of the state and along coastal counties from Rockport to Houston. Nonbreeding or wintering populations are located primarily in the Panhandle, Central, and East Texas, and in other areas of suitable habitat throughout the state (TPWD, 2020b). Golden eagles are year-round residents in Texas; however, there are no known nests in central Texas (Texas Breeding Bird Atlas, 2007).

3.7.1.2.5 Brownwood MOA

Wildlife

The Cross Timbers and Prairies ecoregion supports wide variety of wildlife species. Common species include white-tailed deer, black bear (*Ursus americanus*), bobcat, gray fox (*Urocyon cinereoargenteus*), raccoon, cottontail rabbit, gray squirrel (*Sciurus carolinensis*), fox squirrel (*S. niger*), eastern chipmunk (*Tamias striatus*), white-footed mouse (*Peromyscus leucopus*), pine vole (*Microtus pinetorum*), and cotton mouse (*Peromyscus gossypinus*). Gamebirds include turkey, bobwhite, and mourning dove. Common songbirds include the red-eyed vireo (*Vireo olivaceus*), cardinal (*Cardinalis cardinalis*), tufted titmouse (*Baeolophus bicolor*), wood thrush (*Hylocichla mustelina*), summer tanager (*Piranga rubra*), blue-gray gnatcatcher (*Polioptila caerulea*), hooded warbler (*Setophaga citrina*), and Carolina wren (*Thryothorus ludovicianus*). The herpetofauna include the box turtle (*Terrapene* spp.), common garter snake (*Thamnophis sirtalis*), and western diamondback rattlesnake (U.S. Forest Service, n.d.c).

Special Status Species

For B-21 aircraft operations within the Brownwood MOA airspace, USFWS special status species lists were obtained to identify species with the potential to occur within 12 counties in Texas (USFWS, 2020c). Federally listed threatened, endangered, and/or candidate mammal and bird species with potential to occur under the airspace associated with the Proposed Action are presented in Table 3.7-5. GIS data queries verified that there is no federally designated critical habitat under the Brownwood MOA.

Table 3.7-5. Federally Listed Species Known to Occur or with Potential to Occur Under the Brownwood MOA Airspace

Common Name	Scientific Name	Protection Status	Counties	USFWS Designated Critical Habitat Under the Airspace?	Potential for Occurrence Under the Brownwood MOA Airspace
Birds					
Golden-cheeked Warbler	<i>Dendroica chrysoparia</i>	Endangered	Texas: Eastland, Erath, Hamilton, San Saba	None	Yes. Preferred habitat occurs within the ROI. Golden-cheeked warbler habitat includes woodlands with tall Ashe juniper, oaks, and other hardwood trees.
Least Tern	<i>Sterna antillarum</i>	Endangered	Texas: Brown, Callahan, Coleman, Comanche, Concho, Eastland, Erath, Hamilton, McCulloch, Mills, Runnels, San Saba	None	Potential during migration. Least terns arrive in the eastern two-thirds of Texas as uncommon to rare migrants between mid-March and mid-June. Breed from early April to early August. Fall migrants start departing in early July and are gone by mid-December.
Piping Plover	<i>Charadrius melodus</i>	Threatened	Texas: Brown, Callahan, Coleman, Comanche, Concho, Eastland, Erath, Hamilton, McCulloch, Mills, Runnels, San Saba	None	Potential during migration, piping plover's winter in Texas along the coast.
Red Knot	<i>Calidris canutus rufa</i>	Threatened	Texas: Brown, Callahan, Coleman, Comanche, Concho, Eastland, Erath, Hamilton, McCulloch, Mills, Runnels, San Saba	None	Potential during migration. Red knots are long-distance migrants flying more than 9,300 miles. Stopover habitat includes aquatic areas. Breeding does not occur within the ROI.

Table 3.7-5. Federally Listed Species Known to Occur or with Potential to Occur Under the Brownwood MOA Airspace

Common Name	Scientific Name	Protection Status	Counties	USFWS Designated Critical Habitat Under the Airspace?	Potential for Occurrence Under the Brownwood MOA Airspace
Whooping Crane	<i>Grus americana</i>	Endangered	Texas: Brown, Callahan, Coleman, Comanche, Eastland, Erath, Hamilton, Mills, McCulloch, San Saba	None	Potential during migration. Whooping cranes utilize sloughs, marshes, rivers, lakes, ponds, croplands, and pastures.

Source: (USFWS, 2020c)

MOA = Military Operating Area; ROI = region of influence; USFWS = U.S. Fish and Wildlife Service

Note:

The ROI for federally listed species under the airspace only applies to various bird and mammal species known to occur or with potential to occur in these areas and that have the potential to be impacted by noise associated with B-21 aircraft operations.

Migratory Bird Treaty Act

The Brownwood MOA is located within the USFWS designated BCR 19 Central Mixed-Grass Prairie and BCR 21 Oaks and Prairies (see Appendix E, Biological Resources, for a full list of species), under the Central Flyway migration route (Figure 3.7-1) (USFWS, 2008).

Bald and Golden Eagle Protection Act

Bald and golden eagle habitats are present under the Brownwood MOA airspace. The Texas bald eagle population is divided into two populations; breeding birds and nonbreeding or wintering birds. Breeding populations occur primarily in the eastern half of the state and along coastal counties from Rockport to Houston. Nonbreeding or wintering populations are located primarily in the Panhandle, Central, and East Texas, and in other areas of suitable habitat throughout the state (TPWD, 2020b). Golden eagles are year-round residents in Texas; however, there are no known nests in central Texas (Texas Breeding Bird Atlas, 2007).

3.7.1.2.6 Pecos MOA

Wildlife

The Colorado Plateau Semidesert Province ecoregion supports a wide variety of wildlife species. Large mammals include mule deer, pronghorn antelope, mountain lion (*Puma concolor*), coyote, and bobcat, and elk (*Cervus canadensis*). Smaller species include the black-tailed jackrabbit (*Lepus californicus*), Colorado chipmunk (*Tamias quadrivittatus*), rock squirrel (*Otospermophilus variegatus*), wood rat (*Neotoma*), white-footed mouse

(*Peromyscus leucopus*), cliff chipmunk (*Tamias dorsalis*), cottontail, porcupine (*Erethizon dorsatum*), and gray fox (Bailey, 1995c).

Abundant resident birds of the region include bushtit (*Psaltiriparus minimus*), pinyon jay (*Gymnorhinus cyanocephalus*), plain titmouse (*Baeolophus inornatus*), black-chinned hummingbird (*Archilochus alexandri*), Woodhouse's scrub-jay (*Aphelocoma woodhouseii*), red-tailed hawk, golden eagle, and rock wren (*Salpinctes obsoletus*). Summer residents include the chipping sparrow (*Spizella passerina*), nighthawk (*Chordeiles minor*), black-throated gray warbler (*Setophaga nigrescens*), northern cliff swallow (*Petrochelidon pyrrhonota*), lark sparrow (*Chondestes grammacus*), and mourning dove (Bailey, 1995c).

Amphibians and reptiles include the various turtles, lizards (collard, horned and whiptails) snakes (rattlesnakes, kingsnakes, and whip snakes), frogs, and toads (Bailey, 1995c).

Special Status Species

For B-21 aircraft operations within the Pecos MOA airspace, USFWS special status species lists were obtained to identify species with the potential to occur within five counties in New Mexico (USFWS, 2020c). Federally listed threatened, endangered, and/or candidate mammal and bird species with potential to occur under the airspace associated with the Proposed Action are presented in Table 3.7-6.

Based on GIS data queries, federally designated critical habitat for one fish, the Pecos bluntnose shiner (*Notropis simus pecosensis*), is present under the Pecos MOA airspace. However, because no ground disturbance would occur under the existing airspace during B-21 aircraft operations, fish species were excluded from further analysis and are not discussed further in this EIS.

Table 3.7-6. Federally Listed Species Known to Occur or with Potential to Occur Under the Pecos MOA Airspace

Common Name	Scientific Name	Protection Status	Counties	USFWS Designated Critical Habitat Under the Airspace?	Potential for Occurrence Under the Pecos MOA Airspace
Birds					
Least Tern	<i>Sterna antillarum</i>	Endangered	<u>New Mexico</u> : Chaves	none	Potential summer migrant.
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	Threatened	<u>New Mexico</u> : Lincoln	none	Unlikely. Species' historical range is outside of the ROI.
Piping Plover	<i>Charadrius melodus</i>	Threatened	<u>New Mexico</u> : Chaves, Guadalupe	none	Unlikely. Piping plovers are rarely reported/observed migrating through New Mexico.

Table 3.7-6. Federally Listed Species Known to Occur or with Potential to Occur Under the Pecos MOA Airspace

Common Name	Scientific Name	Protection Status	Counties	USFWS Designated Critical Habitat Under the Airspace?	Potential for Occurrence Under the Pecos MOA Airspace
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	Endangered	<u>New Mexico:</u> Guadalupe, Lincoln	none	Potential spring and fall migrant. Breeding habitat does not occur within the ROI.
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Threatened	<u>New Mexico:</u> Chaves, Lincoln	none	Yes. Species' potential habitat includes the ROI. In New Mexico, the species is found in riparian zones with dense understory vegetation, most commonly in the south and along major drainages.
Mammals					
New Mexico Meadow Jumping Mouse	<i>Zapus hudsonius luteus</i>	Endangered	<u>New Mexico:</u> Guadalupe, Lincoln	none	Unlikely. ROI occurs outside of the species' current native distribution.
<i>Penasco Least Chipmunk</i>	<i>Tamias minimus atristriatus</i>	Candidate	<u>New Mexico:</u> Lincoln	none	Unknown. The Penasco least chipmunk has a narrow range and small population size—only two known populations occur in the White and Sacramento mountain ranges in Otero and Lincoln counties in New Mexico.

Source: (USFWS, 2020c)

MOA = Military Operating Area; ROI = region of influence; USFWS = U.S. Fish and Wildlife Service

Note:

The ROI for federally listed species under the airspace only applies to various bird and mammal species known to occur or with potential to occur in these areas and that have the potential to be impacted by noise associated with B-21 aircraft operations.

Migratory Bird Treaty Act

The Pecos MOA is located within the USFWS designated BCR 16 Southern Rockies/Colorado Plateau, BCR 18 Shortgrass Prairie, and BCR 35 Chihuahuan Desert (see Appendix E, Biological Resources, for a full list of species), under the Central Flyway migration route (Figure 3.7-1) (USFWS, 2008).

Bald and Golden Eagle Protection Act

Bald and golden eagle habitats are present under the Pecos MOA airspace. In New Mexico, bald eagles are primarily migratory, supporting large populations of wintering eagles. Migrating bald eagles can be found near rivers and lakes, where occasional tall trees provide lookout perches and night roosts (New Mexico Game and Fish, 1996).

In New Mexico, golden eagles breed locally in suitable habitat throughout the state. Suitable habitat occurs primarily in areas of mountain cliffs or canyons, or rimrock terrain adjacent to open desert or grassland areas (NMACP, 2020).

3.7.1.3 Analysis Methodology

The first step in the analysis of potential impacts to biological resources was to determine the locations of sensitive habitats and species in relation to the Proposed Action. Maps were examined to locate sensitive species and habitats. Next, areas of overlap for the Proposed Action and sensitive habitats and species were identified. Scientific literature was reviewed for studies that examined similar types of impacts to biological resources. The literature review included a review of basic characteristics and habitat requirements of each sensitive species. Where available, information was also gathered relative to management considerations and threats to each sensitive species. Impact analysis was then conducted based on the information gathered from the literature review and discussions with experts in these areas. The analysis included an assessment of the impacts on biological resources resulting from both construction activities and aircraft operations.

Impacts to biological resources for beddown actions at either basing location could result from activities associated with construction, demolition, and renovation projects as well as from aircraft operations on the installation airfields including noise effects and bird/wildlife aircraft strike considerations (Section 3.2, Noise, and Section 3.11, Health and Safety).

Impacts to biological resources occurring under the airspace proposed for use for B-21 operations would result from associated overflight noise and bird-aircraft collisions. Aircraft noise may result in adverse health and environmental impacts to wildlife (a review of current literature evaluating potential noise effects on wildlife is presented in Appendix E, Biological Resources). Bird-aircraft collisions pose BASH and safety concerns.

The significance of potential impacts to biological resources was determined based on (1) the importance of the resource (i.e., legal, commercial, recreational, ecological, or scientific), (2) the proportion of the resource that would be affected relative to its occurrence in the region, (3) the sensitivity of the resource to proposed activities, and (4) the duration of ecological ramifications.

Impacts to biological resources would be significant if species or habitats of special concern would be adversely affected over relatively large areas or if disturbances would cause reductions in population size or distribution of a special status species. This analysis focuses on wildlife and special status species that occur or potentially occur under the airspace proposed for use for B-21 operations that could be impacted by the Proposed Action and alternatives.

3.7.2 Biological Resources, Environmental Consequences

3.7.2.1 No Action Alternative Consequences

3.7.2.1.1 No Action at Dyess AFB

Under the No Action Alternative, the B-21 would not beddown at Dyess AFB, and there would be no associated construction, demolition, or renovation activities. Noise resulting from baseline aircraft operations at the airfield would continue at current levels (Section 3.2.2.1.1, Noise, No Action at Dyess AFB, Aircraft Noise) (Figure 3.2-1) because the B-21 MOB 1 beddown would not occur.

On-base biological resources would continue to be managed through each of the installation's BASH and Integrated Natural Resource Management programs. Future development that is not associated with the B-21 beddown would continue to be evaluated and implemented as appropriate. The IDP prepared for Dyess AFB provides information on potential future development and construction projects. It is anticipated that future development would occur in accordance with guidance in the IDP and INRMP, as applicable, and, thus, adverse impacts would not be expected. Note that any future development projects would be subject to project-specific environmental review under the EIAP.

Airspace and Range Utilization

Under the No Action Alternative, there would be no development or any other ground-disturbing activities that would cause changes to the biological resources under the PRTC, Lancer MOA, Brownwood MOA, or Pecos MOA airspace. Aircraft operations and airspace use under current operational parameters would continue at current levels (Section 3.1.2.1.1, Airspace, No Action at Dyess AFB) because the B-21 MOB 1 beddown would not occur.

Previous NEPA analyses conducted for the PRTC (USAF, 2014a), Realistic Bomber Training Initiative (USAF, 2000), and New Mexico Training Range Initiative (USAF, 2006) concluded that noise from aircraft operations would not significantly impact any biological resources. Under the baseline No Action Alternative, noise levels range from less than 35 dB L_{dnmr} to 46.1 dB L_{dnmr} across the PRTC (Figure 3.2-2). Likewise, baseline noise levels beneath the Brownwood, Pecos, and Lancer MOAs (less than 35, 55.9, and 43.4 dB L_{dnmr} , respectively) (Figure 3.2-3) would also remain well below the 65 dB L_{dnmr} level that would potentially impact noise-sensitive wildlife listed species.

Since the B-1 will continue to operate under the No Action Alternative, there is the potential that species could be impacted by low-level flights. SELs above 90 dB where low-level overflights occur are associated with a number of behaviors to wildlife, such as retreating from the sound, freezing, or exhibiting a strong startle response. Animals typically exhibit continually decreasing responses to noise exposure, and this suggests habituation as the noise is not perceived as a threat. Threshold noise levels for mild responses (rising of the head, pricking ears, and scenting of the air) to wildlife range from 65 dB for to 85 dB. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms. The previous NEPA analyses concluded that minimal to no effects are expected to threatened, endangered, and other special status species (USAF, 2006; USAF, 2014a; USAF, 2000). Any impact to sensitive species would likely be short term and unlikely to significantly affect the population.

Potential bird-aircraft strikes could occur where migratory flyways converge. Migratory bird species involved in bird-aircraft strike would be considered an incidental taking and would be exempt from any permitting requirement. An infrequent special status bird-aircraft strike would not be expected to adversely affect any populations.

3.7.2.1.2 No Action at Ellsworth AFB

Under the No Action Alternative, the B-21 would not beddown at Ellsworth AFB, and there would be no associated construction, demolition, or renovation activities. Noise resulting from baseline aircraft operations at the airfield would continue at current levels (Section 3.2.2.1.2, Noise, No Action at Ellsworth AFB, Aircraft Noise) (Figure 3.2-1) because the B-21 MOB 1 beddown would not occur.

On-base biological resources would continue to be managed through the installation's BASH and Integrated Natural Resource Management programs. Future development that is not associated with the B-21 beddown would continue to be evaluated and implemented as appropriate. The IDP prepared for Ellsworth AFB provides information on potential future development and construction projects. It is anticipated that future development would occur in accordance with guidance in the IDP and INRMP, as applicable, and, thus, adverse impacts would not be expected. Note that any future development projects would be subject to project-specific environmental review under the EIAP.

Airspace and Range Utilization

Under the No Action Alternative, there would be no development or any other ground-disturbing activities that would cause changes to the biological resources under the current Ellsworth AFB airspace. Aircraft operations and airspace operational parameters would continue at current levels because the B-21 MOB 1 beddown would not occur.

Previous NEPA analyses conducted for the PRTC concluded that aircraft operations would not significantly impact any biological resources (USAF, 2014a). Airspace noise in the PRTC would range from less than 35 dB L_{dnmr} to 46.1 dB L_{dnmr} across the PRTC (Figure 3.2-2) under the No Action Alternative at Ellsworth AFB, which would also remain well below the 65 dB L_{dnmr} level that would potentially impact noise-sensitive wildlife listed species.

Since the B-1 will continue to operate under the No Action Alternative, there is the potential that species could be impacted by low-level flights. SELs above 90 dB where low-level overflights occur are associated with a number of behaviors to wildlife such as retreating from the sound, freezing, or a strong startle response. Animals typically exhibit continually decreasing responses to noise exposure, and this suggests habituation as the noise is not perceived as a threat. Threshold noise levels for mild responses (rising of the head, pricking ears, and scenting of the air) to wildlife range from 65 dB for to 85 dB. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms. It was concluded that minimal to no effects are expected to threatened, endangered, and other special status species (USAF, 2014a). Any impact to sensitive species would likely be short term and unlikely to significantly affect the population.

Potential bird-aircraft strikes could occur where migratory flyways converge. Migratory bird species involved in bird-aircraft strikes would be considered an incidental taking and would be exempt from any permitting requirement. An infrequent special status bird-aircraft strike would not be expected to adversely affect any populations.

3.7.2.2 Dyess AFB Alternative

3.7.2.2.1 Personnel

Changes to personnel would not impact biological resources and therefore are not discussed further in this document.

3.7.2.2.2 Airfield Operations

Under the Dyess AFB Alternative, aircraft operations would decrease from baseline conditions at Dyess AFB by approximately 1.1 percent. Additionally, noise levels at Dyess AFB would decrease from the baseline conditions analyzed under the No Action Alternative (Section 3.2, Noise, and Table 3.2-10). The B-21 is projected to be generally

quieter and tends to fly higher than the B-1; therefore the noise in the area and the number of acres and wildlife exposed from B-21 operations would decrease overall as a result of establishing the B-21 MOB 1 beddown at Dyess AFB. Therefore, under the Dyess AFB Alternative, there would be a reduced potential for adverse noise effects to noise sensitive wildlife, migratory birds (including BCC), and bald or golden eagles on or near Dyess AFB as a result of B-21 operations.

Similar to noise, an overall reduction in aircraft operations would likely decrease the potential for bird/wildlife aircraft strike encounters. Refer to Section 3.11 (Health and Safety) for additional information. During B-21 aircraft operations at Dyess AFB, current procedures for avoiding flight operations during periods of high concentrations of migratory birds would continue. Adherence to the existing BASH Program and the USFWS-issued Depredation Permit conditions would further minimize the risk of bird-aircraft strikes at Dyess AFB, including those for migratory birds (including BCC), and special status species birds to negligible levels. The Dyess AFB BASH Plan provides guidance for bird/wildlife strike hazard reduction in areas where flying operations are conducted. Tasked organizations such as USDA Wildlife Services (USDA-WS) and the 7th Bomb Wing/Flight Safety (7 BW/SEF) Bird Hazard Working Group implement procedures in accordance with the plan. Procedures include (but are not limited to) reporting hazardous bird activity and altering or discontinuing flying operations; disseminating information to all assigned and transient aircrews for specific bird hazards and procedures for avoidance; eliminating or reducing environmental conditions that attract birds to the airfield; and dispersing birds on the airfield using nonlethal measures that prevent or minimize bird damage without purposefully killing or trapping birds (Dyess AFB, 2019a). When nonlethal measures cannot be used, Dyess AFB abides by the USFWS-issued Depredation Permit that authorizes the take of specific species and numbers of birds. The conditions of the permit are updated annually. Additionally, all bird-aircraft strikes and hazards will continue to be reported per AFI 91-204, *Safety Investigations and Reports*, and Air Force Manual (AFMAN) 91-223, *Aviation Safety Investigations and Reports*.

Due to the overall decreases in airfield operations, the noise environment, and potential reduction in bird/wildlife-aircraft strike encounters, impacts to wildlife, special status species, migratory birds (including BCC), and bald or golden eagles at or near Dyess AFB are not anticipated to occur under the Dyess AFB Alternative.

No federally listed species (as presented in Table 3.7-1) or potential suitable habitats occur at Dyess AFB and no further Section 7 consultation is required with the USFWS for the Dyess AFB Alternative. Additionally, species of state significance (spot-tailed earless lizard and the Texas horned lizard) would not be impacted by airfield operations under the Dyess AFB Alternative.

3.7.2.2.3 Airspace and Range Utilization

The existing airspace would not be changed under the Dyess AFB Alternative and B-21 operations would be consistent with current operations as analyzed in the 2014 PRTC EIS and the associated USAF and FAA RODs (USAF, 2015; FAA, 2015; USAF, 2014a), Realistic Bomber Training Initiative (USAF, 2000), and New Mexico Training Range

Initiative (USAF, 2006). For B-21 operations, flights below 3,000 AGL would not occur in SUA.

Under the Dyess AFB Alternative overall aircraft operations would decrease from baseline conditions at the PRTC (by approximately 0.65 percent), Lancer MOA (by approximately 17.73 percent), and Brownwood MOA (by approximately 0.53 percent). Increases in air operations from baseline conditions would occur within the Pecos MOA (by approximately 14.68 percent).

Resulting noise levels from B-21 aircraft operations would remain below 46.1 dB L_{dnmr} within the PRTC, below 35 dB L_{dnmr} within the Lancer and Brownwood MOAs, and below 36.9 dB L_{dnmr} within the Pecos MOA. These training airspace areas are very large, and training operations are sufficiently spread out such that intense overflight noise events at any one location are infrequent. Overflight activity occurs less frequently than in other areas. Because the B-21 is projected to be generally quieter and tends to fly higher than the B-1, the noise in the area and the number of acres and wildlife exposed would decrease overall as a result of establishing the B-21 MOB 1 beddown at Dyess AFB. Therefore, under the Dyess AFB Alternative, there would be a reduced potential for adverse noise effects to noise sensitive wildlife, migratory birds (including BCC), and bald or golden eagles within training airspace and ranges as a result of B-21 operations.

A reduction in aircraft operations within the PRTC, Lancer MOA, and Brownwood MOA would likely decrease the potential for bird/wildlife aircraft strike encounters or, at a minimum, pose no additional strike risks in these areas. However, an increase in operations within the Pecos MOA would potentially result in increased bird/wildlife-aircraft strikes. Bird migrations typically occur within ranges from 500 to 2,000 feet. Since B-21 pilots would fly predominately over 3,000 AGL, the potential for bird-aircraft collisions would be minor.

Therefore, no significant impacts to wildlife, special status species, migratory birds (including BCC), and bald or golden eagles within training airspace and ranges would occur under the Dyess AFB Alternative. Species or habitats of special concern would not be adversely affected or cause disturbances or reductions in population size or distribution of a special status species.

3.7.2.2.4 Facilities and Infrastructure

Vegetation

Under the Dyess AFB Alternative, activities associated with construction, renovation, and demolition projects would occur in previously developed or turf and landscaped areas within Dyess AFB. Approximately 345 acres of land would be disturbed for facilities and infrastructure projects listed in Table 2.4-1. Of which, approximately 106 acres, or 31 percent of the proposed construction footprint shown in Figure 2.4-3, would be newly impacted areas containing a mix of maintained turf or landscaped areas. Approximately 239 acres (or 61 percent of the proposed construction footprint) would consist of previously developed areas containing pavement or previous construction. Revegetation of temporarily disturbed areas would be conducted as directed by the base Natural

Resource Manager to minimize the potential for erosion and dust generation. Since the majority of construction-related impacts would occur on previously developed areas, no significant impacts to vegetation would result from implementation of the Dyess AFB Alternative.

Wildlife

Potential impacts to wildlife would include ground disturbance and construction noise from the associated facility and infrastructure projects. However, the areas planned for development for facilities and infrastructure are highly disturbed and do not provide high quality habitat for wildlife species, though a small number of wildlife species could occur in the turf grass and landscaped areas during construction (generally those tolerant of human presence and activity). As previously stated, approximately 106 acres of existing turf grass and landscaped areas would be lost with construction of the proposed facilities and infrastructure projects. However, given the remaining areas with similar features on and around Dyess AFB, this reduction in low-quality habitat is not considered significant and would not result in population level effects to wildlife species that occur on the base.

Noise resulting from the proposed construction, demolition, and renovation activities would be localized, short-term, and only occur during daylight hours. Areas proposed for construction are in a military industrial land use with frequent elevated noise levels. Impacts to wildlife from construction noise would be minimal.

Special Status Species

No federally listed species (as presented in Table 3.7-1) or potential suitable habitats occur at Dyess AFB and no further Section 7 consultation is required with the USFWS for the Dyess AFB Alternative.

Of the two reptile species of state significance with potential to occur at Dyess AFB, only the Texas horned lizard has been observed at Dyess AFB. The presence of listed species is monitored, and updates to the INRMP are completed every 5 years. Consistent with TPWD recommendations, Dyess AFB requires that site-specific surveys be conducted for the state-listed threatened Texas horned lizard during the warm months when the lizards are active and prior to any proposed habitat disturbance activity. Prior to commencement of construction activities, the Dyess AFB Environmental Management System would identify areas of potential Texas horned lizard habitat and coordinate species surveys to be conducted by a permitted biologist. If Texas horned lizards are found on any project site, the USAF would contact TPWD to develop relocation plans. To minimize impacts to Texas horned lizards, BMPs, as described in the *Texas Horned Lizard Watch – Management and Monitoring Packet* (TPWD, n.d.), would be implemented.

Migratory Birds

The areas planned for development are highly disturbed with frequent elevated noise levels, providing little to no habitat for migratory bird species. Noise resulting from construction, demolition, and renovation activities would be localized, short-term, and only occur during daylight hours. Although a relatively small number of wildlife species could

occur in the grass areas during construction (generally those tolerant of human presence and activity), the limited habitat value substantially decreases the biological importance of the site. No significant impacts to migratory birds (including BCC) would occur as no habitats occur within the Dyess AFB Alternative area.

Bald and Golden Eagles

No bald or golden eagles or eagle nesting is known to occur at Dyess AFB or in the immediate vicinity of the installation and therefore impacts to sensitive nesting habitat would not occur. No significant impacts to eagles protected under the BGEPA are anticipated to result from implementation of the Dyess AFB Alternative.

3.7.2.2.5 Weapons Generation Facility

Construction of the WGF on Dyess AFB would occur within mesquite woodland areas, totaling approximately 49.53 acres. Permanent and temporary impacts to vegetation and wildlife may result from land clearing and construction activities. Trees and other vegetation subject to clearing could support foraging, nesting, and other behaviors for mammals, birds (including migratory birds and BCC), and reptiles. Wildlife within the WGF site would be permanently displaced by the WGF and wildlife in the vicinity may be temporarily disturbed from increased noise and human activity. It is expected that noise effects would be short term and would only affect wildlife in the immediate vicinity around the WGF site. Those affected would generally be able to return to the area after the WGF is constructed. While some wildlife would be displaced and vegetation would be removed, the affected area is considered small compared with other similar habitat available nearby. Mesquite savannah is widely distributed throughout the Rolling Plains areas in Texas (TPWD, 1984). Overall, population-level effects to any species are not expected.

The TPWD recommends excluding vegetation clearing during migratory bird nesting season, March through August (Dyess AFB, 2017). To the extent practicable, Dyess AFB would avoid tree removal during this nesting season. While any habitat loss could adversely affect individual birds, the amount of impacted habitat is relatively small compared to similar habitat available. Overall, population-level effects to any migratory bird species are not expected.

As previously described under Section 3.7.2.2.4 (Biological Resources, Dyess AFB Alternative, Facilities and Infrastructure, Special Status Species), Dyess AFB requires that site-specific surveys be conducted for the state-listed threatened Texas horned lizard during the warm months when the lizards are active and prior to any proposed habitat disturbance activity. Consistent with TPWD recommendations and prior to implementation of the Proposed Action, the Dyess AFB Environmental Management System would identify areas of potential Texas horned lizard habitat and coordinate species surveys to be conducted by a permitted biologist. If Texas horned lizards are found on any project site, the USAF would contact TPWD to develop relocation plans. To minimize impacts to Texas horned lizards, BMPs, as described in the *Texas Horned Lizard Watch – Management and Monitoring Packet* (TPWD, n.d.), would be implemented.

Because no federally listed threatened, endangered, or candidate species and/or designated critical habitat occur in the ROI near Dyess AFB, no impacts to federally listed species would result from activities associated with construction of the WGF.

3.7.2.2.6 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

No mitigations would be necessary to implement the Dyess AFB Alternative.

3.7.2.3 Ellsworth AFB Alternative (Preferred Alternative)

3.7.2.3.1 Personnel

Changes to personnel would not impact biological resources and therefore are not discussed further in this document.

3.7.2.3.2 Airfield Operations

Under the Ellsworth AFB Alternative, aircraft operations would increase from baseline conditions at Ellsworth AFB by approximately 15.8 percent. (Section 3.2.2.3.2, Noise, Ellsworth AFB Alternative, Airfield Operations). However, the resulting noise levels at Ellsworth AFB would decrease from the baseline conditions analyzed under the No Action Alternative (Section 3.2, Noise, and Table 3.2-18). Because the B-21 is projected to be generally quieter and tends to fly higher than the B-1, the noise in the area and the number of acres and wildlife exposed would decrease overall as a result of establishing the B-21 MOB 1 beddown at Ellsworth AFB. Therefore under the Ellsworth AFB Alternative, there would be a reduced potential for adverse noise effects to noise sensitive wildlife, migratory birds (including BCC), and bald or golden eagles on or near Ellsworth AFB from B-21 operations.

An increase in airfield operations would likely result in an increased potential for bird/wildlife aircraft strike encounters on Ellsworth AFB. Refer to Section 3.11 (Health and Safety) for additional information. Current procedures for avoiding flight operations during periods of high concentrations of migratory birds would continue at Ellsworth AFB. The 28th Bomb Wing/Flight Safety (28 BW/SEF) is responsible for the overall BASH program at Ellsworth AFB. The Ellsworth AFB BASH Plan provides guidance for bird/wildlife strike hazard reduction in areas where flying operations are conducted. Tasked organizations such as USDA-WS and the 28 BW/SEF Bird Hazard Working Group implement procedures in accordance with the plan. Procedures include (but are not limited to) reporting hazardous bird activity and altering or discontinuing flying operations; disseminating information to all assigned and transient aircrews for specific bird hazards and procedures for avoidance; eliminating or reducing environmental conditions that attract birds to the airfield; maintaining a current and up-to-date installation USDA-WS Wildlife Hazard Assessment; and dispersing birds on the airfield with nonlethal measures that prevent or minimize bird damage without purposefully killing or trapping birds (Ellsworth AFB, 2019a). In instances of high wildlife collision risk hazards at the airfield, Ellsworth AFB also deters or removes wildlife under a SDGFP-issued resident wildlife depredation permit.

Ellsworth AFB also obtains a USFWS-issued Eagle Depredation Permit that acknowledges the potential for aircraft collisions due to sporadic bald and golden eagle flyovers in the area. Conditions of the permit state that Ellsworth AFB is authorized to use nonlethal scare devices to move or disperse bald and golden eagles that are endangering human safety due to a high risk of a serious bird strike with landing and departing aircraft. The permit does not authorize the killing, injury, or capture of eagles or the destruction of young or nests. Any eagle injuries must be reported to the USFWS Migratory Bird Permit Office within 48 hours. Continued coordination with the USFWS and annual reporting is required as part of the permit preconditions.

Under the Ellsworth AFB Alternative, adherence to the existing BASH Program, the USFWS-issued Depredation Permit conditions, SDGFP depredation permit conditions, and the Eagle Depredation Permit conditions would continue. Implementation of these procedures would minimize the risk of wildlife aircraft strikes at Ellsworth AFB, including those for migratory birds (including BCC), and special status species birds (SGCN and eagles) to negligible levels. Additionally, all bird-aircraft strikes and hazards will continue to be reported per AFI 91-204, *Safety Investigations and Reports*, AFMAN 91-223, *Aviation Safety Investigations and Reports*. Therefore, it is anticipated that no significant impacts to migratory birds (including BCC), eagles, or special status species (such as state-listed SGCN) would occur from airfield operations under the Ellsworth AFB Alternative.

No federally listed plant or animal species are known to occur on Ellsworth AFB and no further Section 7 consultation is required with the USFWS for the Ellsworth AFB Alternative. In a letter dated May 20, 2020, the USFWS agreed that ESA Section 7 requirements had been applied and that no further Section 7 consultation is required for the Ellsworth AFB Alternative (Appendix E, Biological Resources).

3.7.2.3.3 Airspace and Range Utilization

As previously stated, the PRTC airspace would not be changed under the Ellsworth AFB Alternative and B-21 operations would be consistent with current operations as analyzed and approved in the 2014 PRTC EIS and the associated USAF and FAA RODs (USAF, 2015; FAA, 2015; USAF, 2014a). For B-21 operations, flights below 3,000 AGL would not occur in SUA.

Under the Ellsworth AFB Alternative, aircraft operations within the PRTC would increase by approximately 41.1 percent. However, resulting noise levels within the PRTC would remain below 42.0 dB L_{dnmr} . These training airspace areas are very large, and training operations are sufficiently spread out such that intense overflight noise events at any one location are infrequent. Overflight activity occurs less frequently than in other areas. Since the B-21 is projected to be generally quieter and tends to fly higher than the B-1, noise levels in all the airspace areas would decrease overall as a result of implementing the Ellsworth AFB Alternative. Noise effects to wildlife under the airspace would not be considered significant, as species disturbances would be short term and unlikely to result in population level effects.

An increase in operations within the PRTC under the Ellsworth AFB Alternative would potentially increase the potential for bird/wildlife-aircraft strikes in these areas. However,

bird migrations typically occur within ranges from 500 to 2,000 feet and B-21 pilots would fly predominately over 3,000 feet AGL. Therefore, the potential for bird-aircraft collisions within the PRTC is considered to be minor.

Given the decrease in noise levels and minor potential for aircraft strikes associated with B-21 operations within the PRTC, there would be no significant impacts to wildlife, special status species, migratory birds (including BCC), and bald or golden eagles under the Ellsworth AFB Alternative.

3.7.2.3.4 Facilities and Infrastructure

Vegetation and Wildlife

Under the Ellsworth AFB Alternative, activities associated with construction, renovation, and demolition projects listed in Table 2.5-1 would occur in previously developed or turf or landscaped areas. Approximately 424 acres of land would be disturbed for facilities and infrastructure projects. Of which, approximately 71 acres, or about 17 percent of the proposed construction footprint (shown in Figure 2.5-3), would include newly impacted areas consisting of maintained turf grass or landscaped areas. Approximately 353 acres (or about 83 percent of the proposed construction footprint) would consist of developed areas containing pavement or previous construction. Revegetation of temporarily disturbed areas would be conducted as directed by the base Environmental Element Manager to minimize the potential for erosion and dust generation. Therefore, no significant impacts to vegetation would result from implementation of the Ellsworth AFB Alternative.

Noise resulting from the proposed construction, demolition, and renovation activities would be localized, short-term, and only occur during daylight hours. Areas proposed for construction are in a military industrial land use with frequent elevated noise levels. Impacts to wildlife from construction noise would be minimal. Reduction of maintained turf and landscaped areas on Ellsworth AFB would not result in population level effects because these are considered low-quality habitat areas. Therefore no significant impacts to wildlife would result from implementation of the Ellsworth AFB Alternative.

Special Status Species

No federally listed threatened, endangered, or candidate species and/or designated critical habitat occur in the ROI near Ellsworth AFB. Therefore, implementation of the Ellsworth AFB Alternative would not impact the four federally listed species presented in Table 3.7-2. In a letter dated May 20, 2020, the USFWS agreed that ESA Section 7 requirements had been applied and that no further Section 7 consultation is required for the Ellsworth AFB Alternative (Appendix E, Biological Resources).

There is no suitable habitat within the development areas for any of the seven state-listed species that have been documented on base. The land slated for facilities and infrastructure development has been previously disturbed, and or consists of turf grass and landscaped areas, which is not suitable habitat for the swift fox, ferruginous hawk, burrowing owl, lark bunting, Blanchard's cricket frog, bumble bees, or Monarch butterflies.

State-listed species management would continue to be monitored under the installation's INRMP program.

Noise resulting from the proposed construction, demolition, and renovation activities would be localized, short-term, and only occur during daylight hours. Noise effects would not extend to off-base areas, therefore impacts to sensitive species would not occur.

Migratory Birds

The areas planned for development are highly disturbed and provide little to no habitat for migratory bird species. Noise resulting from construction, demolition, and renovation activities would be localized, short-term, and only occur during daylight hours. Although a relatively small number of wildlife species could occur in the grass areas during construction (generally those tolerant of human presence and activity), the limited habitat value substantially decreases the biological importance of the site. No significant impacts to migratory birds (including BCC) would occur as no habitats occur within the proposed construction footprint on Ellsworth AFB.

Bald and Golden Eagles

No bald or golden eagle nesting is known to occur at Ellsworth AFB or in the immediate vicinity of the installation and therefore impacts to sensitive nesting habitat would not occur. No significant impacts to eagles protected under the BGEPA are anticipated to result from implementation of the Ellsworth AFB Alternative.

3.7.2.3.5 Weapons Generation Facility

North WGF Site Subalternative

Construction of the WGF under this subalternative would occur within 50 acres of unimproved areas, consisting of native and introduced grasses and forbs. This area is currently used as a grazing pasture. Permanent and temporary impacts to vegetation and wildlife may result from land clearing and construction activities. Vegetation subject to clearing could support habitats for some small mammals, foraging birds (including migratory birds and BCC), and small reptiles. Wildlife within the North WGF Site would be permanently displaced by new construction, and wildlife surrounding the site may be temporarily disturbed from increased noise and human activity. It is expected that noise effects would be short term and would only affect wildlife in the immediate vicinity. Affected individuals would generally be able to return to the surrounding area after the WGF is constructed. While some wildlife would be displaced and vegetation would be removed, the affected area would be small compared with other similar habitat available nearby. Overall, population-level effects to any species are not expected.

As such, no significant impacts to biological resources would result from the North WGF Site Subalternative. Because no federally listed threatened, endangered, or candidate species and/or designated critical habitat occur in the ROI near Ellsworth AFB, no impacts to special status species would occur under the North WGF Site Subalternative.

South WGF Site Subalternative (Preferred Subalternative)

Construction of the WGF under this subalternative would occur within about 48 acres of unimproved areas consisting of native and introduced grasses and forbs. Additionally, a general bridge placement area would be constructed to connect the alert area to the South WGF. The placement area could impact additional unimproved areas, consisting of native and introduced grasses and forbs, as well as wetlands (refer to Section 3.9.2.3.4, Water Resources, Facilities, Infrastructure, and the WGF, for a discussion of impacts to wetland areas). Impacts to biological resources from construction of the South WGF Site Subalternative would be the same as those discussed for the North WGF Site Subalternative. Therefore, no significant impacts to biological resources (vegetation, wildlife, or special status species) would result from the South WGF Site Subalternative.

3.7.2.3.6 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

No mitigations would be necessary to implement the Ellsworth AFB Alternative.

3.8 CULTURAL RESOURCES

3.8.1 Cultural Resources, Affected Environment

3.8.1.1 Description of Resource

Cultural resources consist of prehistoric and historic sites, structures, artifacts, and any other physical or traditional evidence of human activity considered relevant to a particular culture or community for scientific, traditional, religious, or other reasons. For regulatory purposes, cultural resources are assessed to determine if they are significant and exhibit integrity, in accordance with the National Register criteria (36 CFR Part 63) to qualify for listing in the National Register of Historic Places (NRHP).

As defined under 32 CFR 800 (I)(1), "Historic Property means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria." A traditional cultural property, as defined by National Register Bulletin 38, "is eligible for listing in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker & King, 1990).

This section describes known historic properties within the affected areas that are eligible for listing in the NRHP. As the affected environment is limited to areas already used by the USAF for current bomber operations, information is drawn from existing studies,

cultural resource management plans, and previous environmental documents. The USAF initiated government-to-government consultation with Native American tribes with potential interest in the Proposed Action and engaged the appropriate SHPOs and other consulting parties in accordance with Section 106 of the National Historic Preservation Act (NHPA) (54 U.S.C. 306108) (see Sections 3.8.1.2.1 and 3.8.1.2.2, Affected Environment, Region of Influence, Dyess AFB and Ellsworth AFB, respectively).

3.8.1.2 Region of Influence

As defined under 36 CFR 800.16, “Undertaking means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval. Also, as defined under 36 CFR 800.16, “the Area of Potential Effects is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist. The area of potential effects is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking.”

The Area of Potential Effects (APE) to historic properties is the ROI for cultural resources in this EIS. The APE is influenced by the scale and nature of the alternatives proposed, and, thus, may differ according to the types of effects caused by the action. The APE for this Proposed Action includes areas directly or indirectly affected by construction and implementation of the proposed B-21 MOB 1 beddown at Dyess AFB or Ellsworth AFB, as well as areas beneath the airspace to be utilized for B-21 training operations.

3.8.1.2.1 Dyess AFB

Dyess AFB traces its history to the Abilene Army Air Base, established in 1942 to support pilot training operations for Camp Barkley, located south of Abilene, Texas. The airfield was closed in 1946 and utilized as a training facility for the Texas State National Guard from 1947 to 1952. The 1,500-acre property was purchased by the City of Abilene, which raised money to purchase an additional 3,500 acres following outbreak of the Korean conflict. In 1952, the city offered the land to the DoD for creation of a new military base. The first unit was activated at Dyess AFB in 1955 (USAF, 2017a).

A comprehensive summary of information about cultural resources at Dyess AFB is presented in the 2017 Integrated Cultural Resources Management Plan (ICRMP), which implements AFMAN 32-7003, *Environmental Conservation* (April 20, 2020), which supersedes AFI 32-7065, *Cultural Resources Management* (June 1, 2004), Air Force Policy Directive 32-70, *Environmental Quality*, and DoD Instruction (DoD) 4715.3, *Environmental Conservation Program* (May 3, 1996, amended July 20, 1998). As described in the ICRMP, the entirety of Dyess AFB has been subject to archaeological and historic site inventories to identify historic properties. These inventories identified no eligible archaeological sites and six eligible historic buildings (Figure 3.8-1).

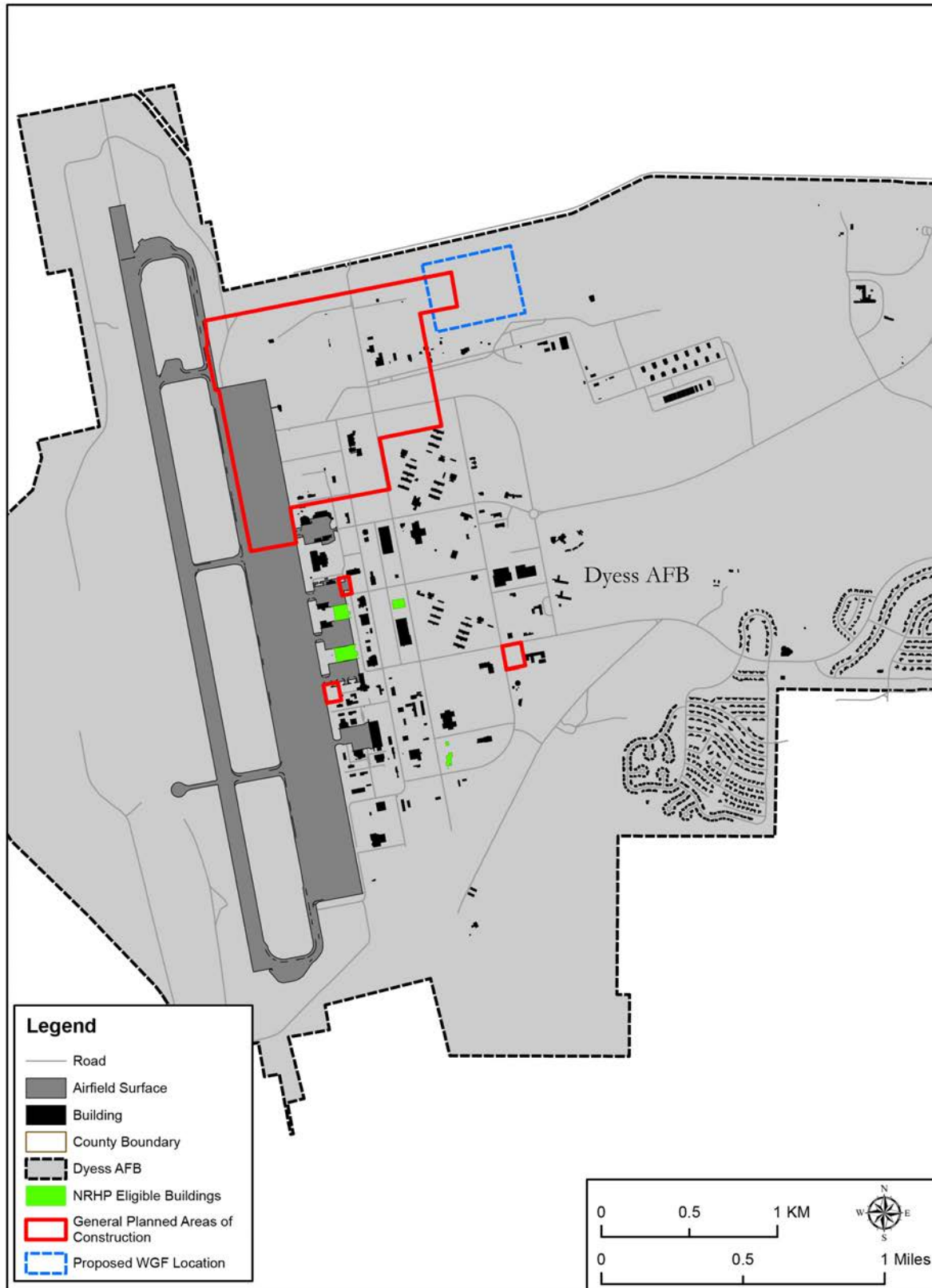


Figure 3.8-1. Location of Historic Properties at Dyess AFB

Two comprehensive archaeological surveys have been completed. In 1989, the Texas Archaeological Research Laboratory surveyed approximately 450 acres for the proposed Peacekeeper Rail Garrison Facilities at Dyess AFB (Powell, 1989). In 1995, 3D/Environmental surveyed 1,013 acres as part of a proactive effort by the USAF to identify archaeological resources in compliance with federal cultural resources regulations (Haywood, Norman A. & Russell, Keith A., 1995).

As a result of these two surveys, five prehistoric, two historic, and one prehistoric and historic era archaeological sites were recorded; none of these sites were determined eligible for listing in the NRHP. Although portions of Dyess AFB, consisting of developed grounds, standing water and channelized waterways, and thick stands of honey mesquite, have not been subject to archaeological survey, an archaeological needs assessment for Dyess AFB completed in 2011 by Geo-Marine, Inc., recommended that the entire base is so heavily disturbed that no additional archaeological investigations are required. Texas State Historic Preservation Officer (SHPO) concurred with this recommendation (USAF, 2017a).

Six architectural surveys have been conducted at Dyess AFB, including a 1994 baseline survey of Cold War material by Mariah Associates, a 1994-1995 study of DoD aircraft hangars by the U.S. Army Corps of Engineers (USACE), a 1995 study by the National Park Service, a 1995 survey of historic objects by the curator of the Dyess Visitor Center and Memorial Park, and a 2006 survey of Cold War-era resources by Geo-Marine, Inc. Together, these architectural surveys have evaluated all World War II resources and all major (and some minor) Cold War-era resources. Some minor Cold War-era resources, such as gas mains, railroad tracks, and fire hydrants, and resources constructed after 1991 have not been evaluated.

Based on the most recent study by Geo-Marine, Inc., and subsequent consultation with the Texas SHPO, six Cold War-era buildings and structures (Buildings 4314, 5020, 8129, 8130, 8131, and 7007) have been determined eligible for listing in the NRHP (USAF, 2017a). While unaccompanied personnel housing (1946–1974) (Buildings 6125, 6126, 6127, 6136, 6137, 7218, 7219, 7220, 7221, 7403, 7407, 7409, 7420, 7421, 7422, and 9212) and World War II- and Cold War-era ammunition storage facilities (1939–1974) (Buildings 9117, 9122, 9123, 9124, 9125, 9126, 9127, 9128, 9129, 9130, 9131, 9132, 9133, 9134, 9135, 9136, and 9139) at Dyess AFB are covered under two Advisory Council on Historic Preservation (ACHP) Program Comments, both signed August 18, 2006 (ACHP, 2006a; ACHP, 2006b), SHPO concurred that these resources are not eligible for listing in the NRHP in a letter dated March 15, 2010. None of the eligible properties are located within the planned construction areas.

The ICRMP identifies no known traditional cultural properties, Native American burials, or sacred areas on Dyess AFB. There are six federally recognized tribes affiliated with the lands managed by Dyess AFB. These are the Apache Tribe of Oklahoma, Comanche Nation, Fort Sill Apache Tribe of Oklahoma, Jicarilla Apache Nation, Kiowa Indian Tribe of Oklahoma, and Mescalero Apache Tribe (USAF, 2017a). Additionally, the Caddo Nation of Oklahoma, Kickapoo Traditional Tribe of Texas, Wichita and Affiliated Tribes, Tonkawa Tribe of Indians of Oklahoma, and Ysleta Del Sur Pueblo may potentially be affected by the Proposed Action. Prior to the public scoping period, the USAF held two informational meetings in early March 2020 in Big Spring and Brownwood, Texas. These

two locations were chosen due to their proximity to the Lancer and Brownwood MOAs. The USAF also published newspaper ads in two national tribal newspapers (Native Sun News and Indian Country Today) for both the informational meetings and the scoping period. No tribal representatives attended the informational meetings. Additionally, in March 2020, the USAF notified all 11 of the tribes, via mail, of the public scoping period and requested their level of interest in participating in government-to-government consultation. To date, only two responses have been received—from the Ysleta Del Sur Pueblo and Comanche Nation, stating there are no properties affected and/or declining government-to-government consultation (see Appendix F, Cultural Resources).

3.8.1.2.2 Ellsworth AFB

Ellsworth AFB was established during World War II as Rapid City Army Air Base; it became known as Ellsworth AFB in 1953. From 1942 to 1945 it served as a training facility for B-17 and B-24 bomber crews. Inactivated in 1945, the base became a permanent USAF facility in 1947, serving as home of a fleet of long-range heavy bombers including B-36s, RB-36s, and later B-52s, as well as KC-135, EC-135 A, and T-38 aircraft. During the Cold War, Ellsworth, a unit of the Strategic Air Command, was host for a group of 150 Minuteman intercontinental ballistic missiles, which were later upgraded to Minuteman II. Aircraft were maintained on a constant-alert status enabling them to immediately respond to a military crisis. These programs were discontinued in the early 1990s, but Ellsworth's strategic importance continued as one of two bases hosting the B-1 bomber. The physical landscape of the base reflects its changing missions over time, with most of the World War II-era resources removed during building campaigns in the 1960s and 1970s, and additional significant changes made for the B1-B bomber beddown in the 1980s. Ellsworth AFB's current boundary also includes the former Rushmore Air Force Station nuclear weapons ordnance facility, established in 1952 and formerly operated by the Atomic Energy Commission (USAF, 2016a; Hufstetler et al., 1997).

Cultural resource management at Ellsworth AFB is facilitated by their 2016 ICRMP, which includes a summary of known cultural resources at the base. According to this document, no eligible archaeological sites and 21 eligible buildings are located at Ellsworth AFB (USAF, 2016a).

Ellsworth AFB was subject to a comprehensive archaeological survey in 1994 that surveyed all significant tracts of undisturbed land at the base, utilizing both pedestrian survey and soil auger testing. The survey does not overlap the current APE but did identify three archaeological sites, including a modified natural spring, a lithic flake, and World War II railroad segments, none of which were determined eligible for listing in the NRHP. The only portions of the base that have not been subject to archaeological survey are areas of steep, broken hillsides at the north end of the base and the areas of the base that have been subject to extensive historical disturbance, such as the current APE. These areas have a low potential for significant archaeological resources, so no additional archaeological survey is recommended in the ICRMP (USAF, 2016a).

The first architectural surveys took place at Ellsworth AFB in the mid-1990s. Over 30 Historic American Building Survey (HABS)/Historic American Engineering Record

(HAER) recordations also were conducted at that time. A Cultural Resources Survey Update was completed in 2006, and the report finalized in 2007.

The survey addressed 119 previously surveyed structures and 20 new structures at least 45 years of age. The study concurred with the previous finding that four World War II structures and three Cold War–era structures are eligible for listing in the NRHP. The authors also recommended an additional 14 Cold War–era buildings eligible for listing in the NRHP. A 2007–2009 study of Cold War–era buildings also recommended these same 14 buildings eligible for listing in the NRHP; the South Dakota SHPO concurred with this finding (USAF, 2016a). A 2018 survey addressed 24 specific buildings at Ellsworth AFB, including three buildings previously determined eligible (Figure 3.8-2).

The authors recommended that the three buildings remained eligible for listing in the NRHP; the other surveyed buildings were recommended ineligible (Kintz, 2018). Currently, four World War II buildings (601, 6904, 6905, 6908) and 17 Cold War–era buildings (7258, 7260, 7262, 7504, 7610, 7614, 7618, 7622, 7624, 9050, 88031, 88106, 88134, 88257, 88271, 88285, 88289) at Ellsworth AFB are eligible for listing in the NRHP (USAF, 2016a). As depicted on Figure 3.8-2, Buildings 7504 (PRIDE Hangar), 7258, 7260, and 7262 are within the general planned areas of construction under the Ellsworth AFB Alternative and are either proposed for modification (Building 7504) or demolition (Buildings 7258, 7260, and 7262).

