Environmental Impact Statement

OPTIMIZATION OF POWDER RIVER TRAINING COMPLEX

Ellsworth Air Force Base
South Dakota



Draft
August 2026

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DRAFT

ENVIRONMENTAL IMPACT STATEMENT
OPTIMIZATION OF POWDER RIVER TRAINING COMPLEX

ELLSWORTH AIR FORCE BASE
SOUTH DAKOTA

August 2026

EISX-007-57-UAF-1729171028

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Privacy Advisory:

The Draft Environmental Impact Statement (EIS) was provided for public comment in accordance with Section 107(c) of the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] 4336) which provided an opportunity for public input on United States Department of the Air Force (DAF) decision-making, allowed the public to offer input on alternative ways for DAF to accomplish what it is proposing, and solicited comments on DAF's analysis of environmental effects.

Letters or other written or verbal comments provided may be published in this EIS. Providing personal information is voluntary. Only the names of the individuals making comments and specific comments will be disclosed. Personal information, home addresses, telephone numbers, and email addresses will not be published in this EIS.

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Cover Sheet

ENVIRONMENTAL IMPACT STATEMENT
OPTIMIZATION OF POWDER RIVER TRAINING COMPLEX
ELLSWORTH AIR FORCE BASE

a. *Responsible and Cooperating Agencies:* United States Department of the Air Force (DAF) (Responsible Agency); Federal Aviation Administration (Cooperating Agency).

b. *Title of Action:* Optimization of Powder River Training Complex

c. *Comments and Inquiries:* Ms. Grace Keesling, AFCEC/CIE at (210) 925-4534

d. *Designation:* Environmental Impact Statement (EIS)

e. *Council on Environmental Quality Unique Identifier*: EISX-007-57-UAF-1729171028

f. *Abstract:* This Draft EIS has been prepared in accordance with the National Environmental Policy Act. The public and agency scoping process resulted in the analysis of the following environmental resources: airspace management and use, safety, noise, air quality, natural resources, socioeconomics, cultural resources, and land use. The DAF proposes to address shortfalls in aircrew readiness by improving day-to-day training and increasing the capability of Large Force Exercises hosted at the Powder River Training Complex to meet emerging threats to National Security.

g. *Comments:* The DAF released this Draft EIS to the public and agencies for review and comment. A Notice of Availability was published in regional and local newspapers, and a press release was announced. This Draft EIS has been posted on a publicly accessible website at www.PRTCairspaceEIS.com. Copies of this Draft EIS document were also sent to local document repositories.

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ACRONYMS AND ABBREVIATIONS

5 BW	5th Bomb Wing
28 BW	28th Bomb Wing
ACAM	Air Conformity Applicability Model
ACC	Air Combat Command
ADS-B	Automatic Dependent Surveillance-Broadcast
AFB	Air Force Base
AFI	Air Force Instruction
AFMAN	Air Force Manual
AGL	above ground level
AHAS	Avian Hazard Advisory System
AIM	Aeronautical Information Manual
APE	Area of Potential Effects
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
BASH	Bird/Wildlife Aircraft Strike Hazard
BGEPA	Bald and Golden Eagle Protection Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DAF	Department of the Air Force
DAFI	Department of the Air Force Instruction
DAFMAN	Department of the Air Force Manual
dB	decibel
dBC	C-weighted decibel
DNL	Day-Night Average Sound Level
DoD	Department of Defense
DoW	Department of War
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FICUN	Federal Interagency Committee on Urban Noise
FL	Flight Level
GHG	Greenhouse Gas
GPS	Global Positioning System
HAP	Hazardous Air Pollutant
Hz	Hertz
IFR	Instrument Flight Rules
JO	Joint Order
kHz	kilohertz
L_{dnmr}	Onset-Rate Adjusted Day-Night Average Sound Level
L_{eq}	Equivalent Sound Level
LFE	Large Force Exercise
LOA	Letter of Agreement
MBTA	Migratory Bird Treaty Act
MOA	Military Operations Area
MSL	mean sea level
NAAQS	National Ambient Air Quality Standards
NAS	National Airspace System
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NM	nautical mile
NO_2	nitrogen dioxide
NOTAM	Notice to Airmen
NPS	National Park Service
NRHP	National Register of Historic Places
O_3	ozone
Pb	lead
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	particulate matter less than or equal to 10 microns in diameter

POI	Point of Interest	SOP	Standard Operating Procedure
PR	Powder River	SUA	Special Use Airspace
PRTC	Powder River Training Complex	TDY	temporary duty
psf	pounds per square foot	TTPs	tactics, techniques, and procedures
RNAV	Area Navigation	U.S.	United States
ROD	Record of Decision	U.S.C.	United States Code
ROI	Region of Influence	UHF	Ultra High Frequency
SEL	Sound Exposure Level	USFWS	United States Fish and Wildlife Service
SHPO	State Historic Preservation Office	VFR	Visual Flight Rules
SO_2	sulfur dioxide	VHF	Very High Frequency

1.0 PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

The Powder River Training Complex (PRTC) is a group of Military Operations Areas (MOAs) and Air Traffic Control Assigned Airspaces (ATCAAs), which overlie parts of South Dakota, North Dakota, Wyoming, and Montana. Currently the complex is the day-to-day (primarily Monday through Friday) training complex for aircrews operating B-1 aircraft from the 28th Bomb Wing (28 BW) at Ellsworth Air Force Base (AFB) and aircrews operating B-52 aircraft from the 5th Bomb Wing (5 BW) at Minot AFB. PRTC will also provide day-to-day training for future aircrews operating B-21 aircraft that are planned to replace the B-1s at Ellsworth AFB (Department of the Air Force [DAF] 2021). In addition to day-to-day training operations, the PRTC hosts Large Force Exercises (LFEs) for joint forces to participate in realistic combat training scenarios. The DAF is proposing to address shortfalls in aircrew readiness by improving day-to-day training and increasing LFE capability hosted at PRTC to meet emerging threats to National Security.

The National Defense Strategy requires an appropriate training environment for today's warfighter. Each type of aircraft has a set of guidelines and methods used for planning, executing, and managing air operations and controlling the aircraft, known as Tactics, Techniques, and Procedures (TTPs). TTPs are standardized practices used by pilots to ensure effective, safe, and efficient operations during flying missions. As the type and level of sophistication of threats to National Security have evolved, so has the National Defense Strategy, resulting in changes to aircraft capabilities and weapons systems. These advanced capabilities have led to changes in the TTPs, which in turn drive training requirements and the airspace needed to meet those requirements.

The 28 BW and 5 BW units are expected to deploy and execute air operations anywhere in the world with short notice. In order to be prepared for this, aircrews must train as they would fight. Combat exposes aircrews to sophisticated anti-aircraft systems operated by highly trained adversaries. To successfully accomplish their missions, these units must have access to training airspace that allows units to fly their aircraft's TTPs at the altitudes and in the same manner as they would in combat. This includes integrated training with the latest and most modern fighter aircraft, the F-22 and F-35, herein referred to as 5th generation aircraft. Threat avoidance is one of the critical elements needed to achieve aircrew readiness and can only be attained by realistic, repetitive training. Aircrews need to have nearly automatic muscle reactions to survive and bring themselves and their aircraft home. Training in airspace that lacks requisite volume, altitude, and attributes introduces artificial constraints and limits training effectiveness. Counterproductive training experience threatens aircrew survivability and mission readiness.

Day-to-day training operations at PRTC are currently limited at or below Flight Level (FL) 260 (approximately 26,000 feet)[1] (DAF 2015). This precludes training at higher altitudes, which is a necessity to accomplish certain flying missions. The DAF evaluates the utility of all of its training areas and ranges in a non-public report known as the Enterprise Range Plan. The most recent Enterprise Range Plan in 2020 identified PRTC's FL260 altitude limitation as severely affecting the ability of aircrews to accomplish their aircraft's TTPs which negatively impacts aircrew readiness and survivability.

PRTC hosts LFEs, which are military training exercises that involve a significant number of participants and assets and are designed to prepare servicemen and women for real-world scenarios. The importance and complexity of LFEs has also evolved with advanced aircraft capabilities and combat strategies. Realistic, stressful, and challenging operational training is the primary means to ensure readiness and prepare the DAF to apply personnel and assets to meet national defense policies. LFEs have grown into large combat integration exercises with participation by more types of aircraft, specifically 5th generation. The integration of multiple aircraft types has become a critical training tool for many units. LFEs are moving away from 2- or 3-day long exercises to 5-day up to 2-week events. Longer duration exercises enable units to achieve complex realistic training. Longer durations also allow non-local units to meet multiple training requirements, justifying the cost of moving non-local units and their support equipment to participate in the exercises. Currently, the duration of LFE events at PRTC are limited to up to 3 days quarterly (no more than 10 days annually) (DAF 2015). This limits the complexity for the LFE scenarios and also deters non-local units from participating due to high mobilization effort and cost.

Addressing the shortfalls in day-to-day training and LFEs requires modifying how the PRTC is used, which in turn requires modifications to the PRTC airspace structure. The safe and efficient use of the National Airspace System (NAS) is the authority of the Federal Aviation Administration (FAA) as defined in 14 Code of Federal Regulations (CFR) Chapter 1, Subchapter E. Modification of airspace is the responsibility of the FAA. The FAA has participated in the preparation of this Environmental Impact Statement (EIS) as a cooperating agency based on the Department of Defense (DoD) FAA Memorandum of Understanding found in Appendix 7 of FAA Order 7400.2R. The FAA may adopt this EIS, in whole or in part, to comply with requirements of the National Environmental Policy Act (NEPA), prior to making a decision on any proposed changes to airspace addressed in this EIS.

This EIS was prepared in compliance with NEPA of 1969 (42 United States Code [U.S.C.] sections 4321–4347); Department of War (DoW) NEPA Implementing Procedures (April 30, 2026); DAF NEPA Procedures (March 2, 2026); FAA Order 1050.1G (June 30, 2025); and Department of Transportation Order 5610.1D (July 1, 2025). This EIS was completed through the Air Force Civil Engineer Center NEPA Division in coordination with Headquarters Air

[1] Altitude references for aircraft operations are presented in several units of measure throughout this document:

- Above ground level (AGL) references are usually used at lower altitudes (almost always below 5,000 feet), when clearance from terrain is more of a concern for aircraft operation.
- Mean sea level (MSL) altitudes are used in aviation when operating at or below 18,000 feet when clearance from terrain is less of a concern for aircraft operation.
- Flight Level (FL) is used to describe the cruising altitudes for aircraft traveling long distances above 18,000 feet. Flight Levels are given in hundreds of feet, e.g. FL300 is 30,000 feet.

Force, Operational Training Infrastructure Division; Air Combat Command; Air Force Global Strike Command; Ellsworth AFB; Minot AFB; and FAA.

1.2 POWDER RIVER TRAINING COMPLEX

1.2.1 Existing Airspace

The establishment and use of the PRTC as it exists today was evaluated in the *Environmental Impact Statement (EIS) for Powder River Training Complex* and implemented by a Record of Decision (ROD) signed in January 2015 (herein referred to as the 2015 ROD) (DAF 2015). The PRTC is managed by the 28 BW and is the largest training airspace in the Continental United States (U.S.). It is comprised of several MOAs[2] and ATCAAs[3] which overlie portions of South Dakota, North Dakota, Wyoming, and Montana, and provide nearby bases with areas for day-to-day training operations, as well as airspace for LFEs. **Table 1.2-1** provides the parameters of the existing PRTC airspace components. The primary day-to-day MOAs include Powder River (PR) 1, 2, 3, and 4 along with their associated ATCAAs. The PR MOAs are vertically segmented into a low and high MOA and include an ATCAA above. The PR 4 MOA does not have a low MOA. The Gateway West ATCAA is also used day-to-day. The Gap MOAs and associated ATCAAs are designed (and only activated) to join the PR MOAs/ATCAAs for LFEs. The Gap MOAs are vertically segmented into a low and high MOA with an ATCAA above, with the exception of Gap C which does not have a low MOA. The Gateway East ATCAA is also only available during LFEs. The Crossbow ATCAA is the space above PR 2 ATCAA and Gateway West ATCAA combined at altitudes FL270–FL310. The complex overlaps three FAA Air Route Traffic Control Centers (ARTCCs): Salt Lake City, Denver, and Minneapolis. **Figure 1.2-1** provides an overview of the PRTC. **Figure 1.2-2** provides a three-dimensional view of the PRTC components to show how they are vertically segmented.

The published time of use for the PRTC is by Notice to Airmen (NOTAM) 2 hours in advance: Monday through Thursday from 07:30–12:00 and 18:00–23:30; Friday from 07:30–12:00; and other times by NOTAM 4 hours in advance (Local Time). The morning and evening designated times of use inaccurately imply that the PRTC is only used in the morning and again in the evening, when in fact the airspace is used throughout the day. Presently, use of the PRTC airspace requires advanced NOTAM. This puts an administrative burden on DAF schedulers and reduces or eliminates flexibility for same day adjustments due to weather, mechanical issues, changes in training need, etc.

1.2.2 Existing Exclusions and Avoidance Areas

The current design of PRTC along with several defined aeronautical procedures were developed with implementation of the 2015 ROD and formal charting of the airspace in FAA Order Joint Order (JO) 7400.10 (which is published annually). These previous mitigation measures were designed to reduce the impact of military use of PRTC on civil users of the NAS and would not change under this EIS Proposed Action.

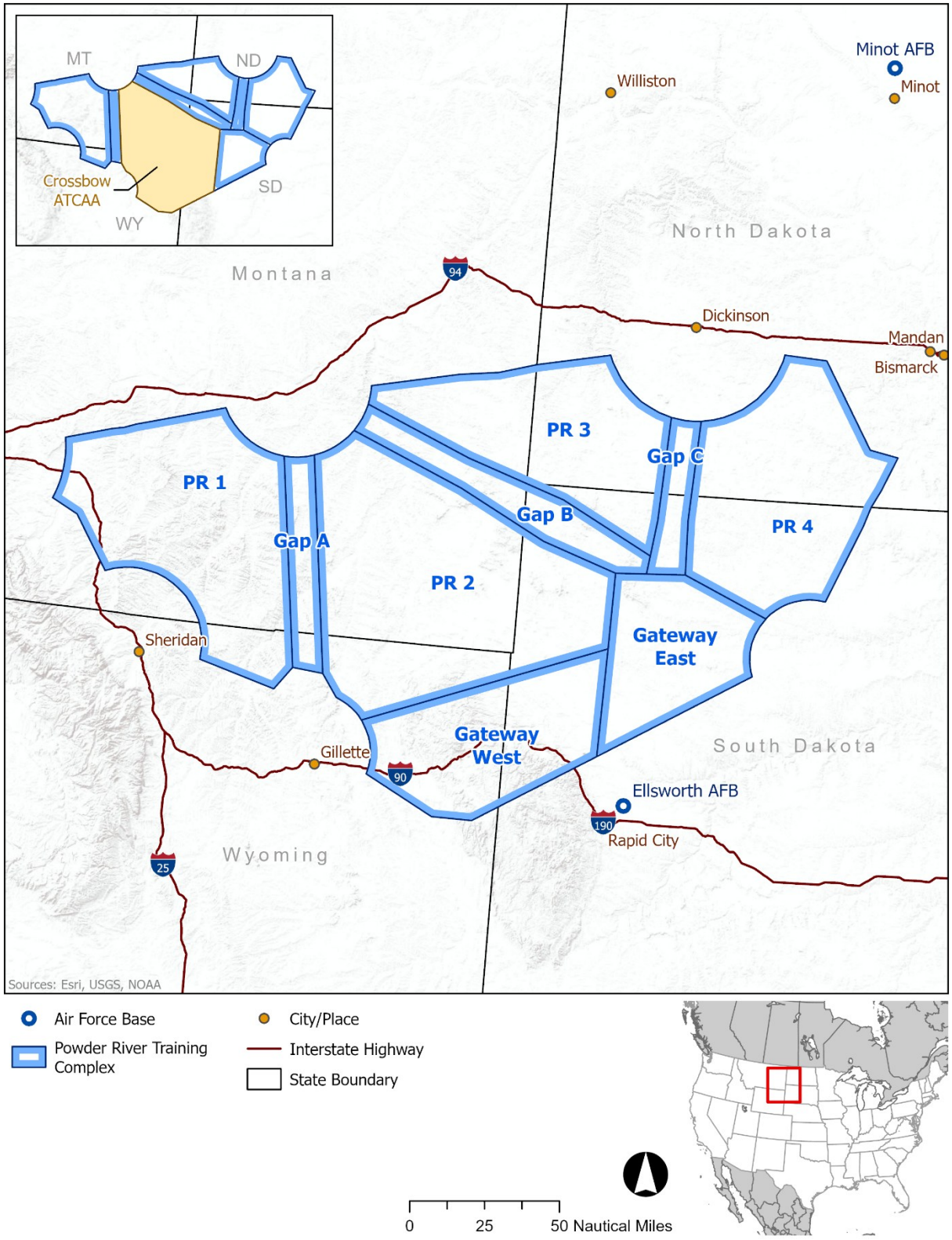
[2] MOAs are a type of Special Use Airspace (SUA) established for the purpose of separating certain military training activities from other air traffic.
[3] ATCAAs are a type of Special Activity Airspace (SAA) of defined vertical and lateral limits, assigned by air traffic control, for the purpose of providing air traffic segregation between the specified activities being conducted, within the assigned airspace and other traffic. SUA is a subset of SAA.

Table 1.2-1 Existing Powder River Training Complex Airspace

Component	Availability	Floor/Ceiling[1]	Controlling Agency
Powder River 1 (PR 1)			FAA, Salt Lake City ARTCC
PR 1A Low MOA	Day-to-day and LFE	500 AGL–12,000 MSL	
PR 1A High MOA	LFE only	12,000 MSL–FL180	
PR 1A ATCAA	LFE only	FL180–FL260	
PR 1B Low MOA	Day-to-day and LFE	500 AGL–12,000 MSL	
PR 1B High MOA	Day-to-day and LFE	12,000 MSL–FL180	
PR 1B ATCAA	Day-to-day and LFE	FL180–FL230 (day-to-day) FL180–FL260 (LFE Only)	
PR 1C Low MOA	Day-to-day and LFE	500 AGL–12,000 MSL	
PR 1C High MOA	LFE only	12,000 MSL–FL180	
PR 1C ATCAA	LFE only	FL180–FL260	
PR 1D Low MOA	Day-to-day and LFE	500 AGL–12,000 MSL	
PR 1D High MOA	Day-to-day and LFE	12,000 MSL–FL180	
PR 1D ATCAA	Day-to-day and LFE	FL180–FL230 (day-to-day) FL180–FL260 (LFE Only)	
Powder River 2 (PR 2)			FAA, Denver ARTCC
PR 2 Low MOA	Day-to-day and LFE	500 AGL–12,000 MSL	
PR 2 High MOA	Day-to-day and LFE	12,000 MSL–FL180	
PR 2 ATCAA	Day-to-day and LFE	FL180–FL260	
Powder River 3 (PR 3)			FAA, Salt Lake City ARTCC
PR 3 Low MOA	Day-to-day and LFE	500 AGL–12,000 MSL	
PR 3 High MOA	Day-to-day and LFE	12,000 MSL–FL180	
PR 3 ATCAA	Day-to-day and LFE	FL180–FL260	
Powder River 4 (PR 4)			FAA, Minneapolis ARTCC
PR 4 High MOA	Day-to-day and LFE	12,000 MSL–FL180	
PR 4 ACTAA	Day-to-day and LFE	FL180–FL260	
Gap A			FAA, Denver ARTCC
Gap A Low MOA	LFE only	500 AGL–12,000 MSL	
Gap A High MOA	LFE only	12,000 MSL–FL180	
Gap A ATCAA	LFE only	FL180–FL260	
Gap B			FAA, Salt Lake City ARTCC
Gap B Low MOA	LFE only	500 AGL–12,000 MSL	
Gap B High MOA	LFE only	12,000 MSL–FL180	
Gap B ATCAA	LFE only	FL180–FL260	
Gap C			FAA, Minneapolis ARTCC
Gap C High MOA	LFE only	12,000 MSL–FL180	
Gap C ATCAA	LFE only	FL180–FL260	
Gateway East ATCAA	LFE only	FL180–FL260	FAA, Minneapolis ARTCC
Gateway West ATCAA	Day-to-day and LFE	FL180–FL260	FAA, Denver ARTCC
Crossbow ATCAA[2]	Day-to-day and LFE	FL270 – FL310	FAA, Denver ARTCC