The ICRMP identifies no known traditional cultural properties at Ellsworth AFB. Federally recognized tribes in South Dakota with potential interest in the construction activities at Ellsworth AFB include the Crow Creek Sioux, Flandreau Santee Sioux, Lower Brule Sioux, Oglala Sioux, Rosebud Sioux, Sisseton-Wahpeton Sioux, and Yankton Sioux, (USAF, 2016a). The Cheyenne River Sioux Tribe, the Crow Tribe, the Northern Cheyenne Tribe, and the Standing Rock Tribe were invited signatories to the original 2014 PRTC Programmatic Agreement and were invited to consult on this EIS undertaking for that reason. In addition, the Blackfeet Nation; Chippewa Cree Tribe; Confederated Salish and Kootenai Tribe; Eastern Shoshone Tribe; Fort Belknap Indian Community; Fort Peck Assiniboine and Sioux Tribes; Mandan, Hidatsa and Arikara Nation; Northern Arapaho Tribe; Spirit Lake Tribe; and Turtle Mountain Band of Chippewa Indians may potentially be affected by the Proposed Action. Prior to the public scoping period, the USAF held three informational meetings in late February 2020 in Hardin and Miles City, Montana and Dickinson, North Dakota. These locations were chosen due to their proximity to tribal reservations underneath the PRTC airspace. The USAF also published newspaper ads in two national tribal newspapers (*Native Sun News* and *Indian Country Today*), as well as the *Original Briefs*, which services the Crow and Northern Cheyenne Tribes, for both the informational meetings and the scoping period. No tribal representatives attended the informational meetings. Additionally, in March 2020, the USAF notified all 21 of the previously mentioned tribes, via mail, of the public scoping period of the public scoping period and requested their level of interest in participating in government-to-government consultation (see Appendix F, Cultural Resources). To date, no responses have been received.

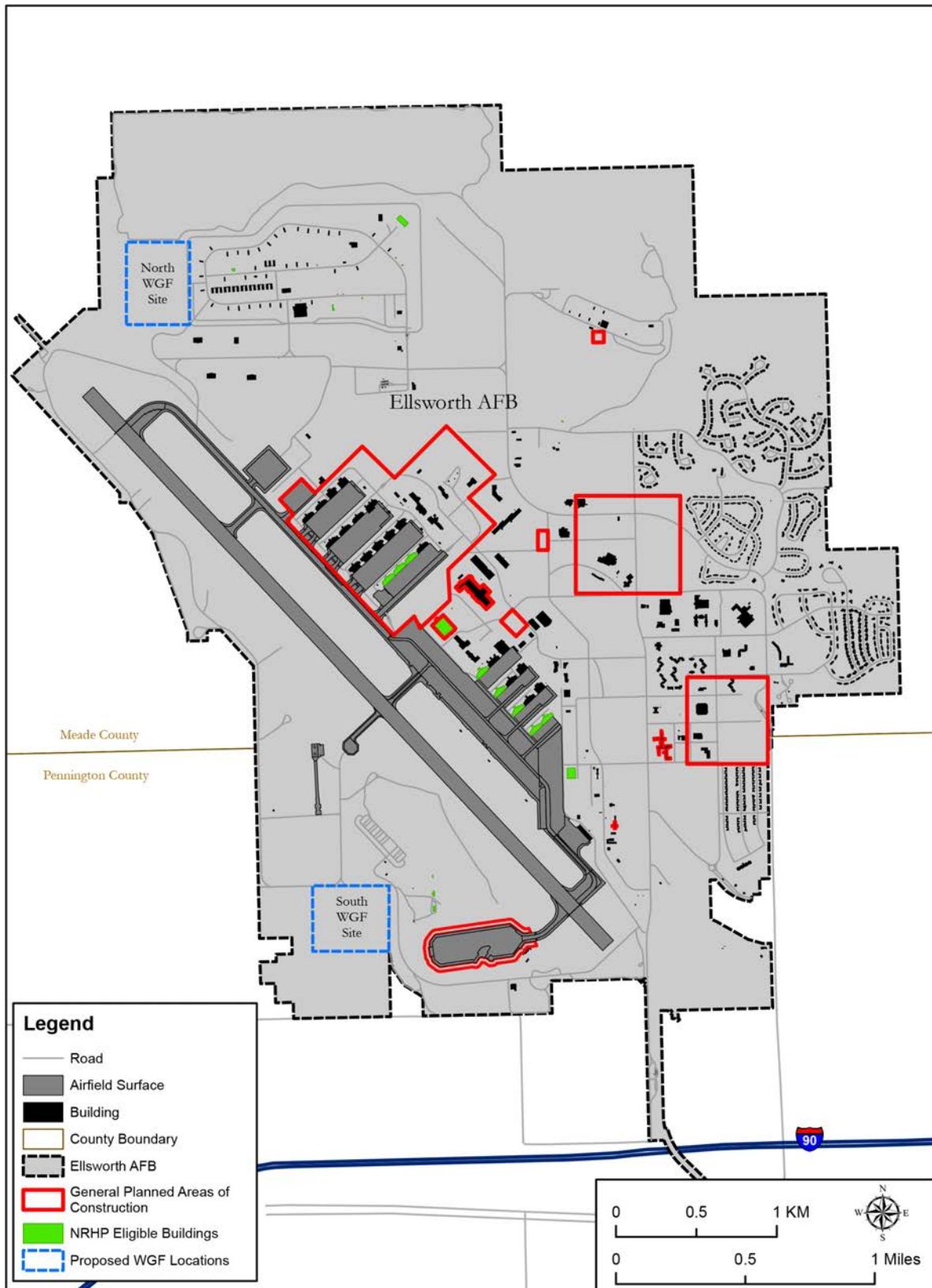


Figure 3.8-2. Location of Historic Properties at Ellsworth AFB

3.8.1.2.3 Powder River Training Complex

Cultural resources with the potential to be impacted by activities at the PRTC are defined in the 2014 PRTC EIS (USAF, 2014a). The document identifies known cultural resources, including NRHP-listed properties, National Historic Landmarks, National Monuments, ghost towns, historic ranches, cultural landscapes, and traditional cultural properties located below the PRTC airspace in Wyoming, Montana, North Dakota, and South Dakota (Table 3.8-1 and Figure 3.8-3). Reported resource counts for each category are provided in Table 3.8-1.

Table 3.8-1. Historic Properties Identified in the 2014 Powder River Training Complex Environmental Impact Statement

Location	NRHP Listed	NHL	National Monuments	Ghost Towns	Historic Ranches	Cultural Landscapes	TCPs
Wyoming	14	0	1	3	1	1	4
Montana	36	2	1	0	5	1	2
North Dakota	16	0	0	5	1	0	0
South Dakota	175	3	0	14	19	0	2

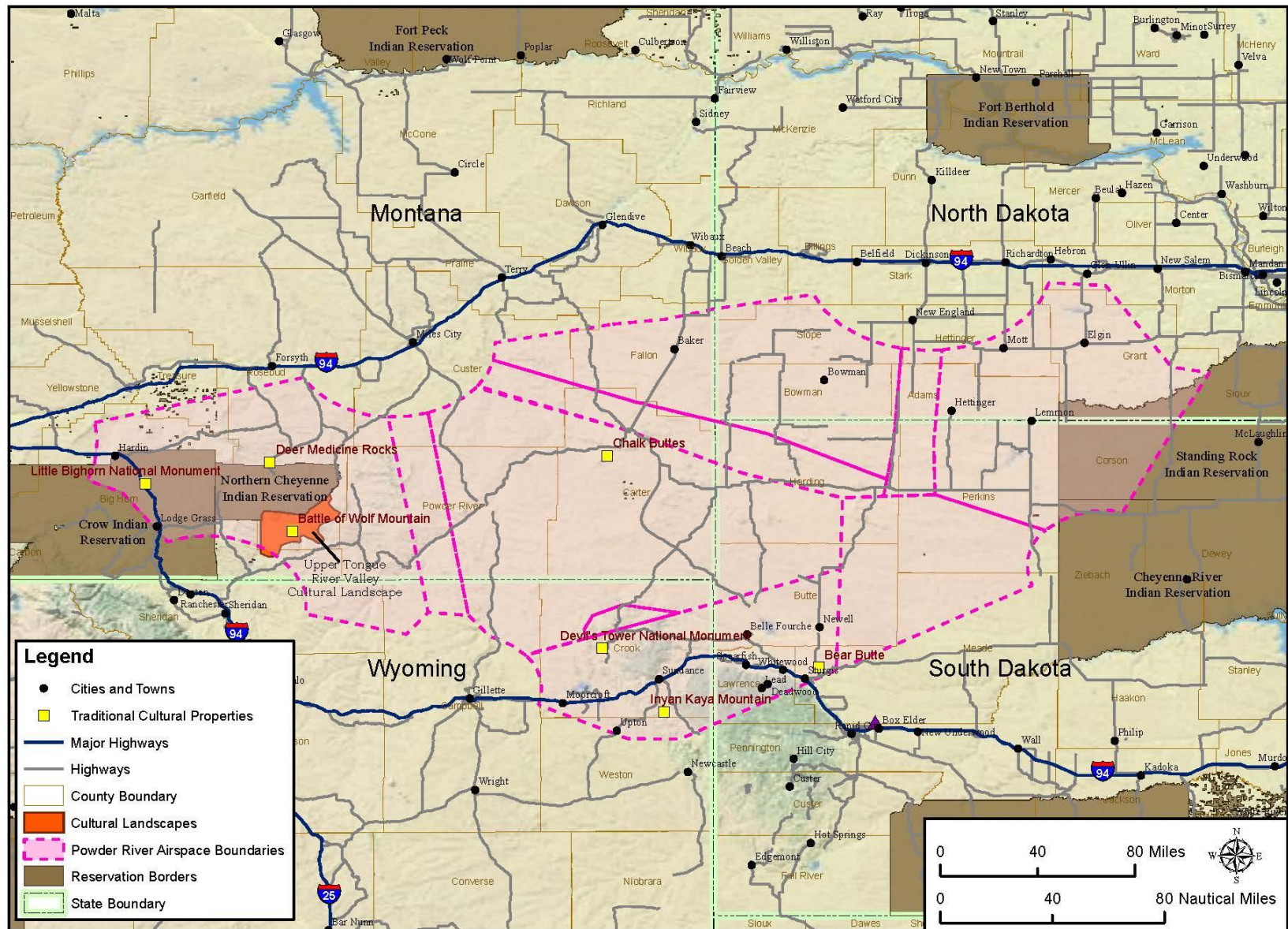
Source: (USAF, 2014a)

NHL = National Historic Landmark; NRHP = National Register of Historic Places; TCP = traditional cultural property

Depicted on Figure 3.8-3, some cultural resources of particular note below the current airspace include Little Bighorn Battlefield National Monument, which, in addition to its historic significance, is held sacred by many Native Americans; Wolf Mountains Battlefield/Where Big Crow Walked Back and Forth and Deer Medicine Rocks National Historic Landmarks; the Tongue River Valley, a cultural landscape with a high concentration of documented sites from prehistoric contexts, Great Sioux War contexts, and early ranching settlement contexts; Chalk Buttes, a traditional cultural property containing sensitive rock art; Devil's Tower National Monument and Inyan Kaya Mountain, both considered sacred by Native Americans; and Bear Butte, a National Historic Landmark and sacred site that is the prehistoric and historic location of annual Native American gatherings (USAF, 2014a).

The PRTC airspace is above portions of four Native American reservations—Cheyenne River Reservation, the Crow Reservation, the Northern Cheyenne Indian Reservation, and the Standing Rock Reservation. These four tribes, as well as the Oglala Sioux and Rosebud Sioux, engaged in government-to-government consultation for the 2014 PRTC EIS (USAF, 2014a). Key concerns of the tribes included the effects of overflights on Native American sacred areas and ceremonies, visual effects to sites and sacred areas from overflights and chaff and flares, and effects on sacred areas and historic sites from subsonic and supersonic noise (USAF, 2014a).

Section 106 consultation associated with the 2014 PRTC EIS resulted in a *Programmatic Agreement among 28th Bomb Wing, Ellsworth Air Force Base, the State Historic Preservation Offices of Montana, North Dakota, South Dakota, and Wyoming, and the Advisory Council on Historic Preservation regarding the Proposed Development, Implementation, and Operation of the Powder River Training Complex*, signed in 2014.



Since the 2014 PRTC Programmatic Agreement expired in 2019, it is currently being renewed. The new agreement is expected to be similar with potentially more tribal parties and a longer, 15-year effective period. It is also anticipated that the stipulations from the 2014 PRTC Programmatic Agreement would be carried forward in the new agreement (see Appendix F, Cultural Resources) (USAF and SHPO, 2014). These stipulations include:

- Avoidance, minimization, or mitigation of adverse effects to historic properties under the PRTC, namely Little Bighorn Battlefield National Monument (Monument), Montana; Great Sioux War Battlefields historic properties in Montana, South Dakota, and North Dakota other than the Monument including Deer Medicine Rocks and Wolf Mountains Battlefield/Where Big Crow Walked Back and Forth; and archaeological locations containing sensitive rock art in the Tongue River Valley, Chalk Butte, and Slim Butte, Montana, and North and South Cave Hills, South Dakota
- Avoidance, minimization, or mitigation of adverse effects to historic properties, religious ceremonies, and important tribal events under the PRTC, with particular mention of developing reasonable temporary or seasonal avoidance areas associated with the “Crow Fair” of the Crow Tribe, the “4th of July Chiefs Powwow” of the Northern Cheyenne Tribe, the “Porcupine Powwow” of the Standing Rock Sioux Tribe, and the “Fair Rodeo and Labor Day Powwow” of the Cheyenne River Tribe
- Awareness training for military trainers and aircrews operating in the PRTC to increase cultural awareness and ensure knowledge of current operating procedures
- Avoidance protocol to implement a program allowing consulting parties to submit requests to avoid training in portions of the PRTC during certain periods
- Supersonic/Large Force Exercise notification to consulting parties at least 15 days prior to such operations, which would occur a maximum of 10 days a year
- ICRMP revision to provide relevant information to PRTC operations

The most specific guidelines are provided for Little Bighorn National Monument, including the requirement that aircraft maintain an altitude of at least 5,000 feet AGL from 1 hour before to 1 hour after the posted hours of operation of the site; the prohibition of supersonic operation of aircraft within a defined avoidance area above the site; and coordination with the National Park Service to conduct a multi-year acoustic monitoring study. The 2014 Programmatic Agreement also called for designation of a Tribal Liaison to facilitate government-to-government relationships with the tribes relative to the PRTC, and establishes procedures for damage reporting and post-review discovery of previously unidentified adverse effects (USAF and SHPO, 2014).

3.8.1.2.4 Lancer MOA

The *Realistic Bomber Training Initiative EIS*, completed in January 2000, addressed cultural resources beneath the Lancer MOA and associated IR-178 airspace. It identified a total of 15 NRHP-listed properties, including two petroglyph sites; two pueblos, ruins,

and other archaeological sites; five historic districts; three public buildings; two houses; and one other site. No National Historic Landmarks were identified within 20 miles of the airspace, and no Native American pueblos, reservations, or traditional cultural properties were located below the airspace. All the identified historic properties were located in areas overflowed by the military prior to implementation of the *Realistic Bomber Training Initiative EIS* proposed action. Projected noise levels at NRHP-listed properties beneath the Lancer MOA were projected to increase by 1 dB to 46 dB, and projected average daily sortie operations were expected to increase by 9; such changes were determined to pose minimal potential for adverse auditory, visual, or physical effects (USAF, 2000, pp. 4-129). Archaeological survey of 16 proposed emitter and scoring site locations identified archaeological resources at 5 of the 16 sites. These included 1 prehistoric quarry and 11 prehistoric isolates. The quarry site was considered eligible for listing in the NRHP and was avoided (USAF, 2000).

A review of NRHP records undertaken for the current proposed action indicates nine listed properties beneath the Lancer MOA in Texas; IR-178 was not considered for the current project. These include four archaeological sites near Post in Garza County; the county sanitarium and courthouse in Post, Garza County; the First National Bank building in Jayton, Kent County; the Lynn County Courthouse in Tahoka; and the Lamesa Farm Workers Community Historic District in Los Ybanez, Dawson County. The Old Algerita Hotel in Post was demolished since the 2000 *Realistic Bomber Training Initiative EIS* (National Park Service, 2020; Texas Historical Commission, 2020).

3.8.1.2.5 Brownwood MOA

A review of NRHP records undertaken for the current proposed action indicates 17 listed properties beneath the Brownwood MOA in Texas. These include a homestead and a railroad depot in Comanche County; the county jailhouse and courthouse in Goldthwaite and the Regency Suspension Bridge in Mills County; a railroad station, church, jail, high school, and two houses in Brownwood, Brown County; the Camp Colorado Replica in Coleman County; two houses and a Carnegie Library in Ballinger, Runnels County; and the county courthouse and Paint Rock Native American Pictograph Site in Concho County (National Park Service, 2020; Texas Historical Commission, 2020).

3.8.1.2.6 Pecos MOA

The *New Mexico Training Range Initiative EIS*, completed in October 2006, addressed cultural resources beneath the Pecos MOA. It identified four NRHP-listed sites and one additional state register site (Rodrick Drug Store) located in Fort Sumner. No Native American reservations underlie the Pecos MOA. Fort Sumner State Monument and the Bosque Redondo Memorial were identified as a site of significant cultural activity for Navajo visitors who commemorate their forced removal, known as The Long Walk, and confinement at Bosque Redondo. The site is identified as “a Noise Sensitive Area (NSA) that has been effective in reducing noise impacts from overflights” (USAF, 2006). A portion of the proposed Long Walk National Historic Trail also passes beneath the airspace. The *New Mexico Training Range Initiative EIS* found that the preferred alternative A (mitigated) was unlikely to result in adverse effects to historic properties,

particularly given the continued maintenance of the Fort Sumner State Monument NSA (USAF, 2006, pp. 3-48; 4-42).

A review of NRHP records undertaken for the current Proposed Action indicates five listed properties beneath the Pecos MOA, all located in Fort Sumner, DeBaca County, New Mexico. These include the Fort Sumner Ruins, Fort Sumner Cemetery Wall and Entry, Fort Sumner Railroad Bridge, Fort Sumner Community House, and the DeBaca County Courthouse (National Park Service, 2020).

3.8.1.3 Analysis Methodology

The impact assessment evaluated the potential impacts of the proposed B-21 MOB 1 beddown to cultural resources. Potential impacts to cultural resources are evaluated with respect to the extent, context, and intensity of the impact in relation to existing regulatory guidance and historic properties present within the APE. Determining significance of impacts (40 CFR 1508.27) requires the action to be analyzed with respect to the setting of that action and consideration relative to the severity of the impact.

NEPA regulations (40 CFR 1508.27[b]) also provide for the consideration of the severity of an impact (i.e., intensity). There are numerous factors to consider when determining the intensity of potential impacts. For cultural resources, the degree to which a proposed action may adversely affect historic properties or objects listed in or eligible for listing in the NRHP or could lead to a loss or destruction of significant scientific, cultural, or historical resources are a primary point of consideration. Other considerations include but are not limited to: unique geographic areas, the potential for significance determinations to establish future precedents, the potential for cumulative impacts, and whether an action may violate a federal, state, or local law concerning the protection of cultural resources and the environment. Together, these factors define the intensity of potential impacts.

NHPA obligations (as described herein) for a federal agency are independent from the NEPA process and must be complied with even when environmental documentation is not required. When both are required, the USAF may coordinate NEPA compliance with their NHPA responsibilities to ensure that historic properties, as defined under 36 CFR 800.16(l)(1), are given adequate consideration. As per AFMAN 32-7003 Section 2.10.4, and 36 CFR 800.8(a), the USAF has chosen to incorporate NHPA Section 106 review into the NEPA process, rather than substituting the NEPA process for a separate NHPA Section 106 review of alternatives (AFMAN 32-7003 Section 2.10.4.3, and 36 CFR 800[c]).

The regulatory NHPA Section 106 compliance process consists of four primary stages. These include: initiation of the Section 106 process (36 CFR 800.3); identification of historic properties (36 CFR 800.4), which includes identifying historic properties potentially affected by undertakings; assessment of adverse effects (36 CFR 800.5), which determines whether the undertaking would affect historic properties and if effects to those properties might be adverse; and resolution of adverse effects (36 CFR 800.6) between affected and consulting parties such as the SHPO, the ACHP, Indian tribes and

interested individuals. Additional stipulations are provided for in the NHPA should a failure to resolve adverse effects occur during this process (36 CFR 800.7).

In early 2020, the USAF initiated consultation with the South Dakota SHPO regarding plans to rehabilitate the PRIDE Hangar (Building 7504) for aerospace ground equipment maintenance in support of the B-21 beddown. The project would remove the existing recreational/fitness facilities and equipment from the building, remodel existing office space and remove some interior partitions, construct a wash bay, and install new overhead doors. The South Dakota SHPO concurred that the project would result in no adverse effect on February 4, 2020 (see Appendix F, Cultural Resources).

The USAF conducted formal Section 106 consultation with the SHPO and the ACHP regarding the entire B-21 MOB 1 beddown at Ellsworth AFB, including the demolition of Buildings 7258, 7260, and 7262. On March 11, 2020, the USAF sent Interagency/Intergovernmental Coordination for Environmental Planning (IICEP) letters to the South Dakota and Texas SHPOs and all tribes with potential interest in activities at Ellsworth AFB and Dyess AFB as part of the environmental review process for the B-21 MOB 1 beddown.

As described above, Dyess AFB and Ellsworth AFB previously have been subject to archaeological and architectural surveys to identify historic properties. These efforts provide comprehensive coverage of the bases. However, after initiating NHPA Section 106 consultation with the South Dakota SHPO, it was determined that the South WGF Site Subalternative location required an Archaeological Survey because the land was acquired after the 1994 archaeological survey was completed. An archaeological inventory conducted in late 2020 in the South WGF Site Subalternative location did not encounter any newly identified cultural resources; therefore no avoidance or further work was recommended. South Dakota SHPO reviewed these findings and concurred with the USAF determinations on January 22, 2021 (see Appendix F, Cultural Resources). While the areas below the affected airspaces have not been fully surveyed, they have been subject to past identification efforts, NHPA consultation, and NEPA assessments associated with the establishment of the current programs in these areas. Given the expansive area covered by the airspaces, comprehensive survey is neither practical nor necessary; assessment of effects to known historic properties will provide a baseline for understanding the Proposed Action's potential to affect historic properties generally.

Effects (i.e., impacts) to cultural resources are defined as "alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register" (36 CFR 800.16(i)). For the purposes of this analysis, there are three types of effects when considering historic properties. These include "no historic properties affected," which applies when there are no historic properties present or there are historic properties present but the undertaking would have no effect upon them; "no adverse effect," which means that there is a direct or indirect effect to a historic property, but the effect does not diminish the qualities that make the property significant; and "adverse effect," which "is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner

that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, and association" (36 CFR 800 5(a)(1)).

3.8.2 Cultural Resources, Environmental Consequences

3.8.2.1 No Action Alternative Consequences

3.8.2.1.1 No Action at Dyess AFB

Under the No Action Alternative, cultural resources at Dyess AFB would continue to be managed in accordance with the ICRMP. The six NRHP-eligible buildings will be maintained in accordance with the Standard Operating Procedures (SOPs) established in Appendix A of the ICRMP (see Figure 3.8-1). The ICRMP identifies one potential project, the Consolidated Fabrication Flight MILCON, with the potential to impact Buildings 8129, 8230, and 8139; however, at the time of the ICRMP, the project was a low priority (USAF, 2017a).

Aircraft from Dyess AFB would continue to utilize the PRTC and Lancer, Brownwood, and Pecos MOAs for training operations and would not exceed levels currently authorized for these training areas. As stated in Section 3.8.1.2.3 (Cultural Resources, Region of Influence, Powder River Training Complex), the PRTC Programmatic Agreement is currently being renewed. The new agreement is expected to be similar to the 2014 PRTC Programmatic Agreement with potentially more tribal parties and a longer, 15-year effective period. The stipulations of the new agreement are expected to minimize potential adverse effects to historic properties and guide ongoing coordination with the tribes and other stakeholders. Under the No Action Alternative, noise levels range from less than 35 dB L_{dnmr} to 46.1 dB L_{dnmr} across the PRTC (Figure 3.2-2).

Noise levels beneath the Brownwood, Pecos, and Lancer MOAs would be less than 35, 55.9, and 43.4 dB L_{dnmr} , respectively (Figure 3.2-3). Since these levels are below 65 dB L_{dnmr} , impacts to cultural resources are not anticipated.

3.8.2.1.2 No Action at Ellsworth AFB

Under the No Action Alternative, cultural resources at Ellsworth AFB would continue to be managed in accordance with the ICRMP. The 21 NRHP-eligible buildings would be maintained in accordance with the SOPs established in Appendix H of the ICRMP (see Figure 3.8-2). The ICRMP identifies potential plans to demolish Building 601, a World War II historic structure; however, since 2016 the USAF has developed plans for the rehabilitation of the building, for which Section 106 consultation has been initiated (USAF, 2016a).

Aircraft from Ellsworth AFB would continue to utilize the PRTC for training operations and noise levels would not exceed 46.1 dB L_{dnmr} (Figure 3.2-2). As stated in Section 3.8.1.2.3 (Cultural Resources, Region of Influence, Powder River Training Complex), the PRTC Programmatic Agreement is currently being renewed. The new agreement is expected to be similar to the 2014 PRTC Programmatic Agreement with potentially more tribal parties and a longer, 15-year effective period. The stipulations of the new agreement are

expected to minimize potential adverse effects to historic properties and guide ongoing coordination with the tribes and other stakeholders.

3.8.2.2 Dyess AFB Alternative

3.8.2.2.1 Airfield Operations

Previous studies have found it is unlikely that noise and vibration associated with air operations would cause structural damage to buildings. In fact, several studies of the effects of noise on historic properties located in high aircraft-noise zones have found that vibration resulting from the activities of tour groups, and even vacuuming, generated more structural vibration than that generated by aircraft noise (National Research Council/National Academy of Sciences, 1977; NASA, 1976; NASA, 1978). Subsonic sound of less than 130 dB is highly unlikely to damage structural elements. Noticeable vibration of window panes and objects within buildings may occur at sound levels of 110 dB or greater (Wyle, n.d.).

Noise studies have found that because the B-21 is projected to be generally quieter and tends to fly higher than the B-1, the noise in the area and the number of acres and people impacted would decrease overall as a result of implementing the Proposed Action at Dyess AFB (see Section 3.2.2.2.2, Noise, Dyess AFB Alternative, Airfield Operations). Noise contours for the base show that noise received by each of the historic properties at Dyess AFB would be expected to decrease under the Dyess AFB Alternative.

Table 3.8-2. Current and Projected Noise Levels at Historic Properties at Dyess AFB

Building	Current Noise Level (dB DNL)	Projected Noise Level (dB DNL)
4314	75 to 80	70 to 75
5020	75 to 80	70 to 75
7007	65 to 70	60 to 65
8129	65 to 70	55 to 60
8130	65 to 70	55 to 60
8131	65 to 70	55 to 60

AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

In all cases, these noise levels are well below the thresholds that might cause damage to structures.

3.8.2.2.2 Airspace and Range Utilization

The 2014 PRTC EIS (USAF, 2014a) identified the potential for adverse visual and noise effects to historic properties and Tribal ceremonies, but these adverse effects were avoided or resolved through a Programmatic Agreement to provide prior notice, avoidance in time or space where feasible, and training of aircrews in the sensitivities concerning traditional or religious properties (USAF, 2014a). The 2014 PRTC Programmatic Agreement expired in 2019 and is being renegotiated; the new agreement is expected to be similar to the 2014 PRTC Programmatic Agreement with potentially more tribal parties and a longer, 15-year effective period. As explained in Section 3.2.2.2.3 (Noise, Dyess AFB, Airspace and Range Utilization), noise levels under the

Dyess AFB Alternative at the PRTC would range from less than 35 to 46.1 dB L_{dnmr} , which reflects no change from the No Action Alternative.

Previous assessment for the Lancer and Pecos MOAs found that operations result in no adverse effects to historic properties (USAF, 2006; USAF, 2000). Under the Dyess AFB Alternative, noise levels at Lancer (less than 35 dB L_{dnmr}) and, Pecos (36.9 dB L_{dnmr}) MOAs would not exceed No Action Alternative noise levels at 43.4 and 55.9 dB L_{dnmr} , respectively. Operations in the Brownwood MOA would decrease by 13 operations annually (see Section 3.1.2.2.2, Airspace, Airspace and Range Utilization) and would be conducted within the existing limits of the airspace (see Figure 3.1-1). Noise levels at Brownwood MOA would remain the same as under the No Action Alternative (less than 35 dB L_{dnmr}).

Since operations would continue to observe current guidelines and noise levels would remain the same or decrease from the No Action Alternative, no adverse impacts from noise would be expected under the Dyess AFB Alternative. Furthermore, the B-21 flies higher than the B-1, so the visibility of the aircraft from historic properties below these airspaces would decrease.

3.8.2.2.3 Facilities and Infrastructure

New and renovated facilities and infrastructure associated with the B-21 MOB 1 beddown at Dyess AFB would not directly impact any historic properties. All historic properties are located outside of the general planned areas of construction. Previous studies have not identified any historic districts at Dyess AFB; the base reflects development over time as mission needs have changed, resulting in the ongoing removal and addition of facilities. While the proposed facilities and infrastructure may be within view of some historic properties, these historic resources currently exist within the setting of an active USAF base made up of a combination of historic and non-historic facilities, and thus visual effects of the new construction would be minimal. Due to the heavy disturbance and development on the base, and as previously concurred by the Texas SHPO, there would be no effect to archaeological resources.

3.8.2.2.4 Weapons Generation Facility

The WGF would not directly impact any historic properties. All historic properties are located outside of the proposed footprint of the WGF. While the WGF may be within view of some historic properties, these historic resources currently exist within the setting of an active USAF base made up of a combination of historic and non-historic facilities, and thus visual effects of the new construction would be minimal.

3.8.2.2.5 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

No mitigations would be necessary to implement the Dyess AFB Alternative.

3.8.2.3 Ellsworth AFB Alternative (Preferred Alternative)

3.8.2.3.1 Airfield Operations

Noise studies have found that because the B-21 is projected to be generally quieter and tends to fly higher than the B-1, the noise in the area and the number of acres and people impacted would decrease overall as a result of implementing the Proposed Action at Ellsworth AFB (see Section 3.2.2.3.2, Noise, Ellsworth AFB, Airfield Operations). Noise contours for the base show that noise received by each of the historic properties at Ellsworth AFB would decrease under the Ellsworth AFB Alternative. In all cases, these noise levels are well below the thresholds that might cause damage to structures.

Table 3.8-3. Current and Projected Noise Levels at Historic Properties at Ellsworth AFB

Building	Current Noise Level (dB DNL)	Projected Noise Level (dB DNL)
601	75 to 80	65 to 70
6904	75 to 80	65 to 70
6905	75 to 80	65 to 70
6908	70 to 75	65 to 70
7258	85 to 90	70 to 75
7260	85 to 90	70 to 75
7262	85 to 90	70 to 75
7504	70 to 75	65 to 70
7610	70 to 75	65 to 70
7614	70 to 75	65 to 70
7618	70 to 75	65 to 70
7622	70 to 75	65 to 70
7624	70 to 75	60 to 65
9050	60 to 65	50 to 55
88031	55 to 60	50 to 55
88106	60 to 65	55 to 60
88134	60 to 65	50 to 55
88257	60 to 65	55 to 60
88271	60 to 65	50 to 55
88285	55 to 60	50 to 55
88289	55 to 60	50 to 55

AFB = Air Force Base; dB = decibel; DNL = day-night average sound level

3.8.2.3.2 Airspace and Range Utilization

PRTC-related B-21 air operations would adhere to the legal descriptions for the PRTC MOAs published in the National Flight Data Digest (effective date: September 17, 2015). As explained in Section 3.2.2.3.3 (Noise, Ellsworth AFB, Airspace and Range Utilization), noise levels under the Ellsworth AFB Alternative at the PRTC would range from less than 35 to 42 dB L_{dnmr} , which reflects a decrease from the No Action Alternative.

The 2014 PRTC EIS (USAF, 2014a) identified the potential for adverse visual and noise effects to historic properties and Tribal ceremonies, but these adverse effects were avoided or resolved through a Programmatic Agreement to provide prior notice, avoidance in time or space where feasible, and training of aircrews in the sensitivities concerning traditional or religious properties (USAF, 2014a). The 2014 PRTC

Programmatic Agreement expired in 2019 and is being renegotiated; the new agreement is expected to be similar to the 2014 PRTC Programmatic Agreement with potentially more tribal parties and a longer, 15-year effective period. Refer to Section 3.8.1.2.3 (Cultural Resources, Region of Influence, Powder River Training Complex) for a list of stipulations from the 2014 PRTC Programmatic Agreement that would be carried forward in the new agreement.

Therefore, no adverse impacts from noise would be expected. Furthermore, the B-21 flies higher than the B-1, so the visibility of the aircraft from historic properties below these airspaces would decrease.

3.8.2.3.3 Facilities and Infrastructure

The development of facilities and infrastructure for the Ellsworth AFB Alternative would require the demolition of three historic properties and renovation of a fourth historic property. As depicted on Figure 3.8-2, Buildings 7258, 7260, and 7262 are within the proposed construction limits and would be demolished. Building 7504 (PRIDE Hangar), located just outside the construction limits, also may be modified and used for maintenance.

The USAF has not recognized any historic districts at Ellsworth AFB; the base reflects development over time as mission needs have changed, resulting in the ongoing removal and addition of facilities. While the proposed facilities and infrastructure may be within view of some historic properties, these historic resources currently exist within the setting of an active USAF base made up of a combination of historic and non-historic facilities, and thus visual effects of the new construction would be minimal.

As described in Section 3.8.1.3 (Cultural Resources, Analysis Methodology), the USAF consulted with the South Dakota SHPO regarding the renovation of the PRIDE Hangar, which would result in minimal exterior changes to the building. The South Dakota SHPO concurred that the renovation would result in no adverse effect on February 4, 2020 (Appendix F, Cultural Resources). The demolition of Buildings 7258, 7260, and 7262 would result in an adverse effect to these historic properties. The USAF initiated consultation with the South Dakota SHPO and the ACHP to resolve this adverse effect. The South Dakota SHPO concurred that the demolition of these buildings would result in an adverse effect, and ACHP declined to participate in the Section 106 consultation process. The ACHP also indicated that the USAF would need to file a Memorandum of Agreement in consultation with the South Dakota SHPO to complete the requirements of NHPA Section 106 (Appendix F, Cultural Resources). A Memorandum of Agreement was developed and signed by the USAF and South Dakota SHPO on February 16, 2021, outlining the stipulations and actions required by the USAF to take into account the adverse effect of the B-21 beddown action on historic properties (Appendix F, Cultural Resources). Stipulations of the MOA include taking photographic documentation and conducting a records search of the affected historic buildings to submit into the South Dakota State Archives prior to demolition. See Section 3.8.2.3.5 (Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts).

3.8.2.3.4 Weapons Generation Facility

North WGF Site Subalternative

The North WGF Site Subalternative would not directly impact any historic properties. All historic properties are located outside of the proposed footprint of the North WGF Site Subalternative. While the WGF may be within view of some historic properties, these historic resources currently exist within the setting of an active USAF base made up of a combination of historic and non-historic facilities, and thus visual effects of the new construction would be minimal.

South WGF Site Subalternative (Preferred Subalternative)

After initiating consultation with the South Dakota SHPO, it was determined that the South WGF Site Subalternative location required an Archaeological Survey because the land was acquired after the 1994 archaeological survey was completed (as discussed in Section 3.8.1.2.2, Cultural Resources, Region of Influence, Ellsworth AFB). In September and November 2020, the USAF conducted intensive cultural resource inventories of a total of 50.4 acres, which included the 48 acres associated with the South WGF Site. The vegetation throughout most of the project area was very dense, consisting primarily of grasses and forbs. Surface visibility in this area ranged from 0 to 20 percent and averaged around 5 percent. In order to compensate for the lack of ground visibility, the inventory was carried out through pedestrian transects spaced no more than 15 meters (50 feet) apart, and 94 shovel and/or auger tests were excavated systematically throughout the project area on a staggered 30-meter grid. For safety purposes, all subsurface infrastructure was buffered by at least 30 meters, and testing did not occur in previously disturbed areas. The inventory did not encounter any newly identified cultural resources; therefore, no avoidance or further work was recommended. South Dakota SHPO reviewed these findings and concurred with the USAF determinations on January 22, 2021 (Appendix F, Cultural Resources). Additionally, the WGF may be within view of some historic properties; however, these historic resources currently exist within the setting of an active USAF base made up of a combination of historic and non-historic facilities, and thus visual effects of the new construction would be minimal.

3.8.2.3.5 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

The adverse effects caused by the demolition to Buildings 7258, 7260, and 7262 have been mitigated via a Memorandum of Agreement between Ellsworth AFB and the South Dakota SHPO, as required by NHPA Section 106 (54 U.S.C. 306108). The following stipulations will be carried out prior to the demolition of historic properties:

- Submit photographic documentation of Buildings 7258, 7260, and 7262 to the South Dakota SHPO for inclusion in the South Dakota State Archives. Digital photographs will meet the standards described in the 2015 National Register Photo Policy Factsheet, included in Appendix F (Cultural Resources).
- Conduct a search for any existing reports, photographs, drawings, plans, or similar documents related to Buildings 7258, 7260, and 7262. The USAF will submit a letter to the South Dakota SHPO documenting what repositories or files were searched. The South Dakota SHPO will make submitted documents available for public use and reproduction through the South Dakota State Archives.

3.9 PHYSICAL RESOURCES

3.9.1 Physical Resources, Affected Environment

3.9.1.1 Description of Resource

Physical resources include topography, geology, soils, and water. Topography pertains to the relief (elevation) and local landforms of a given region. Geological resources typically include features such as bedrock and minerals. However, geology is not addressed in this EIS because impacts are not anticipated on such features based on implementation of any of the alternatives. Neither bedrock nor minerals, including extraction of minerals by mining, would be affected by any of the actions.

Soil refers to unconsolidated accumulation of organic and mineral materials on the land surface that is either formed from the breakdown of underlying bedrock or other parent material, or transported to an area by wind, water, or human activities. Eroded soil particles that are transported and deposited are known as sediment. The delivery and deposition of sediment in waterways is known as sedimentation. Sediment generated by erosion can alter water quality, aquatic habitats, and hydrologic characteristics of streams and wetlands, and increase flooding. Once erosion has occurred, it can lead to increased land management and operating costs. Erosion can also transport chemical contaminants that may be attached to sediment particles. Therefore, in the context of soil, the focus of this EIS is on erosion that could potentially occur as a result of the proposed activities. Topography is addressed because the erosion potential of soil depends in part on the steepness of the land.

Water resources relevant to this EIS are surface water features (including streams, lakes, and adjacent floodplains), wetlands, and groundwater. Surface water is defined as any water on Earth's surface and includes lakes, rivers, streams, and ponds (U.S. Geological Survey, 2020). Surface waters form where the average rate of precipitation exceeds the rate at which runoff seeps into the soil, evaporates, or is absorbed by vegetation. Surface waters also form where the water table intersects the ground surface. Surface waters are important for a variety of reasons including economic, ecological, and recreational functions, and human health. Surface water features also serve as reservoirs to mitigate the impacts of flooding. Surface water features can be impacted by sedimentation and by deposition of contaminants that are transported by storm water runoff or erosion. Groundwater can be impacted directly by spills or by infiltration of contaminated surface waters; specifically for this EIS, from storm water.

A floodplain is defined as an area of relatively flat and normally dry land alongside a stream, river, or lake that is covered by water during a flood (U.S. Geological Survey, 2020). Floodplains mitigate flood risk by slowing storm water runoff and storing floodwaters (Federal Emergency Management Agency, 2018). Other floodplain functions include groundwater recharge and nutrient cycling. Vegetation and soils act as filters, intercepting surface water runoff before it reaches lakes, streams, or rivers, and storing floodwaters during flood events. This filtration process aids in the removal of excess nutrients, pollutants, and sediments from the water. Floodplains are biologically unique

ecosystems that support a wide variety of aquatic and terrestrial species. Floodplain boundaries are typically described in terms of average frequency of inundation. For example, a 100-year floodplain is defined as an area that has a 1 percent chance of inundation by a flood in any given year (once per 100 years on average).

Wetlands are areas of transition between terrestrial and aquatic systems where the water table is usually at or near the surface or where the land is covered by shallow water. Wetlands are defined by USACE as “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas” (USACE, 1987). Wetlands provide fish and wildlife habitat, protect and improve water quality by absorbing contaminants from storm water runoff, storing floodwaters, and maintaining surface water flow in streams during dry periods (EPA, 2004).

Groundwater is defined as water that flows or seeps downward and saturates soil or rock, supplying springs and wells (U.S. Geological Survey, 2020). Below the water table, nearly all open spaces in sediments and rocks are filled with water, and the water contained in this zone is called *groundwater*. An aquifer is a geological formation (e.g., a layer of rock or sediment) that stores relatively large volumes of groundwater, and through which groundwater typically can easily move. Groundwater is an important source of water supply and is also a recharge source for streams and wetlands.

3.9.1.2 Region of Influence

The ROI for physical resources consists of areas within and adjacent to the alternative MOB boundaries where soil and water resources may be directly or indirectly affected by components of the Proposed Action (e.g., construction activities). Off-base areas could be affected if, for example, stormwater or surface water carries contaminants or sediments to nearby streams and wetlands; or if contaminants migrate to groundwater, which subsequently flows to off-base portions of the aquifer. Air operations and airspace and range utilization would not affect physical resources at the PRTC, or the Brownwood, Lancer, or Pecos MOAs.

3.9.1.2.1 Dyess AFB

Topography

Dyess AFB is in the southern part of the Osage Plains Section in the Central Lowlands physiographic province (U.S. Geological Survey, 2018). The Osage Plains Section spans an area that includes north-central Texas, central Oklahoma, and southeastern Kansas, and is characterized by gently rolling terrain (Madole et al., 1991). Figure 3.9-1 shows the topography of Dyess AFB. Each line (referred to as a contour line) on the figure represents locations with the same ground surface elevation. Within the primary construction area, elevation is highest at the northwest corner and drops approximately 15 feet over a distance of 4,600 feet to the southeast corner, corresponding to a slope of approximately 0.3 percent. At the WGF site, elevation is also highest at the northeast corner and drops approximately 10 feet to lowest point on the southwest corner over a

distance of 2,000 feet, corresponding to a slope of approximately 0.5 percent. Slopes between 0.2 and 0.5 percent are considered very flat (United Nations, 1985).

Soils

The soil types found in the planned construction areas and WGF site at Dyess AFB consist of Tobosa clay, Urban land, Vernon clay, Tillman clay loam, Hamby sandy loam, and Sagerton clay loam, as well as “complexes” (or combinations) of these soil types (Figure 3.9-2) (NRCS, 2019). Table 3.9-1 presents a description of each soil type. Table 3.9-2 shows the areal extent and erosion factor for each soil type and soil type complex. The erosion factor indicates the relative susceptibility of a soil to sheet or rill erosion by water. Values range from 0.02 for the least erodible soils to 0.64 for the most erodible (NRCS, 2020a). Erosion factors for soils in the planned construction areas and WGF site at Dyess AFB range from 0.24 to 0.32, which indicates the soils are moderately erodible.

Table 3.9-1. Soil Types in Planned Construction Areas and WGF Site, Dyess AFB

Soil Type	Description
Tobosa Clay	Consists of very deep, well drained, very slowly permeable soils formed in calcareous clayey alluvium derived from limestone. These nearly level to very gently sloping soils occur on dissected plateaus
Urban Land	Soils extensively influenced by human activities
Vernon Clay	Consists of moderately deep over claystone bedrock, well drained, very slowly permeable soils that formed in residuum derived from noncemented claystone bedrock or dense clay of Permian Age
Tillman Clay	Consists of very deep, well drained, slowly permeable soils formed in loamy and clayey alluvium derived from redbed clays and claystone sediments of Permian Age
Hamby Sandy Loam	Consists of very deep, well drained, moderately slowly permeable soils formed in loamy and clayey residuum from cretaceous sediments
Sagerton Clay Loam	Consists of very deep, well drained, moderately slowly permeable soils that formed in calcareous loamy alluvium

Source: (NRCS, 2020b)

AFB = Air Force Base; WGF = Weapons Generation Facility

Table 3.9-2. Areal Extent and Erosion Factors for Soil Types at Planned Construction Areas and WGF Site, Dyess AFB

Soil Unit Name	Soil Map Symbol	Erosion Factor	Acres in Area of Interest ¹	Percent of Area of Interest ¹
Tobosa Clay, 0 to 1 percent slopes	ToA	0.24	196.2	50.6%
Urban Land	Ub	N/A	69.0	17.8%
Vernon Clay, 1 to 3 percent slopes	VeB	0.28	55.7	14.4%
Tobosa-Urban Land, 0 to 3 percent slopes	TuB	0.24	52.8	13.6%
Tillman clay loam, 1 to 3 percent slopes	TmB	0.32	5.8	1.5%
Hamby-Urban Land complex, 0 to 3 percent slopes	HuB	0.32	4.6	1.2%
Sagerton clay loam, moist, 0 to 1 percent slopes	SaA	0.28	2.9	0.7%
Sagerton-Urban land complex, 0 to 3 percent slopes	SeB	0.24	0.7	0.2%
Total for Area of Interest			387.7	100.0%

Source: (NRCS, 2019)

% = percent; AFB = Air Force Base; N/A = not available; WGF = Weapons Generation Facility

Note:

1. Area of Interest consists of the planned construction areas and WGF site at Dyess AFB.

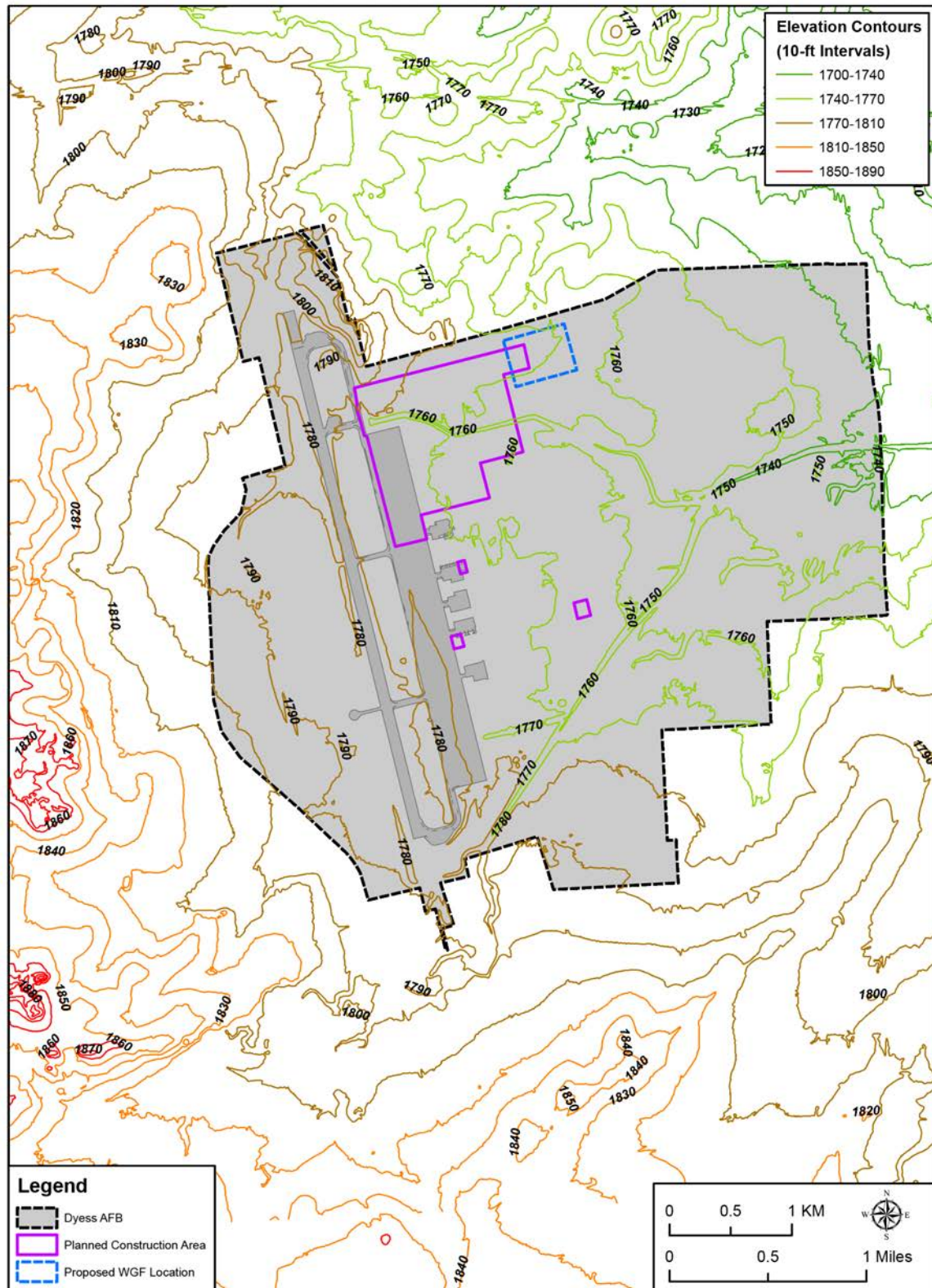


Figure 3.9-1. Topography, Dyess AFB

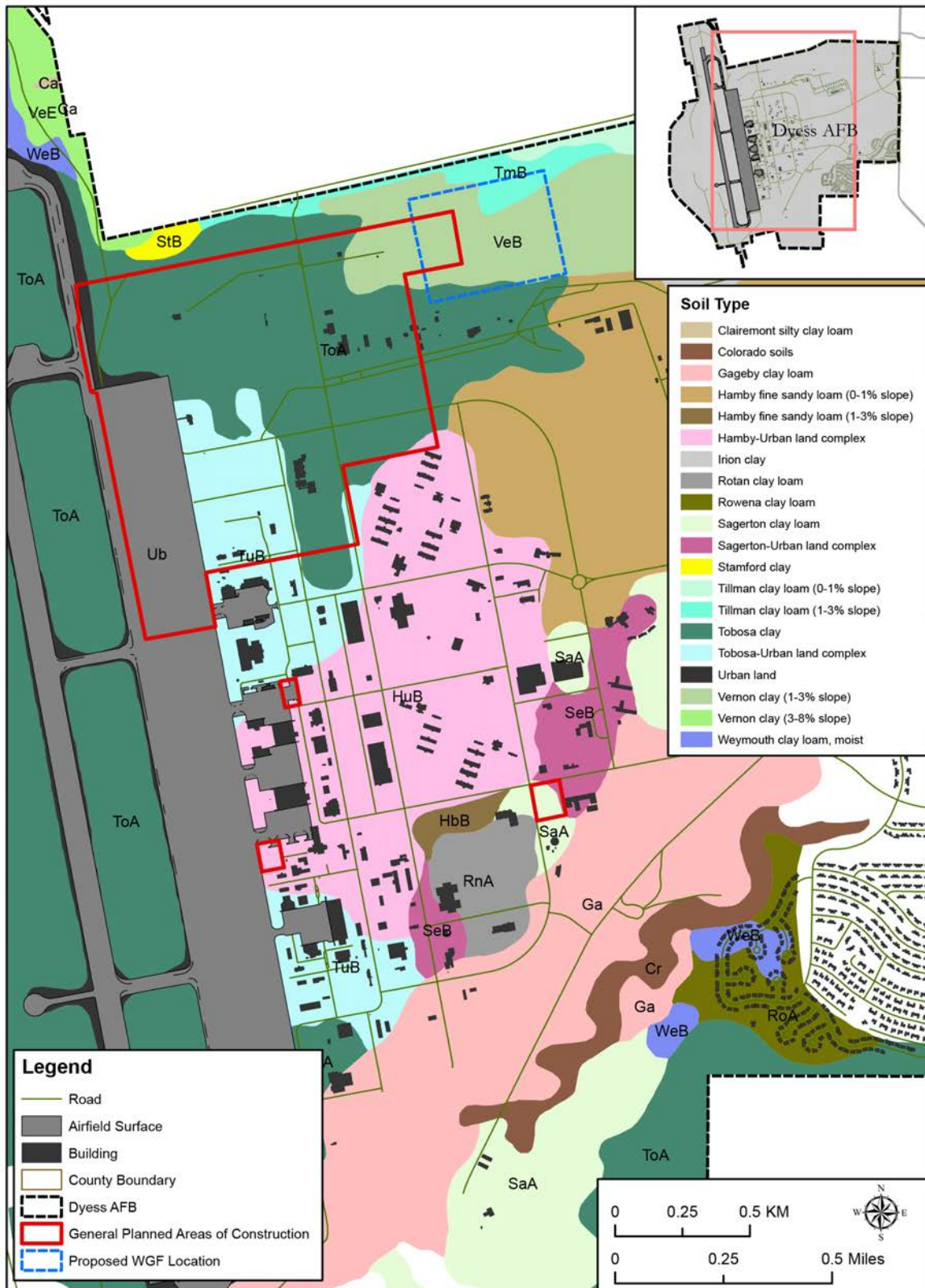


Figure 3.9-2. Soil Types, Planned Construction Areas and WGF Site, Dyess AFB

Water Resources – Surface Water, Floodplains, and Wetlands

The streams that flow through Dyess AFB consist of Little Elm Creek and smaller unnamed streams that flow into Little Elm Creek, also referred to as tributaries (Figure 3.9-3). Little Elm Creek has been diverted from its original course and has been channelized through the base via the South Diversion Ditch. A portion of one of the unnamed tributaries has also been channelized and is referred to as the North Diversion Ditch.

Two unnamed tributaries of Little Elm Creek flow through the golf course and housing area of Dyess AFB (Figure 3.9-3). One of these tributaries was impounded in the 1950s to create Lake Totten. Two storage ponds were constructed in 2002-2003 to supply an irrigation system (Dyess AFB, 2016). The ponds are fed by effluent (water that has been treated, but not sufficiently purified to drink) from the City of Abilene (Department of Energy, 2009). One pond is in the golf course and covers roughly 4.5 acres with a capacity of 9 million gallons. The second is located east of the hospital and covers approximately 2.75 acres with a capacity of nearly 13 million gallons. Effluent water stored in the ponds is used to irrigate the golf course and other landscaped areas at the base.

The North Diversion Ditch and the South Diversion Ditch are the two main drainageways that receive storm water from Dyess AFB. Storm water is carried to these ditches through an underground stormwater system consisting of a network of concrete, vitrified clay, or corrugated metal pipes. The unnamed creeks that flow through the golf course and housing area receive storm water from the southeastern part of the base.

The North Diversion Ditch flows southeast, joining the South Diversion Ditch (the channelized section of Little Elm Creek) within the property approximately 1 mile from the base's east fence line/property boundary.

The South Diversion Ditch is dammed by a weir and discharges through two outlets that are controlled by valves located approximately 50 feet west of the base boundary (see photograph, *right*). In the event of an emergency, the valves can be shut to prevent storm water from exiting Dyess AFB property except in cases of heavy rainfall (Dyess AFB, 2018c).

Under normal conditions, water flows through the outlets into a concrete catch basin which directs water across the boundary crossing. After exiting the base, the ditch becomes Little Elm Creek, which flows for about 4.5 miles before discharging into Big Elm Creek. Approximately 9 miles downstream, Big Elm Creek flows into Lake Fort Phantom Hill, a reservoir that is owned and operated by the City of Abilene for municipal, industrial, and recreational use (Texas Water Development Board, 2020a).



Photograph of Weir System on the South Diversion Ditch, Dyess AFB

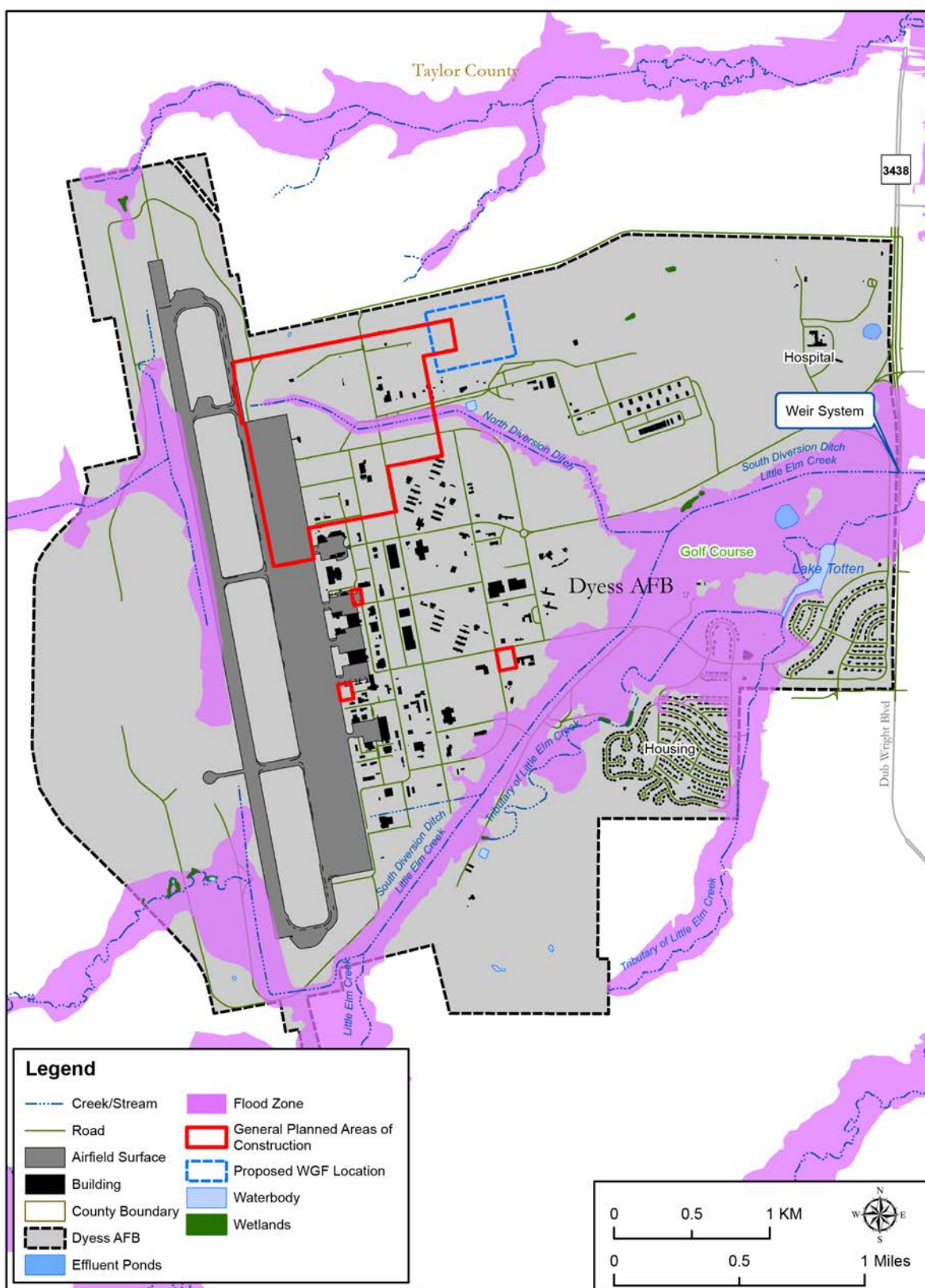


Figure 3.9-3. Streams, Lakes, 100-year Floodplains, and Wetlands, Dyess AFB

The lake serves as a principal drinking water source for the city. Dyess AFB holds a permit from the TCEQ for storm water discharges associated with industrial activities. Permit number TXR05L345 expires on August 14, 2021. As one of the permit requirements, the base has prepared a SWPPP (Dyess AFB, 2018c) that describes stormwater controls (e.g., the weir system described above) and BMPs that the base implements to prevent the release of storm water pollutants. As outlined in the SWPPP and required by the permit, Dyess AFB monitors stormwater outfalls to ensure compliance with permit limits. The weir system on the South Diversion Ditch is one of the outfalls routinely monitored. The SWPPP also notes that the Military Family Housing Area of Dyess AFB is subject to Phase II Municipal Separate Storm Sewer System (MS4) Permit requirements (TXR040000).

In addition to surface water features, Figure 3.9-3 also shows the 100-year floodplain and wetlands at Dyess AFB. Floodplains are generally associated with drainage ditches, Little Elm Creek, and the unnamed streams in the golf course and on-base housing area. There are 12 jurisdictional wetland areas at Dyess AFB, all of which are less than an acre in area (Dyess AFB, 2016).

Other than the floodplain associated with the portion of the North Diversion Ditch located in the primary planned construction area, there are no floodplains or wetlands located within the planned construction areas or the WGF site.

Water Resources – Groundwater

Figure 3.9-4 depicts the active water supply wells near Dyess AFB.

The Texas Water Development Board has identified 9 major aquifers and 22 minor aquifers that are used for water supply in the state of Texas (Texas Water Development Board, 2020b). Major aquifers are defined as “aquifers that produce large amounts of water over large areas,” and minor aquifers are defined as “aquifers that produce minor amounts of water over large areas or large amounts of water over small areas”.

None of the major aquifers are located within 5 miles of the base boundary, but a minor aquifer (the Cross Timbers Aquifer) lies beneath Dyess AFB. Wells of an average depth of 174 to 193 feet are present and can draw groundwater from the Cross Timbers Aquifer (Texas Water Development Board, 2019). Although this aquifer is present beneath the area around Dyess AFB, it does not appear to be frequently used as a water supply source (Figure 3.9-4). There are only two wells within 1 mile outside of the base. These wells are 32 and 33 feet deep and draw water from alluvium, a shallow unconsolidated aquifer that consists of loose deposits of clay, silt, sand, and gravel left by flowing water and often found near streams (in this case, Little Elm Creek).

3.9.1.2.2 Ellsworth AFB

Topography

Ellsworth AFB is in the Unglaciaded Missouri Plateau Section on the Great Plains physiographic province (U.S. Geological Survey, 2018). The topography of the Missouri Plateau is generally level but is interrupted by steep river valleys. The flat areas between the river valleys are called tablelands.

Figure 3.9-5 shows the topography of Ellsworth AFB. Topography is mostly gently sloping, except for the northernmost part of the base where the terrain has a steeper slope. Most of the planned construction areas and the South WGF Site have slopes of about 1 percent but portions of these areas have steeper slopes of about 4 percent. The North WGF Site is an area with more topographic relief (surface slopes of about 5 percent). Slopes between 1 percent and 2.5 percent are considered moderate, while slopes greater than 2.5 percent are considered steep (United Nations, 1985).

Soils

The soil types found in the planned construction areas and WGF sites at Ellsworth AFB consist of Nunn clay loam, Zigweid-Nihill complex, Urban Land, and Onita clay loam (Figure 3.9-6) (NRCS, 2019). Table 3.9-3 presents a description of each soil type, and Table 3.9-4 shows the areal extent and erosion factor for each soil type and soil type complex.

Erosion factors range from 0.02 for the least erodible to 0.64 for the most erodible soils. Erosion factors for soils in the planned construction areas and WGF sites at Ellsworth AFB range from 0.24 to 0.32, which indicates the soils are moderately erodible.

Table 3.9-3. Soil Types in Planned Construction Areas and WGF Site, Ellsworth AFB

Soil Type	Description
Nunn clay loam	Consists of very deep, well drained, soils that formed in loess or mixed alluvium.
Urban land	Soils extensively influenced by human activities.
Nihill gravelly loam	Consists of very deep very well drained soils formed in gravelly alluvium from mixed sources.
Zigweid fine loam	Consists of very deep, well drained soils formed in alluvium from mixed sedimentary sources on fan aprons, alluvial fans, fan piedmonts, fan remnants, terraces, ridges, and hills.
Onita silt loam	Consists of very deep, well and moderately drained soils formed in local alluvium mainly on footslopes.

Source: (NRCS, 2020b)

AFB = Air Force Base; WGF = Weapons Generation Facility

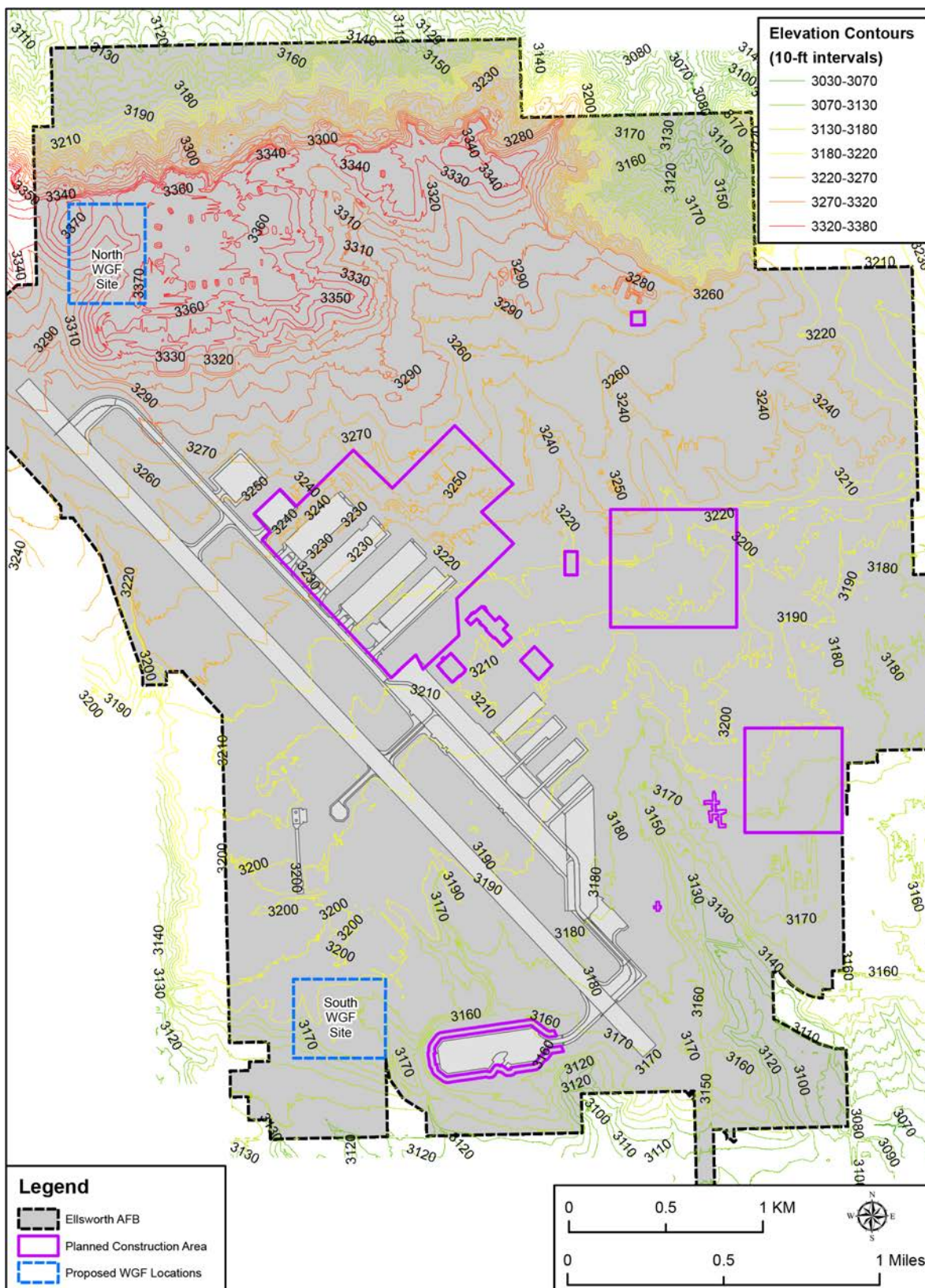


Figure 3.9-5. Topography, Ellsworth AFB

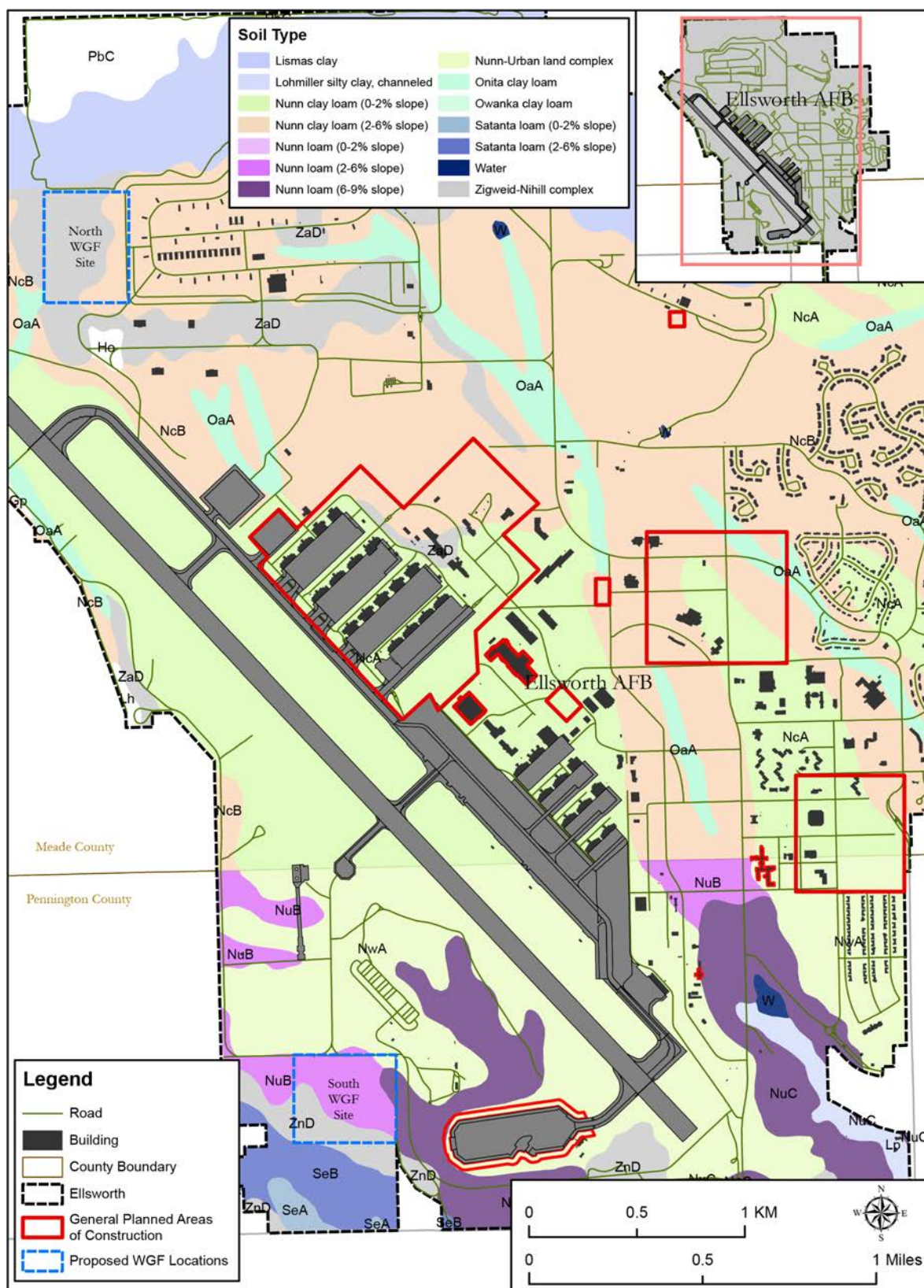


Table 3.9-4. Areal Extent and Erosion Factors for Soil Types at Planned Construction Areas and WGF Sites, Ellsworth AFB

Soil Unit Name	Soil Map Symbol	Erosion Factor	Acres in Area of Interest ¹	Percent of Area of Interest ¹
Nunn clay loam, 0 to 2 percent slopes	NcA	0.24	226.5	44.3%
Nunn clay loam, 2 to 6 percent slopes	NcB	0.24	132.5	25.9%
Nunn-Urban land complex, 0 to 3 percent slopes	NwA	0.28	60.7	11.9%
Zigweid-Nihill complex, 6 to 15 percent slopes	ZaD	0.32	45.0	8.8%
Nunn loam, 2 to 6 percent slopes	NuB	0.28	28.3	5.5%
Onita clay loam, 0 to 4 percent slopes	OaA	0.28	8.5	1.7%
Zigweid-Nihill complex, 6 to 15 percent slopes	ZnD	0.32	6.9	1.3%
Nunn loam, 6 to 9 percent	NuC	0.28	2.9	0.6%
Total for Area of Interest			511.3	100.0%

Source: (NRCS, 2019)

% = percent; AFB = Air Force Base; WGF = Weapons Generation Facility

Note:

1. Area of Interest consists of the planned construction areas and WGF sites at Ellsworth AFB.

Water Resources – Surface Water, Floodplains, and Wetlands

The major streams closest to Ellsworth AFB are Elk Creek to the north and Box Elder Creek and Rapid Creek to the south. Surface runoff from the northern portion of the base flows through unnamed drainages towards Elk Creek, approximately 5 miles to the northeast (Figure 3.9-7).

Surface runoff from the southern portion of Ellsworth AFB (including the planned construction areas and both North and South WGF Sites) flows generally south-southeast via retention ponds, ditches, storm sewers, and ephemeral streams, eventually discharging into Box Elder Creek approximately 1 mile south of the installation boundary (Figure 3.9-7). One of the streams has been impounded to form Bandit Lake, Heritage Lake, and Gateway Lake. There are three small man-made ponds on the western side of the base (Pond 1, 2, and 3). These ponds receive storm water or liquids from the areas where deicing and fueling are performed, and have been designed to contain floating pollutants. Additional details regarding these ponds are described in this section.

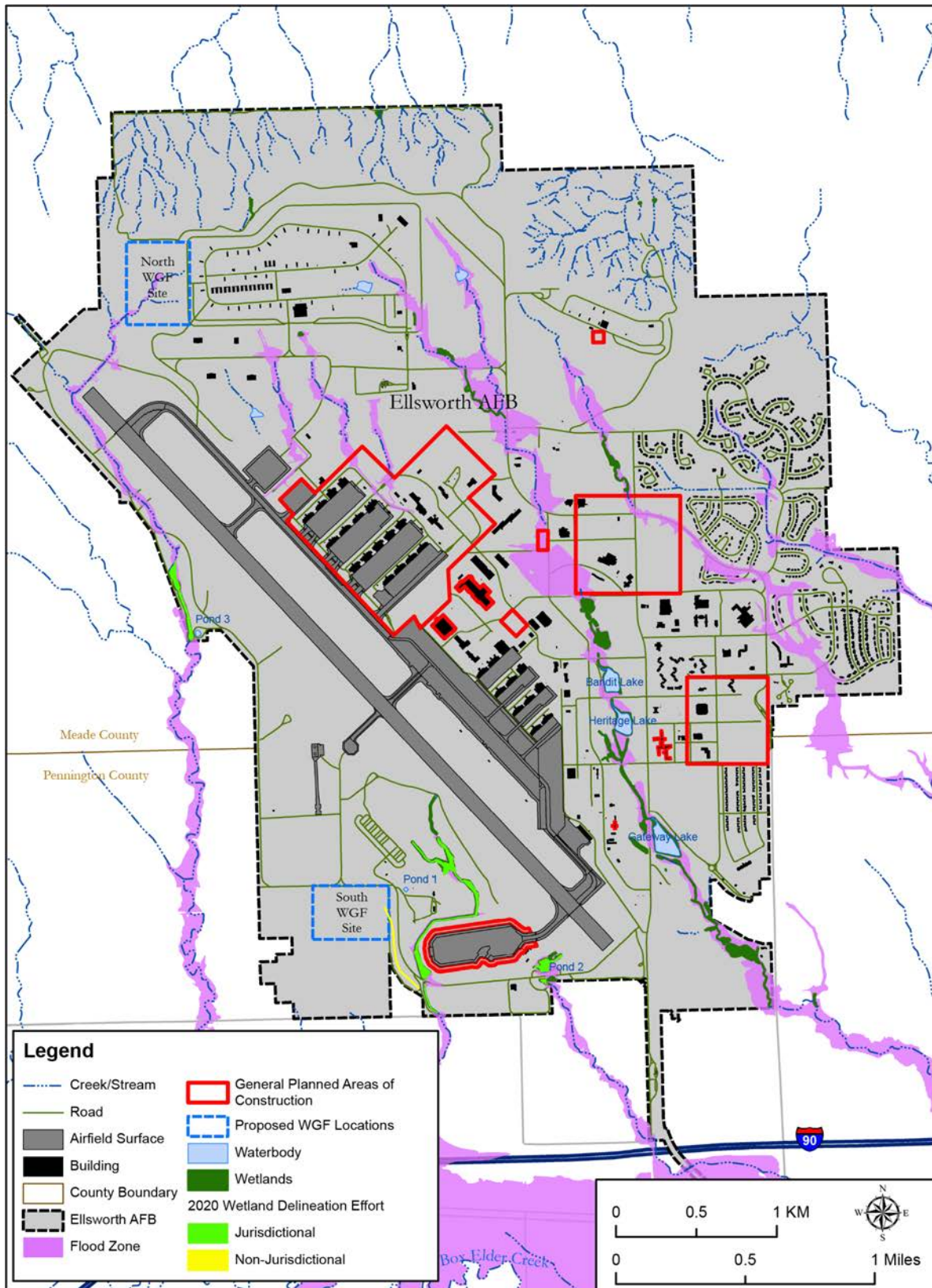


Figure 3.9-7. Streams, Lakes, 100-year Floodplains, and Wetlands, Ellsworth AFB

Ellsworth AFB holds a permit from SDDENR for storm water discharges associated with industrial activities (discharge permit # SD0000281). The permit expired in 2014 but because the base had submitted a renewal application, SDDENR granted an extension to the existing permit while the renewal is being processed. The new permit is anticipated to be completed in 2021 (Goyer, 2019).

As one of the permit requirements, the base has prepared a SWPPP (Ellsworth AFB, 2019b) that describes stormwater controls and BMPs that the base implements to prevent the release of pollutants. As outlined in the SWPPP and required by the permit, Ellsworth AFB monitors stormwater outfalls to ensure compliance with permit limits. Runoff from areas where deicing and fueling are performed flow through stormwater pipes to Pond 1, 2, or 3 (Figure 3.9-7). The inlets for each of the ponds are equipped with manually-controlled spill control valves. In the event of a chemical spill, the spill control valve can be used to prevent liquids (chiefly fuels) from flowing into the pond. Discharges from the ponds flow through oil skimmers before being released to drainageways that carry the discharge towards permitted outfalls (Ellsworth AFB, 2020a).

In addition to surface water features, Figure 3.9-7 also shows the 100-year floodplain and wetlands at Ellsworth AFB. Floodplains occur along the main base drainage and along several creek drainages (Ellsworth AFB, 2020a). Wetlands occur along drainage channels, impoundments, and swales, primarily at drainages associated with the main base channel, fire training area, alert apron, west boundary, and munitions storage area. The USAF recently authorized a wetland delineation survey in areas associated with three existing stormwater retention ponds, designated as Pond 1, Pond 2, and Pond 3, near the southern and western boundaries of Ellsworth AFB (XCEL Engineering, 2020). Based on the survey results, Ellsworth AFB requested and received a jurisdictional determination from the USACE South Dakota Regulatory Office (USACE, 2020). The USACE determined that a total of five wetlands in the survey area are jurisdictional waters of the United States pursuant to the Clean Water Act. In addition, the USACE identified one non-jurisdictional wetland. Figure 3.9-7 shows the jurisdictional and non-jurisdictional wetlands determined by USACE.

Water Resources – Groundwater

The aquifers beneath the Ellsworth AFB include a shallow aquifer and three bedrock aquifers (the Inyan Kara, Minnelusa, and the Madison) (Trihydro Corporation, 2019). The shallow aquifer consists of unconsolidated alluvial terrace sediments and an upper portion of Pierre Shale that lies below the unconsolidated overburden. The Inyan Kara aquifer consists of sandstones and is separated from the shallow aquifer by a layer of Pierre Shale, which is 860 feet thick at the base. The Pierre Shale is not an aquifer because it is a clay-rich bedrock and does not yield groundwater at a reasonable rate (Nichols, 1992; Rust Infrastructure, 1996). The Minnelusa aquifer consists of sandstone and other bedrock units. The Minnelusa aquifer has an average thickness of 736 feet and can be as much as 3,460 feet deep at the base. The Madison aquifer is 521 feet thick and is not commonly used as a drinking water source in the area because of its depth (4,140 feet at the base) (Trihydro Corporation, 2019).

Figure 3.9-8 shows domestic and municipal water supply wells within 1 mile of Ellsworth AFB. Well depths are either shallower than 100 feet or greater than 2,000 feet. The wells that are shallower than 100 feet draw groundwater from the shallow unconsolidated aquifer. The wells that are deeper than 2000 feet draw water from the deeper bedrock aquifers.

As a result of historical activities at Ellsworth AFB, groundwater in the shallow unconsolidated aquifer has been contaminated by fuels and chemicals previously used for maintenance and operations. Groundwater contaminated by petroleum fuel hydrocarbons and chlorinated solvents is currently contained within the base boundary (Figure 3.9-8) (ARGO/LRS JV and Gilbane Federal, 2019). To prevent exposure to petroleum and chlorinated solvent-contaminated groundwater, an institutional control prohibits the use of groundwater within base property (Krebs, 2019).

Groundwater contaminated by per- and polyfluoroalkyl substances (PFAS) in the shallow aquifer extends off-base and is present above the EPA Lifetime Health Advisory of 0.07 micrograms per liter ($\mu\text{g/L}$) in 24 private drinking water wells in the area adjacent to the west and south base boundaries, as well as adjacent to Box Elder Creek for 18 miles east of the base (Krebs, 2020). The USAF is providing an alternative source of water for the affected residences and is performing investigations to identify PFAS sources on base. A deep well for the City of Box Elder has been recommended as a long-term solution to PFAS-impacted private wells. The deep well would benefit the base because it could serve as a back-up water supply for Ellsworth AFB (Varley, 2020).

3.9.1.3 Analysis Methodology

Soils

Soils in the planned construction areas and WGF sites were evaluated to identify soil types and erosion potential, which is influenced by drainage characteristics and site topography. The Proposed Action involves new construction, which would require land disturbance and introduce the potential for soil erosion that can possibly impact on surface water features within and downstream of the Dyess AFB and Ellsworth AFB.

Water Resources

Potential impacts on water resources were evaluated by identifying surface water features and groundwater within and around Dyess AFB and Ellsworth AFB. This allowed for the determination of direct impacts on water resources (e.g., construction in floodplains, storm water runoff to streams, migration of contaminants into groundwater), as well as the potential for impacts on downstream or downgradient of the planned construction areas and WGF sites for each alternative. Potential impacts were also evaluated in the context of Section 303 of the Clean Water Act, which requires states to establish water quality standards for waterways, identify those that fail to meet the standards, and take action to clean up impaired waterways. Waters determined to be impaired are submitted to the EPA for approval as each state's 303(d) list.

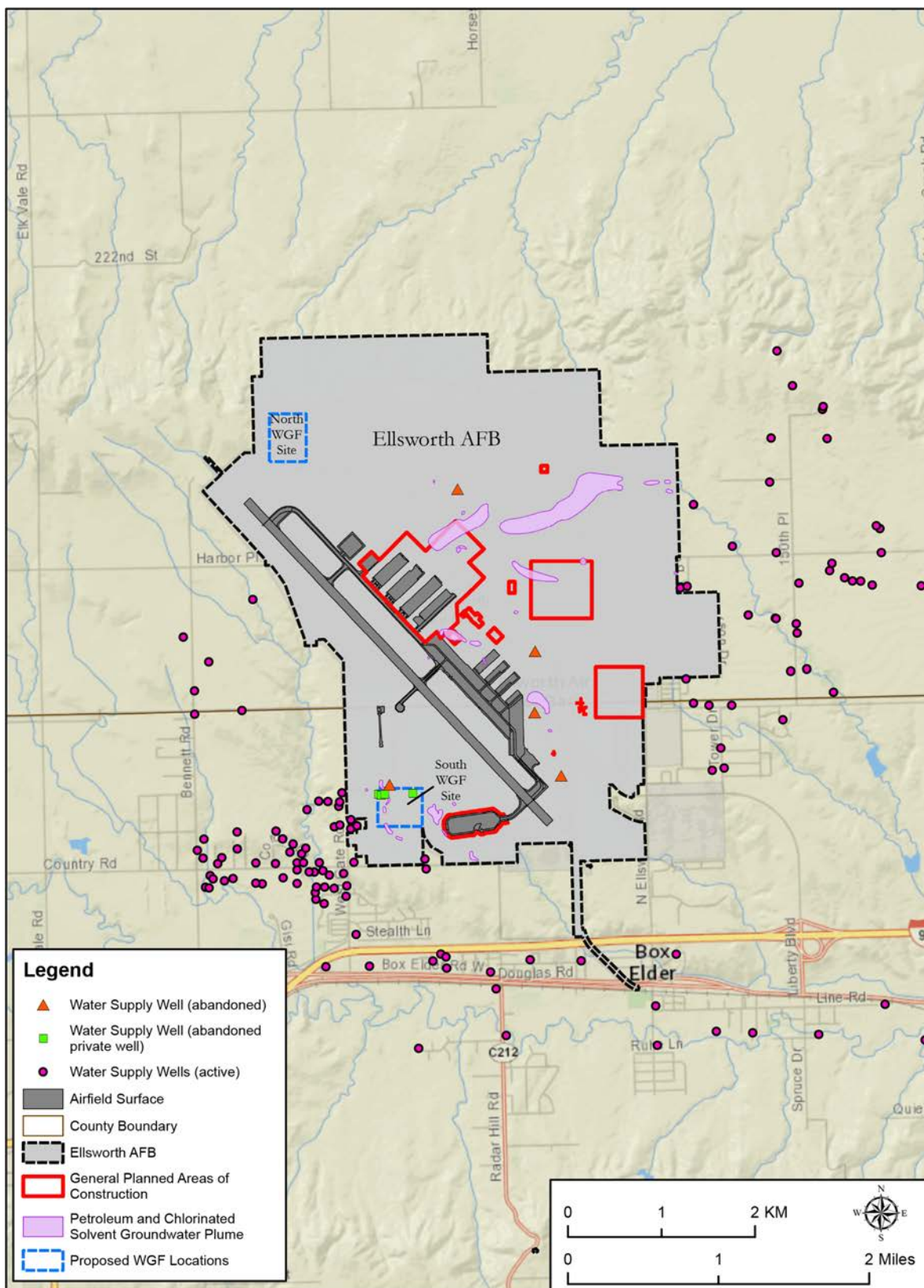


Figure 3.9-8. Active Water Supply Wells near Ellsworth AFB

3.9.2 Physical Resources, Environmental Consequences

3.9.2.1 No Action Alternative Consequences

Under the No Action Alternative, impacts would not occur on physical resources however, demolition, construction, and maintenance would continue as part of normal operations and installation development, and these activities may affect physical resources. These activities would be subject to project-specific environmental review under the EIAP and physical resources concerns would be addressed during that review.

3.9.2.1.1 No Action at Dyess AFB

Soils

The site topography at Dyess AFB is essentially flat, which results in low erosion potential at facilities currently regulated under the base's stormwater discharge permit (Dyess AFB, 2018c). Work involving soil disturbance, building enhancements, and construction projects at Dyess AFB are required to be reviewed by the 7th Civil Engineering Squadron (7 CES) Environmental Group under the EIAP for approval. The review provides the 7 CES Environmental Section the opportunity to identify the potential for adverse impacts, to determine the need for additional project specific NEPA analysis, and to include erosion and sediment control requirements in the work order or contract.

Erosion control and assessment of the erosion control program is ensured by including sediment and erosion control as an element in the annual and quarterly stormwater inspection program. Construction projects encompassing more than 1 acre of disturbed area require a separate permit and are inspected by the 7 CES Environmental Section (Dyess AFB, 2018c). Continuing implementation of EIAP reviews, the erosion control program, the stormwater inspection program, and associating permitting procedures would prevent significant impacts on soils at Dyess AFB under the No Action Alternative.

Water Resources

Dyess AFB maintains and implements a SWPPP (Dyess AFB, 2018c) that includes BMPs and controls for reducing the potential impact from the ongoing military activities on surface water, floodplains, or wetlands. The SWPPP also provides spill prevention measures and response actions, and describes employee training, as well as monitoring and inspection programs. These programs protect surface water and groundwater at and downgradient from the base.

Dyess AFB also maintains an SPCC Plan. The SPCC Plan contains spill response procedures and a list of facilities that have containers for petroleum, oils, and lubricants (POLs) with storage capacities of 55 gallons or greater. Many requirements implemented in the SPCC Plan prevent stormwater pollution and adverse impacts on surface water, floodplains, wetlands, and groundwater. Therefore, by continuing implementation of the SWPPP, the SPCC Plan, and associated BMPs, significant impacts on water resources would not occur under the No Action Alternative.

In summary, soils and water management activities at Dyess AFB under the No Action Alternative would not result in significant adverse impacts on physical resources.

3.9.2.1.2 No Action at Ellsworth AFB

Soils

Site topography at Ellsworth AFB is mostly gently sloping, which results in low erosion potential. However, areas with steeper topography, such as an area near the north boundary of the base, have greater erosion potential. The Ellsworth AFB SWPPP (Ellsworth AFB, 2019b) includes a detailed description of areas within the base with potential for significant erosion, as well as recommended management actions. Continuing implementation of the SWPPP and associated management actions would prevent significant impacts on soils at Ellsworth AFB under the No Action Alternative.

Water Resources

Ellsworth AFB maintains and implements a SWPPP (Ellsworth AFB, 2019b) that includes BMPs and controls for reducing the potential impact from ongoing military activities on surface water, floodplains, or wetlands. The SWPPP also provides spill prevention measures and response actions, and describes employee training, monitoring and inspection programs. Ellsworth AFB implements an Annual Comprehensive Site Compliance Evaluation program, which lists specific items to be inspected in the SWPPP. The results of the comprehensive compliance evaluation are documented and maintained onsite with the SWPPP. These programs protect surface water and groundwater at and downgradient from the base.

Ellsworth AFB also maintains an SPCC Plan. The SPCC Plan identifies regulated areas where POLs are used, stored, and handled. The SPCC plan describes the spill prevention and control devices and procedures used by Ellsworth AFB to prevent unregulated discharges to the environment. Many requirements implemented in the SPCC Plan prevent stormwater pollution and adverse impacts on surface water, floodplains, wetlands, and groundwater. Therefore, by continuing implementation of the SWPPP and the SPCC Plan, significant impacts on water resources would not occur under the No Action Alternative.

In summary, soils and water management activities at Ellsworth AFB under the No Action Alternative would not result in significant adverse impacts on physical resources.

3.9.2.2 Dyess AFB Alternative

3.9.2.2.1 Personnel

Potable water is supplied to Dyess AFB by the City of Abilene, which obtains its water primarily from Fort Phantom Hill Lake. The water treatment system for the City of Abilene has a maximum capacity of 46,000,000 gallons per day (City of Abilene, 2020). Dyess AFB currently uses approximately 169,000 gallons of water per day on average. Water usage would be expected to increase to approximately 235,000 gallons per day to support

the increased number of personnel at the base with the B-21 MOB 1 beddown (Section 3.13, Utilities and Infrastructure). The increased water usage rate is less than 1 percent of the maximum capacity of the water treatment system for the City of Abilene. As such, this increase is not expected to have significant impacts on Fort Phantom Hill Lake from which the City of Abilene primarily draws its water.

The increased number of personnel would also increase vehicle use and potential oil/lubricant spills and leaks (Section 3.12, Transportation). No adverse impacts on the environment are expected from vehicular spills and leaks since these would be captured by stormwater systems at the base. The stormwater system at Dyess AFB is managed and monitored under the SWPPP (Dyess AFB, 2018c).

3.9.2.2.2 Airfield Operations

Water resources at Dyess AFB could potentially be impacted by inadvertent releases of hazardous chemicals that may occur during airfield operations such as fueling, conventional and unconventional munitions storage, equipment maintenance, and waste disposal. Hazardous chemical releases could also occur from leaking fuel storage tanks. The volume of fuels and hazardous chemicals used at Dyess AFB and volume of hazardous waste generated are not expected to change if the B-21 MOB 1 beddown occurs at this location, although the nature of some hazardous wastes could change based on the type of materials used in repair operation. Hazardous Material Management and Hazardous Waste Disposal programs described in Section 3.10 (Hazardous Materials and Hazardous and Solid Wastes) are currently being implemented, and these programs would protect surface waters and groundwater resources downstream of the proposed construction footprints for projects listed in Table 2.4-1 and the WGF site. The Dyess AFB SWPPP (Dyess AFB, 2018c) includes BMPs for spill prevention and response actions. It also describes employee training, monitoring, and inspection programs. Accidental chemical releases would be prevented by the control measures. If these events do occur, spills can be prevented from leaving the base boundary by the weir/valve control system at the South Diversion Ditch/Little Elm Creek. In the event of an emergency, the valves can be shut to prevent chemicals from exiting the Dyess AFB property except in cases of heavy rainfall events (Dyess AFB, 2018c).

The Dyess AFB SPCC Plan contains spill response procedures and a list of facilities that have containers for POLs with storage capacities of 55 gallons or greater. The plan would need to be updated to include new POL storage tanks associated with the proposed B-21 MOB 1. Many requirements implemented in the SPCC Plan also prevent stormwater pollution and adverse impacts on surface water as well as groundwater.

3.9.2.2.3 Airspace and Range Utilization

Airspace and range utilization under the Dyess AFB Alternative would not affect physical resources at the PRTC or the Brownwood, Lancer, or Pecos MOAs.

3.9.2.2.4 Facilities, Infrastructure, and the Weapons Generation Facility

Soils

Establishment of the B-21 MOB 1 at Dyess AFB would require construction of new facilities, as well as renovation and demolition of existing structures. The B-21 MOB 1 beddown would also require construction of a WGF, which would consist of a 52,210-square-foot building within a 35-acre footprint. Construction and other ground-disturbing activities may cause soil disturbance and soil erosion unless mitigation practices are implemented.

The soils in the planned areas of construction and WGF site are shown on Figure 3.9-2. Erosion factors range from 0.24 to 0.32, which indicate moderate erodibility (Table 3.9-2). The slopes in the planned areas of construction and WGF site range from approximately 0.3 percent to 0.5 percent, which are considered very flat (United Nations, 1985). Overall, there is low potential for soil erosion at the planned construction areas and WGF site due to construction and other ground-disturbing activities.

The potential for soil erosion would be further reduced by controls implemented by Dyess AFB for construction projects at the base. As noted above, the Civil Engineering Squadron (CES) Environmental Group reviews construction projects (Dyess AFB, 2018c) and identifies additional erosion and sediment control requirements in the work order or contract if baseline runoff BMPs do not provide adequate protection of surface water during construction. Examples of erosion and sediment controls include minimization of earth-moving activities during wet weather/conditions, covering soil stockpiles, installation of silt fencing and sediment traps, and revegetation of disturbed areas with native plants as soon as possible to contain and prevent off-site migration of sediment or eroded soils from the project areas.

In addition to BMPs specified in the SWPPP or project-specific requirements from the CES Environmental Group, construction of the B-21 MOB 1 facilities and WGF would be covered under a construction general permit (TXR150000) because the area of the WGF building and the areas of many of the new facilities (Table 2.4-1) would be greater than 1 acre (43,560 square feet). The largest new facilities are the Alert Ramp (825,000 square feet or 18.9 acres), the Central Hangar Maintenance Aprons (235,000 square feet or 5.4 acres), the Northern Maintenance Apron (190,000 square feet or 4.4 acres), and the Southern Maintenance Apron (210,000 square feet or 4.8 acres). Construction covered under the construction general permit will adhere to sediment and erosion control requirements included in the permit.

In summary, beddown of the B-21 at Dyess AFB would not result in significant impacts on soil because of the low erosion potential associated with the flat topography at the base in general and in the planned areas of construction and WGF site specifically. The likelihood of potential impacts would be further reduced by the application of BMPs identified in the Dyess AFB SWPPP, adherence to erosion and sediment control requirements established by the CES Environmental Group, and implementation of requirements in the construction general permit for construction projects where land disturbance is greater than 1 acre.

Water Resources

Surface waters that could potentially be affected by construction and operations at the planned areas of construction and WGF site are the North Diversion Ditch, the South Diversion Ditch, and Little Elm Creek (downstream of these ditches). Little Elm Creek is not on the Texas 303(d) list of impaired waters (TCEQ, 2020). Establishment of the B-21 MOB 1 at Dyess AFB would not be expected to cause impairment of this surface water. Wetlands at Dyess AFB would not be affected because there are no wetlands in the planned areas of construction for projects listed in Table 2.4-1 or in the WGF construction footprint. A floodplain associated with a portion of North Diversion Ditch is present in the primary planned construction area (Figure 3.9-3).

Surface runoff from the main planned construction footprint located on the north portion of Dyess AFB would likely flow towards the North Diversion Ditch (Figure 3.9-3). Surface runoff from the smaller planned construction areas located south of the main construction footprint would flow into the underground stormwater system and be conveyed either to the North Diversion Ditch or the South Diversion Ditch.

Potential impacts on surface water typically occur during construction/demolition activities from land disturbance due to eroded soil being transported into nearby drainageways. However, these impacts are unlikely to occur under the Dyess AFB Alternative because of the low likelihood of soil erosion, which stems from the flat topography in the construction footprints for projects listed in Table 2.4-1 and the WGF site. Additionally, erosion control measures would be implemented in accordance with the Dyess AFB SWPPP (Dyess AFB, 2018c), and requirements in the construction general permit (TXR150000) for construction areas where land disturbance would be greater than 1 acre.

Surface water could also potentially be impacted by increased impervious surface area from new facilities and higher discharge volume of stormwater flowing into drainage ways. Based on the areas provided in Table 2.4-1 for new facilities, existing facilities to be demolished, and the WGF building, the net increase in impervious surfaces is estimated to be approximately 64 acres. Increased runoff can be managed by conveyance structures (e.g., roadways, channels, and culverts) designed in accordance with established engineering standards. In addition, stormwater impacts can be reduced by using site controls that treat, store, and infiltrate runoff onsite before it can affect water bodies downstream (EPA, 2020a). These control measures include but are not limited to grassed swales, infiltration basins and trenches, rain gardens, and pervious pavements. Stormwater management controls would conform with Section 438 of the Energy Independence and Security Act, which requires agencies to protect water resources by reducing stormwater runoff from any federal development projects (EPA, 2009).

Because there are subareas within the primary planned construction footprint that are within a 100-year floodplain, Dyess AFB would comply with EO 11988, *Floodplain Management*, in siting new facilities in this area. EO 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative (Federal Emergency Management Agency, 2015). The affected floodplain area is associated with the North

Diversion Ditch and is approximately 20.5 acres, which is a relatively small area (6 percent) of the total main construction footprint (Figure 3.9-3). Siting B-21 MOB 1 facilities away from the 100-year floodplain area to avoid impacts is considered likely given the limited areal extent of the floodplain area relative to the main construction footprint, with one exception. As part of the Dyess AFB Alternative, the existing aircraft parking apron would need to be expanded. This would impact a portion of the Northern Diversion Ditch and approximately 2 acres of floodplain delineated within the ditch. The Northern Diversion Ditch is an already disturbed environment within the cantonment area of Dyess AFB. The proposed extension of the ramp to the north will require extending the existing 10 foot x 10 foot concrete box culvert that runs west to east under the main runway, maintaining similar flow capacity and discharging to the existing lined culvert of the diversion ditch. The hydrological properties of the floodplain would not be impacted.

Currently, Dyess AFB does not have available land to expand the aircraft parking apron without working within the floodplain. If the Dyess AFB Alternative is chosen, a Finding of No Practicable Alternative will be included in the Record of Decision.

No significant impacts on groundwater would be anticipated to result from establishment of the B-21 MOB 1 at Dyess AFB. BMPs and spill prevention practices in the Dyess AFB SWPPP and SPCC plan would serve to protect groundwater. Contamination of the underlying Cross Timbers Aquifer is unlikely given its depth (174 to 193 feet, based on the existing water wells that draw groundwater from this aquifer) (Texas Water Development Board, 2019).

In summary, there would be no significant impacts on physical resources under the Dyess AFB Alternative.

3.9.2.2.5 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

Construction-related impacts on soil and surface water quality can be reduced through implementation of erosion and sediment control measures. Examples of controls include minimization of earth-moving activities during wet weather/conditions, covering soil stockpiles, installation of silt fencing and sediment traps, and revegetation of disturbed areas with native plants as soon as possible to contain and prevent off-site migration of sediment or eroded soils from the project areas.

Site drainage around the new facilities would be designed to manage the anticipated increase in runoff from increased impervious surfaces through properly sized stormwater conveyance structures and incorporating stormwater management features such as porous pavements and infiltration basins that treat, store, and infiltrate runoff onsite before it can affect downstream water bodies (EPA, 2020a).

Building sites would be located to avoid the 100-year floodplain areas, if possible.

3.9.2.3 Ellsworth AFB Alternative (Preferred Alternative)

3.9.2.3.1 Personnel

Potable water is supplied to Ellsworth AFB by Rapid City, which obtains its water primarily from the Rapid City Alluvium, Rapid Creek, and Minnelusa and Madison aquifers (Rapid City Water Division, 2019). Rapid City's Jackson Springs water treatment plant has a maximum capacity of 8,000,000 gallons per day (Burns and McDonnell, 2020). Ellsworth AFB currently uses approximately 500,000 gallons of water per day. Based on the projected personnel increase associated with the B-21 MOB 1 beddown and the current estimated daily usage, water usage would be expected to increase to approximately 650,000 gallons per day (Section 3.13, Utilities and Infrastructure). Given that the increased usage is a relatively low percentage (8 percent) of the maximum capacity of the Rapid City water treatment plant, the expected water demand from increased personnel associated with the B-21 MOB 1 beddown at Ellsworth AFB would not be expected to significantly impact groundwater and surface waters that Rapid City uses as water sources.

Like the Dyess AFB Alternative, an increased number of personnel would also increase vehicle use and potential oil/lubricant spills and leaks (Section 3.12, Transportation). However, no adverse impacts on the environment are expected from potential increased vehicular spills and leaks since these would be captured by stormwater systems at the base. The Ellsworth AFB stormwater system is managed and monitored under the SWPPP (Ellsworth AFB, 2019b).

3.9.2.3.2 Airfield Operations

Surface water could potentially be impacted by inadvertent releases of hazardous chemicals that may occur during airfield operations and from leaking fuel storage tanks. The volume of fuels and hazardous chemicals used at Ellsworth AFB and the volume of hazardous waste generated would not be expected to change if the B-21 MOB 1 were established at this location, although the nature of some hazardous wastes could change based on the type of materials used in repair operations. Hazardous Material Management and Hazardous Waste Disposal programs described in Section 3.10 (Hazardous Materials and Hazardous and Solid Wastes) are currently being implemented, would protect surface waters in the planned areas of construction, WGF site, and downstream. The Ellsworth AFB SWPPP (Ellsworth AFB, 2019b) includes BMPs and controls for reducing the potential impacts from ongoing military activities on surface water, floodplains, or wetlands. The SWPPP also provides spill prevention measures and response actions and it describes employee training, monitoring, and inspection programs. Ellsworth AFB implements an Annual Comprehensive Site Compliance Evaluation Program, which includes specific items to be inspected in the SWPPP. If the B-21 MOB 1 were established at Ellsworth AFB, the SWPPP would need to be updated to include the new facilities to include inspections during the comprehensive compliance program at the base.

The Ellsworth AFB SPCC Plan identifies regulated areas where POLs are used, stored, and handled. The SPCC also describes the spill prevention and control devices as well as procedures used by Ellsworth AFB to prevent unregulated discharges to the environment. The SPCC would need to be revised if there are changes to the number and location of POL storage tanks associated with construction of the proposed B-21 MOB 1. Many requirements implemented in the SPCC prevent stormwater pollution and adverse impacts on surface water, floodplains, wetlands, and groundwater.

Two of the planned construction areas at Ellsworth AFB (North and South WGF sites) are located on the western side of the base. The other two planned areas of construction are on the eastern side (Figure 3.9-7). If a liquid chemical release occurred in the areas on the western side of the base, the liquid would flow towards Ponds 1, 2, or 3. All three ponds are equipped with spill control valves on the pond inlet that would block the flow of liquids into the ponds to prevent downstream and offsite release should a large spill occur. If spills occur in the planned areas of construction on the east side of the base, liquids would flow to a series of ponds including Bandit, Heritage, and Gateway Lakes. These lakes ultimately discharge through a permitted outfall to Box Elder Creek (Ellsworth AFB, 2020a; Ellsworth AFB, 2019b). There are physical barriers that would prevent releases from going offsite on the west side of Ellsworth AFB. There are no physical barriers for releases on the east side of Ellsworth AFB.

3.9.2.3.3 Airspace and Range Utilization

Airspace and range utilization under the Ellsworth AFB Alternative would not affect physical resources at the PRTC.

3.9.2.3.4 Facilities, Infrastructure, and the WGF

Soils

The soils in the planned areas of construction, the North and South WGF Sites at Ellsworth AFB have been identified in Figure 3.9-6. Erosion factors range from 0.24 to 0.32, which indicate moderate erodibility (Table 3.9-4). Most of the planned construction areas have slopes of about 1 percent but portions of these areas have steeper slopes of about 4 percent.

Based on the soil erosion factors and surface slopes in the planned construction areas and WGF sites, there is moderate to high likelihood for soil erosion in these areas unless mitigation practices are implemented. The Ellsworth AFB SWPPP (Ellsworth AFB, 2019b) recognizes the existence of potential erosion-prone areas and provides erosion and sediment control measures that can be used for moderate to steep slopes.

Construction of the B-21 MOB 1 facilities and WGF at Ellsworth AFB would likely be covered under a construction general permit (SDR100000) because the area of the WGF building and the areas of many of the new facilities (Table 2.5-1) are greater than 1 acre. For example, new pavement would be constructed with areas ranging from 105,000 to 1,211,000 square feet (2.4 to 27.8 acres). During construction, erosion and sediment control requirements specified in the construction general permit would be followed.

In summary, there is potential for soil erosion during construction of the B-21 MOB 1 beddown at Ellsworth AFB because of the moderate to steep slopes in the planned areas of construction and WGF sites. With the application of erosion and sediment control measures in the Ellsworth AFB SWPPP, and adherence to requirements in the construction general permit, potential impacts on soil could be reduced if the B-21 MOB 1 were established at Ellsworth AFB.

Water Resources

The surface waters that could potentially be affected by establishment of B-21 MOB 1 facilities and the WGF include the streams that flow south/southeast towards Box Elder Creek. None of the wetlands at Ellsworth AFB are located within the planned areas of construction and would not be directly impacted. Box Elder Creek is on South Dakota's 303(d) list of impaired waters due to elevated levels of *E. coli* (SDDENR, 2020). Establishment of the B-21 MOB 1 at Ellsworth AFB would not be expected to affect *E. coli* levels or to otherwise degrade water quality at Box Elder Creek because domestic and industrial wastewater from the base is treated in an off-site wastewater treatment plant in the City of Box Elder.

Impacts on surface waters from erosion during construction/demolition could be avoided if erosion and sediment control measures specified in the Ellsworth AFB SWPPP (Ellsworth AFB, 2019b) were implemented. Furthermore, for construction projects involving land disturbance greater than 1 acre, coverage under the construction general permit (SDR100000) is required, and erosion would be controlled through adherence to the permit requirements.

There are 100-year floodplains within two of the planned construction areas and at the North WGF Site (Figure 3.9-7). Siting of facilities within these areas will need to comply with EO 11988, *Floodplain Management*. The 100-year floodplain areas are limited in areal extent and siting facilities away from these areas would be feasible. The floodplain areas are 2 percent (4.4 out of 217 acres) and 8 percent (8.1 out of 98 acres) of the planned construction areas. The USAF would site facilities to avoid impacting the 100-year floodplains. Proposed development in the floodplain includes a stormwater detention cell for stormwater runoff control. The stormwater cell is likely to require flow modulation, erosive velocity control, solids settlement, and maintenance access features. The finished detention cell is not expected to result in filling of or obstructions to the present flood control channel.

Surface water could potentially be impacted by increased impervious surface area from new construction and higher discharge volume of stormwater flowing into streams. Based on the areas provided in Table 2.5-1 for new facilities, existing facilities to be demolished, and the WGF, the net increase in impervious surfaces is estimated to be approximately 72 acres. As in the Dyess AFB Alternative, increased runoff at Ellsworth AFB can be managed by properly designed stormwater conveyance structures and by using site designs, such as rain gardens and pervious pavement that treat, store, and infiltrate runoff onsite before it can affect downstream water bodies (EPA, 2020a).

No significant impacts on groundwater are anticipated to result from establishment of the B-21 MOB 1 at Ellsworth AFB. Site groundwater will be protected by Hazardous Material and Waste Management programs at Ellsworth AFB described in Section 3.10 (Hazardous Materials and Hazardous and Solid Wastes), as well as BMPs and spill prevention practices in the Ellsworth AFB SWPPP and SPCC. Groundwater in the shallow unconsolidated aquifer at Ellsworth AFB has been contaminated by historical releases of fuels and chlorinated solvent chemicals previously used for maintenance. The groundwater contaminated by petroleum and chlorinated solvents is currently contained within the base boundary (ARGO/LRS JV and Gilbane Federal, 2019). To prevent exposure to the contaminated groundwater, an institutional control prohibits the use of groundwater within base property (Krebs, 2019). A long-term monitoring program is in place at Ellsworth AFB to monitor groundwater contaminant plumes and evaluate the effectiveness of groundwater remediation efforts (ARGO/LRS JV and Gilbane Federal, 2019). Shallow groundwater contaminated by PFAS extends off the base and has been detected above the EPA Lifetime Health Advisory level of 0.07 µg/L in 24 private drinking water wells. The USAF has provided an alternate drinking water source to the affected residences. PFAS-containing firefighting foam was last used at Ellsworth AFB in November 2016 (Ellsworth AFB, 2019c).