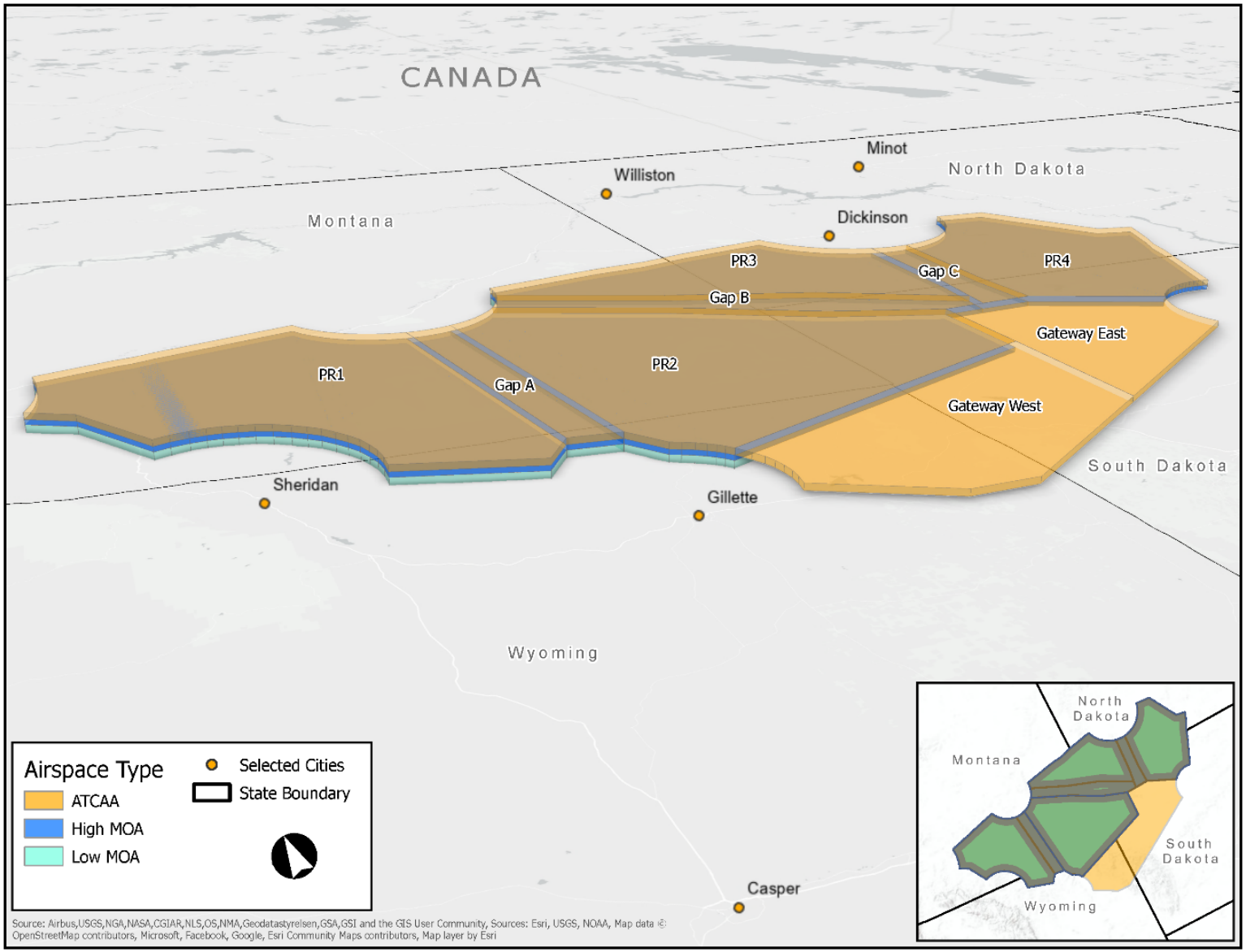
Note: [1]The official publication of the low MOAs in FAA Order JO 7400.10 are 500 feet AGL to, but not including, 12,000 feet MSL. For simplicity in the table and throughout the EIS, this is represented as "500 AGL–12,000 MSL." Likewise, the high MOAs are published as 12,000 feet MSL to, but not including, FL180, but represented in the table as "12,000 MSL–FL180."
[2]Crossbow ATCAA is the space above PR 2 ATCAA and Gateway West ATCAA combined (FL270–FL310).

Legend: AGL = above ground level; ARTCC = Air Route Traffic Control Center; ATCAA = Air Traffic Control Assigned Airspace; FAA = Federal Aviation Administration; FL = Flight Level; LFE = Large Force Exercise; MOA = Military Operations Area; MSL = mean sea level; PR = Powder River



Legend: ATCAA = Air Traffic Control Assigned Airspace; PR = Powder River

Figure 1.2-1 Powder River Training Complex Overview



Legend: ATCAA = Air Traffic Control Assigned Airspace; MOA = Military Operations Area; PR = Powder River

Figure 1.2-2 Powder River Training Complex – Three-dimensional View

FAA minimum safe altitudes (14 CFR 91.119) designate that aircraft must avoid congested areas of a city, town, or settlement or any open-air assembly of people by 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft. Outside congested areas, aircraft must avoid persons, vessels, vehicles, or structures by 500 feet. In PRTC specifically, the avoidance of towns is greater than the minimum safe altitude and defined as:

- Large towns (population over 1,000): 2,000 feet above ground level (AGL)
- Small towns (population over 100): 1,000 feet AGL

In accordance with FAA Order JO 7400.2R, MOAs must exclude the airspace below 1,500 feet AGL within a 3 nautical mile (NM) radius of airports available for public use. In PRTC specifically, private use airfields are also avoided by 1,500 feet AGL within 1 NM. Excluded airports are shown on **Figure 1.2-3**.

The Northern Cheyenne Reservation (including Deer Medicine Rocks National Historic Landmark) is excluded from the PR 1 Low MOA, thus flights remain above 12,000 feet mean sea level (MSL) (in the High MOA and ATCAA only). Similarly, there is no PR 4 Low MOA and flights remain above 12,000 feet MSL (in the High MOA and ATCAA only). This effectively excludes the Cheyenne River Reservation and the Standing Rock Reservation from low-level overflights. See **Figure 1.2-3** for locations of these reservations.

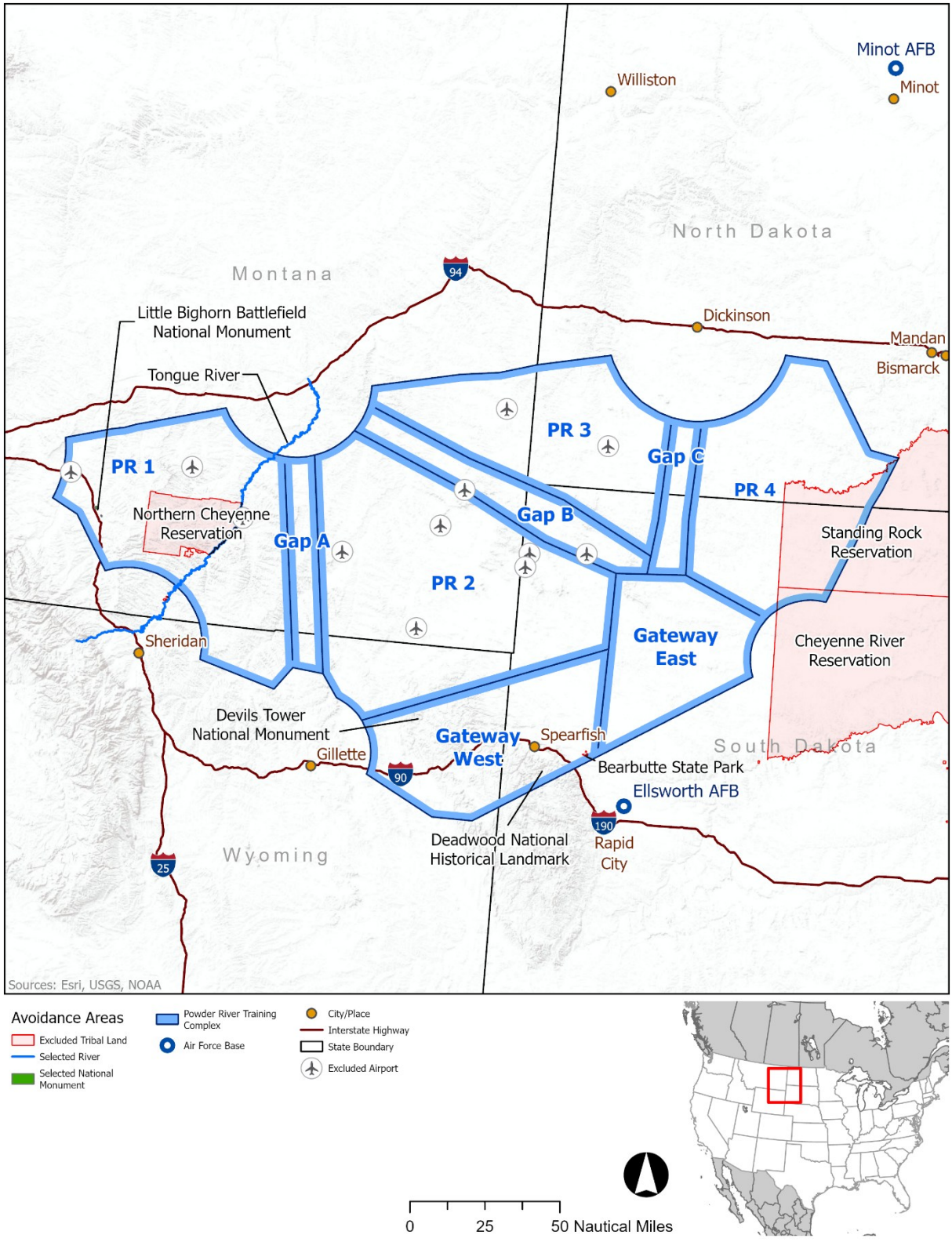
In accordance with the Mitigation Measures defined in the 2015 ROD, Devils Tower National Monument and Deadwood National Historic Landmark are avoided by 18,000 feet MSL and Bear Butte State Park is avoided by 10,000 feet AGL and 2 NM horizontally. These properties are beneath Gateway West ATCAA and identified on **Figure 1.2-3**.

Lastly, additional noise sensitive areas and general avoidance areas have been defined in PRTC and would not change under the EIS Proposed Action (**Table 1.2-2, Figure 1.2-3)**. Avoidances associated with residences and ranches are not shown on **Figure 1.2-3**. PR 4 does not have a low MOA and the floor of the high MOA begins at 12,000 feet MSL; consequently, PR 4 does not contain any avoidance areas.

Table 1.2-2 Existing Avoidance Areas

Airspace	Avoidance or Noise Sensitive Area
PR 1	• Bighorn Battlefield: avoidance of 5,000 feet AGL +/- 1 hour park hours (winter hours [October 1 to Memorial Day] 8:00 a.m. – 4:00 p.m.; summer hours [Memorial Day to September 30] 9:00 a.m. – 5:00 p.m.) • To maximum extent possible, avoid all residences and ranches at low altitude (remain above 2,000 feet AGL) • To maximum extent possible, avoid ranches and corrals during calving (February–May) and weaning (October–November) (remain above 2,000 feet AGL) • Avoid repetitive routing that focuses low-altitude activity in one area • Flights must cross perpendicular to the Tongue River (i.e., flight cannot follow the river valley)
PR 2 and PR 3	• To maximum extent possible, avoid all residences and ranches at low altitude (remain above 2,000 feet AGL) • To maximum extent possible, avoid ranches and corrals during calving (February–May) and weaning (October–November) (remain above 2,000 feet AGL) • Avoid repetitive routing that focuses low-altitude activity in one area

Legend: AGL = above ground level; PR = Powder River



Legend: PR = Powder River

Figure 1.2-3 Existing Exclusions and Avoidance Areas

1.2.3 Existing Operations in Airspace

1.2.3.1 Day-to-Day Training

The PRTC primarily supports bomber aircraft which have the range to reach and remain near a target area, combat capability to carry a variety of munitions, sensors for specific targets, responsiveness to be at the scene when needed, and flexibility to relocate and respond to time-sensitive targets. Existing day-to-day training (primarily Monday through Friday) consists of non-hazardous flight activity such as low-altitude ingress/egress and terrain following, close air support, time-sensitive targeting, distant target identification, and networking with multiple aircraft and ground assets. Live munitions training is not authorized within the PRTC. Supersonic operations are not authorized during day-to-day operations, but they are authorized during LFEs (discussed in Section 1.2.3.2).

Average annual sorties which utilize PRTC are detailed in **Table 1.2-3**. A sortie includes the takeoff, mission, and landing of a single aircraft. A single sortie can occur across multiple MOAs or ATCAAs, depending on the training being accomplished and how the airspace is scheduled. The sorties in **Table 1.2-3** are a 3-year average in the PRTC and include sorties related to day-to-day training and LFEs. Nighttime operations (occurring after sunset) occur in PRTC and account for up to 20 percent of the total sorties.