In summary, there would be no significant impacts on physical resources under the Ellsworth AFB Alternative.

North WGF Site Subalternative

The North WGF Site is in an area of more topographic relief where the estimated slope is about 5 percent, which is considered steep. Steep slopes at the North WGF Site could lead to potential soil erosion issues during construction. However, this would be reduced by application of erosion and sediment control measures described in the Ellsworth AFB SWPPP and adherence to requirements in the construction general permit, which would be needed because land disturbance to construct the WGF building would exceed 1 acre. There are no wetlands within the North WGF Site, but a 100-year floodplain area is present (Figure 3.9-7). The floodplain area is associated with the drainageway that cuts across the North WGF Site, but it is limited in areal extent (2.1 acres) compared to the area extent of the North WGF Site (4 percent of 50 acres). If this subalternative is selected and the floodplain area at the North WGF Site cannot be avoided, the USAF would prepare a Finding of No Practicable Alternative and include it in the Record of Decision.

South WGF Site Subalternative (Preferred Subalternative)

Slopes at the South WGF Site are about 1 percent, which is less steep when compared to the North WGF Site. However, this site is still considered vulnerable to soil erosion with moderate potential. Negative impact from construction could be readily reduced by erosion and sediment control measures specified in the Ellsworth AFB SWPPP and construction general permit requirements. There are no wetlands or 100-year floodplain areas in the South WGF Site. A road ditch east/southeast of the South WGF Site was determined to be a non-jurisdictional wetland (USACE, 2020). This road ditch would likely receive stormwater runoff from the South WGF Site, which would then flow towards a

jurisdictional wetland (Figure 3.9-7). Therefore, stormwater runoff could potentially carry eroded soil from the South WGF Site to the wetland during construction activities. However, negative impacts on the downstream wetland would be reduced by erosion and sediment control measures that would be part of construction general permit requirements. In addition, stormwater management features would prevent long-term impacts associated with operation of the WGF facility.

As noted in Section 2.5.5 (South WGF Site Subalternative at Ellsworth AFB), a bridge would be needed to provide direct access from the alert apron to the South WGF Site. The bridge would be constructed over approximately 1 acre of floodplains and 0.4 acre jurisdictional wetlands located between the two areas. Although design specifications are unknown at this time, bridge placement would avoid direct impacts to the wetlands if possible. However, if the bridge design requires construction within the wetlands, Ellsworth AFB would coordinate with USACE to obtain a permit under Section 404 of the CWA. Ellsworth AFB would implement any requirements, potentially including mitigations, associated with the permit. Refer to Section 3.9.2.3.5 for information on potential mitigations.

3.9.2.3.5 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

Construction-related impacts on soil and surface water quality can be reduced through implementation of erosion and sediment control measures. If possible, buildings should be sited in areas with moderate slopes and avoid disturbing areas with steep slopes, specifically at the North WGF Site. The bridge connecting the alert apron and the South WGF Site would be designed to avoid construction within floodplains and jurisdictional wetlands to the greatest extent possible. However, if the bridge design requires construction within the wetlands, then the USACE would likely require mitigation measures to be implemented. In general, actions resulting in loss of wetland functions may require compensatory mitigation measures. However, the need for and nature of specific mitigation measures would be determined, in consultation with the USACE, when bridge design specifications are developed.

Site drainage around the new facilities should be designed to manage the anticipated increased runoff from the increased impervious surface through properly sized stormwater conveyance structures, and by incorporating stormwater management features such as porous pavements and infiltration basins that treat, store, and infiltrate runoff onsite before it can affect downstream water bodies (EPA, 2020a).

Facilities and structures where military operations would involve handling of hazardous chemicals or fueling operations would be best placed where spill control valves serve as physical barriers that could prevent releases from flowing into the ponds and offsite streams.

Building sites should be located to avoid the 100-year floodplain areas. These areas are present at the North WGF Site and in two planned construction areas but are limited in areal extent and could be easily avoided.

3.10 HAZARDOUS MATERIALS AND HAZARDOUS AND SOLID WASTES

3.10.1 Hazardous Materials and Hazardous and Solid Wastes, Affected Environment

3.10.1.1 Description of Resource

This resource area evaluates hazardous material usage and hazardous waste generation and storage. Hazardous materials and hazardous wastes refer to substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA). In general, hazardous materials include substances that, because of their quantity concentration or physical, chemical, or infectious characteristics, may present substantial danger to public health or the environment when released into the environment.

Hazardous wastes are regulated under RCRA and defined as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes that either exhibit one or more of the hazardous characteristics of ignitability, corrosivity, toxicity, or reactivity, or are listed as an hazardous waste under 40 CFR Part 261. Texas and South Dakota generally follow federal regulations related to hazardous waste management. In Texas, specific requirements may be found in Texas Administrative Code, Title 30, Chapter 335, *Industrial Solid Waste and Municipal Hazardous Waste*. South Dakota regulations are found under the Administrative Rules of South Dakota, Chapter 74:28, *Hazardous Waste*. The state hazardous waste programs are responsible for regulating the storage, treatment, transport, and disposal of hazardous waste, and provide technical assistance, conducts inspections, and assigns generator identification numbers.

The affected resources include ERP sites. The CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites; provided for liability of persons responsible for releases of hazardous waste at these sites; and established a trust fund to provide for cleanup when no responsible party could be identified. The Superfund Amendments Reauthorization Act mandated the military departments within DoD to follow the same cleanup regulations that apply to private entities under CERCLA and established the Defense ERP. The ERP is used by DoD to identify, characterize, clean up, and restore sites contaminated with toxic and hazardous substances, low-level radioactive materials, petroleum products, or other pollutants and contaminants.

The affected resources also include the potential presence of toxic substances in structures (i.e., asbestos in building materials and lead in paints). Asbestos is a naturally occurring mineral that is a very effective heat and sound insulator. Consequently, it was used in many buildings as a fire and noise retardant. Asbestos has been linked to several diseases, including lung cancer, and has not been used in construction materials since 1987. Friable (brittle) asbestos becomes hazardous when fibers become airborne and are inhaled. Asbestos management is addressed in various federal and state regulations,

key among these is the Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP). This regulation is intended to minimize the release of asbestos fibers during activities involving the handling of asbestos.

Lead was used as an additive and pigment in paints for many years prior to 1978; therefore, older structures on the base that have multiple layers of older paint are potential sources of lead. Lead has been associated with central nervous system disorders, particularly among children and other sensitive populations. Exposure to lead is usually through inhalation during renovation and demolition activities or through ingestion of paint chips or lead-contaminated drinking water. Title IV of the Toxic Substances Control Act, as well as other authorities in the Residential Lead-Based Paint Hazard Reduction Act of 1992, directs EPA to regulate lead-based paint (LBP) hazards.

Finally, this resource area evaluates impacts associated with solid waste disposal from proposed activities. This includes both municipal solid waste (MSW) C&D debris. In Texas, requirements related to solid waste management may be found in Texas Administrative Code, Title 30, Chapter 330, *Municipal Solid Waste*, while South Dakota solid waste regulations are found under South Dakota Codified Law 34A-6, *Solid Waste Management*. These regulations require the effective and safe disposal of solid waste.

Commonalities

The following elements of hazardous materials and hazardous waste management are common to Dyess AFB and Ellsworth AFB.

Hazardous Materials Management

A variety of products containing hazardous materials are used by the installations as part of day-to-day operations. These include fuels, oils and lubricants, solvents, paints, etc. To administer these materials, the installations have implemented a comprehensive hazardous materials management process, including the use of a Hazardous Material Pharmacy (HAZMART). The HAZMART encompasses a storage facility and an established set of procedures designed to control the acquisition, storage, issue, and disposition of serviceable hazardous materials. Working in coordination with the Environmental Management, Bio-environmental, and Safety Offices, the HAZMART ensures that only approved products are purchased and stored and that they are only issued to authorized users. In addition, the HAZMART helps minimize waste by ensuring residual materials are returned to use until the products are exhausted. Unserviceable or excess materials may also be returned for proper disposal. Contractors conducting operations on the installation are required to supply information to the installation regarding any hazardous materials utilized (USAF, 2018).

Hazardous Waste Management

Hazardous waste at both installations are generated from maintenance of aircraft, vehicle, and aviation support equipment activities and from petroleum, oils, and lubricants management and distribution. Types of hazardous waste generated include waste paint and paint-related products, used solvents, used sealants/adhesives, and waste corrosive or flammable liquids. Petroleum and recyclable waste are also generated (managed as

regulated non-hazardous waste) that include used oil and filters, waste antifreeze, reclaimed jet fuel, waste diesel, used hydraulic fluid, etc. Universal wastes, a subset of hazardous wastes, generated include used fluorescent lamps and batteries (USAF, 2016b; USAF, 2019a).

Hazardous wastes at each industrial facility (shop) are accumulated at Initial Accumulation Points (IAP), as long as the amount of waste does not exceed 55 gallons or 1 quart of acute hazardous waste (P-Listed waste as listed in 40 CFR 261.33), and the accumulation container remains in good condition. Each IAP is under the control of an appointed and trained Accumulation Point Manager. Once a container is full at the IAP, the container is relocated to the Central Accumulation Points, where it is stored for up to 90 days until it can be shipped off site. The waste is then transported to an approved off-base treatment, storage, or disposal facility where it is managed in accordance with all applicable local, state, federal, USAF, and DoD regulations (USAF, 2016b).

Both installations have implemented *Hazardous Waste Management Plans* that identify waste generating locations and waste types and addresses proper labeling, storage, and handling of these wastes (USAF, 2016b; USAF, 2019a). These plans include requirements associated with record keeping, spill contingency and emergency response, as well as personnel training requirements.

Other Ongoing Investigations

As part of the overall program to identify impacts from historical operations, the USAF is also currently investigating potential effects related to chemicals known as per- and polyfluoroalkyl substances (i.e., PFAS). This family of chemicals was developed in the 1940s and include the chemicals perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). While PFOS was used in stain- and water-resistant products, PFOA was used for protective coatings. PFASs have been used in many industrial and consumer products since the 1950s. Although aqueous film forming foam (AFFF) containing PFAS (i.e., PFOS and/or PFOA) was developed and deployed by the Navy in the early 1960s, AFFFs have been used at U.S. airports, municipal fire stations and airports, petroleum facilities, and other industries to effectively extinguish hydrocarbon-based fires.

The history of AFFFs placed on the Qualified Product List indicates that multiple AFFFs were available for use between the 1970s and 1990s when fire fighters on military bases regularly trained with AFFF. Due to the uncontained nature of AFFF use during emergencies and fire-fighter training, perfluoroalkyl carboxylates, sulfonates (PFASs), and precursors that degrade to these compounds, along with other AFFF constituents (e.g. hydrocarbon surfactants) and co-contaminants (e.g., petroleum hydrocarbons and chlorinated solvents) have contaminated surrounding soils, sediment, surface water and groundwater. Note: PFAS are in numerous consumer goods and AFFF is only one of many products that has been produced.

In May 2016, the EPA Office of Water issued lifetime drinking water Health Advisory (HA) values for PFOS and PFOA: 0.07 µg/L for each constituent; however, when these two chemicals co-occur in a drinking water source, a conservative and health protective approach is recommended that compares the sum of the concentrations (PFOS + PFOA)

to the HA value (0.07 µg/L). HA values are not legally enforceable federal standards and are subject to change as new information becomes available.

Although the EPA has not established HA values for PFAS in soil, the USAF calculated a residential screening level of 1.26 milligrams per kilogram for PFOS and PFOA in soil. EPA has also derived Tap Water Regional Screening Level (RSL) values for perfluorobutanesulfonic acid (PFBS) for which there is a Tier 2 toxicity value of 40 µg/L (USAF, 2019b).

3.10.1.2 Region of Influence

The ROI for hazardous materials and hazardous and solid wastes is defined as the installation boundaries where hazardous materials are used and hazardous and solid wastes generated. The ROI includes on-base contamination (ERP) areas as well as any off-base areas potentially impacted by this contamination. Finally, the ROI includes off-base landfills where solid wastes are disposed of.

3.10.1.2.1 Dyess AFB

Hazardous Materials Management

Dyess AFB has implemented a comprehensive hazardous materials management process, including the use of a HAZMART described above (Building 7004), to effectively manage hazardous materials. Dyess AFB has also implemented various procedures, such as the *Hazardous Material Planning and Emergency Response Plan (One Plan)*. The concept of the One Plan involves consolidating requirements in multiple plans (including a petroleum SPCC) in order to facilitate and streamline emergency response efforts in case of an unintended release of hazardous materials or petroleum products (USAF, 2018).

Hazardous Waste Management

Dyess AFB is classified as a Large Quantity Generator of hazardous waste per Federal and Texas regulations and maintains an EPA Identification Number of TX3571924643. Large Quantity Generators are defined as facilities that generate more than 1,000 kilograms (2,240 pounds) of hazardous waste per month. During Calendar Year 2019 (CY19), Dyess AFB generated and disposed of a total of approximately 24,000 pounds of hazardous waste (USAF, 2020a). The location of hazardous waste sites is depicted in Figure 3.10-1.

Dyess AFB utilizes two Central Accumulation Points, located at Buildings 4313 and 5205, where hazardous wastes is stored for up to 90 days until it can be shipped off site (USAF, 2016b). To manage hazardous wastes, the Dyess AFB *Hazardous Waste Management Plan* includes requirements associated with record keeping, spill contingency and emergency response, as well as personnel training requirements (USAF, 2016b).

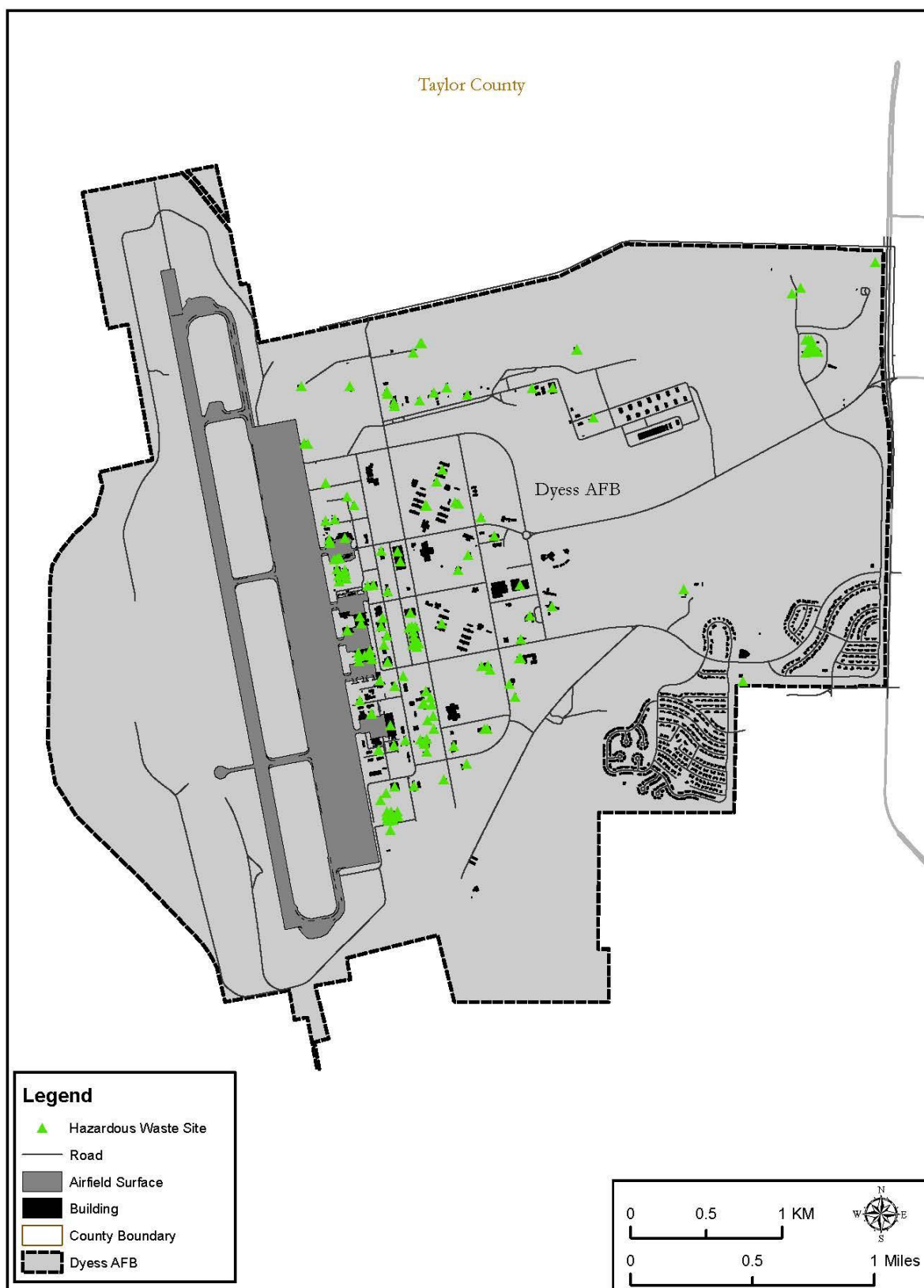


Figure 3.10-1. Hazardous Waste Sites at Dyess AFB

Toxic Substances

Surveys at Dyess AFB have identified asbestos-containing materials (ACM) in older buildings; this includes Building 4111, which is proposed for demolition under the Proposed Action (USAF, 2020b). Friable and nonfriable ACM in this and other older buildings may include pipe insulation, caulk, mastic, ceiling panels, asphalt shingles, and floor tiles. The base's *Asbestos Management Plan* (USAF, 2019c) guides all activities associated with existing ACM. ACM is typically managed in-place unless demolition or renovation occurs. Unless buildings have been previously tested or have been certified that ACM is not present, all buildings undergoing renovation or demolition must be tested for the presence of ACM prior to the commencement of work (USAF, 2019c).

No comprehensive base-wide survey has been conducted to determine the presence and extent of LBP on all buildings; however, the potential for LBP exists for buildings constructed prior to 1978. If older buildings have not been rehabilitated (i.e., LBP has been removed or encapsulated with new paint), it is assumed that LBP is present. Dyess AFB's process for management of LBP is described in the *Lead Management Plan* (USAF, 2004a) and is as follows: 1) maintain in place LBP that is undamaged and does not pose a health risk, 2) repair, which involves sealing or encapsulating LBP to prevent the release of LBP dust, and 3) abatement (removal).

Base facilities are prioritized for LBP surveys, with facilities including childcare facilities, medical facilities, and residential housing receiving the highest priority. Surveys are also conducted prior to the commencement of renovation or demolition work on any building suspected of containing LBP (USAF, 2004a).

ERP Sites

The ERP at Dyess AFB began in 1984 with a base-wide records search that identified seven ERP sites for further investigation. Supplemental site assessments and investigations in the later 1980s and early 1990s have brought the total number of sites to 43. Most ERP sites have undergone regulatory closure with No Further Action approved. These sites include storage tanks, oil/water separators, landfills, drainage areas, fire training areas, spill areas, and waste disposal pits.

Environmental assessment and response actions for Dyess AFB have generally been conducted under 30 Texas Administrative Code, Chapter 335, Subchapter S, the Risk Reduction Rule. This program establishes procedures for closure or remediation of sites. Three Risk Reduction Standards (RRSs) are associated with the program and are described below:

- RRS 1 – Closure with No Further Action/Remediation to Background
- RRS 2 – Closure/Remediation to Health-Based Standards and Criteria
- RRS 3 – Closure/Remediation with Controls

Based on this program, the remaining 16 ERP sites at Dyess AFB have received regulatory closure with established LUCs (see Table 3.10-1 and Figure 3.10-2).

Table 3.10-1. Dyess AFB ERP Sites with Established Land Use Controls

Site ID	Site Name	Closure Dates	Remedy Components	Current Status
FT001	FPTA No. 1A (SWMU 3A)	January 1998 (Soil and Groundwater)	Closure for groundwater under TCEQ RRS 2 with LUC for non-potable groundwater use within the site boundaries. Closure for soil under TCEQ RRS 3 with deed recordation of site boundaries requiring LUCs to maintain non-residential property use.	Site is currently under LTM.
FT002	FPTA Area No. 1B (SWMU 3B)	January 1998 (Soil)	Closure for soil under TCEQ RRS 3 with deed recordation of site boundaries requiring LUCs to maintain non-residential property use.	Site is currently under LTM.
LF004 / DP043	Landfill No. 4 (SWMU 7) POL Sludge Disposal Area No. 2 (SWMU 39)	January 1998 (Soil and Groundwater)	Closure for groundwater under TCEQ RRS 3 with LUCs for non-potable groundwater use within the site boundaries. Closure for soil under TCEQ RRS 3 with deed recordation of site boundaries requiring LUCs to maintain non-residential property use.	Site is currently under LTM.
WP005 / LF013	Evaporation Pit Area (SWMU 6) Hardfill No. 1 (SWMU 9)	Groundwater monitoring requirements removed in 2003		Site is currently under LTM.
SD007	South Diversion Ditch (SWMU 34)	January 1998 (Soil/Sediment)	Closure for groundwater under TCEQ RRS 1 with no further action required. Closure for sediment under TCEQ RRS 3 with deed recordation of site boundaries requiring LUCs to maintain non-residential property use.	Site is currently under LTM.
OT011	DRMO-Building 9104 Waste Storage Area (SWMU 1)	July 1996 (Groundwater) January 1998 (Soil)	Closure for groundwater under TCEQ RRS 2 with LUCs for non-potable groundwater use within the site boundaries. Closure for soil under TCEQ RRS 3 with deed recordation of site boundaries requiring LUCs to maintain non-residential property use.	Site is currently under LTM.
SD015	Building 4116 OWS (SWMU 12)	January 1998 (Soil and Groundwater) TCEQ issued final closure letter March 2016.	Closure for groundwater under TCEQ RRS 3 with LUCs for non-potable groundwater use within the site boundaries. Closure for soil under TCEQ RRS 3 with deed recordation of site boundaries requiring LUCs to maintain non-residential property use.	Site is currently under LTM.
SD017	Building 4311 OWS (SWMU 14)	January 1998 (Soil and Groundwater) TCEQ issued final closure		Site is currently under LTM.

Table 3.10-1. Dyess AFB ERP Sites with Established Land Use Controls

Site ID	Site Name	Closure Dates	Remedy Components	Current Status
		letter March 2016.		
SD020	Building 4317 OWS (SWMU 17)	July 1996 (Soil) January 1998 (Groundwater)		Site is currently under LTM.
SD025	Building 5204 OWS (SWMU 23)	July 1996 (Soil) January 1998 (Groundwater)	Closure for soil and groundwater under TCEQ RRS 3 with deed recordation of site boundaries requiring LUCs to maintain non-residential property use and non-potable groundwater use.	Site is currently under LTM.
SD028	Building 7040 OWS (SWMU 26)	January 1998 (Soil) July 1996 (Groundwater)	Closure for groundwater under TCEQ RRS 1 with no further action required. Closure for soil under TCEQ RRS 3 with deed recordation of site boundaries requiring LUCs to maintain non-residential property use.	Site is currently under LTM.
SD029	Building 8007 OWS (SWMU 27)	January 1998	Closure for soil under TCEQ RRS 3 with deed recordation of site boundaries requiring LUCs to maintain non-residential property use.	Site is currently under LTM.
OT031	463 FMS/Refurb Shop – Building 5017 (SWMU 19)	January 1998 (Soil) July 1996 (Groundwater)	Closure for groundwater under TCEQ RRS 1 with no further action required. Closure for soil under TCEQ RRS 3 with deed recordation of site boundaries requiring LUCs to maintain non-residential property use.	Site is currently under LTM.
ST032	Auto Hobby Shop Waste Oil Tank (SWMU 29)	January 1998 (Soil) July 1996 (Groundwater)	Closure for groundwater under TCEQ RRS 2 with no further action required. Closure for soil under TCEQ RRS 3 with deed recordation of site boundaries requiring LUCs to maintain non-residential property use.	Site is currently under LTM.
OT035	Golf Course Maintenance Shop (SWMU 32)	July 1996	Closure for groundwater under TCEQ RRS 1 with no further action required. Closure for soil under TCEQ RRS 3 with deed recordation of site boundaries requiring LUCs to maintain non-residential property use.	Site is currently under LTM
SS042	Background Boring 2	July 1996		Site is currently under LTM

Source: (USAF, 2016c)

AFB = Air Force Base; DRMO = Defense Reutilization Marketing Office; ERP = Environmental Restoration Program; FMS = Field Maintenance Shop; FPTA = Fire Protection Training Area; ID = identification code; LTM = Long Term Management; LUC = land use control; No. = number; OWS = oil/water separator; POL = petroleum, oil, and lubricant; RRS = Risk Reduction Standard; SWMU = Solid Waste Management Unit; TCEQ = Texas Commission on Environmental Quality

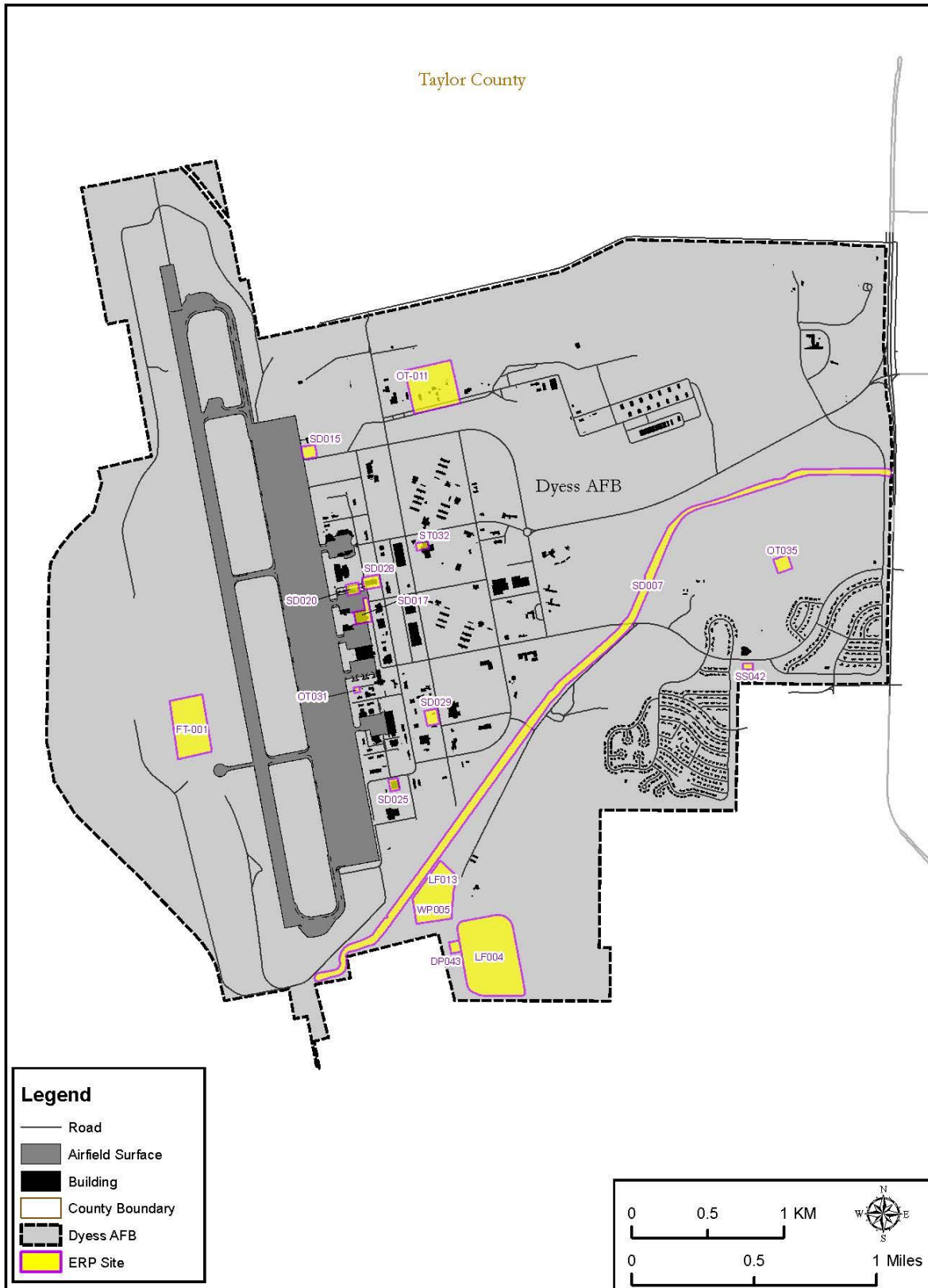


Figure 3.10-2. Dyess AFB ERP Sites with Established Land Use Controls

LUCs are used when it has been determined that it is safe to leave specific types of contamination at a property if defined restrictions are adhered to. They are designed to prevent exposure of human receptors to unacceptable risk associated with contaminants remaining in place. LUCs are specified in a decision document that identifies the remedy for environmental contamination that best fits the site condition. The regulatory agency (in this case the TCEQ) and the USAF enter a LUC that allows ongoing use of the property within the limits defined in the decision document. Common LUC provisions include establishing that a remedial system (e.g., monitoring wells) would not be disturbed, limiting onsite soil disturbance or groundwater use, disallowing sensitive uses of the property (i.e., residential development). A LUC is codified with a revision to the property deed and remains in effect until it is formally removed or modified. The regulatory agency will review applications and information supporting a LUC termination or variance. For example, if the owner completes additional cleanup to remove contamination, the agency could go through the process of a public notice and terminate the LUC.

Other Ongoing Investigations

In September 2014, TCEQ established Protective Concentration Levels (PCLs) for 16 PFAS in soil and groundwater as part of the Texas Risk Reduction Program (TRRP). The TRRP rule provides a three-tiered process for establishing human-health PCLs for contaminants of concern in soil and groundwater. The TRRP does not provide PCLs for sediment or surface water (USAF, 2019b).

A Site Inspection Report, published in April 2019, documented results of an investigation of PFOS/PFOA at Dyess AFB. Measured concentrations of these chemicals in groundwater, soil, and sediment were compared to the federal and TCEQ regulatory thresholds discussed above. The investigation identified 27 potential AFFF release areas on Dyess AFB, with the following 15 identified for further investigation under an Expanded Site Inspection (Table 3.10-2, Figure 3.10-3) (USAF, 2019b).

Table 3.10-2. Summary of PFAS Investigation Results¹ for Dyess AFB

Site ID	Parameter	Exceeds Screening Level ²	Potentially Complete GW Exposure Pathway
AFFF Release Area 1, Former Fire Protection Training Area 2	Surface soil	Yes	No
	Subsurface soil	Yes	
	Groundwater	Yes	
AFFF Release Area 2, Active Fire Training Area	Surface soil	Yes	No
	Subsurface soil	Yes	
	Groundwater	Yes	
AFFF Release Area 3, Hangar 4225	Surface soil	Yes	No
	Subsurface soil	-	
	Groundwater	Yes	
AFFF Release Areas 4, 5, and 6; Hangars 4312, 4314, and 4315	Surface soil	Yes	No
	Subsurface soil	-	
	Groundwater	Yes	

Table 3.10-2. Summary of PFAS Investigation Results¹ for Dyess AFB

Site ID	Parameter	Exceeds Screening Level ²	Potentially Complete GW Exposure Pathway
AFFF Release Area 7, Hangar 5020	Surface soil	Yes	No
	Subsurface soil	-	
	Groundwater	Yes	
AFFF Release Areas 8, 9, and 10; Hangars 5105, 5110, and 5112	Surface soil	Yes	No
	Subsurface soil	-	
	Groundwater	Yes	
AFFF Release Area 11, Former Fire Station (Building 4003)	Surface soil	Yes	No
	Subsurface soil	No	
	Groundwater	-	
AFFF Release Area 12, Spray Test Area No. 1	Surface soil	Yes	No
	Subsurface soil	Yes	
	Groundwater	Yes	
AFFF Release Area 13, Spray Test Area No. 2	Surface soil	Yes	No
	Subsurface soil	-	
	Groundwater	Yes	
AFFF Release Area 14, North and South Diversion Ditches	Sediment	Yes	No
	Surface water	Yes	
	Groundwater	-	
AFFF Release Area 15, Taxiway C	Surface soil	Yes	No
	Subsurface soil	No	
	Groundwater	Yes	

Source: (USAF, 2019b)

AFB = Air Force Base; AFFF = aqueous film forming foam; ID = identification number; GW = groundwater; PFAS = per- and polyfluoroalkyl substances; PFOA = perfluorooctanoic acid; PFOS = perfluorooctane sulfonate

Notes:

1. Remedial investigations are planned for all sites listed in the table (Varley, 2020).

2. A "Yes" indicated exceedance of any of 16 PFAS-related constituents evaluated, including PFOA and PFOS.

A dash (-) means no sampling was conducted.

The 2019 Site Inspection report showed PFOS was detected in soil at concentrations exceeding the EPA RSL based on a residential exposure scenario, at AFFF Areas 1 through 4, 7 through 9, 11, and 12. PFOA was also detected in soil at concentrations exceeding the EPA RSL based on a residential exposure scenario at AFFF Areas 1 and 8. PFOS and PFOA were also detected in surface water at concentrations exceeding the EPA HA at all sample locations, and PFOS and PFOA were detected in groundwater at concentrations exceeding the EPA HA at all sample locations (USAF, 2019b).

Additionally, PFBS was detected at concentrations above the EPA Tapwater RSL at Areas 2 and 12 (USAF, 2019b). With respect to TCEQ TRRP Tier 1 Residential PCLs, at all soil locations sampled PFAS concentrations exceeding PCLs. Likewise, PFAS were detected in groundwater and surface water at concentrations exceeding the TCEQ TRRP Tier 1 Residential PCLs at all sample locations. These sites were recommended for further investigation to evaluate if exposure pathways are complete and to better quantify the level of ground water impacts (USAF, 2019b).

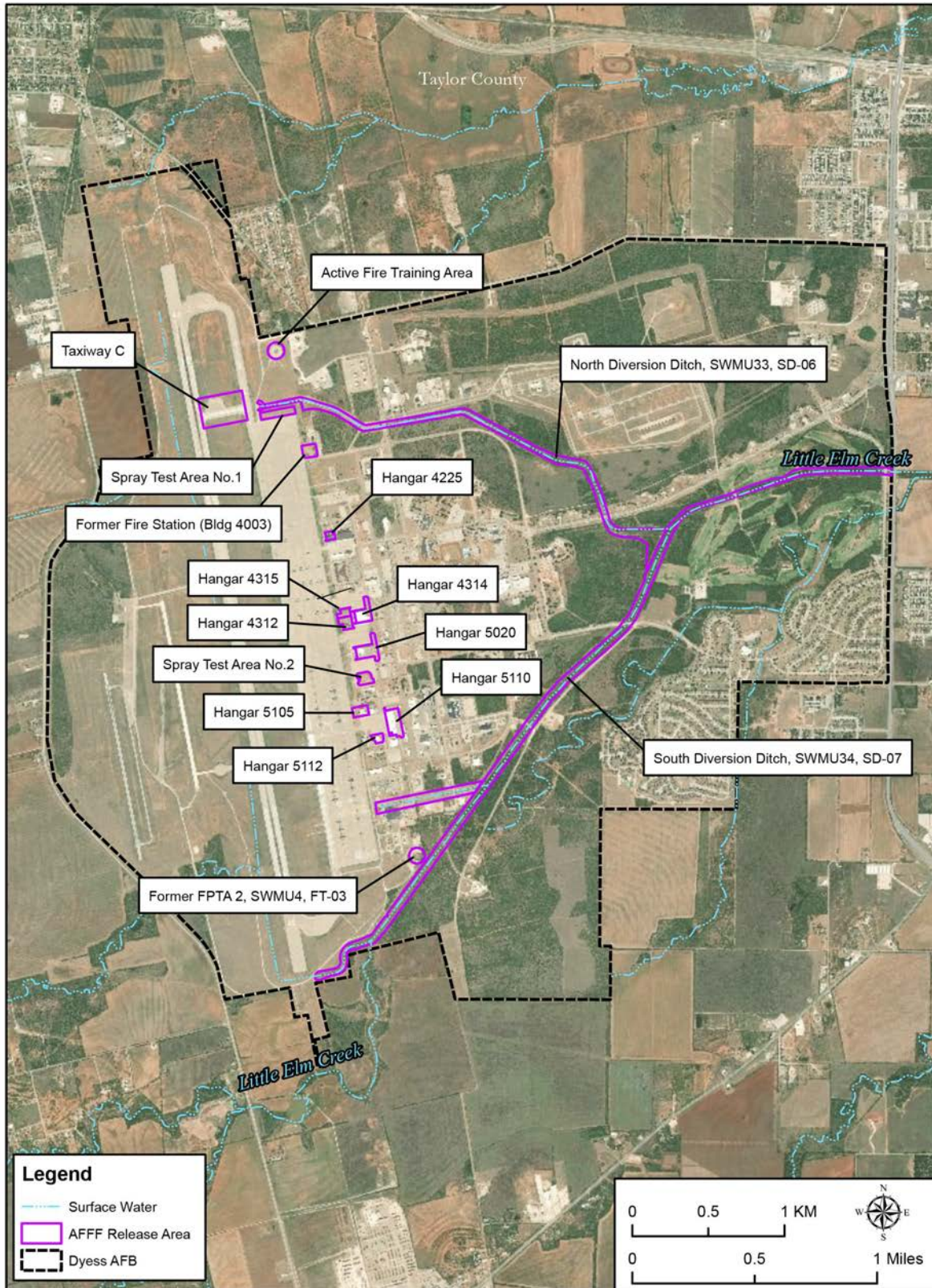


Figure 3.10-3. PFAS on Dyess AFB

Solid Wastes

Wastes generated and requiring management under the Proposed Action would be associated with MSW and C&D debris. Solid waste tracking data show that during FY19, Dyess AFB disposed to the landfill approximately 1,470 tons of MSW. This number includes both MSW from industrial operations as well as from military family housing located on the installation. During the same period, Dyess AFB generated and disposed of approximately 75 tons of C&D debris (USAF, 2020a). Note: The quantities of C&D wastes generated fluctuates significantly annually depending on the amount of construction, renovation, and demolition occurring on base. Disposal of C&D debris generated during development activities at the installation is the responsibility the construction contractor.

There are no on-base disposal facilities for MSW. Two on-base municipal landfills were used in the past, but both have been closed. Solid waste (including C&D debris) generated at the base are disposed of at the Abilene Environmental Landfill, located on Farm-to-Market Road 3034, approximately 2.5 miles north of I-20 in Abilene, Texas. The facility has been in operation since 2006 and is permitted to provide disposal of MSW, C&D debris, and non-hazardous industrial wastes. The facility encompasses 246 acres and receives approximately 770 tons per day of mixed waste (estimated at 220,000 tons per year), with MSW comprising approximately 65 percent of the total waste stream and C&D comprising most of the remainder. The landfill is expected to remain in operation for an additional 63 years (Rhodes, 2020). MSW and C&D debris may also be disposed of at the BFI Landfill, also located on Farm-to-Market Road 3034. This landfill, which has been in operation since 1983 and covers nearly 400 acres, has a projected life expectancy of nearly 200 years. The landfill has an average disposal rate of 700 to 800 tons per day of mixed waste (Grothaus, 2011).

3.10.1.2.2 Ellsworth AFB

Hazardous Materials Management

At Ellsworth AFB, a variety of products containing hazardous materials are used as part of day-to-day operations. Ellsworth AFB has also implemented a HAZMART (located in Building 1911) to administer these materials. As described previously, the HAZMART helps minimize waste by ensuring residual materials are returned to use until the products are exhausted. Unserviceable or excess materials may also be returned for proper disposal (USAF, 2019a).

To effectively manage hazardous materials, Ellsworth AFB has implemented various procedures, such as the *Integrated Contingency Plan*, to mitigate and respond to releases of hazardous materials and petroleum products (USAF, 2017c).

Hazardous Waste Management

Ellsworth AFB is classified as a Large Quantity Generator of hazardous waste per Federal and South Dakota regulations and maintains an EPA Identification Number of ID# SD2571924644 (USAF, 2019a). Hazardous wastes at Ellsworth AFB are also generated from maintenance of aircraft, vehicle, and aviation support equipment. During the 1-year

period from October 2018 through September 2019, Ellsworth AFB generated and disposed of a total of approximately 107,000 pounds of hazardous waste (Ellsworth AFB, 2020b). Ellsworth AFB utilizes two Central Accumulation Points, located at Buildings 1913 and 1908, where hazardous wastes is stored for up to 90 days until it can be shipped off site (USAF, 2019a). The location of hazardous waste sites is depicted in Figure 3.10-4.

The Ellsworth AFB *Hazardous Waste Management Plan* identifies waste generating locations and waste types, addresses proper labeling, storage, and handling of these wastes, and summarizes record keeping, emergency response, and training requirements (USAF, 2019a).

Toxic Substances

Surveys at Ellsworth have identified ACM in older buildings. Friable and nonfriable ACM in these buildings may include pipe insulation, caulk, mastic, ceiling panels, asphalt shingles, and floor tiles. The base's *Asbestos Management Plan* (USAF, 2004b) guides all activities associated with existing ACM. ACM is typically managed in-place unless demolition or renovation occurs. Unless buildings have been previously tested or have been certified that ACM is not present, all buildings undergoing renovation or demolition must be tested for the presence of ACM prior to the commencement of work.

No comprehensive base-wide survey have been conducted to determine the presence and extent of LBP on all buildings; however, a 1995 survey for LBP focused on sensitive buildings, including the Pediatrics Wing of the Base Clinic, the Youth Center, the Child Development Center, and selected units from base housing. Detected LBP was encapsulated or removed, as required. The potential for LBP also exists for all buildings constructed prior to 1978. If older buildings have not been rehabilitated (i.e., LBP has been removed or encapsulated with new paint), it is assumed that LBP is present. Ellsworth AFB's process for management of LBP is described in the *Lead Paint Hazard Management Plan* (USAF, 2004c) and comprises maintaining undamaged LBP in place, repairing damaged LBP to prevent the release of LBP dust, or abating LBP. Surveys are also conducted prior to the commencement of renovation or demolition work on any building suspected of containing LBP (USAF, 2004c).

ERP Sites

The ERP at Ellsworth AFB began on May 1985 with a base-wide records search that identified 15 potential contamination sites for further investigation. Supplemental site assessments and investigations in the later 1980s, 1990s, and 2000s have brought the total number of sites to 43. Additional investigations in the 2010s resulted in numerous additional sites being added, to bring the current total number of ERP sites to 59. These include: Former Compliance Restoration Program sites added in 2010; Military Munitions Response Program sites added in 2016; and PFOS/PFOA sites added in 2020. Many of these sites were closed with Further Action required. Current ERP sites are depicted in Figure 3.10-5.

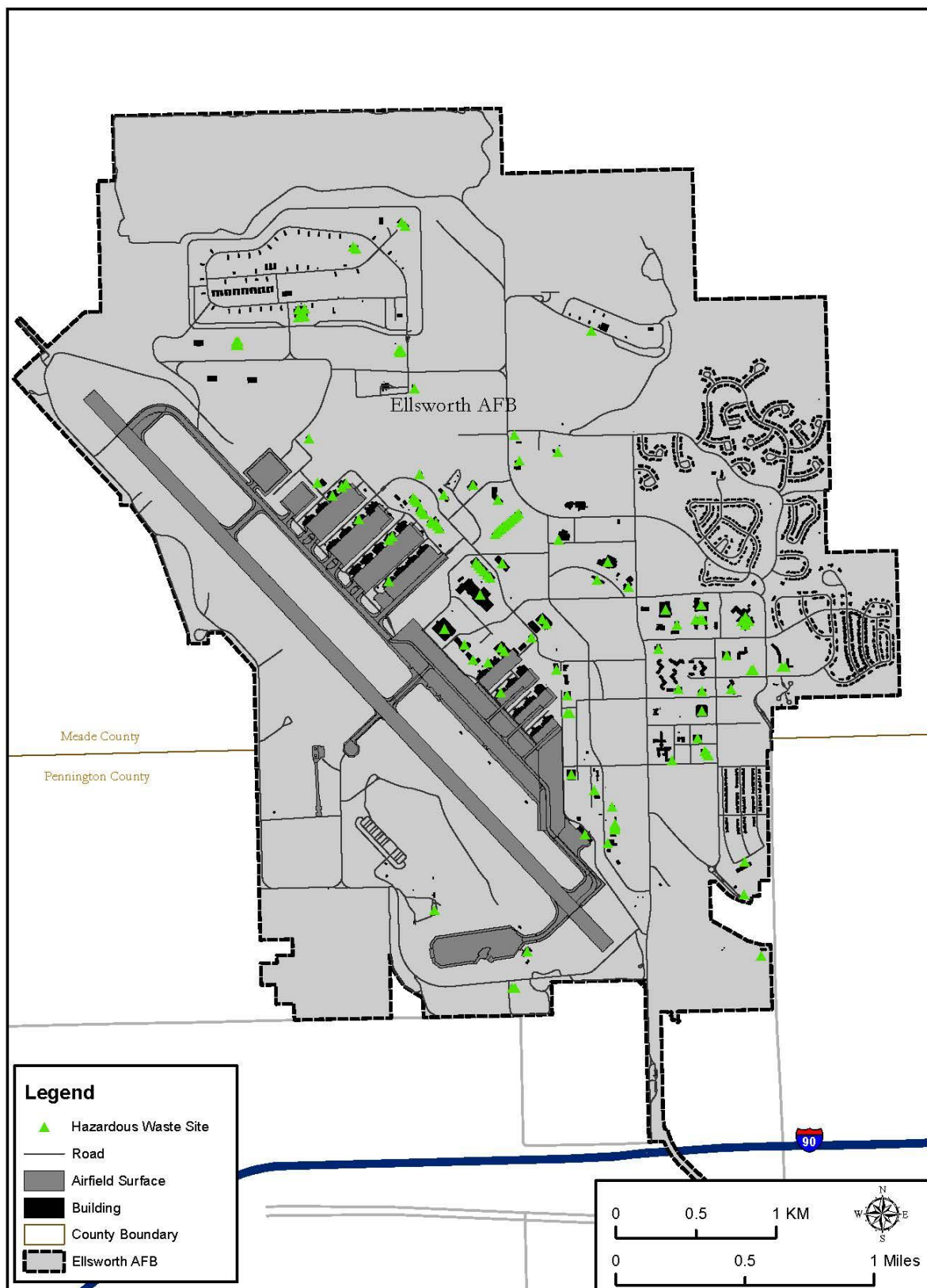


Figure 3.10-4. Hazardous Waste Sites at Ellsworth AFB

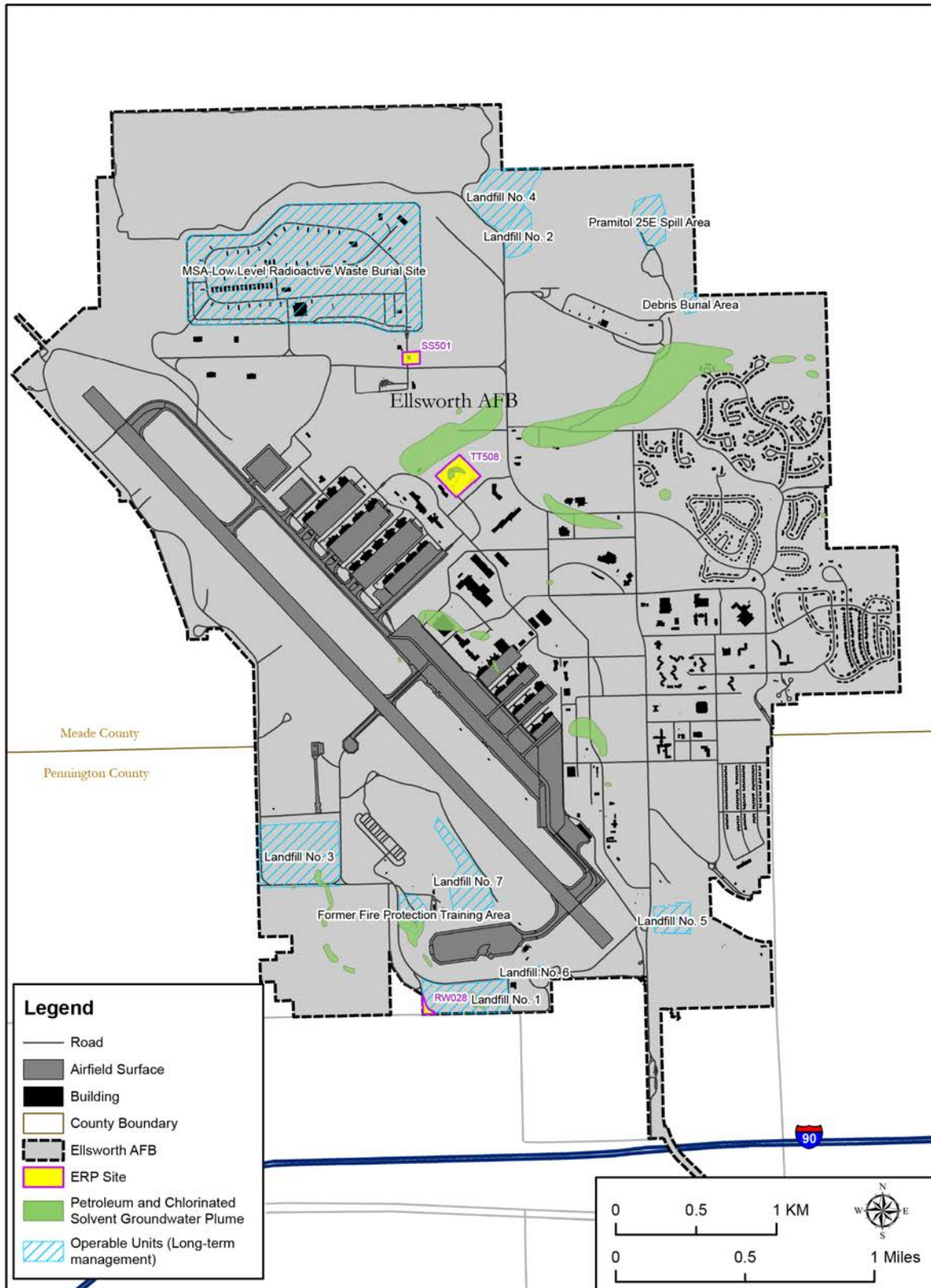


Figure 3.10-5. Open ERP Sites at Ellsworth AFB

Table 3.10-3 list sites undergoing long-term monitoring or other remedial/investigative actions. They include landfills, fire training areas, spill areas, and radioactive waste sites. Primary contaminants in soil and water include fuels, waste solvents, dissolved phase fuels and solvents, and low-level radiation waste (USAF, 2019d; USAF, 2020c).

Table 3.10-3. ERP Sites at Ellsworth AFB Undergoing Monitoring or Other Remedial/Investigative Actions

Site ID	OU Site	Description	Current Status
FT-01	OU-1	Fire Protection Training Area	A Remedial Investigation is currently underway at FT001 (OU-1) for PFCs PFOS/PFOA in soil and groundwater. A “sub-site” was opened under FT001 (FT001P-SUB) to track PFOS/PFOA phases and funding. The PFOS/PFOA sub-site of FT001 also includes the current fire training area. ¹
LF-02	OU-2	Landfills 1 and 6	Long-term Monitoring
LF-03	OU-3	Landfill 2	
LF-04	OU-4	Landfill 3	
LF-05	OU-5	Landfill 4	
LF-06	OU-6	Landfill 5	
RW-07	OU-7	Low-Level Radioactive Waste Burial Site	
SS-11	OU-8	EOD Area, Pramitol Spill	Long-term Monitoring
SS-501	N/A	Spill Site 88408	A remedial investigation was completed in 2015-2016 and in-situ chemical injections were conducted in December 2017 in accordance with the Remedial Action Work Plan. Semiannual monitoring is being conducted until site closure is achieved. ¹
ST-10	N /A	Hydrant Leaks (Pumphouses 1-5)	Pumphouses 1–4 have all received no further action letters from SDDENR and no further work is required at these areas. Pumphouse 5 has a SDDENR status of “monitoring.” Persulfate injections were conducted in 2011 at Pumphouse 5 to treat petroleum contamination in groundwater. Long-term monitoring has indicated an increasing trend in benzene and naphthalene in groundwater and SDDENR has indicated that additional work may be required. ¹
ST-17	N/A	Installation wide USTs	Long-term Monitoring
ST-19	OU-10	North Hangar Complex	
ST-23	N/A	Abandoned WWII POL System	The site consists of dissolved-phase petroleum constituents in groundwater (benzene and naphthalene) and nonaqueous phase liquid is occasionally detected and subsequently removed. The site also consists of a nearby benzene plume surrounding extraction well SDDW04. ¹
OT-20	OU-11	Base-wide Groundwater	Long-term monitoring and implementation of Remedial Action Objective ²
OW-525	N/A	Oil Water Separator 6909	A Site Assessment was completed in 2017, and SDDENR agreed to site closure with the understanding that the fuel-related

Table 3.10-3. ERP Sites at Ellsworth AFB Undergoing Monitoring or Other Remedial/Investigative Actions

Site ID	OU Site	Description	Current Status
			contamination to the east/southeast was from a different source and would be investigated. OW525 was reopened in 2019 to investigate the fuel-related contamination. ²
LF-21	OU-12	Hardfill No.1/Landfill 7	Long-term Monitoring
TT508	N/A	Fuels Area D	A remedial investigation was completed in 2015 and the recommendation from the remedial investigation was to complete in-situ chemical oxidation injections to further decrease concentrations. A Remedial Action Work Plan was prepared, and injections completed in 2018. Due to site constraint, not all contamination was accessible for injections. In 2019, SDDENR agreed to change monitoring frequency from quarterly to semiannually until site closure is achieved. ²

Source: (USAF, 2019d; USAF, 2020c)

AFB = Air Force Base; EOD = Explosive Ordnance Disposal; ERP = Environmental Restoration Program; ID = identification code; N/A = not applicable; No. = number; OU = Operable Unit; PFC = perfluorocarbon; PFOA = perfluorooctanoic acid; PFOS = perfluorooctane sulfonate; POL = petroleum, oil, and lubricant; SDDENR = South Dakota Department of Environment and Natural Resources; UST = underground storage tank

Notes:

1. Source: (Varley, 2020)

2. The Remedial Action Objectives for OT-20/OU11 are: (1) Prevent current and future human exposure to on-base groundwater with contaminants of concern exceeding South Dakota and Federal water quality standards; (2) Prevent additional groundwater containing contaminants of concern from moving off base; (3) Prevent human exposure to off-base groundwater with contaminants of concern at concentrations that pose an unacceptable risk to human health; and (4) Attain South Dakota and Federal water quality standards.

Due to onsite contamination, Ellsworth AFB was added to the National Priorities List on August 30, 1990 (EPA No. SD2571924644). In January 1992, the USAF, EPA, and SDDENR signed a Federal Facilities Agreement, which identified discrete environmental study areas that are designated as Operable Units (OUs).

Ellsworth AFB has 12 OUs, which are addressed under the ERP. Ten of the 12 identified OUs (OU-2, OU-3, OU-4, OU-5, OU-6, OU-7, OU-8, OU-9, OU-10, and OU-12) were deleted from the National Priorities List in December 2006. All clean-up activities for these sites were accomplished in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan, CERCLA guidance and policy, RCRA guidance and policy, and applicable South Dakota law. Groundwater contamination identified at these OUs, as well as OU-1 was transferred into OU-11 via an Explanation of Significant Differences. Surface soil, unsaturated subsurface soil, surface water, and sediments at OU-1 were deleted from the National Priorities List on May 25, 2012. No active remedial systems are currently operating at any of the OUs (USAF, 2019d).

Over time, the volatile organic compounds from released chlorinated solvents at the base migrated to groundwater, creating contaminant plumes that have migrated laterally with groundwater flow underneath base buildings and residences. The volatile organic compounds have the potential to migrate out of the groundwater and up through the vadose zone via diffusion, where they may accumulate under buildings. Once under the

buildings, the volatile organic compounds may migrate into the building indoor air via diffusion or direct flow through foundation cracks, utility penetrations, or other preferential pathways. The chlorinated solvent subsurface plumes associated with these sites are being remediated by in-situ reductive treatment and monitored natural attenuation (USAF, 2020d; USAF, 2019d).

A 2019 base-wide investigation for vapor intrusion at Ellsworth AFB evaluated potential hazards to building occupants from vapors associated with groundwater plumes. After a screening process that evaluated a total of 59 buildings, the investigation focused on 15 buildings identified as meeting the screening criteria. Buildings evaluated for vapor intrusion included the 28 BW Headquarters (Building 7925), Operations Group Headquarters (Building 7918), Radar Relay Facility (Building 9050), PRIDE Hangar (Building 7504), Fire Station (Building 7502), Communications Facility Land Radio Manager (Building 7235), and Child Development Center (Building 7812). The results of the investigation indicated vapor intrusion did not represent a significant exposure pathway at buildings on Ellsworth AFB. The report concluded no further base-wide investigation of vapor intrusion was warranted. The report did make two recommendations: seal any foundation cracks/utility penetrations at the PRIDE Hangar (Building 7504) and resample indoor air to verify trichloroethene concentrations at the Communications Facility (Building 7235) to ensure these were below screening levels (USAF, 2020d).

Other Ongoing Investigations

A PFOS/PFOA site inspection completed in 2018 evaluated 12 suspected areas of AFFF releases at Ellsworth AFB (Figure 3.10-6). Based on the site inspection, AFFF releases at Ellsworth AFB have resulted in PFOA and PFOS concentrations above screening levels in groundwater at AFFF Areas 1, 2, 3, 4, 5, 6, 9, 11, and 12 (9 of the 12 areas investigated). The presence of PFOS and PFOA in groundwater and a complete ingestion pathway represents a potential risk to human health. PFOS/PFOA impacted groundwater from AFFF Areas 1, 2, 3, 4, 5, 6, 9, 11, and 12 was shown to have migrated off base, posing a threat to down-gradient private drinking water wells. USAF sampling of the off-base wells confirmed the presence of PFOS and PFOA at concentrations above the EPA lifetime Health Advisory level in 24 private wells, and immediate steps were taken to provide alternate sources of safe drinking water. The groundwater ingestion exposure pathway for groundwater is incomplete for AFFF Areas 7, 8, and 10 where PFOA and PFOS concentrations were below screening levels (USACE, 2019). Table 3.10-4 presents a summary of the investigation results.

PFOA and PFOS were also detected at concentrations above screening levels in surface water at AFFF Areas 2, 10, 11, and 12. Impacted surface water discharging from Outfall #3 (AFFF Area 2) and from Outfall #5 (at the former Wastewater Treatment Plant at AFFF Area 10) impacts groundwater in communication with surface water downstream from the outfalls. There is also potential for discharge of impacted groundwater from the base to surface water (i.e., Box Elder Creek and its tributaries) based on groundwater flow to the southeast. The human ingestion exposure pathway for impacted surface water is, therefore, potentially complete via surface water to groundwater interactions (USACE, 2019).

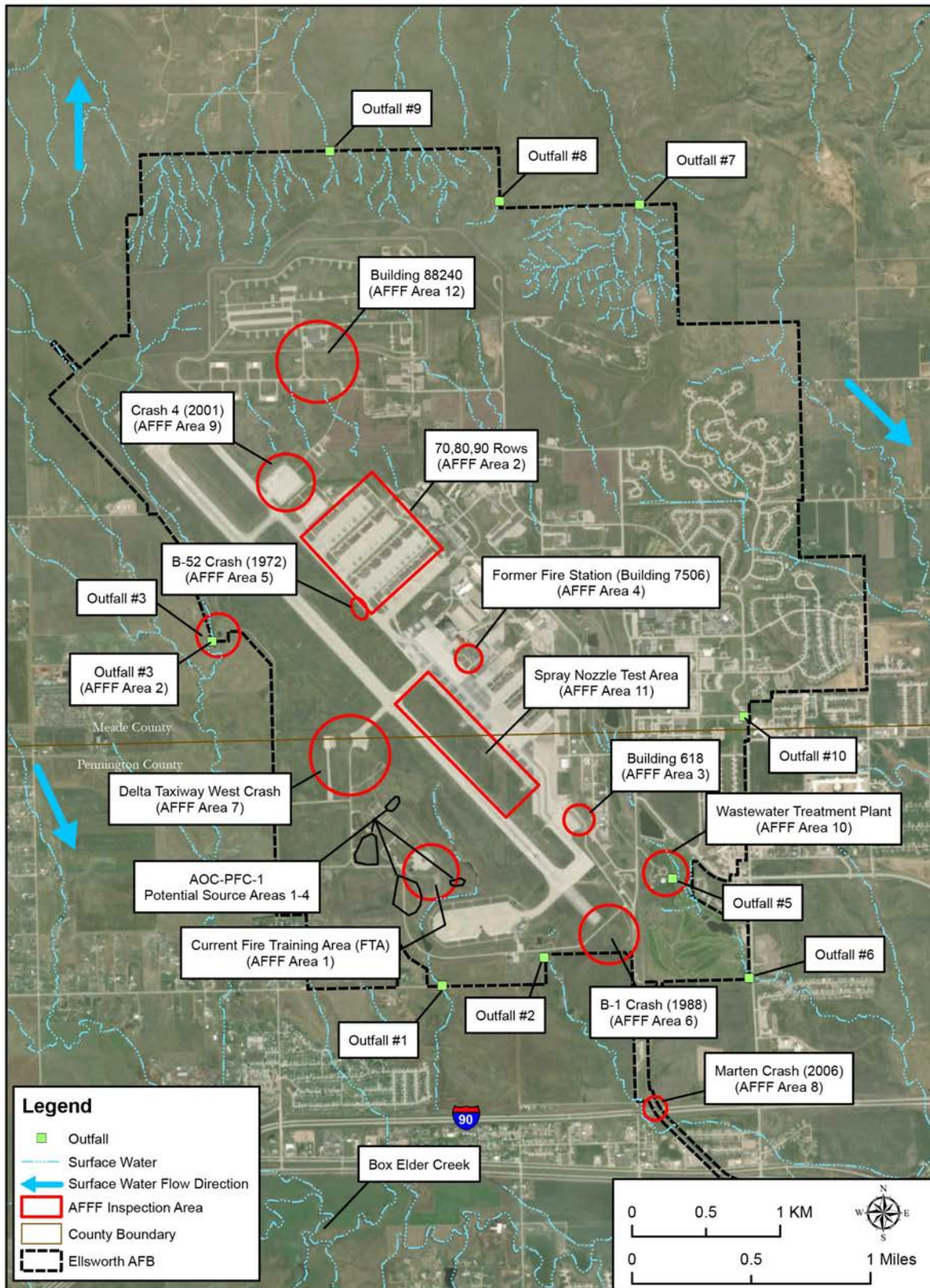


Figure 3.10-6. PFAS on Ellsworth AFB

Table 3.10-4. Summary of PFAS Investigation Results for Ellsworth AFB

Site ID	Media	Exceeds Screening Level ¹	Potentially Complete Exposure Pathway
AFFF Area 1, Current Fire Training Area ²	Surface soil	Yes	No
	Subsurface soil	Yes	No
	Groundwater	Yes	Yes
AFFF Area 2, 70, 80, 90 Rows and Outfall #3 ⁽³⁾	Surface soil	No	No
	Subsurface soil	No	No
	Groundwater	Yes	No
AFFF Area 3 (Building 618) ³	Surface soil	No	No
	Subsurface soil	-	-
	Groundwater	Yes	Yes
AFFF Area 4, Former Fire Station (Building 7506) ³	Surface soil	Yes	No
	Subsurface soil	No	No
	Groundwater	Yes	Yes
AFFF Area 5, B-52 Crash (1972) ³	Surface soil	No	No
	Subsurface soil	No	No
	Groundwater	Yes	Yes
AFFF Area 6, B-1 Crash (1988) ³	Surface soil	No	No
	Subsurface soil	No	No
	Groundwater	Yes	Yes
AFFF Area 7, Delta Taxiway West Crash (2000)	Surface soil	No	No
	Subsurface soil	No	No
	Groundwater	No	No
AFFF Area 8, Marten Crash (2006)	Surface soil	No	No
	Subsurface soil	No	No
	Groundwater	No	No
AFFF Area 9, Crash 4 (2001) ³	Surface soil	No	No
	Subsurface soil	No	No
	Groundwater	Yes	Yes
AFFF Area 10, Wastewater Treatment Plant ³	Surface soil	Yes	No
	Subsurface soil	No	Np
	Groundwater	No	No
AFFF Area 11, Spray Nozzle Test Area ³	Surface soil	No	No
	Subsurface soil	No	No
	Groundwater	Yes	Yes
Building 88240 AFFF Area 12 ⁽³⁾	Surface soil	Yes	No
	Subsurface soil	No	No
	Groundwater	Yes	Yes

Source: (USACE, 2019)

AFB = Air Force Base; AFFF = aqueous film forming foam; ID = identification number; PFAS = per- and polyfluoroalkyl substances; PFC = perfluorocarbon; PFOA = perfluorooctanoic acid; PFOS = perfluorooctane sulfonate

Notes:

1. A "Yes" indicated exceedance of any of the constituents evaluated (i.e., PFOA and PFOS). A dash (-) means no sampling was conducted.

2. A Remedial Investigation is currently underway at FT001 (OU-1) for PFCs PFOS/PFOA in soil and groundwater. A "sub-site" was opened under FT001 (FT001P-SUB) to track PFOS/PFOA phases and funding. The PFOS/PFOA sub-site of FT001 also includes the current fire training area (Varley, 2020).

3. Remedial investigations are planned for all sites listed in the table (Varley, 2020).

PFOS was also detected above residential screening levels in surface soil at AFFF Areas 1, 4, 10 and 12; in subsurface soil at Area 1; and in sediment at AFFF Area 10. Complete human ingestion exposure pathways for PFOS-impacted soil or sediment are unlikely, but impacted soil or sediment could represent a continuing source for groundwater and/or surface water impacts. These sites were recommended for further investigation to evaluate if exposure pathways are complete and to better quantify the level of ground water impacts interactions (USACE, 2019).

Solid Wastes

Solid waste data show during the 1-year period of October 2018 to September 2019, Ellsworth AFB generated approximately 1,510 tons of MSW, of which approximately 1,100 tons were disposed to the landfill (the rest was used for energy recovery or recycled). During the same period, the installation disposed of 178 tons of C&D debris to the landfill (Ellsworth AFB, 2020b).

There are no active landfills on Ellsworth AFB. Solid waste generated at the base, including C&D debris, is collected by contractors and transported to the Rapid City Sanitary Landfill, which is a 450-acre landfill that has been in operation since 1960. The Rapid City Sanitary Landfill receives approximately 450 tons per day, varying between 350 to 550 tons, of mixed solid waste. This equates to approximately 133,000 tons per year. The landfill is currently permitted to operate another 20 years; however, the landfill has access to additional land areas that could extend its life expectancy until at least 2060 (Roth, 2020).

3.10.1.2.3 Airspace and Range Utilization

Training operations at the PRTC, and the Lancer MOA, Brownwood MOA, and Pecos MOA would have no impact on the affected environment for hazardous materials, hazardous or solid wastes, or ERP sites; consequently, these are not discussed further.

3.10.1.3 Analysis Methodology

The significance of potential impacts associated with hazardous materials, constituents, substances, and wastes is based primarily on their characteristics, distribution, transportation, storage, and disposal. Factors used to assess significance include the extent or degree to which implementation of an alternative would substantially increase the human health risk or environmental exposure resulting from the storage, use, handling, transportation, or disposal of these hazardous materials, toxic substances, and hazardous wastes. A second measure of significance is whether the use, storage, or disposal of hazardous wastes is consistent with applicable federal and state requirements.

To evaluate significance related to impacts on existing ERP/contaminated sites, the location of these sites was compared with the location of proposed activities. Site-specific conditions, including the existence of LUCs, were then analyzed against proposed activities to assess whether these activities could result in health impacts to workers or releases of hazardous constituents to the environment. Additionally, significance was evaluated in terms of whether project-generated C&D debris and MSW would exceed available disposal capabilities (e.g., landfill space) or require extraordinary effort to meet applicable solid waste regulatory requirements.

3.10.2 Hazardous Materials and Hazardous and Solid Wastes, Environmental Consequences

Commonalities

The following potential environmental consequences for hazardous materials and hazardous waste management and toxic substances are common to both the Dyess AFB Alternative and Ellsworth AFB Alternative.

Hazardous Materials Management

Hazardous materials and petroleum products (e.g., paints, solvents, lubricants, fuels) would be used during construction and renovation activities. These materials would be stored in proper containers, employing secondary containment as necessary to prevent and limit accidental spills. Additionally, emergency generators with integral fuel storage tanks may be required at proposed construction sites. All spills and accidental discharges of hazardous materials or petroleum products would be reported and mitigated in accordance with installation emergency response plans and procedures for the management of hazardous materials as described previously.

Hazardous materials would also be used as part of aircraft maintenance to support aircraft operations. Many of the hazardous materials used under the Proposed Action, such as oils, lubricants, and fuels, would be the same as those currently used under existing conditions (i.e., the No Action Alternative). The primary difference between the B-1 aircraft and the B-21 is the extensive use of advanced composites and coatings in the B-21. These composites play a key role in the aircraft's operational and low observable characteristics. Fabricating or repairing composite components and applying coatings would involve the use of hazardous materials including resins, curing agents, reinforceable fibers, and coatings. Contact with these materials has been shown to potentially result in acute health effects, such as eye and skin irritation, respiratory sensitization, contact dermatitis, and conjunctivitis. Continued exposure to some of these hazardous materials may also result in chronic conditions, such as hepatotoxicity (liver toxicity) or cancer (OSHA, 2020).

Potential health hazards associated with the use of advanced composites would be controlled through the implementation established of safe work practices. These safe work practices are identified in the bases' standard operating procedures and comprise engineering controls, work practice controls, proper personal protective equipment, and administrative controls, as listed below:

- *Engineering Controls* – Isolation (e.g., isolated storage, separate process areas, closed systems) and local exhaust ventilation.
- *Work Practice Controls* – Employee training and education; proper procedures for use of process and control equipment; proper use, maintenance, and cleaning of personal protective equipment; periodic inspection and maintenance of process and control equipment; and good supervision.
- *Personal Protective Equipment* – Use of gloves, protective clothing, respirators, and eye protection.

- *Administrative Controls* – Control employee exposures by scheduling operations with the highest exposures at a time when the fewest employees are present.

Use of described safe work practices and of established or new management procedures would ensure there would be no adverse environmental impacts from the use of hazardous materials.

Hazardous Waste Management

Aircraft maintenance operations would also generate liquid and solid hazardous wastes. The total quantity of hazardous wastes generated would not be expected to significantly change under the alternatives; however, the nature of these wastes may change based on the type of hazardous materials used in composite repair operations. If any additional waste streams were to be identified as part of new maintenance procedures, the Bases would establish new IAPs at generation locations, and personnel managing these locations would be properly trained in waste management. This would include the implementation of any new applicable safe work practices (as described above). Management of hazardous wastes would be performed according to prescribed procedures already in place, and the installation-specific Hazardous Waste Management Plans would be updated as required to reflect any new procedures. The existing hazardous waste management process is adequate for the quantity and types of wastes that would be generated at both installations, and no changes to permits or hazardous waste generator status are anticipated.

Use of described safe work practices and of established or new management procedures would ensure there would be no adverse environmental impacts from the generation of hazardous wastes.

Toxic Substances

Due to their age, some of the buildings associated with proposed projects have a potential for containing ACM and LBP. Prior to any renovation or demolition activities, new building surveys would be conducted, as required, to identify if any such materials are present. Abatement of structures known to contain ACM or LBP would be conducted in accordance with federal and state regulations, including submission of applicable state notifications, use of state-certified contractors, and use of appropriate personal protective equipment. Management and disposal of any resulting ACM- or LBP-contaminated debris would be conducted in accordance with applicable regulations, including the Occupational Safety and Health Act, Toxic Substances Control Act, and NESHAP regulations. Disposal of any contaminated debris would be accompanied by a waste manifest and would only occur at an approved facility.

Implementation of these management procedures would eliminate any adverse impacts resulting from ACM and LBP. These materials would not be employed in new construction; consequently, there would be beneficial impacts from the removal of existing ACM and LBP.

Solid Waste

Construction, renovation and demolition activities associated with the Dyess AFB Alternative would generate C&D debris. Buildings would be constructed primarily of masonry and steel construction or be of a prefabricated design over a concrete slab-type foundation, while resulting debris would include wood, drywall, plastic, steel, masonry, etc. To the greatest extent possible, construction projects would incorporate Leadership in Energy and Environmental Design®, commonly referred to as LEED®, and sustainable development concepts to achieve optimum resource efficiency, sustainability, and energy conservation. MSW waste would also be generated from construction site operations (e.g., food waste, office waste, empty containers, and packaging materials). The quantity of this type of waste would be minor when compared to the volume of C&D debris expected to be generated. Construction activities at both installations would occur over multiple years and all feasible waste recycling and management measures would be implemented through enforcement of contract specifications to further minimize the quantity of C&D debris generated. Construction waste recycling and management involves the process and separation of salvaging the recoverable waste materials for recycling and reuse.

As an example, in the case of paved surfaces, debris would likely consist mostly of wooden forms that could be recycled. Also, durable modular metal form systems for use in concrete construction may be selected based on being readily demountable and reusable on other projects, thus eliminating wood waste associated with formwork fabricated of plywood and dimensional lumber. Any suitable substitute for aggregate (e.g., recovered masonry, concrete, and asphalt rubble) may be recycled into new aggregate or asphalt and would be considered during construction. Some building-related waste can also be minimized (e.g., construction products) can be selected based on its being designed and manufactured to be shipped with minimal packaging. Soil excavated during construction activities would be stockpiled for construction and landscaping uses, while woody debris from land-clearing activities could also be chipped or mulched onsite and used for landscaping. New materials, such as asphalt and concrete, would not be expected to generate significant waste because they are produced in the needed quantities and can be recycled if the material or its placement does not meet specifications. Additional MSW diversion measures, including recycling of office waste, beverage containers, cardboard, plastics, and scrap metal would further limit any potential adverse impacts on landfill capacity.

3.10.2.1 No Action Alternative Consequences

3.10.2.1.1 No Action at Dyess AFB

Under the No Action Alternative, the Proposed Action would not occur and there would be no change in the storage or use of hazardous materials or the generation of solid or hazardous wastes at Dyess AFB. Ongoing activities related to the management of ERP sites and sites impacted by PFOS/PFOA would continue. As such, implementation of the No Action Alternative would not result in significant impacts.

3.10.2.1.2 No Action at Ellsworth AFB

Under the No Action Alternative, the Proposed Action would not occur and there would be no change in the storage or use of hazardous materials or the generation of solid or hazardous wastes at Ellsworth AFB. Ongoing activities related to the management of ERP sites and sites impacted by PFOS/PFOA would continue. As such, implementation of the No Action Alternative would not result in significant impacts.

3.10.2.2 Dyess AFB Alternative

3.10.2.2.1 Personnel

Potential impacts resulting from the proposed change in the number of personnel would be associated with an increase in generation of MSW. These potential impacts are discussed in Section 3.10.2.2.4 (Hazardous Materials and Hazardous and Solid Wastes, Dyess AFB Alternative, Facilities and Infrastructure).

3.10.2.2.2 Airfield Operations

Potential impacts to hazardous materials and hazardous wastes resulting from aircraft operations would be associated with maintenance activities to support these operations. These potential impacts were discussed above, under Commonalities.

3.10.2.2.3 Airspace and Range Utilization

There would be no impacts to hazardous materials and hazardous and solid waste from airspace and range utilization associated with training operations in the PRTC, or the Lancer MOA, Brownwood MOA, or Pecos MOA, as hazardous materials would not be used or stored at these locations. Similarly, no hazardous or solid wastes would be generated.

3.10.2.2.4 Facilities and Infrastructure

Toxic Substances

Potential impacts associated with toxic substances from upgrades to facilities and infrastructure were discussed above, under Commonalities.

ERP Sites

As Figure 3.10-7 shows, the general planned areas of construction would overlap areas associated with ERP sites SD015, SD017, SD020, SD028, and OT-11. As shown in Table 3.10-5, these sites that have established LUCs that limit development to industrial uses (i.e., nonresidential). Most sites also limit groundwater use to non-potable only.

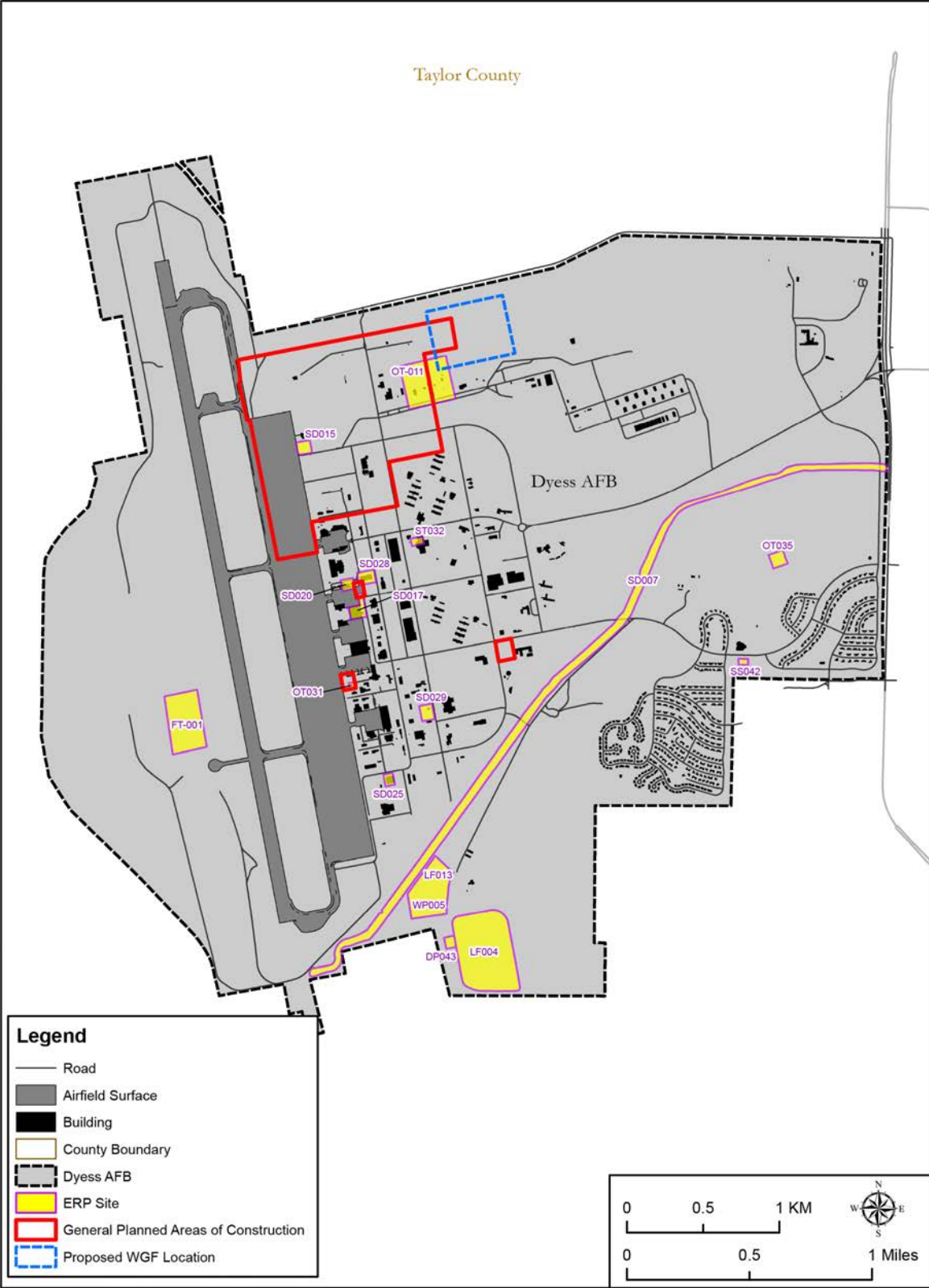


Figure 3.10-7. Overlap of Proposed Projects on ERP Sites at Dyess AFB

Table 3.10-5. Affected ERP Sites at Dyess AFB

Site	Affected Site	Remedy Components
General Planned Areas of Construction, Proposed WGF Location	OT011, DRMO-Building 9104 Waste Storage Area	LUCs requiring land use be limited to industrial development and groundwater use be limited to non-potable only
General Planned Areas of Construction	SD015, Building 4116 OWS SD017, Building 4311 OWS SD020, Building 4317 OWS	
	SD028, Building 7040 OWS	LUC requiring land use be limited to industrial; no restrictions for groundwater use

Source: (USAF, 2016c)

AFB = Air Force Base; DRMO = Defense Reutilization Marketing Office; ERP = Environmental Restoration Program; LUC = land use control; OWS = oil/water separator; WGF = Weapons Generation Facility

As part of proposed activities, these sites would be only redeveloped for industrial use and would not use groundwater for potable purposes. Also, exposure to environmental media during construction (soil, surface water, sediment, or groundwater) would be unlikely to result in adverse human health effects. Prior to any work on or near ERP sites, the Environmental Office would be notified. This would include disturbance to any existing any remediation infrastructure, such as groundwater monitoring wells. Dyess AFB would also coordinate with TCEQ, if required, regarding disturbance at existing ERP sites. As discussed in Section 3.10.1.2.1 (Hazardous Materials and Hazardous and Solid Wastes, Region of Influence, Dyess AFB), the USAF is currently investigating possible contamination at identified PFAS sites. Construction activities would avoid these sites to the greatest extent possible. Any actions at these sites would be coordinated with TCEQ and other applicable stakeholders.

Should contaminated soils need to be removed, transported, treated, and/or disposed, RCRA regulations would apply to the characterization, transportation, and disposal of this material. Additionally, prior to disturbing these sites, the potential presence of hazardous constituents would be communicated to workers. Site safety briefings that include distribution of material safety data sheets and discussion of safe work practices would be conducted to protect worker health.

With implementation of the procedures described above, there would be no significant impacts to ERP sites.

Additionally, MSW would be generated as a result of new personnel assigned to the base. As discussed in Section 3.10.1.2.1 (Hazardous Materials and Hazardous and Solid Wastes, Region of Influence, Dyess AFB), during FY19, Dyess AFB disposed to the landfill approximately 1,470 tons of MSW. This number included both MSW from industrial operations as well as from on-base residents in military family housing. Under this alternative, the total number of personnel (including dependents) would increase by approximately 39 percent (10,145 versus 14,098). As a rough approximation, it is assumed the quantity of MSW would similarly increase. This means an additional 573 tons of MSW would be generated annually, for a total of 2,043 tons. Table 3.10-6 shows total tons of MSW and C&D debris associated with this alternative. Note: Construction activities at Dyess would occur over multiple years, limiting the quantity of debris generated at any one time.

Table 3.10-6. Total Solid Waste Disposed of from the Dyess AFB Alternative

Action	Total Square Feet ¹	C&D Generation Factor ² (lb/sf)	C&D Tons
New Construction	1,192,769	4.34	2,588
Renovation	46,000	11.32	260
Demolition	71,762	158	5,669
C&D Debris Total (Tons)³			8,517
Annual MSW Total (Tons)⁴			2,043
Solid Waste Total (Tons)			10,560

AFB = Air Force Base; C&D = construction and demolition; lb = pounds; MSW = municipal solid waste; sf = square feet

Notes:

1. Total does not include square footage associated with construction of pavements, aprons, ramps, and parking areas, as construction of these are assumed not to generate significant quantities of C&D debris.
2. Source: EPA, 2003
3. Construction activities at Dyess would occur over multiple years, further limiting the quantity of debris generated at any one time.
4. Total assumes an approximate 30 percent increase over current MSW generation quantity, based on the number of additional personnel at the installation.

As the table shows, approximately 10,560 tons of solid waste would be disposed of at the Abilene Environmental Landfill. As discussed in Section 3.10.1.2.1 (Hazardous Materials and Hazardous and Solid Wastes, Region of Influence, Dyess AFB), the Abilene Environmental Landfill receives approximately 220,000 tons of mixed waste per year. The combined quantity of C&D debris and MSW generated at Dyess AFB under this alternative would represent only approximately 5 percent of average annual landfill disposal. At its current disposal capacity, the landfill is expected to remain in operation for an additional 63 years.

Implementation of appropriate waste recycling, diversion and management measures, as described in the Commonalities, would further minimize the quantity of MSW and C&D debris generated. Based on the results of the analyses, the Dyess AFB Alternative would not result in significant impacts to solid wastes or landfill capacity.

3.10.2.2.5 Weapons Generation Facility

There would be no potential impacts associated with hazardous materials, hazardous wastes, toxic substances, and solid wastes for the WGF not previously discussed under the Commonalities section. The construction footprint for the WGF would overlap areas associated with ERP Site OT-11. With implementation of the procedures described in Section 3.10.2.2.4 (Hazardous Materials and Hazardous and Solid Wastes, Dyess AFB Alternative, Facilities and Infrastructure), there would be no significant impacts to this ERP site.

3.10.2.2.6 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

There is a potential that construction sites could be impacted by PFOS/PFOA or other contaminants (e.g., fuels, solvents). If construction would require soil removal/disposal, then characterization and disposal would be conducted in accordance with USAF policy and guidance. Contaminated soils may be addressed on site or disposed of in an appropriate landfill. No other mitigation measures or additional management actions other than those described in the Commonalities section would be necessary to reduce impacts

to below significant levels for hazardous materials and hazardous and solid waste because no significant impacts are anticipated.

3.10.2.3 Ellsworth AFB Alternative (Preferred Alternative)

3.10.2.3.1 Personnel

Potential impacts resulting from the proposed change in the number of personnel would be associated with an increase in generation of MSW. These potential impacts are discussed in Section 3.10.2.3.4 (Hazardous Materials and Hazardous and Solid Wastes, Ellsworth AFB Alternative, Facilities and Infrastructure).

3.10.2.3.2 Airfield Operations

Potential impacts to hazardous materials and hazardous wastes resulting from aircraft operations would be associated with maintenance activities to support these operations. These potential impacts were discussed above, under Commonalities.

3.10.2.3.3 Airspace and Range Utilization

There would be no impacts to hazardous materials and hazardous and solid waste associated with training operations in the PRTC, as hazardous materials would not be used or stored at these locations. Similarly, no hazardous or solid wastes would be generated.

3.10.2.3.4 Facilities and Infrastructure

Toxic Substances

Potential impacts associated with toxic substances from upgrades to facilities and infrastructure were discussed above, under Commonalities.

ERP Sites

As Figure 3.10-8 shows, the general planned areas of construction would overlap areas associated with ERP site TT-508 (Fuels Area D) and FT-01/OU-1 (Fire Protection Training Area). TT-508 is located within a petroleum, oil, and lubricant area of Ellsworth AFB and has historically been used for bulk storage of jet propellant. Underground storage tanks containing diesel fuel and unleaded gasoline were also located in this area. Various investigations have identified soil and groundwater hydrocarbon contamination associated with petroleum releases from historical operations. In January 2018, in-situ chemical oxidation, using hydrogen peroxide/iron catalyst injections, was completed to address identified contaminant of concerns, which include benzene and naphthalene. Site TT-508 is currently undergoing quarterly post-injection monitoring to evaluate progress towards reducing contaminant levels in the subsurface. The current groundwater monitoring network includes 18 monitoring wells and two piezometers (USAF, 2020e).

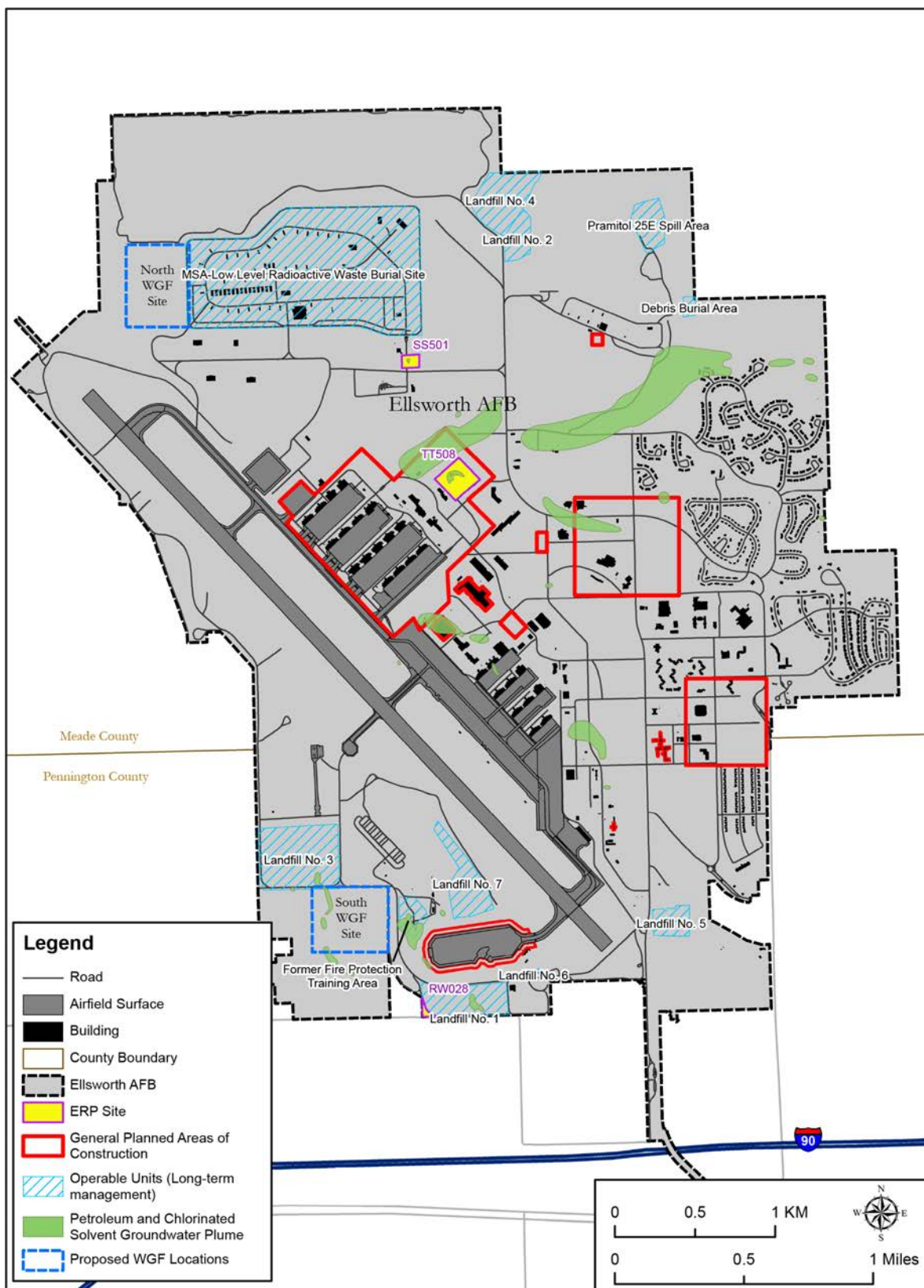


Figure 3.10-8. Overlap of Proposed Projects on ERP Sites at Ellsworth AFB

Construction for the new bridge connecting the South WGF Site to the alert apron may occur near areas associated with FT-01/OU-1. The Fire Protection Training Area occupies approximately 7 acres, has been in use since 1993, and is still used for fire training activities. All current nozzle spray testing and flushing performed by the Ellsworth AFB Fire Department occurs at this area. Although most AFFF was contained by the lined fire training pit and adjacent retention pond, some AFFF may have been released to surrounding grassed areas. As discussed in Section 3.10.1.2.2 (Hazardous Materials and Hazardous and Solid Wastes, Region of Influence, Ellsworth AFB), the USAF is currently investigating possible impacts at identified PFAS sites. Construction activities would avoid these sites to the greatest extent possible.

Additionally, prior to any work on or near ERP sites, the Environmental Office and the Air Force Civil Engineer Center Remedial Project Managers would be notified and would engage SDDENR and the EPA as needed/required. Any actions at these sites would be coordinated with SDDENR and other applicable stakeholders.

Should contaminated soils need to be removed, transported, treated, and/or disposed, RCRA regulations would apply to the characterization, transportation, and disposal of this material. Additionally, prior to disturbing the site, the potential presence of hazardous constituents would be communicated to workers. Site safety briefings that include distribution of material safety data sheets and discussion of safe work practices would be conducted to protect worker health. With implementation of the procedures described above, there would be no significant impacts to ERP sites.

Solid Waste

Construction, renovation and demolition activities associated with this alternative would generate C&D debris. Additionally, MSW would be generated as a result of new personnel assigned to the base. As discussed in Section 3.10.1.2.2 (Hazardous Materials and Hazardous and Solid Wastes, Region of Influence, Ellsworth AFB), during the 1-year period of October 2018 to September 2019, Ellsworth AFB disposed to the landfill approximately 1,100 tons of MSW. This number included MSW from industrial operations as well as from on-base residents. Under this alternative, the total number of personnel (including dependents) would increase by approximately 30 percent (see 10,596 versus 13,743). As a rough approximation, it is assumed the quantity of MSW would similarly increase. This means that an additional 330 tons of MSW would be generated annually, for a total of 1,430 tons. Table 3.10-7 shows total tons of MSW and C&D debris associated with this alternative. Note: Construction activities at Ellsworth AFB would occur over multiple years, further limiting the quantity of debris generated at any one time.

As the table shows, approximately 13,572 tons of solid waste would be disposed of at the Rapid City Sanitary Landfill. As discussed in Section 3.10.1.2.2 (Hazardous Materials and Hazardous and Solid Wastes, Region of Influence, Ellsworth AFB), the landfill receives approximately 133,000 tons of mixed waste per year. The combined quantity of C&D debris and MSW generated at Ellsworth AFB would represent approximately 10 percent of average annual landfill disposal. At its current disposal capacity, the landfill

is permitted to operate another 20 years; however, the landfill has access to additional land areas that could extend its life expectancy until at least 2060.

Implementation of appropriate waste recycling, diversion and management measures, as described in the Commonalities, would further minimize the quantity of MSW and C&D debris generated. Based on the results of the analyses, the Ellsworth AFB Alternative would not result in significant impacts to solid wastes or landfill capacity.

Table 3.10-7. Total Solid Waste Disposed of from the Ellsworth AFB Alternative

Action	Total Square Feet ¹	C&D Generation Factor ² (lb/sf)	C&D Tons
New Construction	798,664	4.34	1,733
Minor Renovation (Re-use)	647,817	4.34	1,406
Major Renovation (Add/Alter)	42,840	11.32	242
Demolition	109,632	158	8,661
C&D Debris Total (Tons)³			12,042
Annual MSW Total (Tons)⁴			1,430
Solid Waste Total (Tons)			13,572

AFB = Air Force Base; C&D = construction and demolition; lb = pound; MSW = municipal solid waste; sf = square feet

Notes:

1. Total does not include square footage associated with construction of pavements, aprons, ramps, and parking areas, as construction of these are assumed not to generate significant quantities of C&D debris.

2. Source: EPA, 2003

3. Construction activities at Dyess would occur over multiple years, further limiting the quantity of debris generated at any one time.

4. Total assumes an approximate 30 percent increase over current MSW generation quantity, based on the number of additional personnel at the installation.

3.10.2.3.5 Weapons Generation Facility

There would be no potential impacts associated with hazardous materials, hazardous wastes, toxic substances, ERP sites, and solid wastes for the North WGF Site or South WGF Site (Preferred Subalternative) Subalternatives not previously discussed under the Commonalities section or Section 3.10.2.3.4 (Hazardous Materials and Hazardous and Solid Wastes, Ellsworth AFB Alternative, Facilities and Infrastructure).

3.10.2.3.6 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

There is a potential that construction sites could be impacted by PFOS/PFOA or other contaminants (e.g., fuels, solvents). If construction would require soil removal/disposal, then characterization and disposal would be conducted in accordance with USAF policy and guidance. Contaminated soils may be addressed on site or disposed of in an appropriate landfill. No other mitigation measures or additional management actions other than those described in the Commonalities section would be necessary to reduce impacts to below significant levels for hazardous materials and hazardous and solid waste as no significant impacts are anticipated.

3.11 HEALTH AND SAFETY

3.11.1 Health and Safety, Affected Environment

3.11.1.1 Description of Resource

Health and safety considers activities, occurrences, or operations that have the potential to affect the safety, well-being, or health of members of the public. A safe environment is one in which there is no, or optimally reduced, potential for death, serious bodily injury or illness, or property damage. The primary goal is to identify and prevent potential accidents or impacts on the general public.

The health and safety resource area addresses flight safety, including the potential for aircraft mishaps. Additionally, this resource area evaluates hazards related to day-to-day operations, primarily construction activities, and considers whether associated procedures are designed to minimize hazards to workers and are completed in accordance with required safety standards. Finally, this resource area evaluates potential impacts associated with munitions storage and explosive safety and whether proposed safety buffers, known as QD arcs, would be sufficient to mitigate any explosive hazards.

A variety of USAF regulations govern the various aspects of safety. For example, policies related to flight safety include AFI 91-202, *U.S. Air Force Mishap Prevention Program*, and DoD Instruction 6055.07, *Mishap Notification, Investigation, Reporting, and Record Keeping*. These policies detail procedures for mishap prevention, notification, investigation, reporting, and record keeping. AFMAN 91-201, *Explosives Safety Standards*, addresses explosives safety and defines safety distances (i.e., QD arcs) to be maintained between explosive storage areas and other types of facilities.

Workplace safety regulations are typically addressed under the 29 CFR 1960 series, Occupational Safety and Health Administration (OSHA) standards; however, OSHA standards do not always apply to military-unique workplaces, operations, equipment, and systems. According to DoD policy, OSHA applies insofar as is possible, practicable, and consistent with military requirements. Applicable OSHA requirements are reflected in AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health* (AFOSH), and AFMAN 91-203, *Air Force Occupational Safety, Fire and Health Standards*.

Note: The health and safety analysis does not evaluate potential impacts from existing airfield CZs and APZs, as these would not change as a result of the Proposed Action (these zones delineate areas around an airfield where an aircraft mishap is most likely to happen). The B-21 would likely be smaller in size than the existing B-1, while operational profiles and number of sorties would not significantly change from current conditions; consequently, the potential for aircraft/bird strikes would also not significantly change. Therefore, the health and safety analysis does not evaluate impacts associated with bird/wildlife-aircraft strikes.

Commonalities

The following elements of health and safety are common to Dyess AFB and Ellsworth AFB.

Flight Safety and Mishap Prevention

Flight safety is based on the physical risks associated with aircraft flight. Military aircraft fly in accordance with FAA Regulations Part 91, General Operating and Flight Rules, which govern such things as operating near other aircraft, right-of-way rules, aircraft speed, and minimum safe altitudes. These rules include the use of testing and training flight areas, arrival and departure routes, and airspace restrictions as appropriate to help control air operations.

There is no generally recognized threshold of flight safety that defines acceptable or unacceptable conditions. Instead, the focus of airspace managers is to reduce risks through numerous measures. These include, but are not limited to, providing and disseminating information to airspace users, setting appropriate standards for equipment performance and maintenance, defining rules governing the use of airspace, and assigning appropriate and well-defined responsibilities to the users and managers of the airspace.

The USAF values safety and professionalism and has adopted many measures to promote aviation safety. All personnel are provided continuous safety training throughout their career with the USAF. Specifically, all USAF pilots use state-of-the-art simulators for training purposes that include all facets of flight operations and comprehensive emergency (such as mechanical failure or bird strike) response procedures that minimize the mishap risks associated with pilot error. Maintenance crews are also highly trained to perform preventative maintenance actions, maintenance repairs, diagnostic testing of the repair, and flight safety inspections on each aircraft in accordance with USAF regulations.

The primary safety concern regarding military aircraft operations is the potential for aircraft mishaps to occur. Mishaps may be caused by mid-air collisions with other aircraft or objects, weather, mechanical failures, pilot error, etc. Although mishap rates from previous years cannot predict future mishap rates, reviewing mishap historical data is helpful in providing perspective. Aircraft mishaps are categorized based on the extent of property damage, loss of life, or disability they cause. The military services define four categories of aircraft mishaps (A to D), with “Class A” mishaps defined as the most serious. Class A mishaps are classified as resulting in a total property damage of \$2 million or more, a fatality, or permanent total disability. Due to the potential for impact severity, only Class A mishaps are discussed in this section.

For in-flight emergencies, military pilots are trained take all appropriate emergency measures, including avoiding populated areas, if possible. If a mishap does occur, there are well-established emergency response procedures currently in-place. Each installation maintains emergency and mishap response plans to guide responses to

aircraft accidents. These plans assign responsibilities and prescribe functional activities necessary to react to mishaps, whether on- or off-station. Additionally, highly trained maintenance crews perform inspections on each aircraft in accordance with DoD regulations, and maintenance activities are monitored to ensure that aircraft are equipped to safely withstand the rigors of operational and training events. When these measures are implemented, risks are minimized, even though they can never be eliminated.

In the unlikely event of an aircraft emergency or mishap, installations maintain emergency and mishap response plans to guide responses to aircraft accidents. These plans assign responsibilities and prescribe functional activities necessary to react to mishaps, whether on- or off-base. Response would normally occur in two phases. The initial response focuses on rescue, evacuation, fire suppression, safety, elimination of explosive devices, securing the area, and other actions immediately necessary to prevent loss of life or further property damage. The second phase is the mishap investigation, which involves an array of organizations whose participation would be governed by the circumstances associated with the mishap and actions required to be performed (DoD, 2018c). Installations also maintain mutual aid agreements with local fire departments, which detail each party's responsibility when responding to a mishap. The installations also conduct annual training drills, where emergency personnel are instructed on proper response procedures. These drills may include participation of emergency response agencies from the local community.

After all required investigations and related actions on a mishap site are complete, the aircraft would be removed from the mishap site. Installation personnel accomplishes cleanup of the site or contracts to an outside agency to accomplish the cleanup. Overall, the purpose of response planning is to:

- Save lives, property, and material by timely and correct response to mishaps
- Quickly and accurately report mishaps to higher Headquarters
- Investigate the mishap to preclude the recurrence of the same or a similar mishap

Explosives Safety

Both installation store and maintain a range of munitions required for performance of their mission. All explosives handling operations must undergo risk assessments that analyze hazards associated with transporting, storing, disposing of, handling or firing ammunition and explosive materials. These risk assessments may range from examining the relationship between a potential explosion site and an exposed site to determine what effect one has on the other in the event of an accidental explosion, to ascertaining the worst credible event ramifications of an explosives handling mishap. All explosives storage and handling operations are documented in a site-specific Explosive Site Plan (ESP). These ESPs must contain all the information needed for the reviewer to determine if the explosives safety requirements of AFMAN 91-201 are met. ESPs may include documentation such as detailed drawings, engineering analyses, risk assessments,

commanders' risk acceptances, etc., in order to verify compliance with explosives safety requirements.

At both installations, munitions storage areas are located away from the main cantonment area. The installations have established QD arcs (i.e., safety buffers) around the munitions storage areas that limit the types of development allowed to maintain personnel safety and to minimize the potential for damage to other facilities. QD arcs are also established around the aircraft parking areas on the main ramp. Aircraft undergoing hot-pit refueling or undergoing end-of-runway or arm/de-arm operations are categorized as being in transportation mode and are exempt from QD criteria; however, separation distances to exposed sources must still be considered. For example, in their respective Master Aircraft Parking Plans, the installations may implement compensatory measures that address which buildings need to be evacuated when munitions are loaded on certain areas of the flightline.

Construction Safety

Daily operations and maintenance operations at both installations are performed in accordance with applicable USAF safety regulations, USAF technical guidance, and the standards stipulated in AFOSH requirements. Construction and demolition activities are common and have associated inherent risks such as chemical (e.g., asbestos, lead, hazardous materials) and physical (e.g., noise propagation, falling, electrocution, collisions with equipment) sources.

Companies and individuals contracted to perform construction activities on USAF installations are responsible for adhering to OSHA requirements to mitigate these hazards. Industrial hygiene programs address exposure to hazardous materials, use of personal protective equipment, and the availability and use of safety data sheets, the latter of which are also the responsibility of construction contractors to provide to workers. Federal civilian and military personnel that have a need to enter areas under construction must adhere to OSHA and AFOSH requirements, as well as applicable industrial hygiene programs. Individuals tasked to operate and maintain equipment, such as power generators, are responsible for following all applicable technical guidance, as well as adhering to established OSHA and USAF safety guidelines.

3.11.1.2 Region of Influence

The ROI for health and safety include the installation boundaries, with an emphasis on areas used for munitions storage or where construction activities would occur, as well as any adjacent off-base areas (i.e., public lands, military training areas, MOAs) that potentially would be affected by safety issues related to the Proposed Action.

3.11.1.2.1 Dyess AFB

Flight Safety and Mishap Prevention

Dyess AFB has been operating the B-1 bomber aircraft for over 30 years, and there have been three Class A mishaps associated with Dyess AFB aircraft. One mishap involved a collision with a pelican, one involved a short circuit in the aircraft's electrical system, and one was due to pilot error. As discussed under the common elements, the USAF implements numerous procedures to minimize the potential for aircraft mishaps and has implemented procedures for emergency response in case a mishap does occur.

Explosives Safety

At Dyess AFB, the existing munitions storage area is located on the northeast portion of the installation as shown in see Figure 3.11-1. QD arcs are also established around the aircraft parking areas on the main ramp. As discussed under Commonalities, all munitions are handled and stored in accordance with USAF explosive safety directives and all munitions maintenance is carried out by trained, qualified personnel using USAF-approved technical procedures.

3.11.1.2.2 Ellsworth AFB

Flight Safety and Mishap Prevention

There have been five Class A mishaps associated with Ellsworth AFB B-1 bomber aircraft. The first occurred in November 1988 when the aircraft crashed while landing at the base. A USAF investigation concluded that the pilots lost track of altitude because of weather conditions. Four subsequent mishaps have occurred with the last one happening in August 2013. Two of these occurred while the aircraft was training overseas. The cause of these mishaps have included pilot error, mechanical failure, or the cause could not be determined. As discussed under the common elements, the USAF implements numerous procedures to minimize the potential for aircraft mishaps and has implemented procedures for emergency response in case a mishap does occur.

Explosives Safety

Explosives safety QD arcs are implemented for the munitions storage area, located on the northern portion of the installation, that extend outwards for several hundred feet (see Figure 3.11-2). QD arcs are also established around the aircraft parking areas and hangars, as well as around areas of the airfield where aircraft may be temporarily parked. As discussed under the common elements, all munitions are handled and stored in accordance with USAF explosive safety directives and all munitions maintenance is carried out by trained, qualified personnel using USAF-approved technical procedures.