Table 1.2-3 Average Annual Sorties in PRTC by Aircraft

Aircraft	Average Annual Sorties
B-1	1,945
B-2	8
B-52	1,086
Tanker	134
Transient Fighter	52
Transient Heavy	5
RQ/MQ	4
Total	**3,234**

Note: Transient Fighter activity includes the most common fighters utilizing the airspace: F-15, F-16, and F-22.
Legend: MQ = multi-role remotely piloted aircraft system; RQ = reconnaissance unmanned aircraft system
Source: DAF 2024

The day-to-day MOAs include PR 1, 2, 3, and 4, along with their associated ATCAAs, and Gateway West ATCAA. **Table 1.2-4** provides the percentage of time spent in each airspace by aircraft type. **Table 1.2-5** illustrates aircraft use of airspace by altitude block. The primary users of the MOAs are the bombers stationed at Ellsworth and Minot AFBs, but the MOAs also support other DAF units. As defined in FAA Order JO 7400.2R, *Procedures for Handling Airspace Matters*, Chapter 21, Paragraph 21-1-7 "to ensure optimum use of the airspace, the using agencies must, where mission requirements permit, make their assigned Special Use Airspace (SUA) available to the activities of other military units on a shared basis." Use of the existing MOAs by non-local DAF units or other military organizations is considered transient activity.

Table 1.2-4 Percent of Time Spent in Airspace[1] for Existing Day-to-Day Operations[2]

Aircraft	PR 1	PR 2	PR 3	PR 4	Gateway West ATCAA
B-1	11	56	11	11	11
B-2	0	82	0	0	18
B-52	5	67	6	6	16
Tanker	10	53	16	11	10
Transient	5	56	11	6	22

Note: [1]Includes MOA and ATCAA for all segments (PR 1, PR 2, PR 3, and PR 4) except for Gateway West ATCAA.
[2]Numbers are rounded to the nearest whole number and do not represent the decimal number; as a result, not all sums will equal 100%.
Legend: ATCAA = Air Traffic Control Assigned Airspace; MOA = Military Operations Area; PR = Powder River

Table 1.2-5 Percent of Time Spent in Altitude[1] Block for Existing Day-to-Day Operations[2]

Aircraft	500–999 AGL	1,000–1,999 AGL	2,000–4,999 AGL	5,000 AGL–12,000 MSL	12,000–18,000 MSL	FL180–FL260
B-1	4	8	4	2	5	77
B-2	0	0	0	5	5	90
B-52	0	7	1	0	7	84
Tanker	0	0	0	1	1	98
Transient	2	2	1	1	3	91

Note: [1]AGL references are used in lower altitudes when clearance from terrain is a concern. Altitudes above 5,000 AGL are generally represented in MSL. Altitudes above 18,000 feet are presented in FL.
[2]Numbers are rounded to the nearest whole number and do not represent the decimal number; as a result, not all sums will equal 100%.
Legend: AGL = above ground level; FL = Flight Level; MSL = Mean Sea Level

1.2.3.2 Large Force Exercises

The 28 BW is currently authorized to host up to four LFEs, called Exercise COMBAT RAIDER, annually. The 2015 ROD caps the PRTC altitude at or below FL260 and limits LFEs to 10 days per year (no more than 3 days per quarter). To gain access to higher altitudes (above FL260) requires significant coordination between FAA and 28 BW to generate a one-time approval for each LFE.

LFEs include bomber aircraft assigned to Ellsworth and Minot AFBs, as well as fighter, surveillance, command/control, and refueling aircraft from units across the country. Approximately 20 aircraft participate in Exercise COMBAT RAIDER for up to 3 days quarterly to provide integrated training to aircrews and ground personnel against surface and air threats. This training improves readiness and combat survivability. LFEs involve all MOAs and ATCAAs in the PRTC. **Table 1.2-6** provides the percentage of time spent in each airspace by aircraft type during LFEs. **Table 1.2-7** illustrates aircraft use by altitude block during LFEs.

Table 1.2-6 Percent of Time Spent in Airspace[1] for LFEs[2]

Aircraft	PR 1	PR 2	PR 3	PR 4	Gap A,B,C	Gateway East ATCAA	Gateway West ATCAA
B-1	22	24	15	19	9	4	7
B-52	21	22	13	17	9	6	12
Tanker	45	4	2	45	1	1	2
Transient	22	24	15	19	9	4	7

Note: [1]Includes MOA and ATCAA for all segments (PR1, PR2, PR3, PR4, Gap A, B, and C) except for Gateway East and West ATCAAs.
[2]Numbers are rounded to the nearest whole number and do not represent the decimal number; as a result, not all sums will equal 100%.
Legend: ATCAA = Air Traffic Control Assigned Airspace; PR = Powder River
Source: DAF 2024

Table 1.2-7 Percent of Time Spent by Altitude[1] Block for LFEs[2]

Aircraft	500–999 AGL	1,000–1,999 AGL	2,000–4,999 AGL	5,000 AGL–12,000 MSL	12,000–18,000 MSL	FL180–FL260
B-1	3	8	3	2	6	78
B-52	0	0	0	0	0	100
Tanker	0	0	0	0	0	100
Transient	4	4	0	0	19	73

Note: [1]AGL references are used in lower altitudes when clearance from terrain is a concern. Altitudes above 5,000 AGL are generally represented in MSL. Altitudes above 18,000 feet are presented in FL.
[2]Numbers are rounded to the nearest whole number and do not represent the decimal number; as a result, not all sums will equal 100%.
Legend: AGL = above ground level; FL = Flight Level; MSL = mean sea level
Source: DAF 2024

Supersonic operations are authorized during LFEs in all airspace except for PR 1C. The authorized minimum altitude is 20,000 feet mean sea level (MSL) for B-1 and 10,000 feet AGL for transient fighter aircraft. Supersonic speed does not occur for the duration of the sortie, but rather a fraction of the total time. **Table 1.2-8** presents the typical supersonic flights and time spent at supersonic speeds for B-1 and the most common transient fighter aircraft operating in MOAs and ATCAAs. B-52s do not fly at supersonic speeds. Supersonic activity would be distributed within the MOA/ATCAAs proportionate to the distribution of operations by aircraft type (see **Table 1.2-6**).

Table 1.2-8 Time Spent in Supersonic Flight by Aircraft Type for LFE Training

Aircraft	Annual flights (sortie)[1]	MOAs[2] (minutes/year)	ATCAAs[3] (minutes/year)
B-1	60	0	15.0
Fighters[4]	100	2.4	45.6
Total	**160**	**2.4**	**60.6**

Notes: [1]A sortie is the takeoff, mission, and landing of one aircraft.
[2]Between 10,000 AGL and 17,999 MSL.
[3]Between 18,000 and 26,000 MSL.
[4]Fighter activity includes the most common fighters utilizing the airspace: F-15, F-16, and F-22
Legend: ATCCA = Air Traffic Control Assigned Airspace; LFE = Large Force Exercise; MOA = Military Operations Area
Source: DAF 2024

1.3 PURPOSE AND NEED FOR PROPOSED ACTION

The DAF is proposing to address shortfalls in aircrew readiness by improving day-to-day training and increasing LFE capability hosted at PRTC to meet emerging threats to National Security.

The purpose of the Proposed Action is to facilitate training that ensures combat effectiveness and aircrew survivability. The Proposed Action is needed because the current PRTC does not allow aircrews to complete required high altitude day-to-day and LFE training, and because current limitations on LFEs prevent realistic training that ensures mission readiness and aircrew survivability.

The DAF determined the Proposed Action and any alternatives must meet the following selection standards:

1. Provide sufficient volume of training space at PRTC required to effectively accomplish TTPs.
2. Accommodate more effective LFEs at PRTC by increasing the duration of individual events.
3. Integrate 5th generation aircraft in bomber training at PRTC.
4. Provide training environment that aligns as closely as possible to real-world scenarios.
5. Utilize existing ground assets at PRTC.

1.4 INTERAGENCY/INTERGOVERNMENTAL COORDINATION AND CONSULTATIONS

Prior to making a decision, the DAF must consult with and obtain the comments of any other federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. For this EIS, the DAF is consulting with regulatory agencies as described in **Section 1.4.1**. The DAF has initiated Government-to-Government Consultation with Native American Tribes with reservation lands or historical ties to the land associated with this EIS as described in **Section 1.4.2**.

1.4.1 Interagency Consultation

Under the Endangered Species Act (ESA; 16 U.S.C. sections 1531–1544), it is the responsibility of the action agency (in this case the DAF) to determine whether a proposed action "may affect" species listed as endangered, threatened, or proposed for listing, or their designated critical habitats. If the action agency determines it may affect a listed species, they must consult with the U.S. Fish and Wildlife Service (USFWS). During the scoping phase of the project, the DAF provided a letter to USFWS Mountain Prairie Regional Office and USFWS Ecological Services Field Offices in South Dakota, North Dakota, Wyoming, and Montana announcing the intent to prepare this EIS and inviting their comments and participation in the project. A Biological Evaluation for all species for which a "may affect" determination is made was submitted to USFWS for concurrence. See **Section 3.6**, *Natural Resources*, for additional information on special-status species and results of ESA consultation.

Several federal laws and regulations have been established to manage cultural resources, including the National Historic Preservation Act (NHPA) (54 U.S.C. section 300101 et seq.), the Archaeological and Historic Preservation Act (6 U.S.C. sections 469–469c), the American Indian Religious Freedom Act (42 U.S.C. section 1996), the Archaeological Resources Protection Act

(6 U.S.C. sections 470aa–470mm), and the Native American Graves Protection and Repatriation Act (25 U.S.C. sections 3001-3013). Section 106 of the NHPA requires all federal agencies to consider the effects of their undertakings on historic properties and seek to avoid, minimize, or mitigate adverse effects to these properties (36 CFR 800.1(a)). The DAF is consulting with the South Dakota, North Dakota, Wyoming, and Montana State Historic Preservation Offices (SHPOs). During scoping, each of the SHPOs received a letter from the DAF introducing the undertaking and requesting their concurrence on the Area of Potential Effects (APE). All SHPOs provided their concurrence. In addition to the SHPOs, the Bureau of Indian Affairs Great Plains and Rocky Mountain Regions were also provided a letter announcing the intention to develop an EIS and invited their comments and participation in the project. The identification of historic properties and the assessment of effects to historic properties was provided to all of the above referenced offices. See **Section 3.8**, *Cultural Resources*, for additional information and results of these consultations.

1.4.2 Intergovernmental Consultation

Consistent with NHPA implementing regulations, DoD Instruction 4710.02, *Interactions with Federally-Recognized Tribes*, and Department of the Air Force Manual (DAFMAN) 32-7003, *Environmental Conservation*, the DAF is also consulting with federally recognized tribes that are historically affiliated with the geographic region for the Proposed Action regarding the potential to affect properties of cultural, historical, or religious significance to the tribes. The tribal coordination process is distinct from NEPA consultation or the interagency coordination processes and requires separate notification to all relevant tribes. The timelines for tribal consultation are also distinct from those of interagency consultations. Prior to the scoping phase of this EIS, the DAF initiated government-to-government consultation with 24 Tribes that are located beneath or near the affected airspace or may have traditional ties to these lands. These consultations are occurring at the direction of the Tribe. See **Section 3.8**, *Cultural Resources*, for additional information and results of these consultations.

1.5 PUBLIC INVOLVEMENT

NEPA specifies public and agency stakeholder involvement at various junctures in the development of an EIS, including: (1) a request for public comment in the Notice of Intent (40 U.S.C. 4336a(c)), and (2) consultation and request for comment of any federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved (40 U.S.C. 4332(C)(v)). The FAA has participated in the public involvement activities for this EIS to satisfy their public involvement requirement per NEPA. Public involvement for this EIS is summarized in **Appendix B**. All aeronautical-related comments will be submitted to the FAA for consideration during their aeronautical analysis of the formal airspace proposal.

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2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 PROPOSED ACTION

The DAF is proposing to address shortfalls in aircrew readiness by improving day-to-day training and increasing the capability of LFEs hosted at PRTC to meet emerging threats to National Security. The Proposed Action includes:

- Actions to improve day-to-day operations:
  - Raise the ceiling of the most used ATCAAs from FL260 to FL600
  - Change times of use for PRTC to 07:00 to 00:30 (7:00 a.m. to 12:30 a.m.) Monday to Thursday, 07:00 to 18:00 (7:00 a.m. to 6:00 p.m.) Friday, and other times by NOTAM
- Actions to improve training capability of LFEs:
  - Raise the available altitude to FL600
  - Increase the total days allowed annually from 10 days to 30 days
  - Increase duration allowed for individual LFEs from 3 days to 12 days

2.2 ALTERNATIVES CARRIED FORWARD FOR ANALYSIS

2.2.1 Alternative 1

Alternative 1 includes changes to improve day-to-day operations and training capability of LFEs. These actions are described in more detail in the following sections.

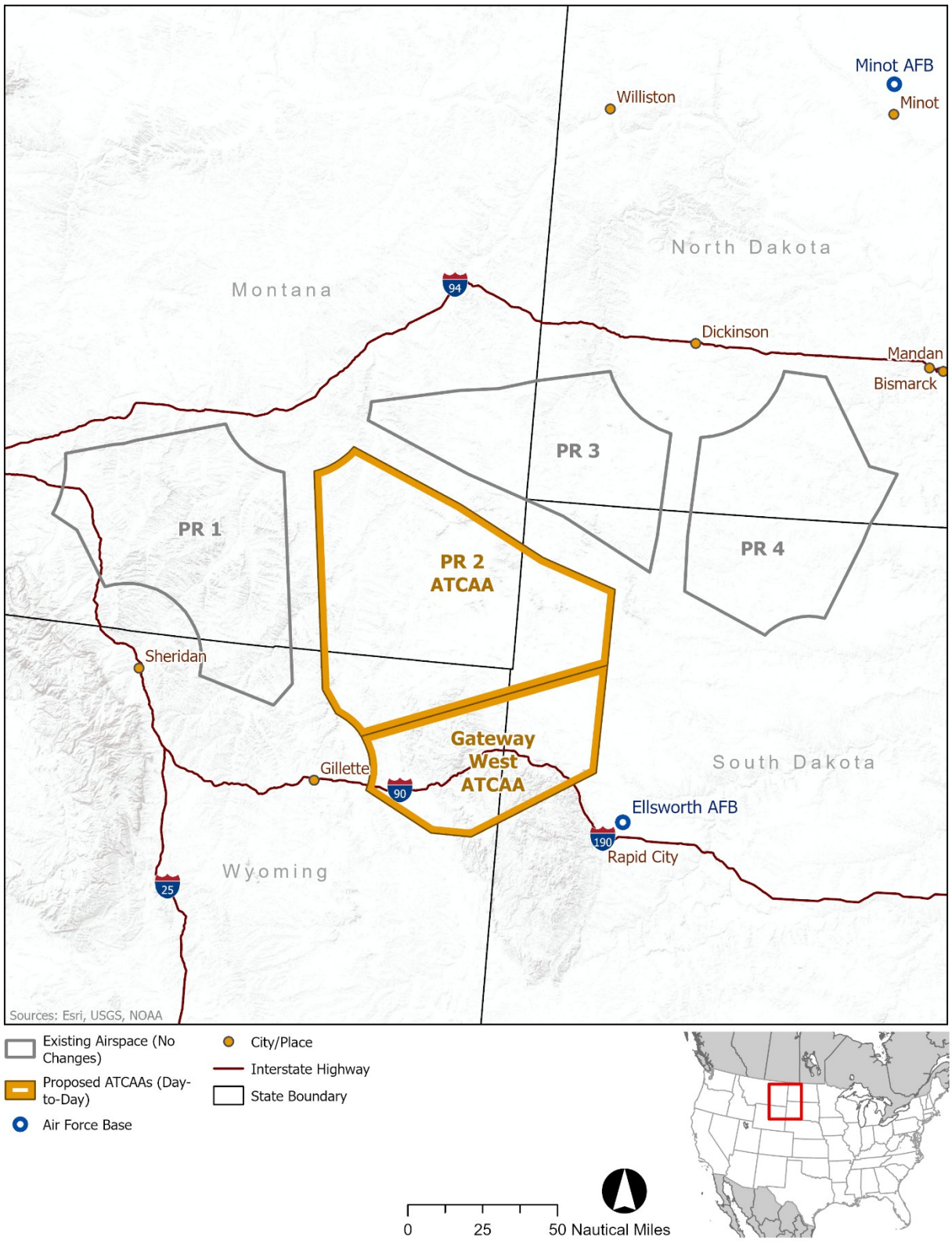
2.2.1.1 Changes to Day-to-Day Operations

Under Alternative 1, the ceilings of the PR 2 ATCAA and Gateway West ATCAA would be raised to FL600 for day-to-day operations (**Figure 2.2-1**). There would be no changes to the lateral dimensions of either of these ATCAAs or the PR 2 MOA (below the PR 2 ATCAA). The Crossbow ATCAA is the combined airspace above PR 2 and Gateway West ATCAAs from FL270–FL310 (as shown on **Figure 1.2-1**). This ATCAA is currently only available to B-52s from Minot AFB and is restricted to a 1,000-foot block of altitude per aircraft. The proposed adjustments to the PR 2 ATCAA and Gateway West ATCAA ceilings would absorb the Crossbow ATCAA and significantly improve usability of this space for all aircraft. **Table 2.2-1** provides a summary of the proposed changes to ATCAAs used for day-to-day operations. There would be no changes to the dimensions of any other PRTC airspace for day-to-day operations under Alternative 1. **Figure 2.2-2** illustrates the proposed vertical changes to the ATCAAs.

Table 2.2-1 Alternative 1 Proposed Changes to PRTC ATCAAs for Day-to-Day Operations

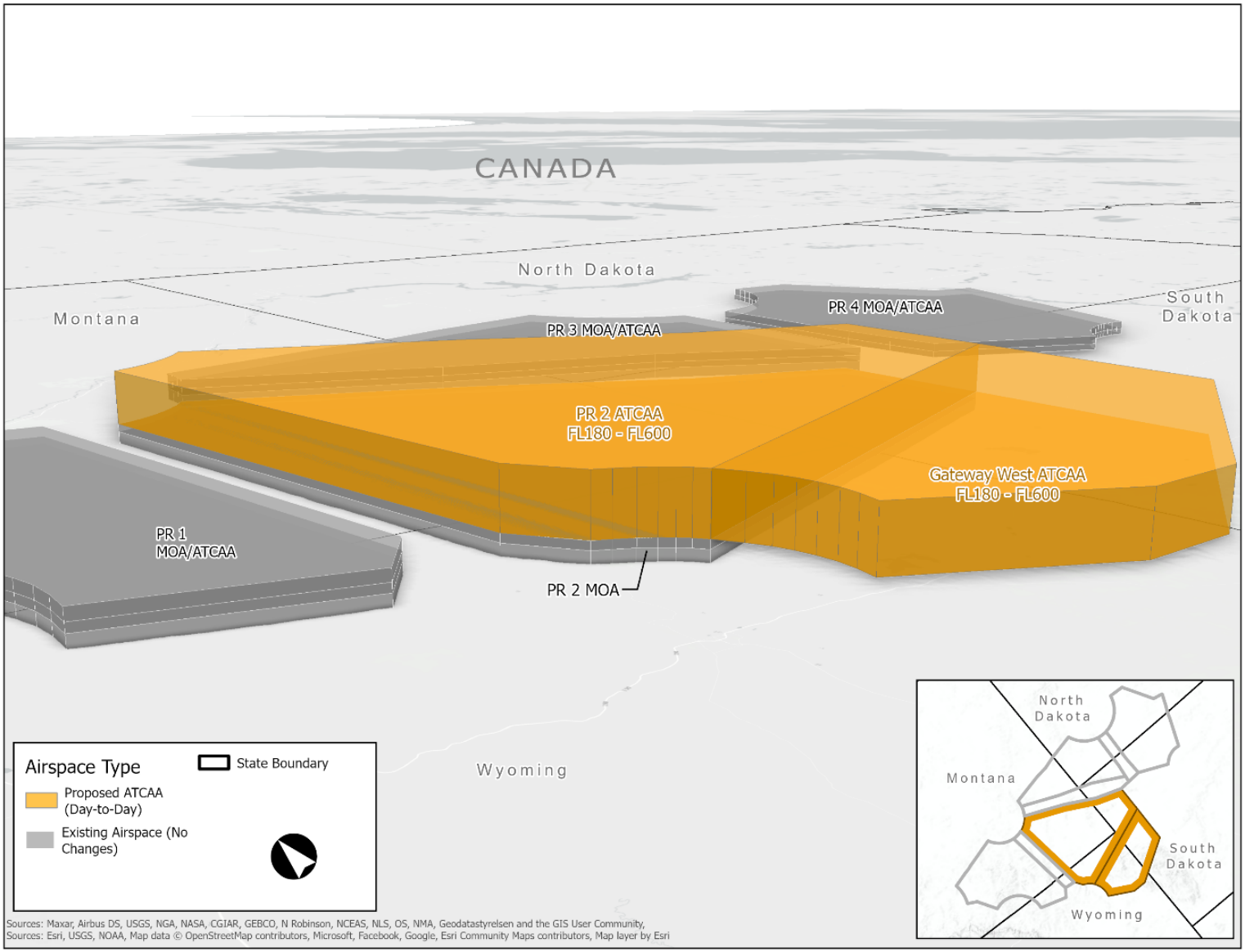
Airspace	Existing Altitudes	Proposed Change
PR 2 ATCAA	FL180–FL260	FL180–FL600
Gateway West ATCAA	FL180–FL260	FL180–FL600
Crossbow ATCAA[1]	FL270–FL310	Absorbed into PR2 and Gateway West ATCAA changes

Note: [1]Crossbow ATCAA is the space above PR2 ATCAA and Gateway West ATCAA combined (FL270–FL310).
Legend: ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; PR = Powder River; PRTC = Powder River Training Complex



Legend: ATCAA = Air Traffic Control Assigned Airspace; PR = Powder River

Figure 2.2-1 Alternative 1 Proposed Changes to ATCAAs for Day-to-Day Operations



Legend: ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; MOA = Military Operations Area; PR = Powder River

Figure 2.2-2 Alternative 1 Proposed Changes to ATCAAs for Day-to-Day Operations – Three-dimensional View

The published times of use for PRTC day-to-day operations would be changed to align with how the complex is currently used and to remove the administrative burden of publishing NOTAMs for activation during published times. These adjustments would improve scheduling flexibility for same day modifications as needed. The Proposed Action includes changing the published times of use to 07:00 to 00:30 (7:00 a.m. to 12:30 a.m.) Monday to Thursday, 07:00 to 18:00 (7:00 a.m. to 6:00 p.m.) Friday, and other times by NOTAM.