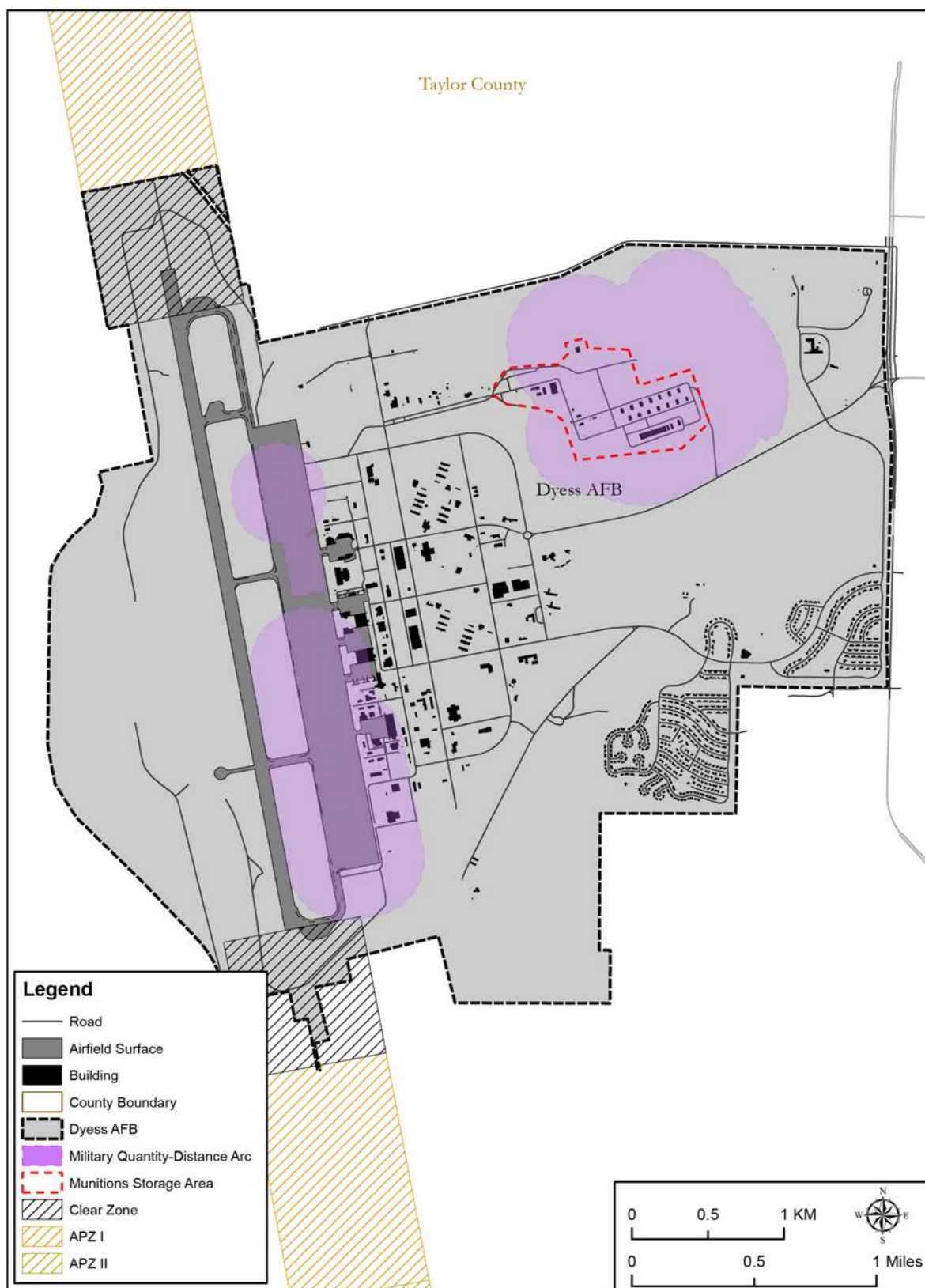


Figure 3.11-1. Established Quantity-Distance Arcs at Dyess AFB

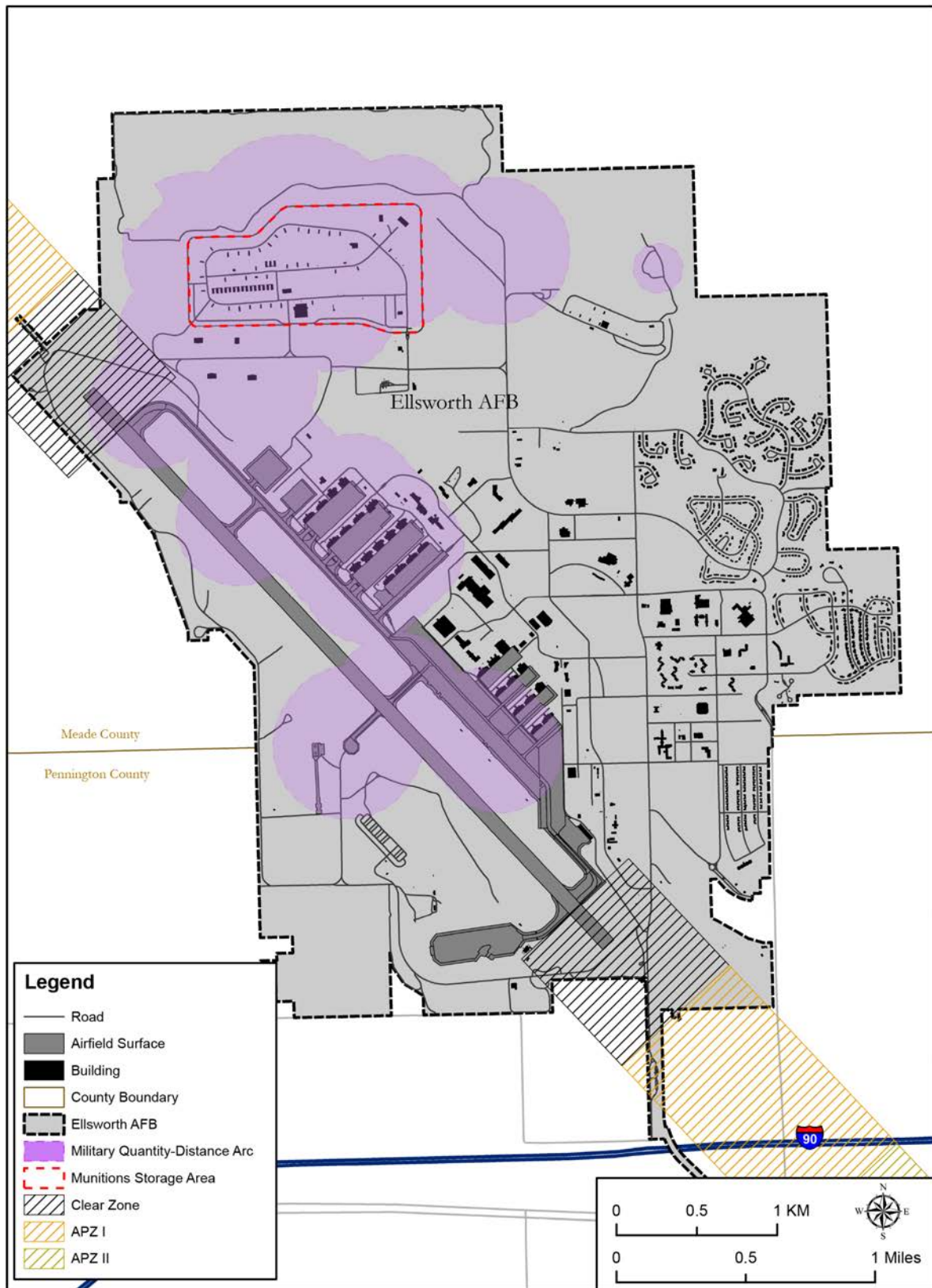


Figure 3.11-2. Established Quantity-Distance Arcs at Ellsworth AFB

3.11.1.2.3 Airspace and Range Utilization

The affected environment for flight safety and mishap risks would be the same as under those discussed for Dyess AFB for Lancer, Brownwood, and Pecos MOAs and Ellsworth AFB for the PRTC. Airspace and range utilization would have no impact on the affected environment for explosive or construction safety; consequently, these are not discussed further.

3.11.1.3 Analysis Methodology

In the analyses, issues that have a potential to affect safety are evaluated relative to the degree to which the activity increases or decreases safety risks to military personnel, the public, and property. For example, the analyses evaluate whether buildings would fall within munitions safety buffers (i.e., QD arcs). Likewise, the potential for a change in the number of aircraft Class A mishaps from flight operations are evaluated by comparing aircraft types and sorties against aircraft-specific aircraft mishap rates.

3.11.2 Health and Safety, Environmental Consequences

Commonalities

The following potential environmental consequences for health and safety are common to the Dyess AFB Alternative and Ellsworth AFB Alternative.

Flight Safety and Mishap Prevention

The USAF calculates Class A mishap rates for each type of aircraft in the inventory. Mishap rates are computed based on the number of mishaps per 100,000 flying hours. (Note: Combat losses due to enemy action are excluded from mishap statistics.) The B-21 has not yet entered service. From an operational and design standpoint, the B-21 would most closely align with the existing B-2 “Spirit” stealth bomber. That is, the B-21 would likely employ operational profiles not unlike the B-2’s, though, overall dimensions appear to indicate a smaller overall bomber form when compared to the B-2. Because this would be a new aircraft, mishap rates are not available; consequently, historical mishap rates for the B-2A are used in the analysis.

Through 2019, the B-2 logged a total of 142,944 flying hours (it began flying operations in 1990) with only a single recorded Class A mishap. This equates to a lifetime mishap rate of 0.7 or approximately one mishap approximately every 143,000 flying hours (USAF, 2020f). Proposed air operations at both installations would comprise 94.5 sorties per month (1,134 sorties per year). With an estimated sortie length of approximately 2 hours, this would equate to 2,268 hours of annual operations. Using the historical B-2 mishap rate of 0.7, this would mean that, statistically, a mishap could occur approximately every 63 years.

This analysis makes only a statistical prediction regarding the frequency of mishaps and may not represent real-world conditions. Current aircraft flight safety policies and procedures (as described in Section 3.11.1.1, Health and Safety, Description of Resource) are designed to ensure that the potential for aircraft mishaps is reduced to the lowest possible level. These safety policies and procedures would continue under this alternative. If a mishap was to occur, there are well-established procedures for responding to aircraft mishaps on USAF and non-USAF property (see Section 3.11.1.1, Health and Safety, Description of Resource, for more information).

As discussed in Section 3.10.2 (Hazardous Materials and Hazardous and Solid Wastes, Environmental Consequences), the B-21 is primarily comprised of advanced composite materials. When these materials burn, as may be the case in a mishap-related fire, they may give off fumes containing toxic constituents; consequently, appropriate personal protective equipment, such as adequate respirators, would be required by response personnel. Note: Health and safety impacts related to the use of composite materials are discussed in Section 3.10.2 (Hazardous Materials and Hazardous and Solid Wastes, Environmental Consequences, Commonalities).

During mishap prevention training, the USAF would communicate any requirements to local fire department personnel regarding the need for specific response procedures and/or protective equipment. Any such requirements would also be implemented (as necessary) when removing and disposing of any mishap-related debris or associated contaminated soils. No significant impacts to flight safety would occur with continued implementation of established and new mishaps prevention procedures.

Construction Safety

Companies and individuals contracted to perform construction activities on USAF installations would be responsible for adhering to OSHA requirements to mitigate all hazards. Industrial hygiene programs would be implemented to address exposure to hazardous materials, use of personal protective equipment, and the availability and use of safety data sheets. Federal civilian and military personnel that have a need to enter areas under construction would adhere to OSHA and AFOSH requirements, as well as applicable industrial hygiene programs. Individuals tasked to operate and maintain equipment, such as power generators, would be responsible for following all applicable technical guidance, as well as adhering to established OSHA and USAF safety guidelines. All actions would be accomplished by technically qualified personnel and would be conducted in accordance with applicable USAF safety requirements, approved technical data, and AFOSH standards; consequently, no significant impacts would occur.

3.11.2.1 No Action Alternative Consequences

3.11.2.1.1 No Action at Dyess AFB

Under the No Action Alternative, Dyess AFB would continue current operations using the B-1 aircraft. All actions would be accomplished by technically qualified personnel and would be conducted in accordance with applicable USAF safety requirements, approved technical data, and AFOSH standards; consequently, no significant impacts would occur.

3.11.2.1.2 No Action at Ellsworth AFB

Under the No Action Alternative, Ellsworth AFB would continue current operations using the B-1 aircraft. All actions would be accomplished by technically qualified personnel and would be conducted in accordance with applicable USAF safety requirements, approved technical data, and AFOSH standards; consequently, no significant impacts would occur.

3.11.2.2 Dyess AFB Alternative

3.11.2.2.1 Personnel

There would be no unique operations (e.g., use of extremely hazardous substances) posing specific health and safety impacts to new personnel from implementation of this alternative. All actions would be accomplished by technically qualified personnel and would be conducted in accordance with applicable USAF safety requirements, approved technical data, and AFOSH standards.

3.11.2.2.2 Airfield Operations

Potential impacts to health and safety from air operations at all locations would be associated with flight safety and mishap prevention. These potential impacts were previously discussed under the Commonalities section (Section 3.11.2, Health and Safety, Environmental Consequences).

3.11.2.2.3 Airspace and Range Utilization

There would be no unique health and safety impacts related to airspace and range utilization at the PRTC, or the Lancer MOA, Brownwood MOA, or Pecos MOA from implementation of this alternative. Potential impacts related to flight operations were previously discussed under the Commonalities section (Section 3.11.2, Health and Safety, Environmental Consequences).

3.11.2.2.4 Facilities and Infrastructure

Explosives Safety

Under this alternative, QD arcs for aircraft parking would move from the south end of the parking apron to the north end. Additionally, general planned areas of construction located near the center and north portions of the flightline would fall within existing QD arcs (Figure 3.11-3).

Proposed structures in these areas would undergo an explosive safety review to ensure occupancy and land uses would be compatible with these locations. Based on that review, Dyess AFB may implement compensatory measures, such as identifying which buildings need to be evacuated when munitions are loaded on certain areas of the flightline. As part of this process, existing explosive safety plans (e.g., ESPs or Aircraft Parking Plans) would be updated accordingly. With implementation of these measures, there would be no adverse impacts related to explosive safety.

3.11.2.2.5 Weapons Generation Facility

Explosives Safety

The footprint for the WGF would fall within the existing QD arcs at the munitions storage area. It would also overlap a portion of the northernmost planned area of construction (Figure 3.11-3). The WGF would be used to maintain nuclear ordnance carried on the B-21. This ordnance contains nuclear components as well as components employing small quantities of conventional explosives. These facilities have been used to support the USAF's nuclear program throughout its history. The WGF would be purpose-built to ensure that nuclear material and conventional explosives would be stored separately. Additionally, building design (i.e., reinforced concrete construction, interior layout, blast resistant walls), combined with dedicated explosive safety and fire suppression systems, would eliminate any risk to the public. The facility would also be subject to the ESP process to ensure that appropriate QD arcs are established and adjoining land uses are compatible; consequently, there would be no adverse impacts related to explosives safety.

3.11.2.2.6 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

No mitigations would be necessary to implement the Dyess AFB Alternative.

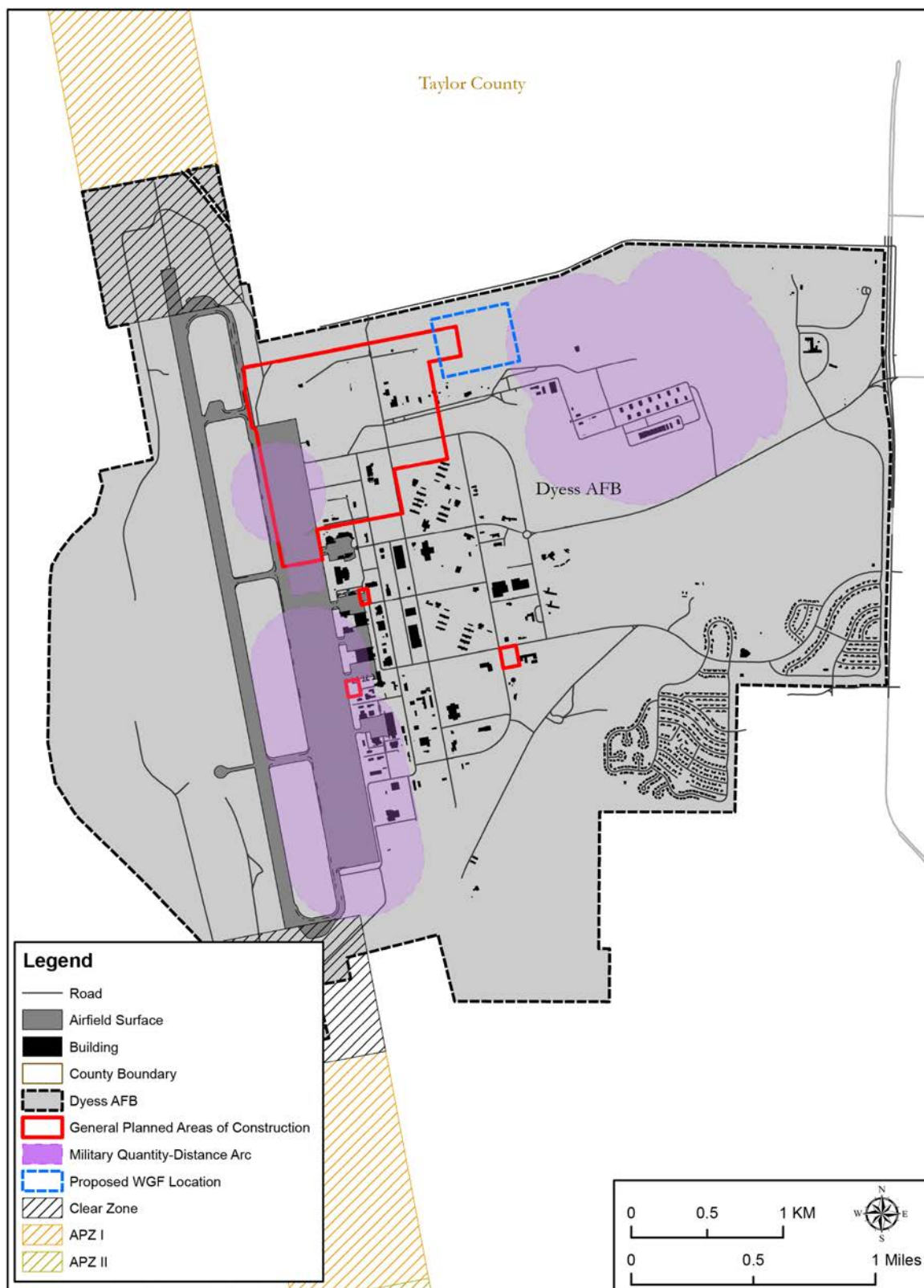


Figure 3.11-3. Quantity-Distance Arcs and Proposed Construction at Dyess AFB

3.11.2.3 Ellsworth AFB Alternative (Preferred Alternative)

3.11.2.3.1 Personnel

There would be no unique operations (e.g., use of extremely hazardous substances) posing specific health and safety impacts to new personnel from implementation of this alternative. All actions would be accomplished by technically qualified personnel and would be conducted in accordance with applicable USAF safety requirements, approved technical data, and AFOSH standards.

3.11.2.3.2 Airfield Operations

Potential impacts to health and safety from air operations at all locations would be associated with flight safety and mishap prevention. These potential impacts were previously discussed under the Commonalities section (Section 3.11.2, Health and Safety, Environmental Consequences).

3.11.2.3.3 Airspace and Range Utilization

There would be no unique health and safety impacts related to training at the PRTC from implementation of this alternative. Potential impacts related to flight operations were previously discussed under the Commonalities section (Section 3.11.2, Health and Safety, Environmental Consequences).

3.11.2.3.4 Facilities and Infrastructure

Explosives Safety

General planned areas of construction would be located within existing QD arcs at munitions storage area, near the center the flightline, and near the south end of the runway (Figure 3.11-4). Proposed structures in these areas would undergo an explosives safety review to ensure occupancy and land uses would be compatible with these locations. Based on that review, Ellsworth AFB may implement compensatory measures, such as identifying which buildings need to be evacuated when munitions are loaded on certain areas of the flightline. As part of this process, existing explosives safety plans (e.g., ESPs or Aircraft Parking Plans) would be updated accordingly. With implementation of these measures, there would be no adverse impacts related to explosives safety.

3.11.2.3.5 Weapons Generation Facility

Explosives Safety

The footprint for the North WGF Site Subalternative would fall within existing QD arcs (Figure 3.11-4). Regardless of the subalternative selected, the WGF would be purpose-built to store B-21 ordnance and would employ dedicated explosives safety and fire suppression systems to eliminate any risk to the public. The facility would also be subject to the ESP process to ensure that appropriate QD arcs are established and adjoining land uses are compatible; consequently, there would be no adverse impacts related to explosives safety.

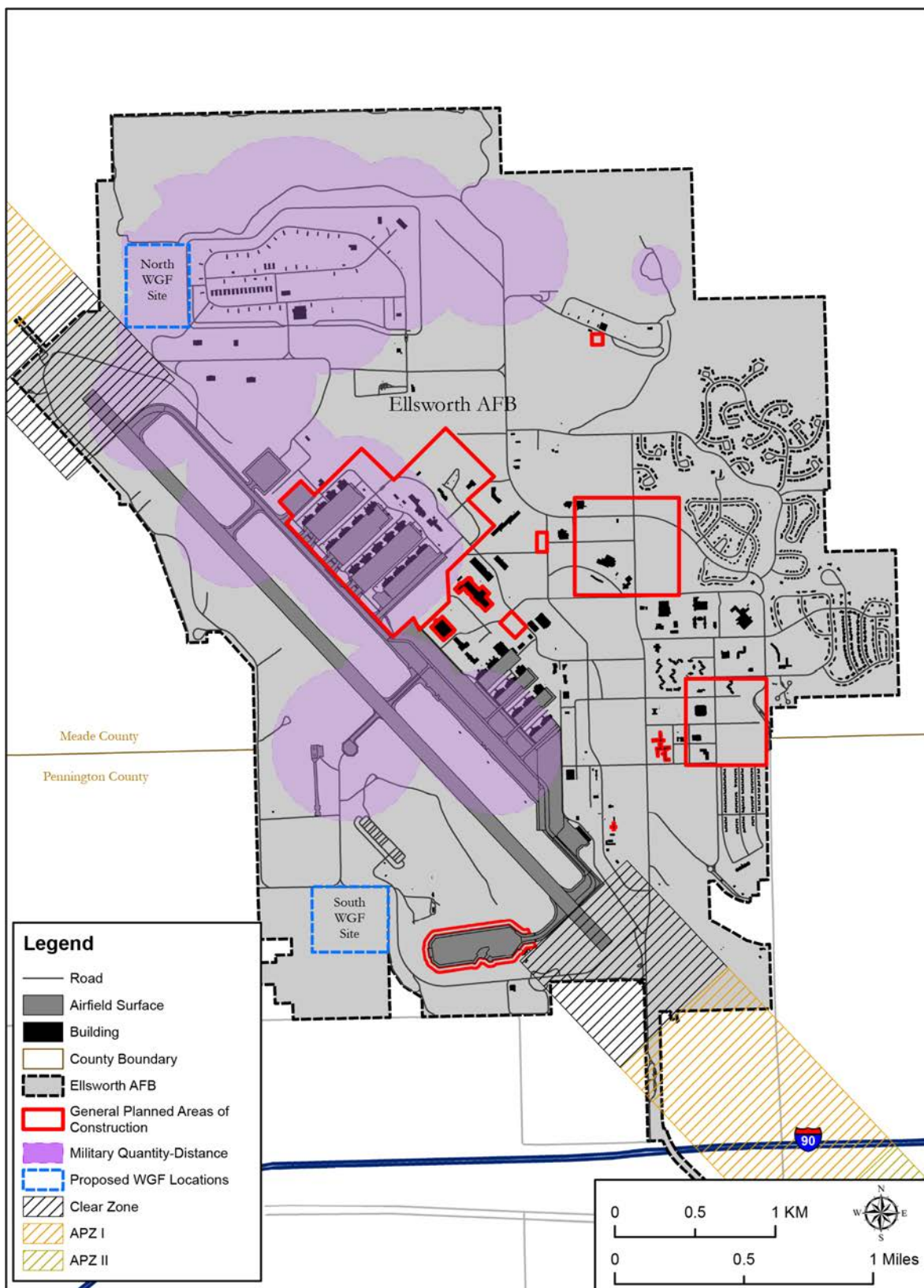


Figure 3.11-4. Quantity-Distance Arcs and Proposed Construction at Ellsworth AFB

3.11.2.3.6 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

No mitigations would be necessary to implement the Ellsworth AFB Alternative.

3.12 TRANSPORTATION

3.12.1 Transportation, Affected Environment

3.12.1.1 Description of Resource

Transportation resources consist of the infrastructure components required for movement of people, materials, and goods. In this EIS, transportation infrastructure refers to the public roadways and associated features (e.g., intersections, roundabouts, entry/exit points) that provide access to Dyess AFB or Ellsworth AFB, as well as the road network and associated features within the boundaries of Dyess and Ellsworth AFBs. Transportation may be evaluated qualitatively and quantitatively. Qualitative descriptors refer to travel conditions as they are perceived by travelers using the transportation system and may include factors such as perceived congestion, ease of use, comfort level, and safety concerns. Quantitative descriptors include measures such as average or peak traffic volume of a roadway segment and delay time measured in seconds.

Volume-to-capacity ratio and level of service (LOS) are two commonly used quantitative or semi-quantitative indicators of transportation efficiency. Volume refers to the actual number of vehicles passing a point on a roadway during a specified time period. Capacity is the maximum number of vehicles that can reasonably be expected to traverse a point during a given time period. LOS is a measure used to indicate the efficiency or ease at which a roadway or other transportation component is operating from the perspective of a traveler.

LOS may be determined for flowing roadway traffic, intersections, and other components such as roadway merge and exit points. Typically, six levels are defined and assigned a letter designation from A to F, with LOS A representing the best operating conditions and LOS F representing the worst. LOS for roadway segments is a measure of operational conditions in terms of travel time, speed, delay, and freedom to maneuver within the traffic stream. LOS A typically represents optimal free-flow conditions where individual users are virtually unaffected by others in the traffic stream, while LOS F represents forced-flow or breakdown conditions where traffic volume exceeds the roadway capacity. Qualitative and quantitative indicators used to define LOS designations typically differ among various roadway types (freeways, multi-lane highways, secondary roads, etc.).

LOS at intersections is typically determined by the delay time experienced at the intersection and may also incorporate other factors such as the ability to traverse an intersection in one traffic signal cycle. Intersection LOS is influenced by factors such as peak hour traffic volume, traffic composition (e.g., percent commercial vehicles), roadway configuration (e.g., number of travel lanes and turn lanes), and signal timing. The federal

Highway Capacity Manual defines LOS for signalized and unsignalized intersections as shown in Table 3.12-1.

Table 3.12-1. Level of Service Designations for Intersections

Level of Service	Average Vehicle Delay (signalized intersection)	Average Vehicle Delay (unsignalized intersection)
A	Less than 10 seconds	Less than 10 seconds
B	10–20 seconds	10–15 seconds
C	20–35 seconds	15–25 seconds
D	35–55 seconds	25–35 seconds
E	55–80 seconds	35–50 seconds
F	Greater than 80 seconds	Greater than 50 seconds

Source: (Dyess AFB, 2018e)

Regional transportation planning entities may designate minimum acceptable LOS standards based on operational conditions such as the type of roadway, time of day (peak versus non-peak traffic), and setting (urban versus rural). Standards are typically designated for the design year, which is defined as 20 years after construction completion. Desirable and minimum LOS standards identified by the states of Texas and South Dakota are provided in Table 3.12-2 and Table 3.12-3.

Table 3.12-2. Traffic Level of Service Standards in Texas

Transportation Component	Minimum Acceptable Level of Service
Urban Streets and Auxiliary Facilities	B
Urban Streets in Heavily Developed Areas	D
Multi-lane Rural Highways and Auxiliary Facilities	B
Urban Freeways	C
Urban Freeways in Heavily Developed Areas	D
Rural Freeways	B
Rural Freeways - Auxiliary Facilities	C

Source: (Texas DOT, 2018)

Table 3.12-3. Traffic Level of Service Standards in South Dakota

Transportation Component	Level of Service			
	Rural – Level or Rolling Terrain	Rural – Mountainous Terrain	Urban	
			Desirable	Minimum
Freeways and Auxiliary Facilities	B	C	B	C
Principal Arterial ¹	B	C	C	D
Minor Arterial ¹	B	C	C	D
Collector ²	C	D	C	D

Source: (South Dakota DOT, 2018)

Notes:

1. Arterials are multi-lane roads, such as freeways and highways, which connect major urban areas.
2. Collectors are single- or multi-lane roads that connect local roads with arterials.

3.12.1.2 Region of Influence

The ROI for transportation consists of the local roadway network within the boundaries of alternative MOB 1 locations (Dyess AFB and Ellsworth AFB), as well as the surrounding

regional roadway network providing access to the MOB or otherwise potentially affected by the Proposed Action. Air operations and airspace and range utilization would not affect transportation at the PRTC or the Brownwood, Lancer, or Pecos MOAs. Therefore, these training and operating areas are not carried forward in the Transportation section.

3.12.1.2.1 Dyess AFB

Vehicular traffic patterns on Dyess AFB primarily radiate off Arnold Boulevard, which becomes Avenue B at the intersection with 5th Avenue (Dyess AFB, 2018b). Arnold Boulevard/Avenue B supports a large portion of the on-base traffic volume, as most vehicles enter and exit the installation via this roadway. Secondary and tertiary roads serve the remainder of the installation. The most frequently used are 2nd Street, 3rd Street, and 4th Street, which intersect with Avenue B and run approximately north-south through most of the developed portion of the base. Avenue C, Avenue D, and Avenue E run parallel to and south of Avenue B.

Overall, the road system on Dyess AFB is considered to function adequately and to efficiently connect all areas of the installation (Dyess AFB, 2018b). However, congestion is noted on Arnold Boulevard during peak morning hours, where vehicles entering the base may back up due to main gate capacity (Dyess AFB, 2014; Dyess AFB, 2018d). Military Drive connects Arnold Boulevard to the Tye gate on the north side of the installation and extends into the city of Tye, where it becomes Air Base Road. Commercial traffic is intended to access the base through the north gate via Arnold Boulevard and Military Drive, although commercial vehicles sometimes use Air Base Road instead (Dyess AFB, 2018d). The road network on and immediately adjacent to Dyess AFB is shown on Figure 3.12-1.

A traffic engineering study conducted on Dyess AFB analyzed conditions at 15 intersections under existing and potential future operations (Dyess AFB, 2018e). The study evaluated LOS, which included qualitative (e.g., congestion) and quantitative (delays measured in seconds per vehicle) factors. Under existing conditions, LOS was considered adequate (level C or better) for 11 of the intersections and poor for one or more components of the remaining intersections. Intersections with inadequate LOS are identified in Table 3.12-4. The study notes that traffic volume is relatively low at the intersections with poor service levels, and that signal light installation is therefore not warranted. However, roundabouts were recommended at two locations: Avenue B/3rd Street and Avenue D/5th Street.

Table 3.12-4. Inadequate Intersection Level of Service on Dyess AFB

Intersection	Inadequate Component	Level of Service
Avenue B and 3rd Street	Southbound through movement/right turn, morning peak and mid-day	D
Avenue B and 4th Street	Northbound and southbound left turn during morning peak	D
Avenue D and 4th Street	Northbound and southbound left turn, southbound through movement/right turn, during morning peak	E (northbound left) F (southbound left) D (southbound through/right)
Avenue D and 5th Street	Southbound left turn during afternoon peak	F

Source: (Dyess AFB, 2018e)

AFB = Air Force Base

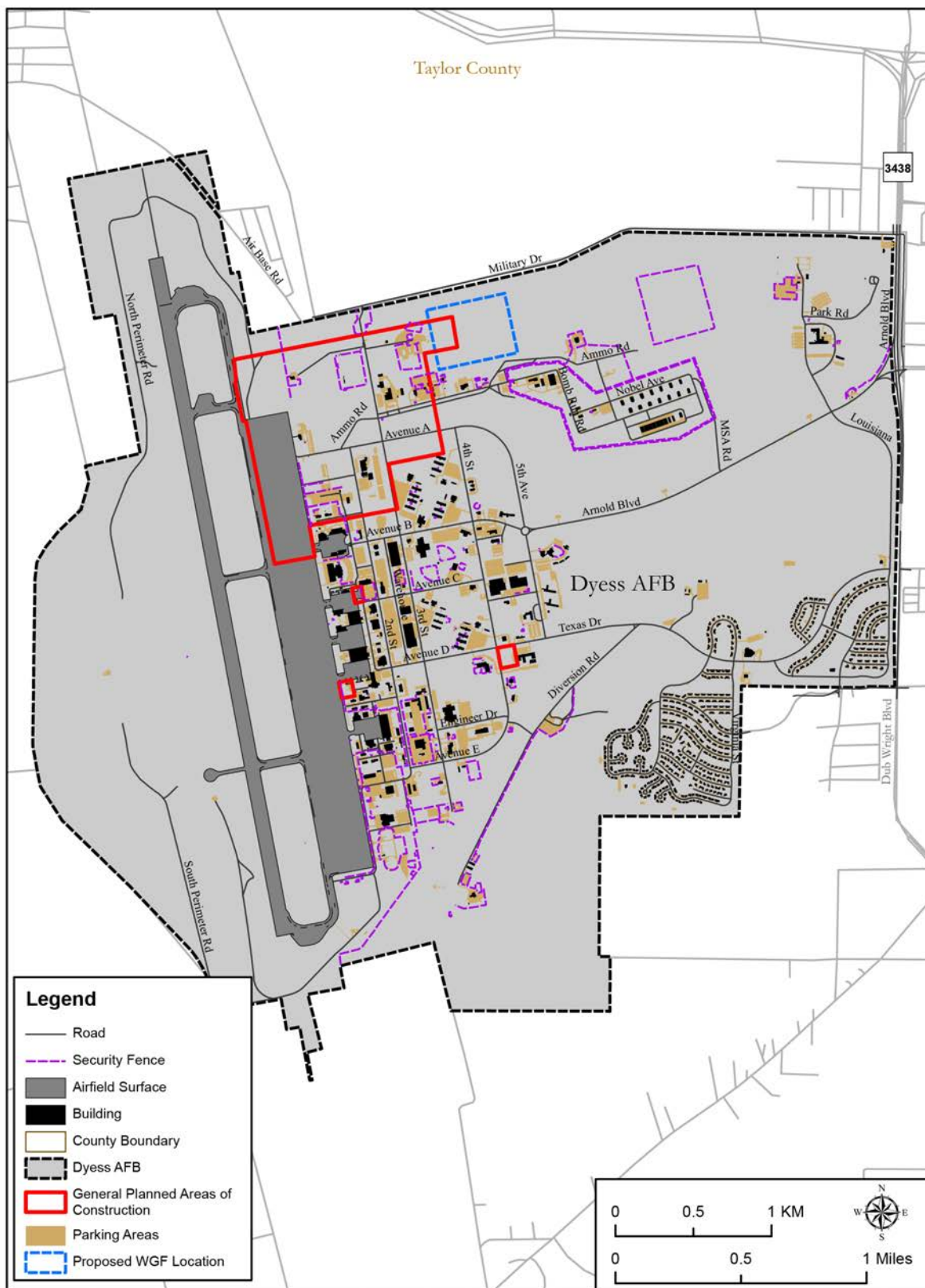


Figure 3.12-1. Road Network on Dyess AFB

U.S. Interstate 20 (I-20) is the major off-base traffic artery in the Abilene area near Dyess AFB. Other U.S. highways in the vicinity include U.S. Highway (US-) 83/84 and US-277. Dub Wright Boulevard, a four-lane north-south road, provides base access from 7th Street and numerous other roadways to the east of Dyess AFB. An off-base encroachment report prepared in 2014 concluded that these roads provide adequate capacity and are generally not considered congested (Dyess AFB, 2014). However, another study identified several roadway segments in the vicinity of Dyess AFB, including segments of I-20, US-83/84, US-277, and Arnold Boulevard/Dub Wright Boulevard, as experiencing substantial congestion at various days and times (Abilene Metropolitan Planning Organization, 2015). Population growth and associated retail commercial development in southwest Abilene has resulted in traffic congestion in this area, particularly along Southwest Drive near US-83/84 (Abilene Metropolitan Planning Organization, 2010). An off-base privatized military housing area (Quail Hollow Family Housing) was established slightly west of this highly developed area, near the intersection of US-277 and Rebecca Lane. Farm-to-Market Road 707, which connects Tye and Caps, lies immediately west of the base. The road network in the region near Dyess AFB is shown on Figure 3.12-2. Estimated average daily traffic counts for roads in the vicinity of Dyess AFB are shown in Table 3.12-5.

Table 3.12-5. Approximate Average Daily Traffic Count Near Dyess AFB

Road/Road Segment	Approximate Average Traffic Count (vehicles per day)
I-20 west of Dyess AFB	25,000
I-20 near the city of Tye	29,000
I-20 east of U.S. Highway 84 interchange	21,000
U.S. Highway 84 near I-20	12,000
Farm-to-Market Road 707	2,000
Texas Avenue	13,000
Arnold Boulevard north of Dyess AFB entrance	8,000
Dub Wright Boulevard	13,000

Source: (Texas DOT, 2016; Texas DOT, 2020)

AFB = Air Force Base; I-20 = U.S. Interstate 20; U.S. = United States

3.12.1.2.2 Ellsworth AFB

The primary entrance onto Ellsworth AFB is through the Liberty (Main) Gate. Liberty Boulevard serves as the principal route for traffic moving between Liberty Gate and I-90 to the south (Ellsworth AFB, 2011). Secondary gates include the Bismarck (Commercial) Gate, which is accessed from Ellsworth Street, and the Patriot Gate, which is accessed from North Ellsworth Road. The primary vehicular routes on the installation include Ellsworth Street, North Ellsworth Road, Lemay Boulevard, and Schriever Street. Secondary roads such as Ohio Avenue, Washington Avenue, and Scott Drive provide access to on-base housing. Traffic capacity is considered adequate. The installation generally does not experience traffic congestion, even during periods of peak operation. Potential short-, mid-, and long-range projects associated with the base's transportation network development plan are identified in the IDP (Ellsworth AFB, 2017). The road network on and immediately adjacent to Ellsworth AFB is shown on Figure 3.12-3.

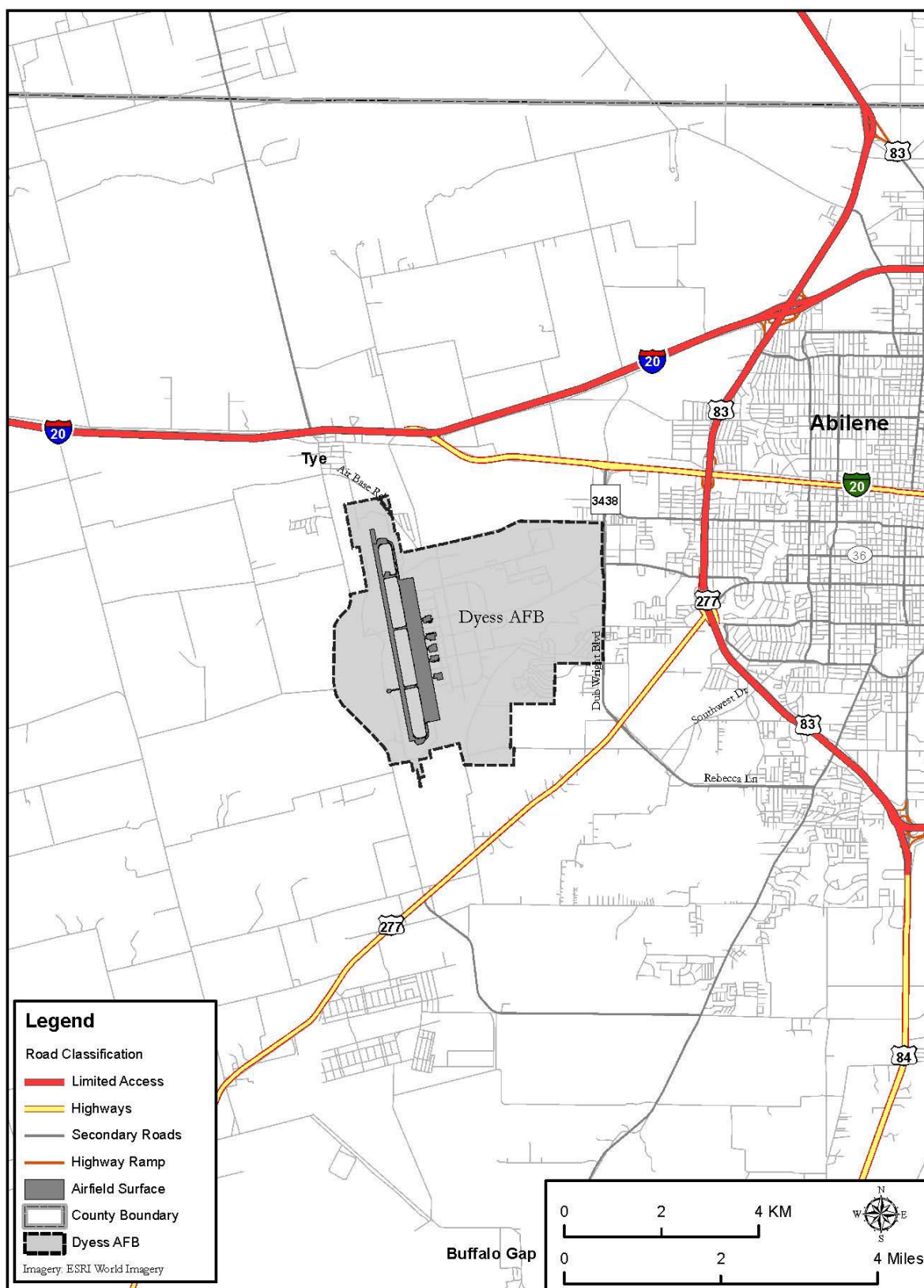


Figure 3.12-2. Highway and Road Network Near Dyess AFB

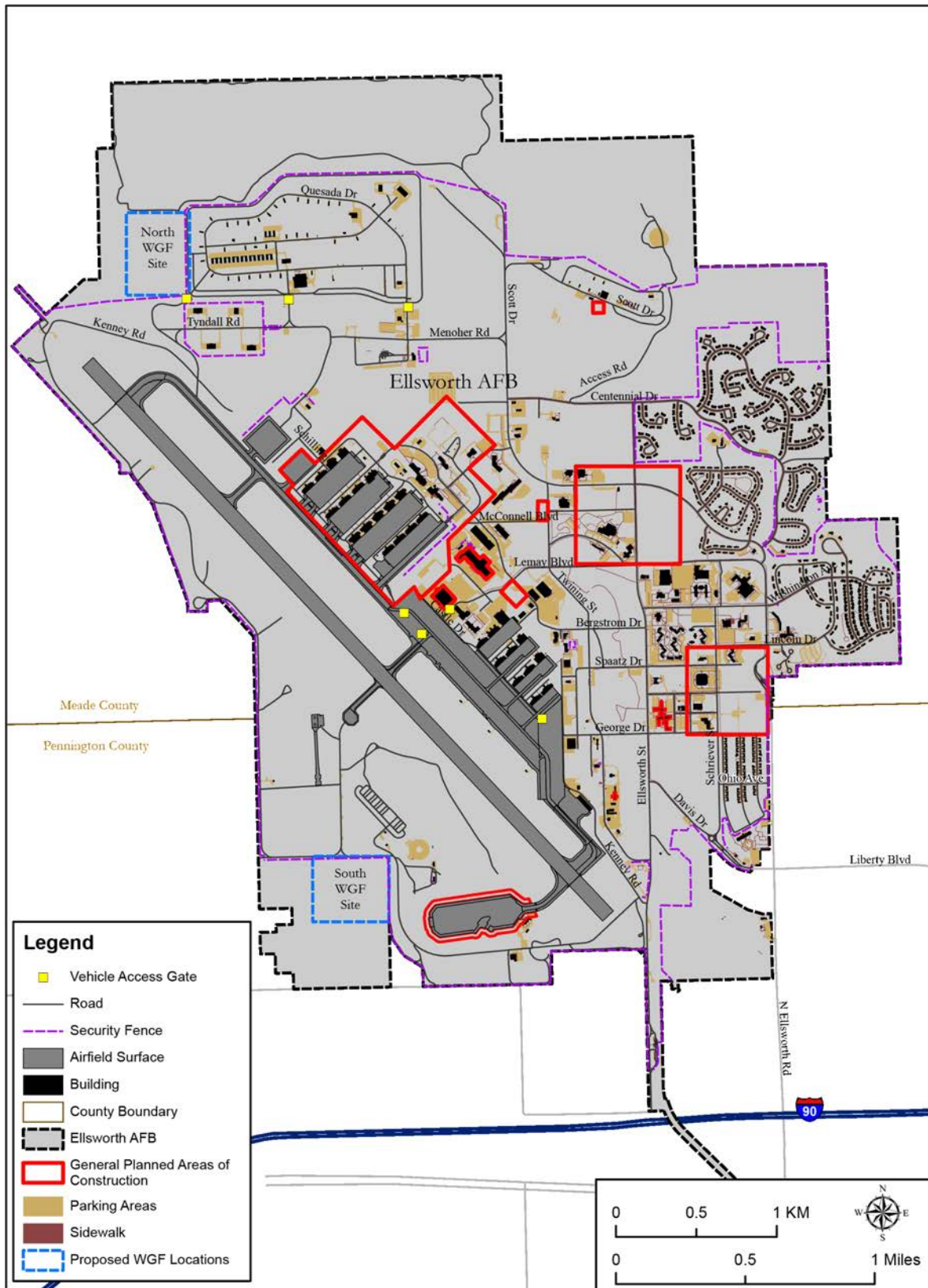


Figure 3.12-3. Road Network on Ellsworth AFB

Low density rural neighborhoods are located adjacent to Ellsworth AFB. The city of Box Elder occurs immediately east and south, and the unincorporated community of Ashland Heights is located about a mile to the southwest. Rapid City is located about 9 miles southwest. I-90, which is the major east-west highway corridor through southern South Dakota, is located south of the installation and provides access to the base's gates via Highway 1416 to the west of the base and Liberty Boulevard to the east (Ellsworth AFB, 2017). Ellsworth Road and Ellsworth Street/Commercial Gate Road extend off-base to the south, through Box Elder. Other major roadways near the base are County Highway 1416 and Radar Hill Road, which also traverse Box Elder. About 70 percent of traffic using the Highway 1416/I-90 ramps is related to travel to and from the base (South Dakota DOT, 2017). Ashland Heights is accessed by secondary roads such as Country Road 214 and T218. U.S. Highways 44, 79, and 16 (Elk Vale Road) converge on Rapid City from the south. The road network in the region near Ellsworth AFB is shown on Figure 3.12-4. Estimated average daily traffic counts for roads in the vicinity of Ellsworth AFB are shown in Table 3.12-6.

Table 3.12-6. Approximate Average Daily Traffic Count Near Ellsworth AFB

Road/Road Segment	Approximate Average Traffic Count (vehicles per day)
I-90 at Elk Vale Road	28,000
I-90 south of Ellsworth AFB	16,000
I-90 east of Ellsworth AFB	11,000
U.S. Highway 1416 near West Gate Road	7,000
North Ellsworth Road	7,000
Liberty Boulevard near I-90	9,000
Liberty Boulevard near North Ellsworth Road	3,000

Source: (South Dakota DOT, 2020a)

AFB = Air Force Base; I-90 = U.S. Interstate 90; U.S. = United States

A recent study evaluated existing traffic operations along I-90 and adjoining roads (Elk Vale Road, Liberty Boulevard) between the exit 61 and 67 interchanges, along with ramp merge/diverge points and associated intersections (South Dakota DOT, 2017). This segment encompasses access to Ellsworth AFB, Rapid City, and Box Elder. LOS on I-90 was calculated based on density (the number of vehicles per mile per lane) and average annual daily traffic. All I-90 segments evaluated were found to operate at a LOS of A or B. Similarly, all ramp merge/diverge points operated at a LOS of A or B. Intersection service levels along the segment varied widely, ranging from LOS A to F during peak hours among various locations, directions, and time of day.

The City of Box Elder has experienced growth in recent years, with population doubling between 2009 and 2014 (City of Box Elder, 2014). New single family residential units increased by about 11 to 21 percent between 2016 and 2018 (City of Rapid City, 2018). In the immediate vicinity of Ellsworth AFB, most development has occurred between Tower Road and Liberty Boulevard, which are located east and south of the installation, respectively.

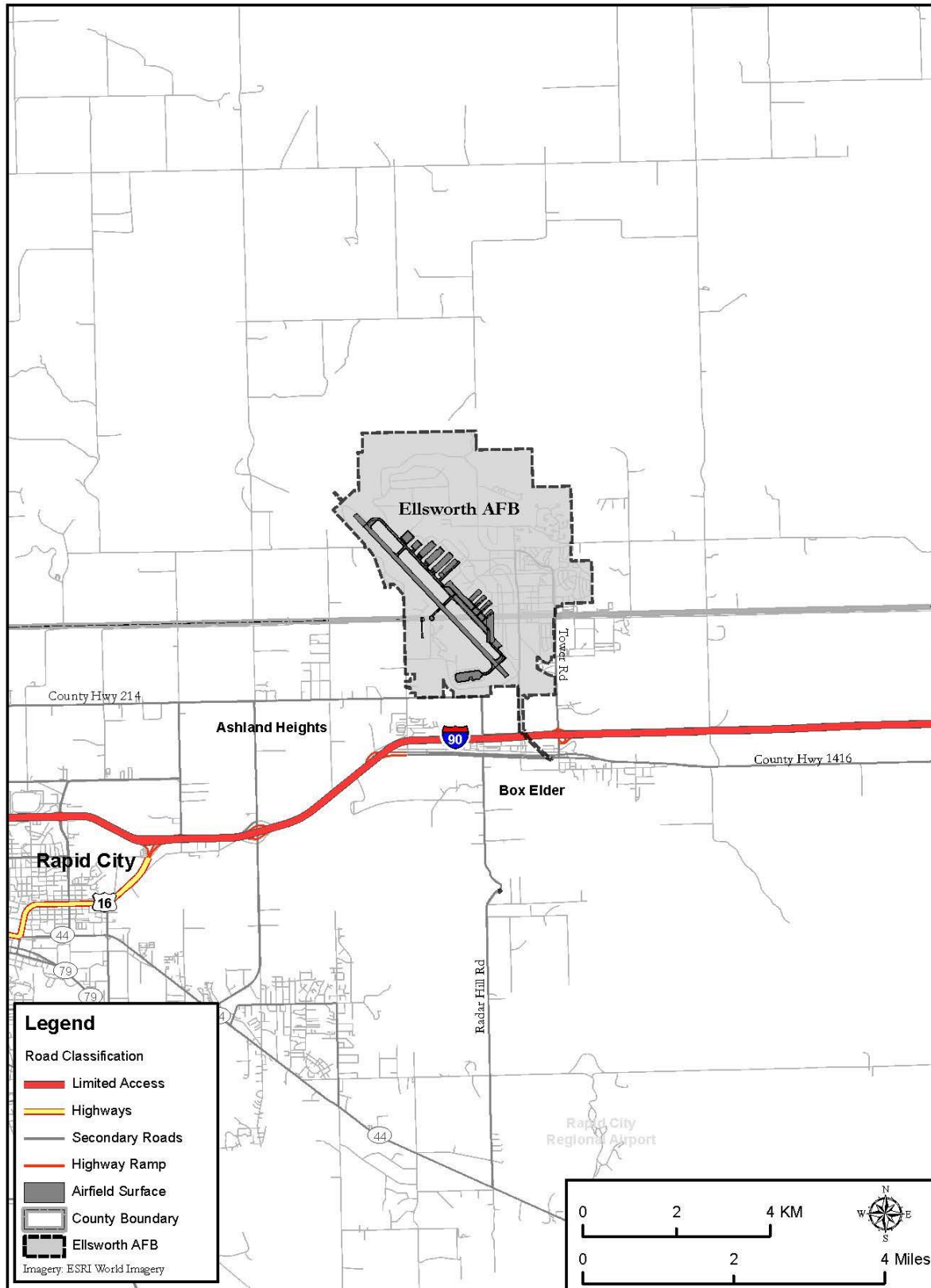


Figure 3.12-4. Highway and Road Network Near Ellsworth AFB

Residential development has also occurred along the Radar Hill Road corridor south of I-90 and in the western part of the city near I-90/Elk Vale Road. Commercial development has occurred along Highway 1416. With the exception of I-90, Elk Vale Road, and portions of Highway 1416 and Liberty Boulevard, only two-lane roads occur in Box Elder.

The highest peak hour traffic volumes occur along Highway 1416, Ellsworth Road, Tower Road, and Liberty Boulevard. Transit to and from Ellsworth AFB is a major contributor to traffic patterns, particularly since the base's gates are located adjacent to Box Elder (City of Box Elder, 2014). Although growth has taxed the city's transportation infrastructure (e.g., periodic congestion is noted), volume-to-capacity ratios calculated in 2014 indicated that roadways generally had sufficient capacity to accommodate existing traffic levels. In addition, analysis of 10 intersections found that, with one exception, they operated at an acceptable LOS of C or better during peak hours. The exception was the westbound Highway 1416/Ellsworth Road intersection, which operated at LOS F during peak hours.

Northeastern Rapid City (the portion nearest Ellsworth AFB) has experienced recent growth and development, along with increased traffic congestion. New single family residential units increased by 7.5 to 9.5 percent between 2016 and 2018 (City of Rapid City, 2018). A study was conducted to identify potential transportation improvements in the area encompassing East North Street, Campbell Street, and Omaha Street/Highway 44, which is considered to be the core transportation network of northeastern Rapid City (Rapid City Area Metropolitan Planning Organization, 2019). The study evaluated intersection and corridor (flowing traffic) LOS, among other factors. Overall, taking into consideration all times and travel directions, intersections mostly operated at a LOS of B or C. However, some intersections operated at level D or E, at specific times and/or directions. The South Dakota DOT generally considers an intersection LOS of C or better to be acceptable. Corridor LOS was determined by comparing prevailing travel speeds with free-flow travel speeds. Overall, morning peak hour traffic operated at a corridor LOS of C or better, while afternoon peak hour traffic operated at level D at several segments. Annual average daily traffic volumes in the area ranged from about 15,000 to 25,000.

3.12.1.3 Analysis Methodology

Potential impacts on transportation were assessed with respect to changes in on-base and off-base traffic operations. For the Proposed Action, potential effects to on-base operations were evaluated in the context of construction/demolition activities, short-term and long-term traffic re-routing and road closure, and short-term and long-term changes in traffic volume. Potential effects to off-base operations considered short-term and long-term changes in traffic patterns and volume. Potential impacts would be considered adverse if the Proposed Action would likely result in disruption of existing traffic operations, decreased corridor or intersection LOS, or roadways operating at or above their full design capacity.

3.12.2 Transportation, Environmental Consequences

3.12.2.1 No Action Alternative Consequences

3.12.2.1.1 No Action at Dyess AFB

Under the No Action Alternative, the B-21 would not be based at Dyess AFB and there would be no associated personnel changes or construction, demolition, or renovation activities. Traffic operations on and outside the base would continue as described in Section 3.12.1.2.1 (Transportation, Region of Influence, Dyess AFB). The on-base road system would generally continue to function adequately, with most non-commercial operators entering from Arnold Boulevard/Avenue B and using secondary streets and avenues to access various portions of the base. A small number of intersections would continue to operate at poor service levels, but relatively few vehicles would be affected at these areas per day.

Future housing and administrative facilities could result in further development of the area between 3rd Street and 4th Street, north and south of Arnold Boulevard/Avenue B (Dyess AFB, 2014), which would increase traffic volume at adjacent road segments and intersections. Construction, maintenance, and transportation improvement projects that are not associated with the B-21 beddown would continue to be evaluated and implemented as appropriate.

The base's IDP provides general discussion of potential future development and construction projects. Some of the potential projects would involve changes to roads, such as adding bike lanes and pedestrian crossing locations. Other future transportation-specific projects could potentially be implemented as well. For example, a traffic study conducted on the base (Dyess AFB, 2018e) recommended numerous projects to improve traffic flow and address compliance issues related to the Federal Highway Administration's Manual on Uniform Traffic Control Devices. Recommendations included a wide variety of projects such as repainting road markings, adding/replacing road signs, repairing sidewalks and pedestrian crossings, and installing roundabouts. Note that any future transportation-related projects on Dyess AFB would be subject to project-specific environmental review under the EIAP.

Activities associated with road shoulders, sidewalks, parking lots, and buildings or other facilities could involve closure of the shoulder, which would likely slow traffic and could increase the potential for minor accidents. Activities such as painting would likely involve lane closure, which could cause some degree of traffic congestion and increased potential for crashes, particularly during peak flow periods. Shoulder and lane closures could amplify issues at intersections with existing poor service levels due to an overall decrease in traffic flow efficiency.

Relatively major projects such as roundabout installation could require lane or street segment closures, resulting in traffic rerouting, congestion, and increased travel time. The effects of some of the actions could therefore increase traffic volume at some road

segments and result in reduced service levels. However, the effects would generally be short-term and most would affect relatively small portions of the base. It is expected that unaffected roads could reasonably accommodate rerouted traffic and that overall impacts to traffic operations would not be significant. An exception would be activities requiring lane closures near the main gate that would result in substantially increased wait time to enter or exit the base. In these cases, it is expected that project planning would include measures to minimize the effects.