Raising the ceiling of the PR 2 and Gateway West ATCAAs would improve the high-altitude training environment for day-to-day operations. These modifications would allow for operations to occur in the higher altitudes but would not change the existing 3,234 total sorties in PRTC (see **Table 1.2-3**). **Table 2.2-2** provides the proposed percentage of time aircraft would spend in airspace during day-to-day operations. PR 2 and Gateway West ATCAAs would continue to be the primary areas used for day-to-day operations accounting for over 87 percent of the training time. **Table 2.2-3** illustrates how aircraft would use the airspace by altitude block for day-to-day operations. As shown, the higher altitudes (above FL180) would continue to be the primary area used for day-to-day operations accounting for over 90 percent of the training time.

2.2.1.2 Changes to Large Force Exercises Operations

Alternative 1 includes authorizing operations up to FL600, as assigned across the PRTC for LFEs (**Figure 2.2-3**). This vertical expansion would create a more realistic and efficient training environment during LFEs, which would better integrate 5th generation fighter aircraft and fully support the bomber aircraft. All of the TTPs for aircraft that use PRTC have optimal tactical employment altitudes from the surface up to FL600. Aircraft handling, tactics, weapons employment, and defensive maneuvers are very different in both the medium- and high-altitude regimes requiring continual training. These higher altitudes are not supported in the current PRTC structure, limiting the training capability for LFEs.

Alternative 1 also includes increasing the LFE days from 10 days total per year (no more than 3 per quarter) to a total of 30 days per year with no quarter restriction. This modification would accommodate LFEs that benefit from a longer duration. Under the Proposed Action, the PRTC would be able to support a 12-day LFE which would maximize participation. A 12-day LFE would include 5 weekdays of flying, no flying on Saturday or Sunday, followed by another 5 weekdays of flying. This arrangement would allow for a complex, 2-week LFE event. Non-local participants would get the most training for their invested time, effort, and money for a single event. An LFE “fly day” would typically consist of two periods of flying activity, one in the morning and one in the evening, each lasting approximately 2 to 4 hours. A summary of the proposed changes to LFEs is provided in **Table 2.2-4.**

Table 2.2-2 Alternative 1 Percent of Time Spent in Airspace[1] for Proposed Day-to-Day Operations[2]

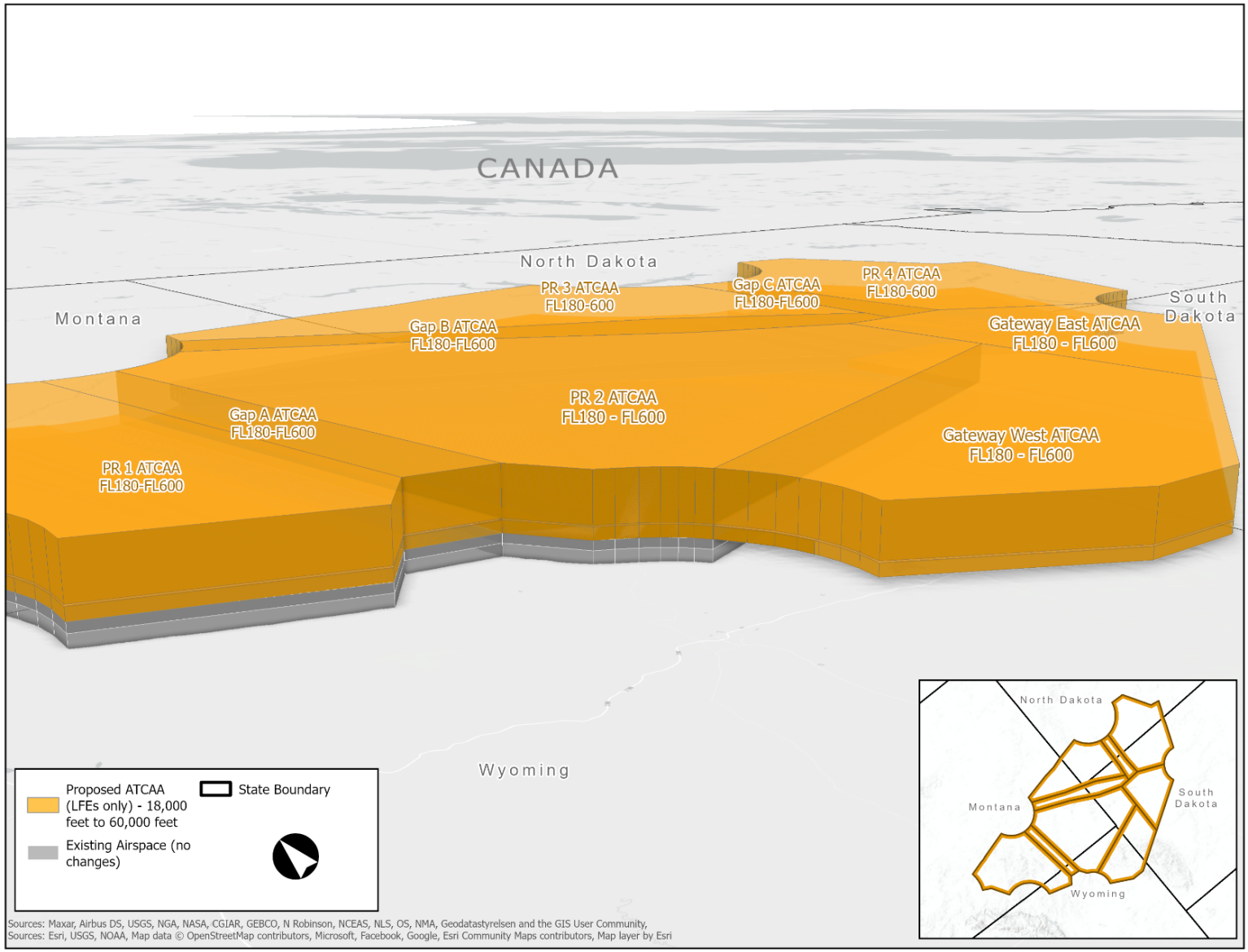
Aircraft	PR 1		PR 2		PR 3		PR 4		Gateway West ATCAA	
	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.
B-1	11	5	56	67	11	5	11	5	11	18
B-2	0	0	82	67	0	0	0	0	18	33
B-52	5	5	67	72	6	3	6	2	16	18
Tanker	10	8	53	70	16	5	11	3	10	14
Transient	5	8	56	62	11	6	6	6	22	18

Note: [1]Includes MOA and ATCAA for all segments (PR 1, PR 2, PR 3, and PR 4) except for Gateway West ATCAA.
[2]Numbers are rounded to the nearest whole number and do not represent the decimal number; as a result, not all sums will equal 100%.
Legend: ATCAA = Air Traffic Control Assigned Airspace; Exist. = Existing; PR = Powder River; Prop. = Proposed

Table 2.2-3 Alternative 1 Percent of Time by Altitude[1] Block for Proposed Day-to-Day Operations[2]

Aircraft	500–999 AGL		1,000–1,999 AGL		2,000–4,999 AGL		5,000 AGL–12,000 MSL		12,000–18,000 MSL		FL180–FL320		FL330–FL410		FL420-FL600–	
	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.[3]	Prop.	Exist.	Prop.	Exist.	Prop.
B-1	4	1	8	1	4	1	2	5	5	2	77	85	0	5	0	0
B-2	0	0	0	0	0	0	5	5	5	5	90	40	0	40	0	10
B-52	0	1	7	1	1	1	0	3	7	4	84	50	0	39	0	1
Tanker	0	0	0	0	0	0	1	1	1	1	98	97	0	1	0	0
Transient	2	2	2	2	1	1	1	1	3	4	91	40	0	30	0	20

Note: [1]AGL references are used in lower altitudes when clearance from terrain is a concern. Altitudes above 5,000 AGL are generally represented in MSL. Altitudes above 18,000 feet are presented in FL.
[2]Numbers are rounded to the nearest whole number and do not represent the decimal number; as a result, not all sums will equal 100%.
[3] The existing airspace does not exceed FL260, thus the percentages shown in this column are for FL180 – FL260.
Legend: AGL = above ground level; Exist. = Existing; FL = Flight Level; MSL = mean sea level; Prop. = Proposed



Legend: ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; LFE = Large Force Exercise; PR = Powder River

Figure 2.2-3 Alternative 1 Proposed Changes to ATCAAs for LFEs

Table 2.2-4 Alternative 1 Proposed Changes to LFEs

LFE Criteria	Current	Proposed
PRTC Airspace[1]	No higher than FL260	Up to FL600, as assigned
Total LFE Days	10 days per year/3 days per quarter	• 30 days total, no quarter restriction • 10 fly days out of 12 days (Monday–Friday flying, off Saturday and Sunday)

Note: [1]PR 1–4 MOAs/ATCAAs; Gap A, B, C MOAs/ATCAAs; Gateway West ATCAA; Gateway East ATCAA.
Legend: FL = Flight Level; LFE = Large Force Exercise; PRTC = Powder River Training Complex

Airspace Operations

Increasing the duration and frequency of LFEs would increase the total sorties within PRTC as detailed in **Table 2.2-5**. **Table 2.2-6** provides the percentage of time that would be spent in airspace for proposed LFEs. **Table 2.2-7** illustrates aircraft use of airspace by altitude block for proposed LFEs. While the total sorties would increase, the distribution of training across the PRTC would remain relatively unchanged. Use of the high-altitude airspace would continue to account for 90 percent of the training time.

Table 2.2-5 Alternative 1 Proposed Sorties in PRTC

Aircraft	Existing Sorties (No Action)[1]	Proposed LFE Sorties	Total
B-1	1,945	0	1,945
B-2	8	120	128
B-52	1,086	0	1,086
Tanker	134	120	254
Transient Fighter	52	1,200	1,252
Transient Heavy	5	180	185
RQ/MQ	4	120	124
Total	**3,234**	**1,740**	**4,974**

Note: [1]Existing sorties include day-to-day operations and LFEs.
Legend: LFE = Large Force Exercise; MQ = multi-role remotely piloted aircraft system; PRTC = Powder River Training Complex; RQ = reconnaissance unmanned aircraft system
Source: DAF 2024

Table 2.2-6 Alternative 1 Percent of Time Spent in Airspace[1] for Proposed LFEs[2]

Aircraft	PR 1		PR 2		PR 3		PR 4		Gap A, B, C		Gateway East ATCAA		Gateway West ATCAA	
	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.
B-1	22	21	24	24	15	15	19	19	9	9	4	5	7	7
B-2	0	20	0	23	0	13	0	17	0	9	0	6	0	12
B-52	21	20	22	22	13	13	17	18	9	9	6	6	12	12
Tanker	45	45	4	4	2	2	45	45	1	1	1	1	2	2
Transient Fighter	21	21	24	24	15	15	19	19	7	9	7	5	7	7
Transient EA-18G	0	21	0	24	0	15	0	19	0	9	0	5	0	7
C2ISR[3]	0	24	0	1	0	10	0	35	0	5	0	15	0	10
RQ/MQ	0	22	0	24	0	15	0	19	0	9	0	4	0	7

Note: [1]Includes MOA and ATCAA for all segments (PR1, PR2, PR3, PR4, Gap A, B, and C) except for Gateway East and West ATCAAs.
[2]Numbers are rounded to the nearest whole number and do not represent the decimal number; as a result, not all sums will equal 100%.
[3]C2ISR aircraft include E-3, E-7, and Rivet Joint.