Completion of projects designed to improve traffic operations would result in long-term beneficial impacts to the transportation system. Population growth of base personnel would likely be minor in the foreseeable future and would not affect on-base traffic operations.

Under the No Action Alternative, off-base traffic operations would also continue as described in Section 3.12.1.2.1 (Transportation, Region of Influence, Dyess AFB). I-20 and other highways and secondary roads in the vicinity of Dyess AFB would continue to function adequately at times, but substantial traffic congestion would likely be experienced at some highways (e.g., US-83/84, Dub Wright Boulevard) during peak hours. Traffic congestion would continue to occur at times on Air Base Road between Dyess AFB and Tye.

Overall regional population growth would not likely affect traffic operations substantially. As described in Section 3.5 (Socioeconomics), population growth for Taylor County is projected to be only 0.5 percent per year between 2018 and 2025. Growth was projected to be 5 and 12 percent for Abilene and Tye, respectively, between 2010 and 2030 (Dyess AFB, 2018b). The projected Abilene growth rate is considered essentially stagnant, although the southwest portion of the city nearest Dyess AFB would likely experience continued development and associated congestion. Data compiled in 2014 indicated that relatively few new addresses occurred immediately adjacent to the installation (Abilene Metropolitan Planning Organization, 2015). Northwest Abilene, including the City of Tye, is expected to experience little urban growth, with the possible exception of neighborhoods located north of Dyess AFB (Abilene Metropolitan Planning Organization, 2010). Although growth is projected for Tye, the baseline population level is low and residential growth is expected to be slow and incremental, resulting in little impact on the Abilene transportation system.

Various off-base transportation improvement projects through the year 2040 are being evaluated by the city of Abilene, including projects involving roadways near Dyess AFB (Abilene Metropolitan Planning Organization, 2015). The potential projects include a wide variety of activities such as bridge replacement, road widening, routine maintenance, and installing signaling and drainage, among many others. In the context of traffic operations, impacts resulting from components of the various projects could range from relatively minor (e.g., shoulder closure or reduced speed limits) to major (e.g., lane closures on I-20 or principal highways). Major projects could result in decreased LOS of some roadway segments and auxiliary features (exits, intersections) due to decreased capacity, increased congestion and travel time, and safety issues. Many projects would be short-

term, but activities such as bridge replacement and road widening could impact traffic operations for an extended time.

It is expected that project planning would include measures to minimize adverse effects to the extent feasible. Completion of projects designed to improve operations would result in long-term beneficial impacts to the regional transportation system.

In summary, there would be no significant impacts to the on-base transportation system under the No Action Alternative. Off-base traffic operations would continue to be affected by existing congestion, population growth, and transportation improvement projects, but activities associated with Dyess AFB would not contribute significantly to these issues.

3.12.2.1.2 No Action at Ellsworth AFB

Under the No Action Alternative, the B-21 would not be based at Ellsworth AFB, and there would be no associated personnel changes or construction, demolition, or renovation activities. Traffic operations on and outside the base would continue as described in Section 3.12.1.2.2 (Transportation, Region of Influence, Ellsworth AFB). The on-base road system would continue to function adequately, and traffic congestion would generally not be expected.

Construction, maintenance, and transportation improvement projects that are not associated with the B-21 beddown would continue to be evaluated and implemented as appropriate. Potential facility development projects, airfield development projects, and projects associated with the base's transportation network development plan are identified in the IDP (Ellsworth AFB, 2017).

Transportation-specific projects include street repairs, road grading, and street expansion. Activities such as street repairs could involve closure of the shoulder, which would likely slow traffic and could increase the potential for minor accidents. Other activities (e.g., grading and street expansion) would likely involve lane closure or street segment closure, which could cause traffic congestion, traffic rerouting, increased travel time, and increased potential for crashes, particularly during peak flow periods. The effects of some of the actions could therefore potentially increase traffic volume at some road segments, result in reduced service levels, and amplify issues at intersections with existing poor service levels. However, the effects would generally be short-term and most would affect relatively small portions of the base. It is expected that unaffected roads could reasonably accommodate rerouted traffic and that overall impacts to traffic operations would not be significant. Completion of projects designed to improve traffic operations would result in long-term beneficial impacts. Note that any future transportation-related projects on Ellsworth AFB would be subject to project-specific environmental review under the EIAP.

Population growth of base personnel would likely be minor in the foreseeable future and would not affect on-base traffic operations. Under the No Action Alternative, off-base traffic operations would also continue as described in Section 3.12.1.2.2 (Transportation, Region of Influence, Ellsworth AFB). The segment of I-90 near Ellsworth AFB, along with ramp merge/diverge points, would probably continue to operate at acceptable LOS into

the intermediate future. However, associated intersection service levels would be variable, ranging from A to F during peak hours. Projected traffic volumes in the year 2045 were evaluated based on residential and commercial growth, as well as two scenarios of population growth on Ellsworth AFB (South Dakota DOT, 2017). The scenarios assumed either no growth in base population, or that the base population would double by 2045.

Overall, the highest projected traffic volume growth was associated with Elk Vale Road and Liberty Boulevard, with volume forecasts ranging from 2.5 to 3.1 times higher than current levels. Projected growth throughout the remaining areas was variable, ranging from 20 to 70 percent without Ellsworth AFB growth and 40 to 90 percent with doubling of the base population. Analysis indicated that doubling Ellsworth AFB personnel would not significantly change forecasts for roadways that do not directly access the base (e.g., Elk Vale Road). However, traffic volume forecasts for roadways that feed directly or indirectly to base gates (e.g., Ellsworth Road, Liberty Boulevard, Highway 1416) were 20 to 30 percent higher than existing operations. Under these conditions, I-90 and associated ramp merge/diverge points were projected to operate at a LOS between A and C (depending on the segment), while intersections were projected to operate at a LOS between D and F. The projections included the assumption that no roadway improvements beyond those currently planned would be implemented.

Box Elder roadways would likely continue to have sufficient capacity, and intersections would operate at an acceptable LOS, into the intermediate future (approximately the next 15 years). Potential future traffic volumes were modeled for the year 2035, assuming an increase of 1,900 households and 1,700 employees (City of Box Elder, 2014). Results suggested that roadways would have sufficient capacity to accommodate projected traffic levels but that some intersection capacity problems would be expected. It is anticipated that numerous intersections would require the addition of signalized or roundabout controls by 2035 to operate at LOS C.

With some exceptions, Rapid City intersections would generally continue to operate at an acceptable LOS. Corridor flow would continue to operate at an acceptable LOS during morning peak hour traffic, but would operate at LOS D at several segments during afternoon peak hour traffic. Future intersection and corridor LOS in northeastern Rapid City (the portion of the city nearest Ellsworth AFB) is expected to deteriorate due to population growth (Rapid City Area Metropolitan Planning Organization, 2019). Therefore, the city is currently evaluating improvement options.

Various off-base transportation improvement projects are ongoing or are being evaluated in the vicinity of Ellsworth AFB, including interstate maintenance projects, major arterial projects, and projects specific to the City of Box Elder (Rapid City Area Transportation Improvement Program, 2019; Rapid City Area Metropolitan Planning Organization, 2019; City of Box Elder, 2014). The potential projects include a wide variety of activities such as road construction, road widening, and routine maintenance, among many others.

Impacts resulting from components of the various projects could range from relatively minor (e.g., shoulder closure or reduced speed limits) to major (e.g., lane closures or traffic rerouting). Major projects could result in decreased LOS of some roadway

segments and auxiliary features. Many projects would be short-term, but some activities could impact traffic operations for an extended time. It is expected that project planning would include measures to minimize adverse effects to the extent feasible. Completion of projects designed to improve operations would result in long-term beneficial impacts to the regional transportation system.

In summary, there would be no significant impacts to the on-base transportation system under the No Action Alternative. Off-base traffic operations would continue to be affected by existing congestion, population growth, and transportation improvement projects, but activities associated with Ellsworth AFB would not contribute significantly to these issues.

3.12.2.2 Dyess AFB Alternative

3.12.2.2.1 Personnel

An increase in personnel associated with the B-21 beddown would result in additional vehicle use and related impacts to on-base traffic operations. The specific number of additional vehicles that would be operated on the installation is unknown but may be estimated based on an end-state increase of 1,645 active military personnel (Table 3.0-1), which represents an increase of approximately 37 percent over baseline conditions. There could potentially be a similar increase in general on-base traffic volume during typical work hours.

The overall on-base road system currently functions adequately, and existing capacity of some road segments might accommodate the increased usage without substantial decrease in LOS. However, in at least some areas, higher traffic volume would likely increase traffic congestion and decrease road segment or intersection service levels, and could possibly cause some segments to operate near capacity. The potential for such effects is greater for segments and intersections that currently operate at low LOS. For example, intersection LOS at Avenue D and 4th Street is low during morning peak hours, likely due in part to drivers accessing the Child Development Center, and a personnel increase would result in more traffic near this facility.

The increased traffic volume could cause significant on-base congestion near the gates. The potential for impacts could be decreased by implementing the base's goal of compact and mixed use development, which is intended to encourage walking and other alternative modes of transportation (Dyess AFB, 2018b), and by implementing recommendations in the base's JLUS related to roadway capacity (Dyess AFB, 2018d). Recommendations include investigating methods to reduce congestion at the main gate, implementing staggered work shifts, and promoting alternative transportation (e.g., walking, bicycling, carpooling).

Increased personnel would also affect off-base traffic operations, including commuter traffic during peak hours, due to higher volume and potentially increased congestion. The number of vehicles that would be added to the existing traffic volume is unknown but may be notionally evaluated based on personnel demographics. It is assumed that 55 percent of additional military personnel would be married. Applying this percentage results in

740 unaccompanied and 905 married personnel. Unaccompanied personnel could generally contribute one vehicle to existing traffic volume at any given time. The results of studies on vehicle use indicate that there are approximately two vehicles per U.S. household on average (Wagner, 2020; Bureau of Transportation Statistics, 2020). Therefore, it is assumed that married personnel and their dependents could contribute two vehicles. Combining these factors, there could theoretically be a maximum end-state addition of 2,550 vehicles to the regional transportation system, although the actual number of additional vehicles operated at any given time would probably be less. There would not necessarily be two vehicles associated with all additional married personnel, as the number of household vehicles is influenced by dependents' age, and it is very unlikely that all vehicles in every household would be operated simultaneously. In addition, new personnel that live on base would use services on the installation (e.g., community services, commercial businesses, and medical facilities) at least part of the time, decreasing the amount of off-base traffic volume.

Most new personnel living off base would likely reside in western or southwestern Abilene, including the Quail Hollow family housing area, while a smaller number could reside in other parts of Abilene, the City of Tye, or other communities. Therefore, although vehicle operation would potentially increase traffic throughout the Abilene region, the increase would likely be concentrated in and near the western part of the city. Some road segments in this area currently experience substantial congestion during peak hours. Areas near the base with notable congestion include Arnold Boulevard/Dub Wright Boulevard near the main gate, and Air Base Road between Dyess AFB and Tye. Existing traffic volume is approximately 20,000 to 30,000 vehicles per day on I-20 near the installation, and is 8,000 and 13,000 vehicles per day on Arnold Boulevard and Dub Wright Boulevard, respectively. Increased vehicle operation associated with the beddown would probably cause moderate effects on I-20 traffic but could cause a noticeable increase in traffic volume and decreased service levels on highways and other components (e.g., intersections) near the base.

Overall, vehicles would generally be operated in different areas of the ROI at various times and would not necessarily be concentrated in any given location. However, there would be an increase in traffic volume concentrated near the base gates during peak commute hours. Assuming that 78 percent of new active duty personnel (end state) would live off base (see Section 3.5, Socioeconomics) and commute to work daily, there could be a maximum of 1,283 additional vehicles accessing and leaving the installation during peak hours, primarily through the main gate but also including the Tye gate. The increase would potentially cause a substantial increase in congestion and queuing near these points.

In summary, a personnel increase would affect on-base and off-base traffic operations differently at various locations. However, in the absence of management actions, impacts would potentially be significant in areas of concentrated operation, such as near the base gates.

3.12.2.2.2 Airfield Operations

Aircraft operations would not affect transportation on Dyess AFB or at adjacent off-base areas. Road closures due to aircraft operations or ordnance handling are not anticipated.

3.12.2.2.3 Airspace and Range Utilization

Airspace and range utilization would not affect transportation at the PRTC or the Brownwood, Lancer, or Pecos MOAs.

3.12.2.2.4 Facilities and Infrastructure

On-base transportation components potentially affected by construction, demolition, and renovation activities mostly occur near the northern end of the runway. Small areas would also be affected near the parking apron and the intersection of Avenue D and 4th Street. Activities could potentially result in shoulder, lane, or road segment closures, traffic rerouting, and reduced travel speeds. These effects could cause traffic congestion and reduced service levels, particularly during peak flow periods, and increase traffic volume on otherwise unaffected road segments. These effects could amplify issues at intersections with existing poor service levels. However, the effects would be temporary and would cease with completion of facility and infrastructure projects. Unaffected roads could potentially accommodate rerouted traffic, and LOS would not likely be affected substantially on most parts of the base. C&D activities would not directly affect roads near the Dyess AFB fire department. However, it is recommended that project planning include measures to ensure that response to fires, injuries, and other emergencies (e.g., fuel spills, ordnance handling issues) would not be hindered by road conditions or new road configuration.

Facilities and infrastructure projects would require delivery and removal of materials and debris, as well as base access by construction crews. Commercial vehicles would access the base at the commercial gate, while crews could access the base by any gate. As a result, there would be a small increase in off-base traffic on Military Drive, Arnold Boulevard, and Dub Wright Boulevard. Areas between the commercial gate and Tye, and on Arnold Boulevard near the main gate, experience congestion during peak hours currently. Although increased use would contribute to existing congestion, the number of vehicles involved would be relatively small, and activities would potentially occur throughout the work day (not restricted to peak hours). In addition, the effects would be temporary and would cease with completion of the projects. It is expected that heavy equipment would be kept on the installation for the duration of activities.

Overall, there would be no significant impacts due to facilities and infrastructure placement.

3.12.2.2.5 Weapons Generation Facility

On-base transportation components potentially affected by construction of the WGF would mostly be limited to the area between Military Drive and Ammo Road. This section of the base is remote from the “downtown” Dyess area and is less heavily used in general,

although a nearby segment of 3rd Street is used frequently during morning peak hour (Dyess AFB, 2018e).

Activities could result in shoulder, lane, or road segment closures, traffic rerouting, and reduced travel speeds. These effects could reduce service levels and increase traffic volume on unaffected road segments, potentially amplifying issues at intersections with existing poor service levels. The effects would be temporary and would not result in substantially reduced LOS. Unaffected roads could likely accommodate rerouted traffic. Impacts would cease with completion of construction. Activities would require delivery and removal of materials, as well as base access by construction crews, which would cause a small increase in off-base traffic on Military Drive and Arnold Boulevard due to use of the commercial gate. Although increased use would contribute to existing congestion, the number of vehicles would be small and the effects would be temporary. It is recommended that project planning include measures to ensure that emergency response would not be hindered by activities.

Overall, there would be no significant impacts due to construction of the WGF.

3.12.2.2.6 Snapshot

Overlap of B-1 and B-21 operations would result in a temporary increase of 386 active military and contractor personnel (not including dependents), compared to the end-state associated with the B-21 beddown (see Table 3.0-1). There would be a temporary corresponding increase in on-base and off-base traffic in the ROI. Increased traffic volume would potentially affect LOS on the base and in western Abilene. The number of personnel associated with the overlap would initially be about 11 percent of the new personnel arriving at the base due to the beddown, and would decrease as B-1 operations were phased out. Additional traffic caused by the overlap could be noticeable on base and in adjacent areas but would not likely affect LOS substantially in the context of overall personnel numbers.

3.12.2.2.7 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

- During construction, demolition, and renovation activities, consider scheduling commercial deliveries outside peak traffic hours and requiring all construction crews to use the commercial gate.
- During project planning, include measures to ensure proper emergency response ability is maintained during construction activities and after project completion.

3.12.2.3 Ellsworth AFB Alternative (Preferred Alternative)

3.12.2.3.1 Personnel

An increase in personnel associated with the B-21 beddown would result in additional vehicle use and related impacts to on-base traffic operations. The specific number of additional vehicles that would be operated on the installation is unknown but may be

estimated based on an end-state increase of 1,664 active military personnel, which represents an increase of approximately 52 percent over baseline conditions. There could theoretically be a similar increase in on-base traffic volume during typical work hours.

The overall on-base road system currently functions adequately, and existing capacity of some road segments could potentially accommodate the increased usage without substantial decrease in LOS. The base's road system was designed and built in the mid-1990s, when personnel numbers were higher than at the present time (Ellsworth AFB, 2017). However, it is possible that in some areas the traffic volume would increase congestion and decrease service levels substantially, and could cause some road segments to operate at or near capacity. The increased traffic volume could potentially cause substantial on-base congestion near the base's gates.

The potential for impacts could be decreased by implementing the base's goal of compact mixed use development and by implementing the transportation network development plan, both of which are intended to reduce vehicular traffic (Ellsworth AFB, 2017). The potential for impacts could be additionally reduced by implementing recommendations in the base's JLUS related to roadway capacity (Ellsworth AFB, 2016b). Recommendations include a feasibility study for public transportation service to the base and constructing a multi-modal transportation center outside the main gate.

Off-base traffic operations could also be impacted. The number of vehicles that would be added to the existing traffic volume is unknown but may be notionally evaluated based on the assumption that 55 percent of additional military personnel would be married. Applying this percentage results in 749 unaccompanied and 915 married personnel. Unaccompanied personnel could generally contribute one vehicle to existing traffic volume at any given time. The results of studies on vehicle use indicate that there are approximately two vehicles per U.S. household on average (Wagner, 2020; Bureau of Transportation Statistics, 2020). Therefore, it is assumed that married personnel and their dependents could contribute two vehicles. Combining these factors, there could be a theoretical maximum end-state addition of 2,579 vehicles to the regional transportation system, although the actual number of additional vehicles operated at any given time would probably be less. There would not necessarily be two vehicles associated with all additional married personnel, as the number of household vehicles is influenced by dependents' age, and it is very unlikely that all vehicles in every household would be operated simultaneously. In addition, new personnel that live on base would use services on the installation (e.g., community services, commercial businesses, and medical facilities) at least part of the time, decreasing the amount of off-base traffic volume.

Most new personnel living off base would probably reside in northwestern Rapid City or Box Elder. Therefore, although vehicle operation would potentially increase traffic throughout the region, the increase would be concentrated in these areas. Increased traffic volume could lead to congestion and reduced LOS. Existing traffic volume is approximately 11,000 to 28,000 vehicles per day on I-90 near the base, and from 3,000 to 9,000 vehicles per day on other area roadways. Increased vehicle operation associated with the beddown would probably have moderate effects on I-90 traffic but

could cause a noticeable increase in traffic volume and decreased service levels on highways near the base.

Overall, vehicles would generally be operated in different areas of the ROI at various times and would not necessarily be concentrated in any given location. However, there would be an increase in traffic volume concentrated near the base gates during peak commute hours. As discussed in Section 3.12.2.1.2 (Transportation, No Action at Ellsworth AFB), roads in Box Elder that lead directly to the base would experience increased congestion, and intersections throughout Box Elder could operate at reduced LOS.

Assuming 78 percent of new active duty personnel would live off base (see Section 3.5, Socioeconomics) and commute to work daily, there could be a maximum of 1,298 additional vehicles accessing and leaving the installation during peak hours. The base's three gates currently process approximately 4,000 scans per day and are able to process current peak demand (the peak number of scans is unknown) without long backups (Ellsworth AFB, 2017). Although existing capacity would be able to accommodate some of the increased usage, there would likely be substantial congestion and queuing near the gates.

In summary, a personnel increase would affect on-base and off-base traffic operations differently at various locations. However, in the absence of management actions, impacts would potentially be significant in areas of concentrated operation, such as near the base gates.

3.12.2.3.2 Airfield Operations

Aircraft operations would not affect the transportation on Ellsworth AFB or at adjacent off-base areas. Road closures due to aircraft operations or ordnance handling are not anticipated.

3.12.2.3.3 Airspace and Range Utilization

Airspace and range utilization would not affect transportation at the PRTC.

3.12.2.3.4 Facilities and Infrastructure

On-base transportation components potentially affected by facility and infrastructure projects mostly occur along the north and south ends of the runway, between Lemay Boulevard and Scott Drive, and between Schriever Street and North Ellsworth Road. Activities could potentially result in shoulder, lane, or road segment closures, traffic rerouting, and reduced travel speeds. These effects could cause traffic congestion and reduced service levels, particularly during peak flow periods, and increase traffic volume on otherwise unaffected road segments. These effects could amplify issues at intersections with existing poor service levels. However, the effects would be temporary and would cease with completion of facility and infrastructure projects. Unaffected roads could potentially accommodate rerouted traffic, and LOS would not likely be affected substantially on most parts of the base. Construction and demolition activities would affect

roads near the Ellsworth AFB emergency services facility. It is recommended that project planning include measures to ensure that emergency response would not be hindered by road conditions or new road configuration.

There would be an increase in off-base traffic during project activities due to delivery and removal of materials and base access by construction crews. Commercial vehicles would use the commercial gate, while crews could use the commercial gate or main gate. The activities would result in a small increase in traffic volumes on Liberty Boulevard and Ellsworth Street/Commercial Gate Drive. Although traffic volume would increase, the number of vehicles involved would be small and would not likely affect roadway or intersection LOS substantially. Any effects would be temporary. It is anticipated that heavy equipment would be kept on the installation for the duration of activities.

Overall, there would be no significant impacts due to facilities and infrastructure placement.

3.12.2.3.5 Weapons Generation Facility

North WGF Site Subalternative

The North WGF Site is remote from the cantonment area, and there are no nearby roadways providing base entry or exit. Therefore, traffic volume is expected to be low, and construction activities would have only minor direct effects on the base transportation system with little effect on LOS. Commercial vehicles entering at the commercial gate would have to traverse the base north-to-south to reach the construction site. Commercial traffic could therefore cause congestion and reduced traffic flow, but the effects would be temporary and relatively minor. It is recommended that project planning include measures to ensure that emergency response would not be hindered by road conditions or new road configuration. Delivery and removal of materials and debris, as well as base access by construction crews, would cause a small increase in off-base traffic on Liberty Boulevard, Commercial Gate Drive, and potentially Highway 1416. However, the number of vehicles entering and exiting the base would be small, and any effects would be temporary. Impacts due to traffic congestion or reduced LOS would not be expected. Overall, there would be no significant impacts due to construction of the WGF.

South WGF Site Subalternative (Preferred Subalternative)

The South WGF Site is remote from the cantonment area and there are no roadways providing base entry or exit in the area. Therefore, traffic volume is expected to be low, and construction activities would have only minor direct effects on the base transportation system with little effect on LOS. On-base commercial traffic would mostly be limited to the southernmost portion of the installation, and any congestion or reduced traffic flow would be minor. It is recommended that project planning include measures to ensure that emergency response would not be hindered by road conditions or new road configuration. Delivery and removal of materials and debris, as well as base access by construction

crews, would cause a small increase in off-base traffic on Liberty Boulevard, Commercial Gate Drive, and potentially Highway 1416. However, the number of vehicles entering and exiting the base would be small, and any effects would be temporary. Impacts due to traffic congestion or reduced LOS would not be expected. Overall, there would be no significant impacts due to construction of the WGF.

3.12.2.3.6 Snapshot

Overlap of B-1 and B-21 operations would result in a temporary increase of 384 active military and contractor personnel (not including dependents) compared to the end-state associated with the B-21 beddown (see Table 3.0-2). There would be a temporary corresponding increase in on-base and off-base traffic in the ROI. Increased traffic volume would potentially affect LOS on the base and in northwestern Rapid City and Box Elder. The number of personnel associated with the overlap would initially be about 11 percent of the new personnel arriving at the base due to the beddown and would decrease as B-1 operations were phased out. Additional traffic caused by the overlap could be noticeable on base and in adjacent areas but would not likely affect LOS substantially in the context of the overall personnel number.

3.12.2.3.7 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

- During construction, demolition, and renovation activities, consider scheduling commercial deliveries outside peak traffic hours and requiring all construction crews to use the commercial gate.
- During project planning, include measures to ensure proper emergency response ability is maintained during construction activities and after project completion.

3.13 UTILITIES AND INFRASTRUCTURE

3.13.1 Utilities and Infrastructure, Affected Environment

3.13.1.1 Description of Resource

The utilities described and analyzed for potential impact resulting from the beddown of the B-21 MOB 1 include potable water, wastewater, electricity, and natural gas. The description of each utility focuses on the existing infrastructure, current utility use, and any pre-defined capacity or limitations as set forth in permits or regulations.

Potable Water

Potable water is safe to consume because it either comes from an uncontaminated aquifer (an underground layer of porous rock containing water) or it has been pre-treated to eliminate contaminants that would potentially cause illness in humans.

Wastewater

Wastewater is water that has been used and contains dissolved or suspended waste materials. The waste materials include a wide variety of pollutants such as human excreta, food waste, soaps, detergents, and other cleaning materials. Before the wastewater can be released into waterways, it is treated at wastewater treatment plants to get rid of the pollutants.

Electricity

Electricity is a form of energy typically supplied to homes and businesses by the electric power industry. Electricity is distributed through the use of aboveground or underground wires to supply power to resources such as lighting, heating, air conditioning, and machinery. Electricity is commonly measured in kilowatt hours.

Natural Gas

Natural gas is a non-renewable hydrocarbon found in deep underground rock formations. It is often used as a source of energy for heating and cooking, as well as electricity generation. Consumption of natural gas is typically measured in cubic feet.

3.13.1.2 Region of Influence

3.13.1.2.1 Dyess AFB

Potable Water

Potable water is supplied to Dyess AFB by the City of Abilene. There are no aquifers of regional significance in the area; therefore, the primary source of potable water is Fort Phantom Hill Lake, with the O.H. Ivie Reservoir and Hubbard Creek Lake as alternate sources. Dyess AFB has a contract with the City of Abilene to receive up to 5 million gallons per day (MGD) (Dyess AFB, 2018b); however, the maximum capacity that can be supplied to the base is 416,000 gallons per day. The capacity is limited by system design rather than permits; the water mains on base consist of 6- to 12-inch diameter pipes, where the city line is actually 16 inches in diameter (Ford et al., 2019). Typical daily usage at the installation is approximately 169,000 gallons, leaving sufficient capacity for growth (Denslow, 2020). If more capacity is needed in the future, the base could increase the size of the water lines (Ford et al., 2019).

On-base water storage totals 1.28 million gallons and consists of a 500,000-gallon elevated tank and two smaller, ground-level storage tanks (25,000-gallon clear well tank and 755,000-gallon ground storage tank). Non-potable water is used for hangar fire protection and irrigation and is stored in individual tanks and in retention ponds, respectively (Dyess AFB, 2018b).

The potable water system main lines extend throughout most of the main cantonment area and flightline area; however, the system does not currently serve Avenue A (the northern portion of 5th Avenue) and the portion of 4th Avenue located north of the Temporary Lodging Facility (Figure 3.13-1). Any new construction in these areas would require extension of the potable water system (Dyess AFB, 2018b).

Wastewater

Domestic and industrial wastewater at Dyess AFB is discharged to the City of Abilene's Hamby Wastewater Treatment Plant in Hamby, Texas; there are no septic systems in use on the installation. The wastewater system is a gravity collection system and covers most of the main cantonment area and flightline area, with a central main running from west to east across the installation. As with the potable water system, however, some northern portions of the installation (Avenue A, the northern portion of 5th Avenue, and the portion of 4th Avenue located north of the Temporary Lodging Facility) has minimal coverage (Figure 3.13-1). Dyess AFB is permitted to discharge 3 MGD but typically discharges 0.3 to 1.8 MGD (Dyess AFB, 2018b).

Electricity

Electricity is supplied to Dyess AFB by American Electric Power via two 69-kilovolt (kV) feeders that serve three on-base substations. Electrical system capacity at Dyess AFB is 40.43 megavolt amperes (mVA) (Dyess AFB, 2018b). Systematic improvements to the grid structure have been made over the past 15 years, resulting in a peak usage of approximately 10 to 12 mVA and an average usage of 6 mVA (Hughes, 2019; Ford et al., 2019). These energy efficient improvements have led to a capacity that would allow for future growth. Some areas of the base (along Avenue A—between 3rd Avenue and 4th Avenue, and the north portion of 5th Avenue) are not serviced by a primary line, and would require extension of the primary electrical system (Figure 3.13-1) (Dyess AFB, 2018b).

Natural Gas

Natural gas is provided and distributed throughout Dyess AFB by Atmos Energy Corporation via more than 47 miles of recently upgraded polyethylene transmission lines. Areas not serviced by a natural gas main include the area along Avenue A (between 3rd Avenue and 4th Avenue), the north portion of 5th Avenue, and along Avenue E. Access to natural gas in these areas would require extension of the natural gas distribution system (Figure 3.13-1). As of 2018, natural gas capacity at Dyess AFB is 3,000,000 cubic feet per day (expressed as 3,000 MCF where MCF equals thousands of cubic feet per day), with a consumption rate of only 457 MCF per day, leaving approximately 85 percent capacity available (Dyess AFB, 2018b).

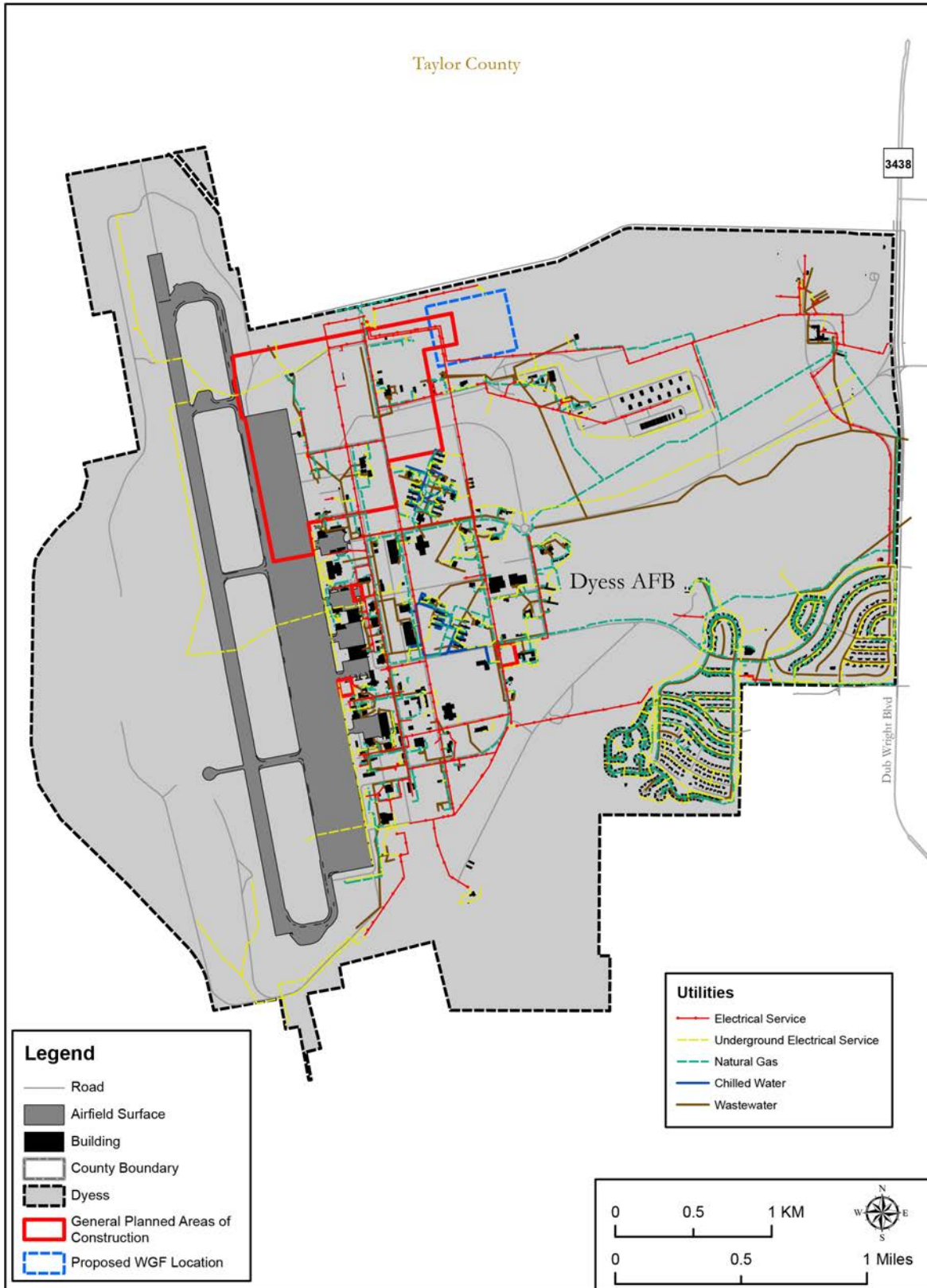


Figure 3.13-1. Dyess AFB Utilities

3.13.1.2.2 Ellsworth AFB

Potable Water

Potable water is supplied to Ellsworth AFB by the City of Rapid City. The water distribution system runs throughout all areas of the base and along the flightline (Figure 3.13-2). As part of the legislation for building Pactola Reservoir, an agreement was made between Rapid City and Ellsworth AFB that Ellsworth AFB would receive all the water it may need, paying Rapid City only for treatment and transportation. Ellsworth AFB has an annual allocation of 977,553,000 gallons and typical usage at the installation is 165,000,000 gallons per year, or 17 percent of allocated capacity (Cleberg, 2020). On-base potable water storage consists of four tanks (two ground-level and two aboveground), with a total capacity of 3.8 million gallons. Additional water storage tanks, dedicated for providing fire protection to the hangars in the North Docks, also exist on base and have a total capacity of 2.1 million gallons (Ellsworth AFB, 2017).

Wastewater

Domestic and industrial wastewater at Ellsworth AFB is discharged and treated at an off-base facility in Box Elder. The wastewater system covers all areas of the base (Figure 3.13-2). Ellsworth AFB is permitted to discharge 1.5 MGD, but only discharges about 0.5 MGD, only using approximately 33 percent of the capacity (Ellsworth AFB, 2017).

Electricity

Electricity is supplied to Ellsworth AFB by Western Area Power Association via two 115-kV feeds from New Underwood and Rapid City that serve one substation and two switching stations on base. Each feed operates at about 38 percent capacity, leaving about 62 percent capacity for growth (Ellsworth AFB, 2017).

Natural Gas

Natural gas is provided and distributed throughout Ellsworth AFB by Montana Dakota Utilities. Natural gas is primarily used for heating facilities and water at Ellsworth AFB. Natural gas capacity at Ellsworth AFB is 4,069 MCF per day, with a consumption rate of about 1,343 MCF per day, leaving approximately 67 percent capacity available. For extremely cold days, where additional gas may be needed for the largest users, Ellsworth AFB has a Propane-Air Mix Plant as a back-up system (Ellsworth AFB, 2017).

3.13.1.3 Analysis Methodology

In general, analysis of impacts to utilities and infrastructure is conducted by comparing the amount of the utility currently being used, regulatory limitations on consumption, and how implementation of each alternative would affect those factors.

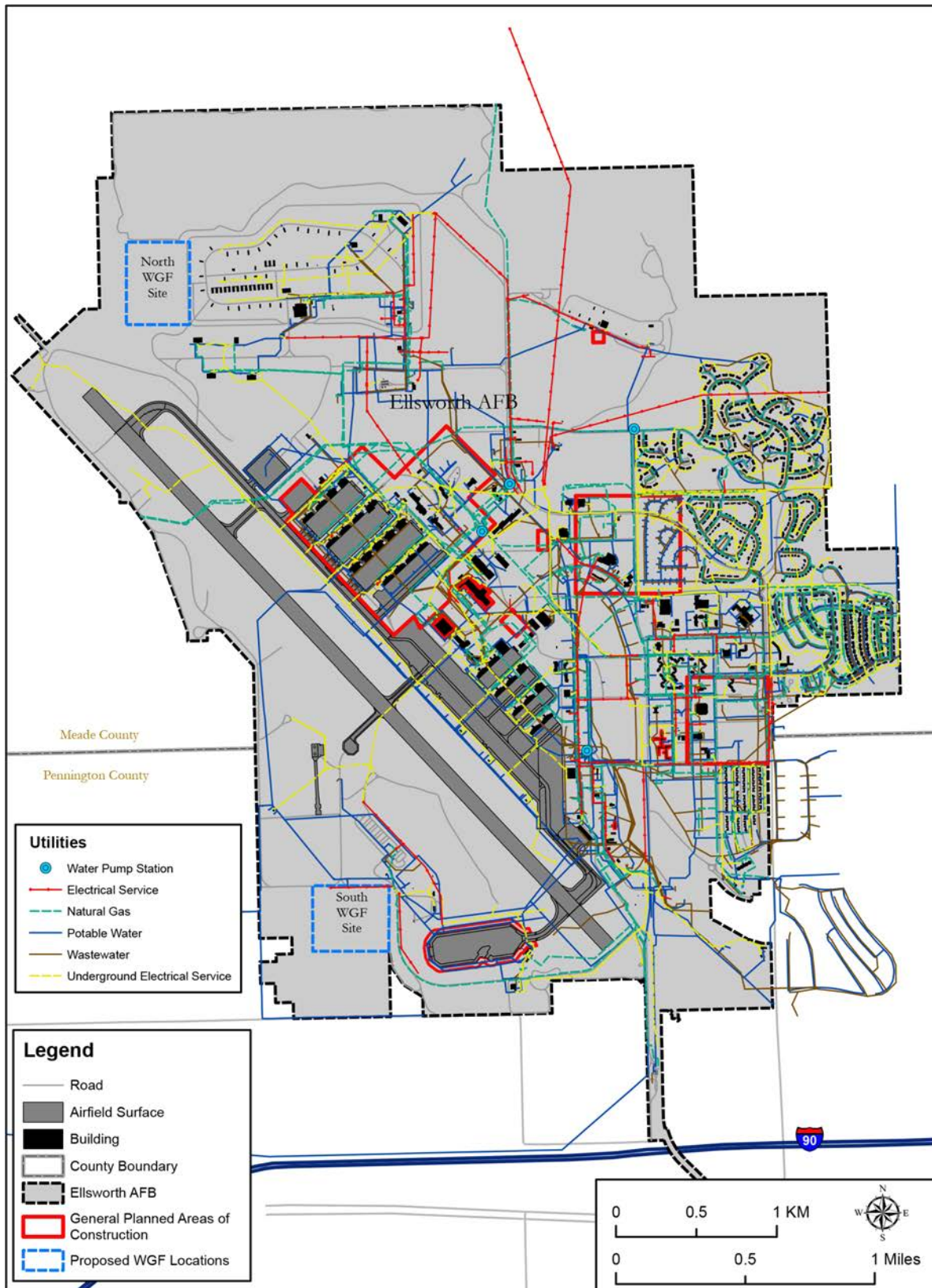


Figure 3.13-2. Ellsworth AFB Utilities

Potable Water

The methodology used to estimate potable water use is based on the number of personnel expected to be affiliated with the B-21 mission. Estimated potable water use is determined by calculating the percent increase in personnel at each base and comparing that against the total percent capacity available for each potable water system. The increase in personnel at each base is determined by adding the number of personnel associated with the Proposed Action (7,700) to the baseline numbers for each base (10,145 at Dyess and 10,596 at Ellsworth AFB), and then subtracting the number of personnel associated with the B-1 mission (3,747 at Dyess and 4,553 at Ellsworth AFB) at each base, respectively (see Table 3.5-3 and Table 3.5-10).

Wastewater

The methodology used to estimate wastewater rates pertaining to the B-21 mission is based on general wastewater quantity guidance found in *Civil Engineering Reference Manual for the PE Exam* (Lindeburg, 1999). According to this guidance, approximately 70 to 80 percent of a domestic/industrial water supply for a community is discharged as wastewater, either to a sanitary or storm sewer system (Lindeburg, 1999). To be conservative, wastewater discharge estimates for both Dyess and Ellsworth AFB are calculated using the assumption that 80 percent of the estimated potable water usage associated with the Proposed Action at each base will be discharged to the respective wastewater treatment system. It is important to note that the overall wastewater discharge rate for a facility usually represents a combination of sources; water other than sanitary can flow into the system from surface runoff, cross connections between storm and sanitary sewers, groundwater, and other miscellaneous sources. This analysis focuses only on the increase in wastewater directly related to the increase in potable water usage.

The estimated rates of wastewater discharge are then compared to the permitted wastewater treatment system capacity for each base to determine if each system would be sufficient to support the estimated increase in wastewater discharge. If the amount of wastewater estimated causes the permitted capacity to be exceeded, potentially adverse wastewater discharge impacts could result. To accommodate the additional wastewater and achieve discharge standards, permit adjustments coordinated with the provider could be made.

In addition to the water supplied to the base on a daily basis, there is also on-base water storage that can contribute to the wastewater rate.

Electricity and Natural Gas

The context and intensity for the proposed B-21 mission is used to quantify potential consequences upon electricity and natural gas resources. Current consumption of electricity was compared to the capacity to generate electricity at both Dyess and Ellsworth AFB. The natural gas infrastructure capability was considered by comparing the current capacity at each base against the current level of natural gas consumed. A large amount of excess natural gas capacity currently exists at both bases.

3.13.2 Utilities and Infrastructure, Environmental Consequences

3.13.2.1 No Action Alternative Consequences

3.13.2.1.1 No Action at Dyess AFB

Under the No Action Alternative, the B-21 would not beddown at Dyess AFB and would not require the use of existing utilities or the establishment of new utilities in areas on base currently without utilities. The existing conditions discussed in Section 3.13.1.2 (Utilities and Infrastructure, Region of Influence) describe the current state of utilities, which would continue under the No Action Alternative and serve as a baseline for the analysis under the Proposed Action.

Potable Water

The average potable water usage rate at Dyess AFB over the past 5 years has shown a slight decrease, with a maximum average of 200,000 gallons per day in 2017 to a minimum average of 169,000 gallons per day in 2019. Assuming this trend in the usage rate would continue, there would be no anticipated increase in the annual water usage under the No Action Alternative.

Wastewater

Based on the assumption that the potable water usage rate would remain steady under the No Action Alternative, wastewater usage would also be expected to remain the same. There would be no anticipated increase in annual wastewater discharge under the No Action Alternative.

Electricity and Natural Gas

According to historical facility metering data, annual average demands for electricity have actually decreased from 2013 to 2018 on Dyess AFB (Dyess AFB, 2019b). Assuming this trend would continue, there would be no increase in electricity usage under the No Action Alternative.

Based on data provided for potable water usage, there has been no significant increase in personnel at Dyess AFB over the past 5 years. If population is to continue to remain steady, natural gas usage would also be expected to stay the same under the No Action Alternative. There would be no increase in natural gas usage under the No Action Alternative.

3.13.2.1.2 No Action at Ellsworth AFB

Under the No Action Alternative, the B-21 would not be beddown at Ellsworth AFB, and therefore, would not require the use of existing utilities. The existing conditions discussed in Section 3.13.1.2 (Utilities and Infrastructure, Region of Influence) describe the current state of utilities, which would continue under the No Action Alternative and serve as a baseline for the analysis under the Proposed Action.

Potable Water

Based on the average potable water usage rate over the past 5 years (165 million gallons per year), Ellsworth AFB has not had a significant increase in potable water usage (Cleberg, 2020). Assuming this usage rate would remain steady, there would be no anticipated increase in the annual water usage under the No Action Alternative.

Wastewater

Based on the assumption that the potable water usage rate would not increase under the No Action Alternative, wastewater usage would also be expected to remain steady. There would be no anticipated increase in annual wastewater discharge under the No Action Alternative.

Electricity and Natural Gas

Based on data provided for potable water usage, there has been no significant increase in personnel at Ellsworth AFB over the past 5 years. If population is to continue to remain steady, electricity and natural gas utility usage would also be expected to stay the same under the No Action Alternative. There would be no anticipated usage increase in electricity and natural gas under the No Action Alternative.

3.13.2.2 Dyess AFB Alternative

The Proposed Action to beddown the B-21 MOB at Dyess AFB would result in a 39 percent increase in personnel (see Table 3.0-1). For this reason, utility usage would be expected to increase based on the proposed changes.

3.13.2.2.1 Personnel

Potable Water

Potable water usage and capacity is based on personnel; an explanation of potable water estimates is provided in Section 3.13.1.3 (Utilities and Infrastructure, Analysis Methodology, Potable Water). As discussed in Section 3.13.1.2.1 (Utilities and Infrastructure, Region of Influence, Dyess AFB), Dyess AFB currently uses approximately 169,000 gallons of water per day on average, which is an estimated 62 million gallons per year. Based on projected personnel increase associated with the B-21 MOB 1 beddown and the current estimated daily usage, water usage would be expected to increase to approximately 235,000 gallons per day or 86 million gallons per year.

The current water supply capacity at Dyess AFB is more than sufficient to support the increased growth associated with the B-21 MOB 1 beddown (see Section 3.13.1.2.1, Utilities and Infrastructure, Region of Influence, Dyess AFB). Because the additional potable water requirements would not exceed the contracted limits of 5 MGD or system design capacity of 416,000 gallons per day, it is expected that there would be no adverse impacts on the potable water system as a result of the Dyess AFB Proposed Action.

Wastewater

For this analysis, wastewater rates are proportional to water supply, which is determined based on personnel. An explanation of wastewater estimates is provided in Section 3.13.1.3 (Utilities and Infrastructure, Analysis Methodology, Wastewater). As discussed in Section 3.13.1.2.1 (Utilities and Infrastructure, Region of Influence, Dyess AFB), Dyess AFB currently discharges between 0.3 and 1.8 MGD of wastewater. Based on the methodology described in Section 3.13.1.3 (Utilities and Infrastructure, Analysis Methodology), 80 percent of the current estimated potable water supply is 135,200 gallons per day. The difference between the calculated wastewater rate associated with the potable water supply and the total wastewater discharge rate received by the municipal collection system is 0.2 to 1.7 MGD.

Based on the projected increase in water usage associated with the B-21 MOB 1 beddown (235,000 gallons per day), wastewater rates specifically associated with the increased potable water supply would be estimated at 188,000 gallons per day. To determine the total wastewater discharge rate (to include other potential wastewater sources), the 188,000 gallons is added to the calculated difference (0.2 to 1.7 MGD) for an estimated rate of 0.4 to 1.9 MGD. The current permitted wastewater discharge capacity allowed by the receiving wastewater treatment plant is 3 MGD; therefore, there would be sufficient capacity to support the increased growth associated with the B-21 MOB 1 beddown (see Section 3.13.1.2.1, Utilities and Infrastructure, Region of Influence, Dyess AFB). Because the additional wastewater discharge requirements would not exceed the permit limits of 3 MGD, it is expected that there would be no adverse impacts on the wastewater system as a result of the Dyess AFB Alternative.

Electricity and Natural Gas

Based on the current average usage (see Section 3.13.1.2.1, Utilities and Infrastructure, Region of Influence, Dyess AFB) and the number of personnel under the No Action Alternative, it is estimated that each person uses approximately 0.0006 mVA. Under the Proposed Action, it is estimated that the base would support an additional 3,953 personnel (Table 3.5-16), which would equate to an additional 2.4 mVA of usage. As a result, total average usage of electricity under the Proposed Action would be estimated at 10.4 mVA, which is well below the electrical system capacity of 40.43 mVA. Therefore, there would be no adverse impacts on the electrical system as a result of the Dyess AFB Alternative.

Using the same method for calculating natural gas usage, it is estimated that each person uses 0.05 MCF per day on average. Based on the increase of personnel under the Proposed Action, the natural gas requirement would increase by an estimated 198 MCF per day, for a total usage of 655 MCF per day. As described in Section 3.13.1.2.1 (Utilities and Infrastructure, Region of Influence, Dyess AFB), there is ample capacity for the increase in natural gas usage under the Proposed Action (3,000 MCF per day). There would be no adverse impacts on the natural gas supply at Dyess AFB.

3.13.2.2.2 Airfield Operations

Airfield operations associated with the B-21 MOB 1 beddown at Dyess AFB would not directly impact utilities and infrastructure and are not discussed further in this section.

3.13.2.2.3 Airspace and Range Utilization

Airspace and range utilization associated with the B-21 MOB 1 beddown at Dyess AFB would not directly impact utilities and infrastructure and is not discussed further in this section.

3.13.2.2.4 Facilities and Infrastructure

There would be a number of new facilities constructed to support the B-21 MOB 1 beddown at Dyess AFB. See Table 2.4-1 for a list of the facilities proposed for C&D under the Proposed Action. Impacts to utilities have been calculated based on personnel numbers and are addressed in Section 3.13.2.2.1 (Utilities and Infrastructure, Dyess AFB Alternative, Personnel) above.

3.13.2.2.5 Weapons Generation Facility

Construction of the WGF would have minimal impact on utilities usage at Dyess AFB. As addressed in Section 3.13.2.2.1 (Utilities and Infrastructure, Dyess AFB Alternative, Personnel) and Section 3.13.2.2.4 (Utilities and Infrastructure, Dyess AFB Alternative, Facilities and Infrastructure), there is ample available capacity in regards to potable water, wastewater, electricity, and natural gas systems at Dyess AFB. However, as depicted in Figure 3.13-1, extension of the natural gas, potable water, and wastewater systems may be required for the proposed WGF location. There would be no adverse impacts anticipated in relation to utilities as a result of the WGF construction.

3.13.2.2.6 Snapshot

Under the Snapshot Scenario, the number of personnel located at Dyess AFB would increase over the No Action Alternative during the transition from the B-1 to the B-21 (see Table 3.0-1). Under this scenario, the potential impacts associated with this snapshot analysis would be similar to those presented in Section 3.13.2.2.1 (Utilities and Infrastructure, Dyess AFB Alternative, Personnel). During the transition, there would be a slight, but temporary, increase in personnel over the Proposed Action. The temporary increase would be minute (4 percent) when compared to the available utility capacity described under the current baseline conditions (see Section 3.13.1.2.1, Utilities and Infrastructure, Regions of Influence, Dyess AFB).

3.13.2.2.7 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

No utilities and infrastructure mitigations are proposed specific to the B-21 MOB 1 beddown at Dyess AFB.

3.13.2.3 Ellsworth AFB Alternative (Preferred Alternative)

The Proposed Action to beddown the B-21 MOB at Ellsworth AFB would result in a 30 percent increase in personnel (Table 3.5-22). For this reason, utility usage would be expected to increase based on the proposed changes.

3.13.2.3.1 Personnel

Potable Water

Potable water usage and capacity is based on personnel; an explanation of potable water estimates is provided in Section 3.13.1.3 (Utilities and Infrastructure, Analysis Methodology, Potable Water). As discussed in Section 3.13.1.2.2 (Utilities and Infrastructure, Region of Influence, Ellsworth AFB), Ellsworth AFB currently uses approximately 500,000 gallons of water per day on average, which is an estimated 165 million gallons per year. Based on the projected personnel increase associated with the B-21 MOB 1 beddown and the current estimated daily usage, water usage would be expected to increase to approximately 650,000 gallons per day or 237 million gallons per year.

The current water supply capacity at Ellsworth AFB is more than sufficient to support the increased growth associated with the B-21 MOB 1 beddown (see Section 3.13.1.2.2, Utilities and Infrastructure, Region of Influence, Ellsworth AFB). Because the additional potable water requirements would not exceed the water supply capacity of 977,553,000 gallons per year, it is expected that there would be no adverse impacts on the potable water system as a result of the Ellsworth AFB Alternative.

Wastewater

For this analysis, wastewater rates are proportional to water supply, which is determined based on personnel; an explanation of wastewater estimates is provided in Section 3.13.1.3 (Utilities and Infrastructure, Analysis Methodology, Wastewater). As discussed in Section 3.13.1.2.2 (Utilities and Infrastructure, Region of Influence, Ellsworth AFB), Ellsworth AFB currently discharges approximately 0.5 MGD of wastewater. Based on the methodology described in Section 3.13.1.3 (Utilities and Infrastructure, Analysis Methodology), 80 percent of the current estimated potable water supply is 400,000 gallons per day. The difference between the calculated wastewater rate associated with the potable water supply and the total wastewater discharge rate received by the wastewater treatment facility is 100,000 gallons per day.

Based on the projected increase in water usage associated with the B-21 MOB 1 beddown (650,000 gallons per day), estimated wastewater rates specifically associated with the increased potable water supply would be approximately 520,000 gallons per day. To determine the total wastewater discharge rate (to include other potential wastewater sources), the 520,000 gallons is added to the calculated difference (100,000 gallons per day) for an estimated rate of 620,000 gallons per day. The current permitted wastewater discharge capacity allowed by the receiving wastewater treatment plant is 1.5 MGD;

therefore, there would be sufficient capacity to support the increased growth associated with the B-21 MOB 1 beddown (see Section 3.13.1.2.2, Utilities and Infrastructure, Region of Influence, Ellsworth AFB). Because the additional wastewater discharge requirements would not exceed the permit limits of 1.5 MGD, it is expected that there would be no adverse impacts on the wastewater system as a result of the Ellsworth AFB Alternative.

Electricity and Natural Gas

Based on the current average usage (see Section 3.13.1.2.2, Utilities and Infrastructure, Region of Influence, Ellsworth AFB) and the number of personnel under the No Action Alternative, it is estimated that each person uses approximately 0.0004 percent of capacity. Under the Proposed Action, it is estimated that the base would support an additional 3,147 personnel (Table 3.5-22), which would equate to an additional 1.25 percent of usage. As a result, total average usage of electricity under the Proposed Action would be estimated at 39 percent capacity, leaving 61 percent capacity available for growth under the Ellsworth AFB Alternative.

Using the same method for calculating natural gas usage, it is estimated that each person uses 0.13 MCF per day on average. Based on the increase of personnel under the Proposed Action, the natural gas requirement would increase by an estimated 407 MCF per day, for a total usage of 1,750 MCF per day. As described in Section 3.13.1.2.2 (Utilities and Infrastructure, Region of Influence, Ellsworth AFB), there is ample capacity for the increase in natural gas usage under the Proposed Action (4,069 MCF per day). There would be no adverse impacts on the natural gas supply at Ellsworth AFB.

3.13.2.3.2 Airfield Operations

Airfield operations associated with the B-21 MOB 1 beddown at Ellsworth AFB would not directly impact utilities and infrastructure and are not discussed further in this section.

3.13.2.3.3 Airspace and Range Utilization

Airspace and range utilization associated with the B-21 MOB 1 beddown at Ellsworth AFB would not directly impact utilities and infrastructure and is not discussed further in this section.

3.13.2.3.4 Facilities and Infrastructure

There would be a number of new facilities constructed to support the B-21 MOB 1 beddown at Ellsworth AFB. See Table 2.5-1 for a list of the facilities proposed for C&D under the Proposed Action. Impacts to utilities have been calculated based on personnel numbers are addressed in Section 3.13.2.3.1 (Utilities and Infrastructure, Ellsworth AFB Alternative, Personnel) above.

3.13.2.3.5 Weapons Generation Facility

Construction of the WGF would have minimal impact on utilities usage at Ellsworth AFB. As addressed in Sections 3.13.2.3.1 (Utilities and Infrastructure, Ellsworth AFB Alternative, Personnel) and 3.13.2.3.4 (Utilities and Infrastructure, Ellsworth AFB Alternative, Facilities and Infrastructure), there is ample available capacity in regards to

potable water, wastewater, electricity, and natural gas systems. There would be no adverse impacts anticipated in relation to utilities as a result of the WGF construction.

North WGF Site Subalternative

While there is ample utility capacity to support construction of the WGF at Ellsworth AFB, selection of the North WGF Site Subalternative may require extension of the electrical, natural gas, potable water, and wastewater systems. See Figure 3.13-2 for depiction of the utility lines in relation to the proposed site.

South WGF Site Subalternative (Preferred Subalternative)

While there is ample utility capacity to support construction of the WGF at Ellsworth AFB, selection of the South WGF Site Subalternative may require extension of the wastewater system. See Figure 3.13-2 for depiction of the utility lines in relation to the proposed site.

3.13.2.3.6 Snapshot

Under the Snapshot Scenario, the number of personnel located at Ellsworth AFB would increase over the No Action Alternative during the transition from the B-1 to the B-21 (see Table 3.0-2). Under this scenario, the potential impacts associated with this snapshot analysis would be similar to those presented in Section 3.13.2.3 (Utilities and Infrastructure, Ellsworth AFB Alternative). During the transition, there would be a slight, but temporary, increase in personnel over the Proposed Action. The temporary increase would be minute (5 percent) when compared to the available utility capacity described under the current conditions (see Section 3.13.1.2.2, Utilities and Infrastructure, Region of Influence, Ellsworth AFB).

3.13.2.3.7 Proposed Resource-Specific Mitigations and Management Actions to Reduce the Potential for Environmental Impacts

No utility and infrastructure mitigations are proposed specific to the B-21 MOB 1 beddown at Ellsworth AFB.

4. CUMULATIVE EFFECTS AND OTHER ENVIRONMENTAL CONSIDERATIONS

4.1 CUMULATIVE EFFECTS

4.1.1 Introduction

According to CEQ regulations, the cumulative effects analysis of an EIS should consider the potential environmental impacts resulting from “the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions” (40 CFR 1508.7).

Cumulative effects may occur when there is a relationship between a proposed action or alternative and other actions expected to occur in a similar location or during a similar time period. This relationship may or may not be obvious. The effects may then be incremental and may result in cumulative impacts. Actions overlapping with or in close proximity to the Proposed Action or alternatives can reasonably be expected to have more potential for cumulative effects on “shared resources” than actions that may be geographically separated. Similarly, actions that coincide in the same timeframe tend to offer a higher potential for cumulative effects.

Accordingly, the USAF has made an effort to identify actions on or near the areas that are under consideration and in the planning stage at this time. These actions are included in the cumulative effects analysis to the extent that details regarding such actions exist and the actions have a potential to interact with the proposed alternatives outlined in this EIS. Although the level of detail available for those future actions varies, this approach provides the most current information. The EIS addresses cumulative impacts to assess the incremental contribution of the alternatives to impacts on affected resources from all factors.

The analysis first discusses past actions, events, and circumstances that are relevant to the environments associated with each of the B-21 MOB 1 beddown alternatives. Following is a discussion of other actions that, when combined with military activities and conceptual construction actions, may result in incremental impacts.

4.1.2 Dyess AFB Cumulative Effects

4.1.2.1 Dyess AFB Relevant Past and Present Actions

The relevant past and present actions associated with the impacts of the Proposed Action include continued use of Dyess AFB for the B-1 mission activities, plus nearby development and infrastructure improvements such as roads, pipelines, and power transmission lines. Past and present actions in and around the action areas associated with these activities may have cumulative effects on the local environment.

Dyess AFB Infrastructure Repairs/Upgrades

- A major water main replacement project has been completed to replace the original 1957 asbestos-cement pipe. Dyess AFB's water mains were replaced by a three-phase effort. A water tower renovation project has also been recently accomplished. These efforts will improve water use on the base (Dyess AFB, 2018b; Downing, 2020).
- There is a current project to repair the base electrical distribution system. Based on discussion with 7th CES personnel during the November 2019 site visit, plans include upgrading the Charlie substation to have a 4-megawatt capacity as part of the Energy Savings Performance Contract (Dyess AFB, 2020; Ford et al., 2019).

Dyess AFB Dormitories

The base has programmed a new dormitory (approximately 60,000 square feet) for construction. Four more dormitories (approximately 113,000 square feet) have been awarded and are under renovation. Several demolitions are planned (approximately 111,000 square feet), with two buildings currently available to be demolished. Three buildings will be vacated with the Security Forces consolidation and one building with the Cyber Intel C2 facility project. This demolition will clear the area of administrative functions housed in former dining facilities associated with the dormitories, clearing the way for development of new dormitories should new missions require them (Downing, 2020).

Wylie Independent School District Bond 2019 Program

The purpose of the 2019 bond program is to accommodate the growing student population within the Wylie Independent School District (ISD). The bond proposal includes approximately \$211.9 million in renovations and additions to two high schools, three junior high schools, two intermediate schools, and seven elementary schools in the district (Wylie ISD, 2019a). As of March 2020, structural foundation work had begun and continues at Wylie East High School, and work on additions and renovations to Bush Elementary, Cox Elementary, Watkins Elementary, and Harrison Intermediate are scheduled to begin once contract details have been completed (Wylie ISD, 2019b).

Dyess AFB Community Center Complex

Although most redevelopment of the family housing area has been completed, a new community center complex was recently completed by the private owner, Balfour Beatty Communities of Newtown Square, Pennsylvania (Downing, 2020). The existing community center building (including parking, green space, pavilions, tennis courts, etc.) encompasses 8 acres, with the facility itself being 5,830 square feet in size. For the purpose of this analysis, it is assumed that the new proposed complex is to be approximately equivalent in size. The terms of the partnership are such that the private owner owns the houses outright (674 separate dwelling units at Dyess AFB) and leases the ground upon which the housing neighborhoods are situated. The land subject to the ground lease is described in *Dyess Air Force Base, Taylor County, Texas, ALTA/ACSM*

Land Title Survey, ACC III Housing (Ground Survey). All the existing roads and streets within the housing area are maintained by the private owner (except for a section of Texas Street). The utilities (electrical, natural gas, wastewater, and water) are subject to maintenance based on the Points of Demarcation (Dyess AFB, 2018b).

4.1.2.2 Dyess AFB Reasonably Foreseeable Future Actions

For the purposes of facilitating cumulative impact analysis, reasonably foreseeable actions have been categorized as those projects outside of the control of Dyess AFB; generally, these are regional development projects. Based on their scope, projects have been identified that may contribute incrementally to impacts associated with the Proposed Action; projects that the USAF considered minor in scope (e.g., building of a courthouse annex, improvements to roadways for pedestrians, etc.) are not identified here and were not included in the impact analysis.

Air Force Reserve Command F-35A Operational Mission

The Air Force Reserve Command is proposing a beddown action that includes Joint Base Fort Worth. This action would include 24 F-35As with two backup inventory aircraft. The F-35A aircraft would replace the Air Force Reserve Command F-16 fighters and utilize Lancer and Brownwood MOAs for aircraft operations.

Abilene Independent School District (AISD) Development Plans

A meeting was conducted by the 2018 Bond Oversight Committee on December 19, 2018, to discuss the status of 2018 Bond Projects. Major projects addressed during the meeting that may contribute incrementally to impacts associated with the Proposed Action include the following (AISD, 2019):

- **Academy of Technology, Engineering, Mathematics and Science/Career and Technical Education (ATEMS/CTE) Center**—A new 124,000-square foot facility, to be called “The LIFT,” is being constructed to hold the ATEMS and CTE schools on Texas State Technical College Campus, off of Loop 322, near Abilene Regional Airport. Anticipated construction is to take place during the 2020–21 timeframe (Gersh, 2019; Abilene ISD News, 2019).
- **New Dyess Elementary School**—A new two-story elementary school (approximately 101,000 square feet) is planned to be constructed on the existing Dyess Elementary School campus (McLean, 2020), which is located southeast of Dyess AFB, just outside the boundary. The current campus buildings, which total approximately 60,000 square feet, would be demolished. Construction plans also include the relocation of a 16-inch water line in early 2020, with construction to follow (AISD, 2019). Anticipated completion date for construction is July 2021, with the new school scheduled to open in August 2021 (Jensen, 2019; McLean, 2020).

4.1.2.3 Dyess AFB Cumulative Effects Analysis

4.1.2.3.1 Airspace Use and Management

The only potential overlapping action with the B-21 beddown at Dyess AFB is the proposed AFRC F-35A basing at Naval Air Station Fort Worth, identified in Section 4.1.2.2 (Dyess AFB Reasonably Foreseeable Future Actions). These two actions would only overlap with regards to aircraft operations within Brownwood MOA and Lancer MOA. Neither action would affect airspace utilization. For the Dyess AFB Alternative, there are no proposed physical changes (external boundaries, dimensions, altitudes, etc.) to any airspace currently utilized. Therefore, no cumulative impacts to airspace use and management would be anticipated from the Dyess AFB Alternative combined with past, present, and reasonably foreseeable actions.

Changes resulting from the Dyess AFB Alternative would be limited to how the airspace is used, particularly with introduction of the B-21. Although additional airspace is not required, certain airspace may be utilized more extensively, while use of other airspace units may decrease. Therefore, the utilization of the current airspace would likely be modified. The result would potentially change the noise levels, patterns, and dispersal over how these areas are currently used. Additionally, changes in utilization of the airspace could also potentially change the air quality within the affected airspace. Potential cumulative impacts on noise and air quality are provided in Section 4.1.2.3.2 (Noise) and Section 4.1.2.3.3 (Air Quality).

4.1.2.3.2 Noise

Cumulative noise impacts consist of the combined potential effects resulting from the Proposed Action and applicable past, present, and reasonably foreseeable future projects described in Section 4.1.2.1 (Dyess AFB Relevant Past and Present Actions) and Section 4.1.2.2 (Dyess AFB Reasonably Foreseeable Future Actions). Noise modeling was conducted to assess cumulative impacts by combining operations for both the Dyess AFB Alternative and the proposed AFRC F-35A basing at Naval Air Station Fort Worth. The overlap of these two proposed actions occur at Brownwood MOA and Lancer MOA. At Brownwood MOA, neither action contributes to the overall cumulative noise levels. The combination of both actions do not generate L_{dnmr} levels above 35 dB. For proposed missions at Lancer MOA, the cumulative L_{dnmr} noise levels would be 43.5 dB, which is similar to L_{dnmr} noise levels associated with the No Action Alternative (43.4 dB), but represents an 8.5-dB increase from the Dyess AFB Alternative (less than 35 dB).

Therefore, the increase in cumulative noise levels resulting from combining B-21 operations with the proposed AFRC F-35A would offset noise reductions associated with the Dyess AFB Alternative to levels similar to baseline conditions modeled for the No Action Alternative. As a result, there would be no significant cumulative noise impacts from operations in the airspace.

Other potential cumulative effects of noise on the surrounding communities, wildlife, and cultural resources would be associated with construction and other noise-generating activities, operation of new facilities, and increased aircraft and vehicle use.

Several projects would involve construction or demolition of USAF facilities, and community construction projects could also contribute to noise in the area. The majority of the relevant past and present actions considered as part of the cumulative impacts in Section 4.1.2.1 (Dyess AFB Relevant Past and Present Actions) and Section 4.1.2.2 (Dyess AFB Reasonably Foreseeable Future Actions) involve construction of a new facility or demolition or renovation of an existing facility. Construction noise is temporary, lasting only for the duration of the construction project and typically limited to normal working hours (7:00 a.m. to 5:00 p.m.). However, construction noise would be noticeable to persons living and working nearby and may cause additional annoyance. Noise impacts associated with these projects are expected to be limited to the immediate areas surrounding the individual projects and would be insignificant both separately and cumulatively. Under the Dyess AFB Alternative, aircraft noise would decrease in the region, as shown and discussed in Section 3.2 (Noise). As a result, there would be no incremental noise impacts from the Dyess AFB Alternative. Furthermore, no significant cumulative impacts from noise are anticipated from the Dyess AFB Alternative combined with past, present, and reasonably foreseeable future projects.

4.1.2.3.3 Air Quality

Cumulative effects to air quality consist of the combined potential effects resulting from the Proposed Action and applicable past, present, and reasonably foreseeable future projects described in Section 4.1.2.1 (Dyess AFB Relevant Past and Present Actions) and Section 4.1.2.2 (Dyess AFB Reasonably Foreseeable Future Actions). These projects would result in direct emissions of criteria pollutants and GHGs. Potential cumulative effects to air quality would be associated with combustion of fossil fuels during construction, transportation, and operation of new facilities.

Dyess AFB infrastructure repairs and dormitory construction would involve construction of USAF facilities. In addition, air emissions would result from the proposed community projects, such as the new ATEMS/CTE Center, and Dyess Elementary School demolition and construction would also contribute air emissions. For some of these projects, air emissions would cease once the initial construction phase is complete, such as the infrastructure repairs. Other projects, such as the ATEMS/CTE Center and Dyess AFB Community Center Complex, would result in minimal increased long-term emissions, such as those associated with heating and transportation. Furthermore, any projects that would include larger emissions-generating sources would be subject to permitting requirements under New Source Review (NSR)/PSD and/or Title V Air Construction or Air Operation permits. With implementation of permit requirements and appropriate management practices, the cumulative amount of emissions resulting from the Dyess AFB Alternative and other past, present, and future actions is unlikely to significantly affect regional air quality. As a result, no significant cumulative impacts to air quality are anticipated from the Dyess AFB Alternative combined with past, present, and reasonably foreseeable future projects.

4.1.2.3.4 Land Use

Cumulative effects to land use consist of the combined potential effects resulting from the Dyess AFB Alternative and applicable past, present, and reasonably foreseeable future projects described in Section 4.1.2.1 (Dyess AFB Relevant Past and Present Actions) and Section 4.1.2.2 (Dyess AFB Reasonably Foreseeable Future Actions). Potential cumulative effects would be associated with changes to on-base and off-base land use compatibility related to infrastructure and facility placement and noise.

Water mains replacement, electrical substation expansion, dormitory construction and renovation, and community center complex development would occur within the installation boundary. It is expected that all activities would be conducted in accordance with applicable installation land use planning procedures and requirements, including guidance contained in the IDP and future land use plan. Projects related to water and electrical supply would result in either no or only minor expansion of the existing infrastructure footprint; therefore, no change to existing land use would be required. Dormitory construction and renovation and community center complex development would occur in areas compatible with those land uses. Noise levels associated with aircraft operations would be less than 65 dB DNL at the dormitory and community center complex sites. Noise generated during infrastructure, construction, and demolition projects would be temporary and would not affect land use on or adjacent to the installation.

The ATEMS/CTE schools and Dyess Elementary School sites, which are located outside the installation boundary, would not be exposed to aircraft noise levels above 65 dB DNL. In addition, the sites are located outside the aircraft APZs and would not result in safety issues due to building height. Therefore, the Dyess AFB Alternative would not have significant cumulative impacts to land use.

4.1.2.3.5 Socioeconomics

Personnel changes and facility construction and modifications would generate economic activity in the ROI. Implementation of the B-21 beddown separately or in conjunction with relevant past, present, and reasonably foreseeable future projects within the ROI would increase the demand for employment, as well as for housing, schools, and other services within the region. Construction of the Dyess AFB Dormitories and the new Dyess Elementary School and the 2019 bond proposal for schools in the Wylie ISD would address some of the housing and education demands. Incremental effects of the B-21 beddown, in combination with potential impacts associated with other Dyess AFB projects, would be expected to create employment and population growth. This growth has the potential to result in cumulative impacts to socioeconomic resources in the ROI. On-base projects would increase demand for socioeconomic resources, while off-base projects would have the potential to address some of the increased demand, especially for labor and housing.

4.1.2.3.6 Environmental Justice

A number of projects have been identified (Section 4.1.2.1, Dyess AFB Relevant Past and Present Actions, and Section 4.1.2.2, Dyess AFB Reasonably Foreseeable Future Actions) that are in proximity to construction activities in the Proposed Action area. All projects identified involve the construction of new facilities and are not anticipated to have adverse impacts to environmental justice or other sensitive populations. There is a potential that projects such as the construction of the new Dyess Elementary School, the ATEMS/CTE Center, and the Dyess AFB Community Center Complex would have a positive impact on environmental justice and other sensitive populations, due to increased access to educational and recreational facilities.

Environmental justice analysis in this EIS indicated that no adverse impacts would occur to environmental justice or other sensitive populations and that implementing the Proposed Action would result in positive impacts. Therefore, no disproportionately high and adverse cumulative impacts to environmental justice or other sensitive populations would be anticipated from the Proposed Action combined with past, present and reasonably foreseeable future projects.

4.1.2.3.7 Biological Resources

A number of projects have been identified (Section 4.1.2.1, Dyess AFB Relevant Past and Present Actions, and Section 4.1.2.2, Dyess AFB Reasonably Foreseeable Future Actions) that are in proximity to construction, demolition, and renovation activities in the Proposed Action area. These construction-related activities would have similar biological resource impacts as those described in this EIS. Impacts would include disturbance or reduction of existing habitat (greater than 10 acres) for wildlife species that occur on the base. There would also be short-term increases in noise resulting from proposed construction, demolition, and renovation activities. Short-term additive noise effects would only occur if construction activities from the Proposed Action and cumulative actions were conducted during the same timeframe. In addition to these impacts, runway improvements at the Ellsworth AFB airfield would impact wetland habitat potentially utilized by migratory birds with the possibility of reducing bird habitat areas on the base. Coordination is ongoing with USACE for that project, and it is assumed that the project mitigation plan would reduce those potential impacts below a significant impact threshold.

Aircraft operations associated with the Dyess AFB Alternative were found to have no significant impacts to noise-sensitive wildlife, special status species, migratory birds (including BCC), and bald or golden eagles within the training airspace and ranges. None of the past, present, or reasonably foreseeable future projects identified in Section 4.1.2.1 (Dyess AFB Relevant Past and Present Actions) and Section 4.1.2.2 (Dyess AFB Reasonably Foreseeable Future Actions) have the potential to interact with aircraft operations or increase the noise levels in the training airspace and ranges. Therefore, no cumulative impacts to biological resources would be anticipated from the Proposed Action combined with past, present and reasonably foreseeable future actions.

4.1.2.3.8 Cultural Resources

Cumulative impacts to cultural resources can result from alterations or demolition of historic structures or disturbance of archaeological resources that incrementally diminish the integrity of the cultural resources at Dyess AFB. Previous comprehensive archaeological studies and needs assessments conducted at Dyess AFB have not identified archaeological resources eligible for listing in the NRHP (Section 3.8.1.2.1 (Cultural Resources, Region of Influence, Dyess AFB)). These studies provided coverage of all portions of the base likely to contain intact archaeological deposits, and significant archaeological resources were not identified. Therefore, implementing the Dyess AFB Alternative along with the relevant past and present actions would not impact archaeological resources. As a result, no cumulative effects to archaeological resources are expected. If any of these projects result in inadvertent discoveries, SOP 5 in the Dyess AFB ICRMP would be followed (USAF, 2017a).

Dyess AFB does not contain any eligible historic districts, and the proposed B-21 MOB 1 beddown at Dyess AFB would not directly impact any eligible historic structures. If the proposed work on the Dyess AFB Dormitories has the potential to affect historic structures, the USAF will follow SOP 1 (New Construction) and SOP 2 (Demolition) of the Dyess AFB ICRMP to implement Section 106 of the NHPA (USAF, 2017a). No cumulative effects associated with this Proposed Action are expected.

4.1.2.3.9 Physical Resources

Construction-related soil disturbance from concurrent construction projects at multiple adjacent locations may result in cumulative impacts. If the construction of facilities associated with the Dyess AFB Alternative occur simultaneous to construction of the Dyess AFB Dormitories or the Dyess AFB Community Center Complex, wind-borne eroded soil and increased transport through stormwater runoff can have cumulative impacts on water quality. Impacts from soil disturbance from concurrent construction activities would be minimized by consistently implementing erosion and sediment control practices.

Military activities associated with the new B-21 aircraft at multiple facilities, when B-21 MOB 1 is established, may also result in potential cumulative impacts on water resources. However, consistent basewide application of BMPs and control measures for hazardous material handling, hazardous waste disposal, spill prevention, and stormwater management will reduce the likelihood of cumulative effects.

4.1.2.3.10 Hazardous Materials and Hazardous and Solid Waste

Construction of projects under the Dyess AFB Alternative, in combination with past, present, or reasonably foreseeable future actions listed in Section 4.1.2.1 (Dyess AFB Relevant Past and Present Actions) and Section 4.1.2.2 (Dyess AFB Reasonably Foreseeable Future Actions), would result in contributions of MSW and C&D debris to regional landfills. As standard practice for proposed projects, C&D waste would be diverted from the landfill to the greatest extent possible through reuse or recycling. Waste

would either be segregated and recycled at a certified facility or disposed of (for mixed or nonsegregated waste) at a certified recycling facility.

As result of the Dyess AFB Alternative, 10,560 tons of solid waste would be disposed of at the Abilene Environmental Landfill. As discussed in Section 3.1.1.2.1 (Airspace, Region of Influence, Dyess AFB), the Abilene Environmental Landfill receives approximately 220,000 tons of mixed waste per year. The combined quantity of C&D debris and MSW generated at Dyess AFB under this alternative would only represent approximately 5 percent of average annual landfill disposal. At its current disposal capacity, the landfill is expected to remain in operation for an additional 63 years. Solid waste from the Dyess AFB Alternative would be generated over multiple years, further limiting any potential impacts. For cumulative actions, construction of new facilities would be addressed under separate and specific environmental reviews. Because landfill capacity is anticipated to be sufficient for the combined demand of the cumulative actions, as well as projects under the Dyess AFB Alternative, cumulative impacts on solid waste facilities would be less than significant.

There would be no cumulative impacts associated with management of hazardous materials, toxic substances, hazardous wastes, or ERP sites. These would continue to be managed according to established procedures.

4.1.2.3.11 Health and Safety

Flight, ground, and munitions safety associated with B-21 operations are not expected to have any cumulative effects in conjunction with other past, present, and reasonably foreseeable future actions. Proposed activities would be similar in nature to existing operations, and the USAF would continue to apply established safety, accident mitigation, and crash response procedures. Planned structures would undergo explosive safety reviews to ensure occupancy and land uses would be compatible with all locations. As part of this process, existing explosive safety plans (e.g., ESPs or Aircraft Parking Plans) would be updated as required.

Potential short-term minor impacts to contractor health and safety may occur from implementation of demolition and construction activities. However, construction safety and environmental health effects would not be significant, because risks to workers, potential for offsite dispersion of contaminants, and future exposure to residual onsite contamination would be small and confined to the immediate project site. All actions would be performed in accordance with AFOSH directives and OSHA regulations; no cumulative impacts would occur. Regional cumulative demolition and construction would be required to adhere to OSHA regulations.

4.1.2.3.12 Transportation

Cumulative effects on transportation consist of the combined potential effects resulting from the Dyess AFB Alternative and applicable past, present, and reasonably foreseeable future projects described in Section 4.1.2.1 (Dyess AFB Relevant Past and Present Actions) and Section 4.1.2.2 (Dyess AFB Reasonably Foreseeable Future Actions). Potential cumulative effects would be associated with short-term and long-term changes in traffic patterns and volume, due to construction/demolition/renovation projects and placement of new facilities.

On-base water mains replacement, electrical substation expansion, dormitory construction, demolition and renovation, and community center complex development could potentially require reduced travel speeds near project areas, road-shoulder closures, and lane closures. In addition, commercial vehicles associated with construction crews and delivery and removal of construction materials and debris would be operated on the base. These actions could cause increased traffic volume and congestion on the installation, which would contribute cumulatively to similar impacts potentially resulting from the B-21 beddown. However, the effects would generally be short-term and would affect relatively small portions of the base at any given time. Establishment of the new dormitory and community center complex would not likely change traffic flow patterns on the base noticeably. Overall, there would be no long-term impacts to the on-base transportation system.

C&D activities at Dyess Elementary School would potentially cause delays on roads adjacent to and near the school, including Dub Wright Boulevard. These actions could, therefore, contribute to increased traffic volume and congestion associated with the B-21 beddown. However, the effects would be short-term and would cease after completion of the project. Establishment of the ATEMS/CTE schools could result in a very small population increase (and associated traffic operations) and slightly altered traffic flow patterns near the facilities. However, the project site is located on the eastern side of Abilene (opposite Dyess AFB), and the cumulative contribution to traffic volume would be negligible in the context of personnel additions associated with the B-21 beddown.

4.1.2.3.13 Utilities and Infrastructure

Of the actions described as potentially creating cumulative impacts, two of the current projects are improvements to the existing utility infrastructure and would have a positive impact on water and electricity usage. The current construction of the Dyess AFB Dormitory would increase water, electricity, and natural gas use, but would be balanced out by the demolition of several facilities. For the reasonably foreseeable future actions, only the Dyess AFB Community Center Complex would impact Dyess AFB utility usage; the other projects are located outside the base and would not impact Dyess AFB utility usage. Since the overall use of water, electricity, and natural gas is projected to be considerably less than current capacity, it is not expected that the addition of a community center complex would have a cumulative impact on utilities. In conclusion, there would be no cumulative impact on utilities from past, current, and foreseeable future projects.

4.1.3 Ellsworth AFB Cumulative Effects (Preferred Alternative)

4.1.3.1 Ellsworth AFB Relevant Past and Present Actions

The relevant past and present actions associated with the impacts of the Proposed Action include continued use of Ellsworth AFB for the B-1 mission activities, plus nearby development and infrastructure improvements such as roads, pipelines, and power transmission lines. Past and present actions in and around the action areas associated with these activities may have cumulative effects on the local environment.

Ellsworth AFB Infrastructure Repairs/Upgrades

There have been no significant infrastructure repairs or upgrades completed within the last 5 years or currently under construction at Ellsworth AFB.

Ellsworth AFB Veterinary Clinic

The Ellsworth AFB Veterinary Clinic (8,339 square feet) completed a large-scale renovation for the 28th Medical Group in March 2020. This project also included facilities for the 28th Security Forces Squadron military working dog team (Ellsworth AFB, 2020c).

Ellsworth AFB Attack-Resistant Dormitories

Construction of a dormitory complex was recently completed on Ellsworth AFB to provide additional housing for unaccompanied Airmen. The complex includes up to 140 new rooms, which all meet the latest dormitory design standard of a four-bedroom, partitioned design (Dorms-4-Airmen concept). Each floor consists of a core area that branches into four smaller “pod” areas. Each pod includes a kitchen, laundry area, and four bedrooms. Also included in the design is a common area on each floor (Ellsworth AFB, 2018). Construction of the complex included the following:

- Individual climate control for each room
- Soundproofing of walls and floors
- Energy efficient building and design
- Green building practices, including the use of recycled materials for construction

Eddie's Truck Center, Rapid City

A new tractor-trailer truck center was completed in October 2017. It is 3.4 miles west of Ellsworth AFB. It sits on a 10-acre parcel, southwest of the intersection of I-90 and Highway 16 (also known as North Elk Vale Road). Seven acres of this 10-acre parcel were developed. This facility replaced the previous truck center located on Omaha Street. The construction included the following elements (Dean Kurtz Construction, 2020):

- More than 90,000 cubic yards of fill transported to the site to prepare the land for building
- Geothermal ground-source heat loops to provide geothermal heating and cooling

- An 18,000-square foot service shop
- Various interior spaces (retail shopping, truck service bay, indoor showroom and sales floor, two-story office structure, parts warehouse, and car wash bays)

Fleet Farm Store, Rapid City

Fleet Farm plans to open a new store in Rapid City in the summer of 2020 with construction already underway. The store will be located on Mall Drive, between Lacrosse and North Streets, approximately 5 miles west of Ellsworth AFB. The store will be approximately 190,000 square feet and will bring approximately 200 jobs to the area (Fleet Farm, 2019; Brundige, 2020b).

The Monument (Civic Center), Rapid City

The Monument is currently under construction and located southeast of the intersection of Mount Rushmore Road and North Street. It is 6.7 miles southwest of Ellsworth AFB. The project's completion is planned for the summer of 2021. The Monument is an expansion of the current civic center and will be located directly west of the existing Rushmore Plaza Civic Center. The facility will be approximately 250,000 square feet, to include a new indoor arena with approximately 12,500 seats. This arena is expected to have the capability of hosting a variety of large-scale entertainment and sporting events. Other construction elements include the following (M. A. Mortenson Company, 2020; Black Hills Knowledge Network, n.d.):

- Large arena floor
- Expansive rigging grid
- Up-to-date height clearances and infrastructure to support technical requirements for modern large-scale events
- Minimum seating capacity of 10,000 for an end-stage concert setup
- Loading dock that can handle a 15 to 20-truck show (with appropriate turning radii in access/parking areas)

4.1.3.2 Ellsworth AFB Reasonably Foreseeable Future Actions

For the purpose of facilitating cumulative impact analysis, reasonably foreseeable future actions have been categorized as those projects outside of the control of Ellsworth AFB; generally, these projects are regional development projects. Based on their scope, projects have been identified that may contribute incrementally to impacts associated with the Proposed Action; projects that the USAF considered minor in scope (e.g., building of a courthouse annex, improvements to roadways for pedestrians, etc.) are not identified here and were not included in the impact analysis.

Ellsworth AFB Construction and Infrastructure Repairs/Upgrades

The following projects are proposed for construction for FY21 through FY25 (Ellsworth AFB, 2020d):

- Repair Concrete Slabs - Taxiway G
- Repair Runway 13 Keel Section
- B601 Rehabilitation Project (historic eligible World War II-era hangar)

Additionally, Ellsworth AFB has begun discussions with USACE regarding a project that would fill approximately 1.2 acres of non-wetland riparian and slope vegetation and 0.2 acre of jurisdictional wetlands on the west side of the runway due to BASH concerns. This project has been approved and a mitigation plan is being developed (Brundige, 2020c).

Ellsworth AFB Demolition

There are no significant demolition projects proposed for FY21 through FY25 at Ellsworth AFB.

Interstate 90 and LaCrosse Street Interchange Reconstruction, Rapid City

The South Dakota DOT is planning a reconstruction of the interchange at the intersection of I-90 (Exit 59) and LaCrosse Street, Rapid City (South Dakota DOT, 2020b; South Dakota DOT, 2014). This intersection is a 15-minute drive west of Ellsworth AFB. The project's design and public-involvement phase started in 2019 and is still ongoing. The construction is expected to let to bid in the summer of 2020. The estimated duration of the construction phase is 2 years. The purpose of this project is to accommodate future traffic volume demands projected for 2035 and improve its safety, traffic flow, and road conditions. The need was first identified in the *2010 South Dakota Decennial Interstate Corridor Study* and the *Rapid City Area Metropolitan Planning Organization 2015 Long-Range Transportation Plan*. The design was detailed in the South Dakota DOT's Interchange Modification Justification Report. The proposed design of the interchange includes a Diverging Diamond Interchange configuration.

Capital Improvement Plan and Road Construction Projects, Rapid City

Rapid City's Capital Improvement Plan (CIP) and project list are managed by their Engineering Services Division. The total number of projects that are actively under construction is constantly changing. All the CIP projects are budgeted for, but may not be constructed unless a bid is made, awarded, and approved. The CIP project list primarily focuses on transportation and infrastructure projects, with fewer facility improvements (City of Rapid City, 2020a; City of Rapid City, 2020b; Furchner, 2020). Currently, there are no CIP projects in the construction phase that would have a significant cumulative impact.

4.1.3.3 Ellsworth AFB Cumulative Effects Analysis

4.1.3.3.1 Airspace Use and Management

With the exception of the addition of the B-21 to Ellsworth AFB and drawdown of the B-1, none of the past, present, or reasonably foreseeable future projects identified in Section 4.1.3.1 (Ellsworth AFB Relevant Past and Present Actions) and Section 4.1.3.2 (Ellsworth AFB Reasonably Foreseeable Future Actions) would affect airspace utilization. For the Ellsworth AFB Alternative, there are no proposed physical changes (external boundaries, dimensions, altitudes, etc.) to any airspace currently utilized. Therefore, no cumulative impacts to airspace use and management would be anticipated from the Ellsworth AFB Alternative combined with past, present, and reasonably foreseeable future actions.

Changes from the Ellsworth AFB Alternative would be limited to how the airspace is used, particularly with introduction of the B-21. Although additional airspace is not required, certain airspace units may be utilized more extensively, while use of other airspace units may decrease. Therefore, the utilization of the current airspace would likely be modified, but only within the constraints of the PRTC EIS ROD. The result would potentially change the noise levels, patterns, and dispersal over how the airspace is currently used. Additionally, changes in utilization of the airspace could also potentially change the air quality within the affected airspace. Potential cumulative impacts on noise and air quality are provided in Section 4.1.3.3.2 (Noise) and Section 4.1.3.3.3 (Air Quality).

4.1.3.3.2 Noise

Cumulative noise impacts consist of the combined potential effects resulting from the Ellsworth AFB Alternative and applicable past, present, and reasonably foreseeable future projects described in Section 4.1.3.1 (Ellsworth AFB Relevant Past and Present Actions) and Section 4.1.3.2 (Ellsworth AFB Reasonably Foreseeable Future Actions). Potential cumulative effects of noise on the surrounding communities, wildlife, and cultural resources would be associated with construction and other noise-generating activities, operation of new facilities, and increased aircraft and vehicle use.

Several projects would involve construction or demolition of USAF facilities, and community construction projects could also contribute to noise in the area. The majority of the relevant past and present actions considered as part of the cumulative impacts in Section 4.1.3.1 (Ellsworth AFB Relevant Past and Present Actions) and Section 4.1.3.2 (Ellsworth AFB Reasonably Foreseeable Future Actions) involve construction of a new facility or demolition or renovation of an existing facility. Construction noise is temporary, lasting only for the duration of the construction project, and is typically limited to normal working hours (7:00 a.m. to 5:00 p.m.). However, construction noise would be noticeable to persons living and working nearby and may cause additional annoyance. Noise impacts associated with these projects are expected to be limited to the immediate areas surrounding the individual projects and would be insignificant both separately and cumulatively. Under the Ellsworth AFB Alternative, aircraft noise would decrease in the region, as shown and discussed in Section 3.2 (Noise). As a result, there would be no incremental noise impacts from the Ellsworth AFB Alternative. Furthermore, no significant

cumulative impacts from noise are anticipated from the Ellsworth AFB Alternative combined with past, present, and reasonably foreseeable future projects.

4.1.3.3.3 Air Quality

Cumulative effects to air quality consist of the combined potential effects resulting from the Proposed Action and applicable past, present, and reasonably foreseeable future projects described in Section 4.1.3.1 (Ellsworth AFB Relevant Past and Present Actions) and Section 4.1.3.2 (Ellsworth AFB Reasonably Foreseeable Future Actions). These projects would result in direct emissions of criteria pollutants and GHGs. Potential cumulative effects to air quality would be associated with combustion of fossil fuels during construction, transportation, and operation of new facilities.

Ellsworth AFB infrastructure repairs, veterinary clinic construction, and dormitory construction would involve construction of USAF facilities. In addition, air emissions would result from the proposed community projects, such as Eddie's Truck Center and The Monument; Rapid City's CIP projects would also contribute air emissions. For some of these projects, air emissions would cease once the initial construction phase is complete, such as the infrastructure repairs. Other projects, such as Eddie's Truck Center and The Monument, would result in minimal increased long-term emissions, such as those associated with heating and transportation. Furthermore, any projects that would include larger emissions-generating sources would be subject to permitting requirements under NSR/PSD and/or Title V Air Construction or Air Operation permits. With implementation of permit requirements and appropriate management practices, the cumulative amount of emissions resulting from the Ellsworth AFB Alternative and other past, present, and future actions is unlikely to significantly affect regional air quality. As a result, no significant cumulative impacts to air quality are anticipated from the Ellsworth AFB Alternative combined with past, present, and reasonably foreseeable future projects.

4.1.3.3.4 Land Use

Cumulative effects to land use consist of the combined potential effects resulting from the Ellsworth AFB Alternative and applicable past, present, and reasonably foreseeable future projects described in Section 4.1.3.1 (Ellsworth AFB Relevant Past and Present Actions) and Section 4.1.3.2 (Ellsworth AFB Reasonably Foreseeable Future Actions). Potential cumulative effects would be associated with changes to on-base and off-base land use compatibility related to infrastructure and facility placement and noise.

No cumulative impacts are identified for renovation and construction of the on-base veterinary clinic and dormitories, as these projects were completed in accordance with existing land use policies, and the facilities are located in compatible noise zones. Future repair and construction projects at and adjacent to the airfield would also occur in accordance with applicable procedures and requirements; these projects would not result in changes to existing land use. Noise generated during the repair and construction projects would be temporary and would not affect land use on or adjacent to the installation.

The tractor-trailer truck center, Fleet Farm retail store, and future civic center site, which are located outside the installation boundary, would not be exposed to aircraft noise levels greater than 65 dB DNL. In addition, the sites are located outside the aircraft APZs and would not result in safety issues due to building height. Therefore, the Ellsworth AFB Alternative would not affect land use at these locations. Reconstruction of the I-90/LaCrosse Street interchange would not change land use in Rapid City or encroach upon operations at Ellsworth AFB. Similarly, encroachment and associated land use issues are not anticipated for any future Rapid City CIP projects. The Rapid City Planning Commission has enacted zoning ordinances to regulate land use adjacent to the base, and the city's Comprehensive Plan discourages development that could conflict with aircraft operations at the base (Ellsworth AFB, 2016a). Therefore, there would be no significant cumulative impacts to land use from the Ellsworth AFB Alternative.

4.1.3.3.5 Socioeconomics

Personnel changes and facility construction and modifications would generate economic activity in the ROI. Implementation of the B-21 beddown separately or in conjunction with relevant past, present, and reasonably foreseeable future projects within the ROI would increase the demand for employment, as well as for housing, schools, and other services within the region. Construction of the Ellsworth AFB Dormitories, along with construction and renovation projects associated with the Rapid City Area School 6-year plan, would address some of the housing and education demands. Incremental effects of the B-21 beddown, in combination with potential impacts associated with other Ellsworth AFB projects, would be expected to create employment and population growth. This growth has the potential to result in cumulative impacts to socioeconomic resources in the ROI. On-base projects would increase demand for socioeconomic resources, while off-base projects would have the potential to address some of the increased demand, especially for labor and housing.

4.1.3.3.6 Environmental Justice

A number of projects have been identified (Section 4.1.3.1, Ellsworth AFB Relevant Past and Present Actions, and Section 4.1.3.2, Ellsworth AFB Reasonably Foreseeable Future Actions) that are in proximity to construction activities in the Proposed Action. All projects identified involve the construction of new facilities and are not anticipated to have adverse impacts to environmental justice or other sensitive populations.

Environmental justice analysis in this EIS indicated that no adverse impacts would occur to environmental justice or other sensitive populations and that implementing the Proposed Action would result in positive impacts. Therefore, no disproportionately high and adverse cumulative impacts to environmental justice or other sensitive populations would be anticipated from the Proposed Action combined with past, present and reasonably foreseeable future projects.

4.1.3.3.7 Biological Resources

A number of projects have been identified (Section 4.1.3.1, Ellsworth AFB Relevant Past and Present Actions, and Section 4.1.3.2, Ellsworth AFB Reasonably Foreseeable Future

Actions) that are in proximity to construction, demolition, and renovation activities in the Proposed Action area. These construction-related activities would have similar biological resource impacts as those described in this EIS. Impacts would include disturbance of existing habitat (greater than 10 acres) and short-term increases in noise resulting from proposed construction, demolition, and renovation activities. Short-term noise impacts would only occur if construction activities from the Proposed Action and cumulative actions occurred during the same timeframe. In addition to these impacts, runway improvements at the Ellsworth AFB airfield would impact wetland habitat potentially utilized by migratory birds. Coordination is ongoing with USACE for that project, and the project mitigation plan will replace any lost wetlands at a 1:1 ratio (Brundige, 2020b), reducing potential impacts below a significant impact threshold.

No significant impacts to vegetation, wildlife, or special status species would result from implementation of the Ellsworth AFB Alternative, and no significant cumulative impacts to biological resources are anticipated from implementing the known construction projects in the vicinity of Ellsworth AFB. Therefore, no significant cumulative impacts to biological resources are anticipated with implementation of the construction portion of the Ellsworth AFB Alternative in conjunction with past, present, and reasonably foreseeable future construction actions.

Aircraft operations associated with the Ellsworth AFB Alternative were found to have no significant impacts to noise-sensitive wildlife, special status species, migratory birds (including BCC), and bald or golden eagles within the training airspace and ranges. None of the past, present, or reasonably foreseeable future projects identified in Section 4.1.3.1 (Ellsworth AFB Relevant Past and Present Actions) and Section 4.1.3.2 (Ellsworth AFB Reasonably Foreseeable Future Actions) have the potential to interact with aircraft operations or increase the noise levels in the training airspace and ranges. Therefore, no cumulative impacts to biological resources would be anticipated from the Proposed Action combined with past, present and reasonably foreseeable future actions.

4.1.3.3.8 Cultural Resources

Cumulative impacts to cultural resources can result from alterations or demolition of historic structures or disturbance of archaeological resources that incrementally diminish the integrity of the cultural resources at Ellsworth AFB. Ellsworth AFB was subject to a comprehensive archaeological survey in 1994 that surveyed all significant tracts of undisturbed land at the base, utilizing both pedestrian survey and soil auger testing. The survey does not overlap the current APE. The only portions of the base that have not been subject to archaeological survey are areas of steep, broken hillsides at the north end of the base and the areas of the base that have been subject to extensive historical disturbance, such as the current APE. These areas have a low potential for significant archaeological resources, so no additional archaeological survey is recommended in the ICRMP (USAF, 2016a). However, it was determined that the South WGF Site Subalternative location required an Archaeological Survey because the land was acquired after the 1994 archaeological survey. An archaeological inventory conducted in late 2020 in the South WGF Site Subalternative location did not encounter any newly identified cultural resources; therefore no avoidance or further work was recommended.

South Dakota SHPO reviewed these findings and concurred with the USAF's determinations on January 22, 2021 (see Appendix F, Cultural Resources). As a result, no cumulative effects to archaeological resources are expected. If any of these projects result in inadvertent discoveries, SOP 7.4 in the Ellsworth AFB ICRMP would be followed (USAF, 2016a).

Four World War II buildings and 17 Cold War–era buildings at Ellsworth AFB are eligible for listing in the NRHP. Four of the Cold War–era buildings would be impacted under the Ellsworth AFB Alternative, three of which would be demolished and one renovated. NHPA Section 106 consultation with the South Dakota SHPO and the ACHP resulted in the development of a Memorandum of Agreement with stipulations to mitigate adverse effects from the demolition of historic properties. None of the past, present, or reasonably foreseeable future projects at Ellsworth AFB would directly impact any of the individually eligible historic structures at the base or have the potential for significant indirect effects to historic properties. Implementing the Ellsworth AFB Alternative would not have incremental effects above those described in Section 3.8.2.3 (Cultural Resources, Ellsworth AFB Alternative). Adherence to requirements outlined during Section 106 consultation would reduce the severity of adverse effects. Therefore, no cumulative effects to aboveground historic properties would occur under the Ellsworth AFB Alternative.

4.1.3.3.9 Physical Resources

As in the Dyess AFB Alternative, construction-related soil disturbance from concurrent construction projects at multiple adjacent locations at Ellsworth AFB may result in cumulative impacts. None of the actions noted in Section 4.1.3.1 (Ellsworth AFB Relevant Past and Present Actions) and Section 4.1.3.2 (Ellsworth AFB Reasonably Foreseeable Future Actions) would involve significant land disturbance. However, simultaneous construction of facilities associated with the Ellsworth AFB Alternative may result in cumulative effects. Potential cumulative impacts from soil disturbance from concurrent construction activities would be minimized by consistently implementing erosion and sediment control practices.

Runway improvements at the Ellsworth AFB airfield would impact wetland habitat. However, implementation of project-specific mitigations identified during coordination with USACE would reduce the severity of potential impacts to wetlands. It is expected that any lost wetland areas would be replaced at a 1:1 ratio. BMPs would be implemented to reduce the potential for indirect wetland impacts. As a result, there would be no incremental impacts to wetlands on Ellsworth AFB.

Military activities associated with new B-21 aircraft at multiple facilities, when B-21 MOB 1 is established, may have potential cumulative impacts on water resources. However, consistent basewide application of BMPs and control measures for hazardous material handling, hazardous waste disposal, spill prevention, and stormwater management will reduce the likelihood of cumulative effects.

4.1.3.3.10 Hazardous Materials and Hazardous and Solid Waste

Construction of projects under the Ellsworth AFB Alternative, in combination with past, present, or reasonably foreseeable future actions listed in Section 4.1.3.1 (Ellsworth AFB Relevant Past and Present Actions) and Section 4.1.3.2 (Ellsworth AFB Reasonably Foreseeable Future Actions), would result in contributions of MSW and C&D debris to regional landfills. As standard practice for proposed projects, C&D waste would be diverted from the landfill to the greatest extent possible through reuse or recycling. Waste would either be segregated and recycled at a certified facility or disposed of (for mixed or nonsegregated waste) at a certified recycling facility.

As result of the Ellsworth AFB Alternative, 13,572 tons of solid waste would be disposed of at the Rapid City Sanitary Landfill. As discussed in Section 3.1.1.2.2 (Airspace, Region of Influence, Ellsworth AFB), the landfill receives approximately 133,000 tons of mixed waste per year. The combined quantity of C&D debris and MSW generated at Ellsworth AFB would represent approximately 10 percent of average annual landfill disposal. At its current disposal capacity, the landfill is permitted to operate another 20 years; however, the landfill has access to additional land areas that could extend its life expectancy until at least 2060. Solid waste from the Ellsworth AFB Alternative would be generated over multiple years, further limiting any potential impacts. For cumulative actions, construction of new facilities would be addressed under separate and specific environmental reviews. Because landfill capacity is anticipated to be sufficient for the combined demand of the cumulative actions, as well as projects under the Ellsworth AFB Alternative, cumulative impacts on solid waste facilities would be less than significant.

There would be no cumulative impacts associated with management of hazardous materials, toxic substances, hazardous wastes, or ERP sites. These would continue to be managed according to established procedures.

4.1.3.3.11 Health and Safety

As with Dyess AFB, flight, ground, and munitions safety associated with B-21 operations are not expected to have any cumulative effects in conjunction with other past, present, and reasonably foreseeable future actions. Proposed activities would be similar in nature to existing operations, and the USAF would continue to apply established safety, accident mitigation, and crash response procedures. Planned structures would undergo explosive safety reviews to ensure occupancy and land uses would be compatible with all locations. As part of this process, existing explosive safety plans (e.g., ESPs or Aircraft Parking Plans) would be updated as required.

Potential short-term minor impacts to contractor health and safety may occur from implementation of demolition and construction activities. However, construction safety and environmental health effects would not be significant, because risks to workers, potential for offsite dispersion of contaminants, and future exposure to residual onsite contamination would be small and confined to the immediate project site. All actions would be performed in accordance with AFOSH directives and OSHA regulations; no

cumulative impacts would occur. Regional cumulative demolition and construction would be required to adhere to OSHA regulations.

4.1.3.3.12 Transportation

Cumulative effects on transportation consist of the combined potential effects resulting from the Ellsworth AFB Alternative and applicable past, present, and reasonably foreseeable future projects described in Section 4.1.3.1 (Ellsworth AFB Relevant Past and Present Actions) and Section 4.1.3.2 (Ellsworth AFB Reasonably Foreseeable Future Actions). Potential cumulative effects would be associated with short-term and long-term changes in traffic patterns and volume, due to construction/demolition/renovation projects and placement of new facilities.

No cumulative impacts to the on-base transportation system are identified for renovation and construction of the veterinary clinic and dormitories, as these projects have been completed. Future repair and construction projects at and adjacent to the airfield would not affect overall traffic flow on the installation due to road shoulder or lane closures, because the project sites are limited to the industrial area near the runway. Commercial vehicles associated with construction crews and delivery and removal of construction materials and debris would be operated on the base; this could cause increased traffic volume and congestion, which would contribute cumulatively to similar impacts potentially resulting from the B-21 beddown. However, the effects would be short-term and would affect a small portion of the base at any given time.

No cumulative impacts to the off-base transportation system are identified for construction of the tractor-trailer truck center, because this project has been completed. Construction of the civic center and Farm and Fleet retail store would potentially cause delays and traffic congestion on roads adjacent to and near the facilities. The civic center project site is located in western Rapid City (opposite Ellsworth AFB), and, the cumulative contribution to traffic congestion would, therefore, be negligible in the context of personnel additions associated with the B-21 beddown. The Farm and Fleet project could contribute to traffic congestion in north and northeast Rapid City, but the effects would similarly be minor in the context of existing traffic conditions and personnel additions associated with the beddown. Reconstruction of the I-90/LaCrosse Street interchange and potential future Rapid City CIP projects would likely cause some level of traffic congestion and delays, particularly if lane closures or traffic rerouting were required. These effects could contribute to increased off-base traffic volume and congestion associated with the B-21 beddown. The effects would generally be short-term and would cease after completion of construction activities. The projects would have a long-term beneficial impact on traffic operations.

4.1.3.3.13 Utilities and Infrastructure

There are no current infrastructure repairs/upgrades being conducted at Ellsworth AFB. Recently completed construction of the veterinary clinic and dormitories would slightly increase water, electricity, and natural gas usage; however, overall use of these utilities at Ellsworth AFB is projected to be considerably less than current capacity. In addition,

there are no foreseeable future actions identified that would impact utility usage on Ellsworth AFB; projects that require utilities are located outside the base. In conclusion, there would be no cumulative impacts on utilities from past, current, and future foreseeable projects.

4.2 OTHER ENVIRONMENTAL CONSIDERATIONS

4.2.1 Relationship Between Short-Term Uses and Long-Term Productivity

Construction, demolition, and renovation-related activities would result in a short-term use of resources. Long-term productivity impacts are determined by comparing the project's impacts against long-term regional and local planning objectives. Impacts are associated with land use changes, population increases, and the related traffic and socioeconomic factors. The short- and long-term effects of the Proposed Action and alternatives are summarized below.

4.2.2 Short-Term Uses

All alternatives would have minor short-term effects related to their construction and military activities through the use of construction-related materials, fuels, etc. The significant economic benefits created during construction in the form of jobs and the direct and indirect demand for goods and services would offset the short-term use of the environment.

4.2.3 Long-Term Productivity

Long-term adverse impacts to productivity as a result of unmitigated short-term impacts and uses would include the following:

- Increased traffic in the local area
- Increased demand for housing and schools
- Increased demand for utilities

Long-term beneficial impacts to productivity would include the following:

- Decreased noise levels associated with the B-21
- Overall support of the region's continued economic development through:
 - Creation of more jobs locally
 - Increases in the tax base
 - Increased revenues for local businesses
 - Increased revenues for local utilities
 - Increased housing construction
 - Continued military mission

4.2.4 Short-Term Uses Versus Long-Term Productivity

The construction/demolition period for each alternative would result in a short-term increase in employment, income, and net fiscal benefits and revenues to the surrounding community. Additionally, there would be a short-term increase in the amount of local building supplies needed to execute all of the facilities and infrastructure projects. It is not expected that the availability of these resources for other users would be reduced due to the small size of the project relative to the regional building industry around each installation.

Local short-term resource uses resulting from both alternatives would be consistent with the maintenance and enhancement of long-term productivity for the local communities, state, and region surrounding Dyess AFB and Ellsworth AFB. The ongoing missions at each installation is consistent with regional planning objectives, and Dyess AFB's and Ellsworth AFB's continued growth is beneficial and essential from an economic standpoint.

Many of the potential adverse impacts to long-term productivity are the result of short-term factors, which are often mitigated through planning aspects when implementing a proposed action and/or alternatives; traffic is one example. The Proposed Action and alternatives analyzed in this document would have immediate impacts to traffic in the short-term with long-term implications.

Typically, the DoD looks to normal civil highway programs to make highway improvements to defense installations because the installations generate major economic benefits. The USAF, local planning agencies, and the Texas or South Dakota DOT would work to address transportation issues to ensure that long-term impacts would be mitigated through proper planning and design of local roadways and transportation infrastructure. The Defense Access Road Program is one method for DoD to help pay for public highway improvements required as a result of sudden/unusual defense-generated traffic impacts. The challenge is accommodating the base's growth and the needs of the local community in a manner that is mutually beneficial. While there are potential adverse impacts to long-term productivity, many impacts can be mitigated, resulting in benefits to long-term productivity associated with local increases in employment, income, and net fiscal benefits and revenues that outweigh short-term impacts.

4.2.5 Irreversible and Irretrievable Commitment of Resources

The NEPA requires environmental analysis to identify any irreversible and irretrievable commitments of resources involved in the implementation of the Proposed Action or alternatives. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. *Irreversible* effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. *Irretrievable* resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural site).

Implementing the Proposed Action through any of the alternatives would require a commitment of natural, physical, human, and fiscal resources. In all of these categories, irreversible and irretrievable commitments of resources would occur. Land required for new construction would be irreversibly committed during the functional life of the facilities; in some cases land uses would change from undeveloped to developed. Although it is possible for land to revert to its former state if the facilities were abandoned and destroyed, the likelihood of such an occurrence for established facilities would be low.

Considerable amounts of fossil fuels and construction materials, such as steel, cement, aggregate, and bituminous material, would be expended under the action alternatives. These physical resources should generally be in sufficient supply during the proposed project initiation, and their commitment to the project would not have an adverse effect on the resource's continued or future availability.

Some cultural resources would be irreversibly and irretrievably lost with construction of the proposed facilities and infrastructure at Ellsworth AFB, as three NRHP-eligible buildings would be demolished. This would result in an adverse effect to historic properties. The USAF began corresponding with the South Dakota SHPO and the ACHP regarding the proposed demolition of the three NRHP-eligible buildings as separate projects. After additional discussions with the South Dakota SHPO, the USAF decided to prepare a single consultation and memorandum of agreement package for the entire beddown for the Section 106 consultation. The USAF submitted the package to the South Dakota SHPO and the ACHP to formally initiate consultation. The Final EIS will include the results of the Section 106 consultation.

In terms of human resources, labor would be used in preparation, fabrication, and construction of the project. Labor is generally not considered to be a resource in short supply, and commitment to the project would not have an adverse effect on the continued availability of these resources. Project construction would require a substantial expenditure of funds.

The proposed commitment of natural, physical, human, and fiscal resources is based on the requirements mandated by the DoD. It is anticipated that businesses, employees, and residents of the local area would benefit from improved economics resulting from implementation of the Proposed Action.

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