Legend: ATCAA = Air Traffic Control Assigned Airspace; C2ISR = Command and Control Intelligence, Surveillance, and Reconnaissance; Exist. = Existing; MQ = multi-role remotely piloted aircraft system; RQ = reconnaissance unmanned aircraft; PR = Powder River; Prop. = Proposed

Table 2.2-7 Alternative 1 Percent of Time Spent by Altitude[1] Block for Proposed LFEs[2]

Aircraft	500–999 AGL		1,000–1,999 AGL		2,000–4,999 AGL		5,000 AGL–12,000 MSL		12,000–18,000 MSL		FL180–FL320		FL330–FL410		FL420–FL600	
	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.[4]	Prop.	Exist.	Prop.	Exist.	Prop.
B-1	3	1	8	1	3	1	2	1	6	5	78	90	0	1	0	0
B-2	0	0	0	0	0	0	0	0	0	0	0	15	0	45	0	40
B-52	0	1	0	1	0	1	0	1	0	1	100	15	0	75	0	5
Tanker	0	0	0	0	0	0	0	0	0	5	100	90	0	5	0	0
Transient Fighter	4	2	4	2	0	1	0	1	19	4	73	15	0	65	0	10
Transient EA-18G	0	1	0	1	0	1	0	1	0	16	0	80	0	0	0	0
C2ISR[3]	0	0	0	0	0	0	0	0	0	0	0	70	0	30	0	0
RQ/MQ	0	0	0	0	0	0	0	5	0	5	0	75	0	15	0	0

Note: [1]AGL references are used in lower altitudes when clearance from terrain is a concern. Altitudes above 5,000 AGL are generally represented in MSL. Altitudes above 18,000 feet are presented in FL.
[2]Numbers are rounded to the nearest whole number and do not represent the decimal number; as a result, not all sums will equal 100%.
[3]C2ISR aircraft include E-3, E-7, and Rivet Joint.
[4]The existing airspace does not exceed FL260, thus the percentages shown in this column are for FL180 – FL260.

Legend: AGL = above ground level; C2ISR = Command and Control Intelligence, Surveillance, and Reconnaissance; Exist. = Existing; FL = Flight Level; MSL = mean sea level; MQ = multi-role remotely piloted aircraft system; Prop. = Proposed; RQ = reconnaissance unmanned aircraft

Supersonic operations would continue to occur during LFEs. The authorized minimum altitude would be unchanged: 20,000 feet MSL for B-1 and 10,000 feet AGL for transient fighter aircraft. Supersonic speed does not occur for the duration of the sortie, but rather a fraction of the time. Accommodating more fighter aircraft over more LFE days would increase the total supersonic sorties from the current operations. Supersonic sorties by aircraft type are provided in **Table 2.2-8**. As shown, approximately 95 percent of the supersonic activity would continue to be in the ATCAAs above FL180.

Table 2.2-8 Alternative 1 Annual Time Spent in Supersonic Flight by Aircraft Type for Proposed LFEs

Aircraft	Supersonic Sorties[1]		MOAs[2] (minutes/year)		ATCAAs[3] (minutes/year)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
B-1	60	180	0	0	15	45
F-16	60	300	1.4	150	27.4	2,850
F-15	20	230	0.8	115	8.8	2,185
F-22	10	490	0	245	4.8	4,655
F-35	0	300	0	150	0	2,850
Other Fighters	10	180	0.2	90	4.6	1,710
Total	**160**	**1,680**	**2.4**	**750**	**60.6**	**14,295**

Note: [1]A sortie is the takeoff, mission, and landing of one aircraft.
[2]Between 10,000 AGL and 17,999 MSL
[3]Between 18,000 and 60,000 MSL
Legend: ATCAA = Air Traffic Control Assigned Airspace; LFE = Large Force Exercise; MOA = Military Operations Area

Airfield Operations

Increasing the duration and frequency of LFE events would increase the transient aircraft airfield operations. The airfield operations were recently evaluated in an EIS for the beddown of the B-21 and approved in a ROD (DAF 2021). **Table 2.2-9** provides those projected airfield operations based on the future beddown which serves as No Action for this EIS. The Proposed Action in this EIS would not affect the projected airfield operations associated with the based aircraft (B-1 or the future B-21), but the increased capability for LFEs would bring more transients to the airfield during those events. The increase in transient operations (an additional 2,706 operations) at the airfield are evaluated in this EIS.

Table 2.2-9 Alternative 1 Proposed Airfield Operations[1] at Ellsworth AFB

Aircraft	Projected Operations[2] (No Action)	Proposed Operations[3]	Change
Based Aircraft (B-1/B-21)	9,664	9,664	0
Transient	654	3,360	2,706
Total Airfield Operations	**10,318**	**13,024**	**2,706**

Notes: [1]The number of airfield operations is comprised of the total operations per aircraft at the airfield (takeoff, landing, and patterns).
[2]Projected operations are those that were assessed in the B-21 Beddown EIS (DAF 2021) and approved in a ROD on June 3, 2021.
[3]Proposed operations include the anticipated increase in transient operations from the increased LFE events addressed in this EIS.
Legend: AFB = Air Force Base

Personnel

Transient aircraft participating in LFEs would be accompanied by pilots, crewmembers, and support personnel that would travel to Ellsworth AFB on a temporary duty (TDY) basis for the duration of the event. A 12-day event (10 fly days, no weekend flying) could involve up to an estimated 400 TDY personnel that would stay in local hotels for the duration of the event. **Table 2.2-10** provides an annual estimate of personnel and travel days associated with increased duration and frequency of LFEs. Some LFE events could be of shorter duration and the annual total could be less than that presented in **Table 2.2-10**.

Table 2.2-10 Alternative 1 Estimated TDY Personnel and Expenditures

Activity	TDY Personnel	Hotel (Nights)[1]	Per Diem (Days)
LFE event (12 days)	400	5,600	5,600
Annual Total	1,200	16,800	16,800

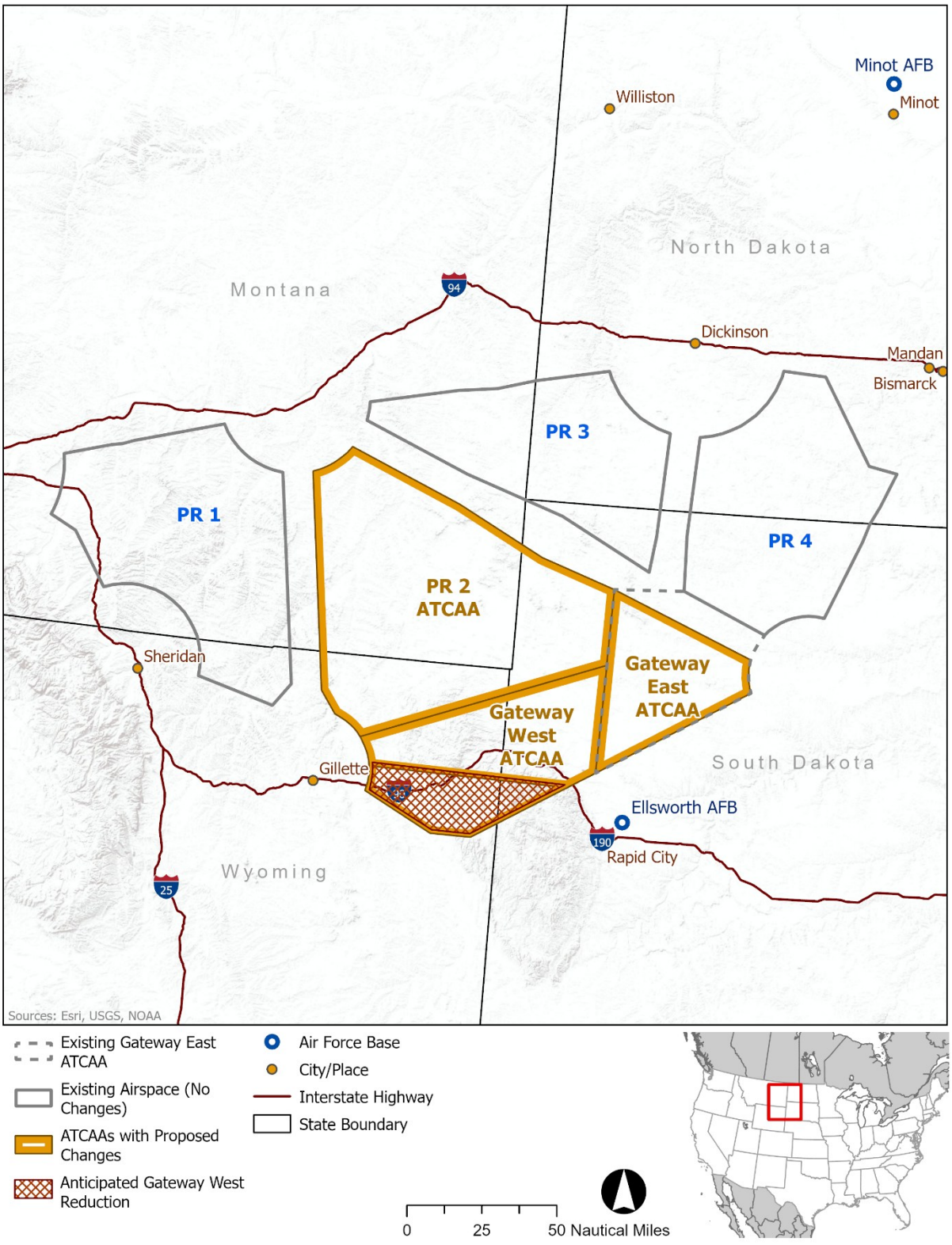
Note: [1]It is assumed TDY personnel would arrive 1–2 days prior to an LFE event, thus each person would spend 14 nights in a hotel.
Legend: LFE = Large Force Exercise; TDY = temporary duty

2.2.2 Alternative 2

Alternative 2 includes changes to improve day-to-day operations and training capability of LFEs. These actions are described in more detail in the following sections.

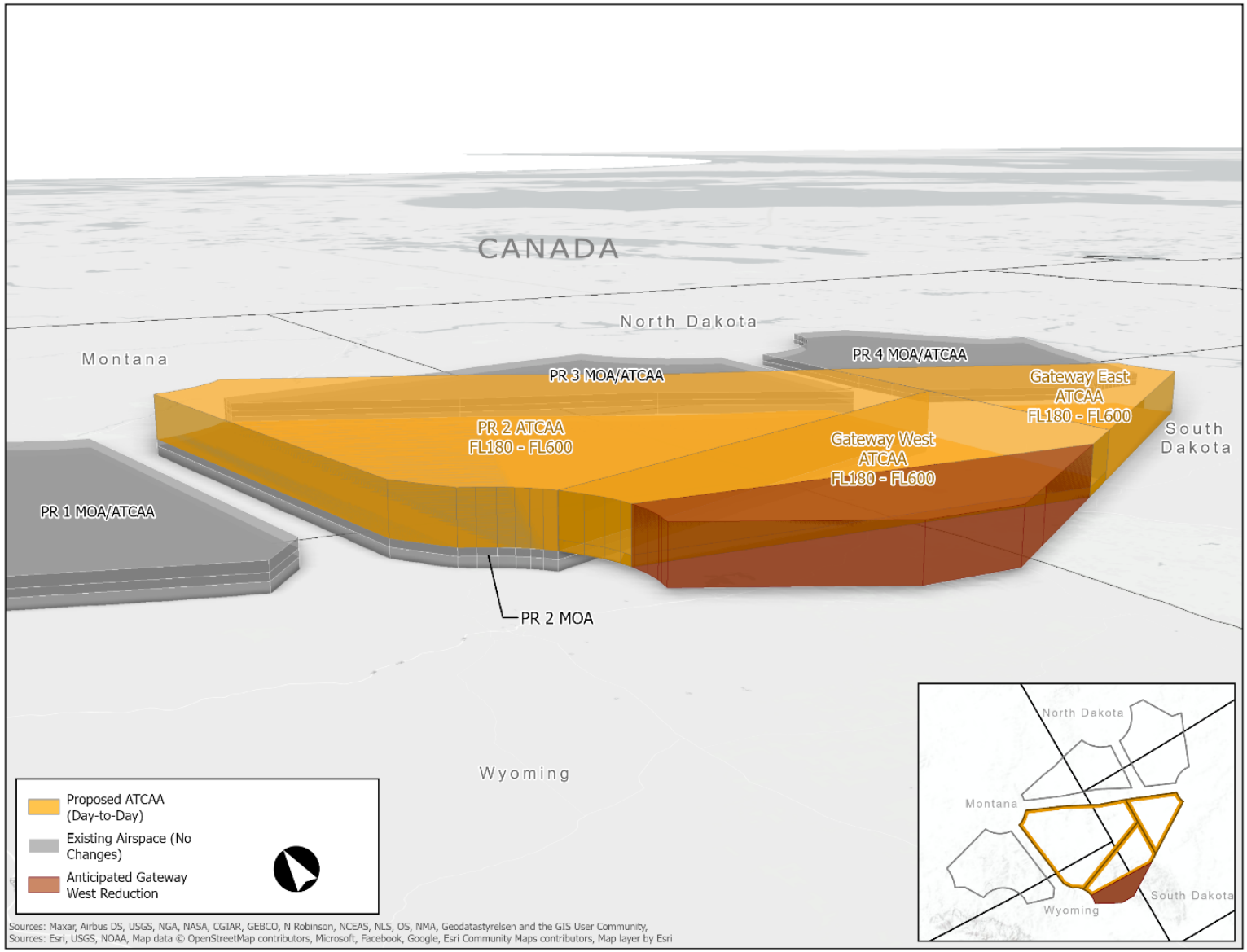
2.2.2.1 Changes to Day-to-Day Operations

Under Alternative 2, the northern border of the Gateway East ATCAA would be shifted south to align with the PR 2 ATCAA northern border, preserving the Gap B corridor (**Figure 2.2-4**). The modified Gateway East ATCAA would be available for day-to-day operations (currently, use of Gateway East ATCAA is limited to LFEs only). Allowing use of the Gateway East ATCAA for day-to-day operations would require the Gateway West ATCAA to be minimized to reduce potential impacts to civilian users of the airspace. The southern corner of Gateway West ATCAA would be moved to the north; the exact location of the new southern boundary would be coordinated with FAA during a revision to the Letter of Agreement (LOA) for this ATCAA after the respective NEPA and aeronautical processes are complete (see **Figure 2.2-4** for the approximate reduction). Since a new boundary would not be known until much later in the aeronautical review process, the EIS analysis includes the full Gateway West ATCAA to represent the greatest area of potential effect. The ceiling of the PR 2 ATCAA and the modified Gateway East/West ATCAAs would be raised to FL600 (**Figure 2.2-5** and **Table 2.2-11**). As with Alternative 1, the Crossbow ATCAA would be absorbed with these changes. The published times of use for PRTC day-to-day operations would be changed to 07:00 to 00:30 (7:00 a.m. to 12:30 a.m.) Monday to Thursday, 07:00 to 18:00 (7:00 a.m. to 6:00 p.m.) Friday, and other times by NOTAM (same as Alternative 1).



Legend: ATCAA = Air Traffic Control Assigned Airspace; PR = Powder River

Figure 2.2-4 Alternative 2 Proposed Changes for Day-to-Day Training



Legend: ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; MOA = Military Operations Area; PR = Powder River

Figure 2.2-5 Alternative 2 Proposed Changes for Day-to-Day Training – Three-dimensional View

Table 2.2-11 Alternative 2 Proposed Changes to PRTC ATCAAs for Day-to-Day Operations

Airspace	Existing Altitudes	Proposed Change
PR 2 ATCAA	FL180–FL260	FL180–FL600
Gateway East ATCAA[1]	FL180–FL260	FL180–FL600
Gateway West ATCAA	FL180–FL260	FL180–FL600
Crossbow ATCAA[2]	FL270–FL310	Absorbed into PR 2 and Gateway West ATCAA changes

Notes: [1]Gateway East ATCAA is not currently used for day-to-day operations; the existing altitudes are for LFE only.
[2]Crossbow ATCAA is the space above PR2 ATCAA and Gateway West ATCAA combined (FL270–FL310).
Legend: ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; PR = Powder River; PRTC = Powder River Training Complex

Raising the ceiling of the PR 2, Gateway East, and Gateway West ATCAAs would improve the high-altitude training environment for day-to-day operations. These modifications would allow for day-to-day training in a larger area and also allow for operations at higher altitude. The percent of time spent in each MOA/ATCAA is provided in **Table 2.2-12**. **Table 2.2-13** illustrates how aircraft would use the airspace by altitude block; it should be noted the use within each block is the same as Alternative 1. PR 2, Gateway West, and Gateway East ATCAAs would be the primary areas used for day-to-day operations accounting for over 87 percent of the training time. As with Alternative 1 and the current situation, the higher altitudes (above FL180) would continue to be the primary area used for day-to-day operations accounting for over 90 percent of the training time.

2.2.2.2 Changes to Large Force Exercises Operations

Alternative 2 includes the same changes to LFEs as Alternative 1, but it incorporates the modifications to Gateway East and West ATCAAs described above for day-to-day operations (**Figure 2.2-6**). A new Gap D ATCAA (FL180–FL600) would be established in place of the northern portion of Gateway East ATCAA affected by the proposed modification described above for day-to-day operations. All other proposed changes would be the same as described in Alternative 1: authorizing operations up to FL600 and increasing the total annual days to 30. See **Section 2.2.1.2** for details on proposed changes to airspace operations, airfield operations, and personnel associated with LFEs.

2.2.3 No Action Alternative

The No Action Alternative is carried forward for analysis to provide a baseline against which to measure the impacts of the Proposed Action and alternatives. Under the No Action Alternative, the day-to-day operations and LFEs would continue in the PRTC as they do currently and as described in **Section 1.2.3**. The DAF would continue to have limited training airspace vertically for the B-1 and B-52 and limit the integration opportunities with 5th generation aircraft. The altitude and duration limitations would continue to decrease the value of LFEs in PRTC for most combat aircraft and discourage them from attending an LFE. The continuation of inefficient training threatens aircrew survivability and mission readiness.

Table 2.2-12 Alternative 2 Percent of Time Spent in Airspace[1] for Proposed Day-to-Day Operations[2]

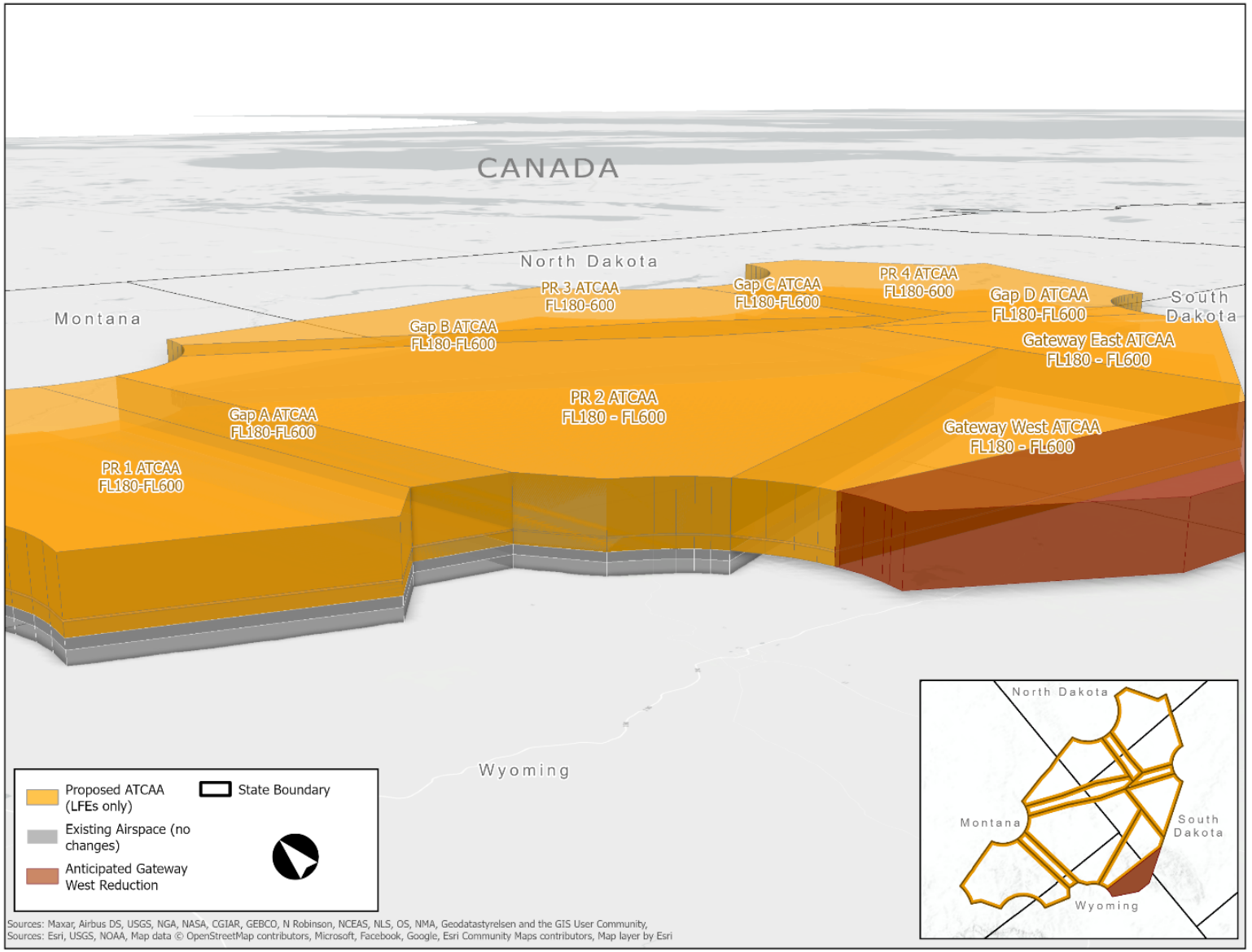
Aircraft	PR 1		PR 2		PR 3		PR 4		Gateway-East ATCAA		Gateway-West ATCAA	
	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.
B-1	11	5	56	58	11	5	11	5	0	15	11	12
B-2	0	0	82	55	0	0	0	0	0	25	18	20
B-52	5	5	67	63	6	3	6	2	0	15	16	12
Tanker	7	8	53	62	16	5	11	3	0	12	10	10
Transient	5	8	56	53	11	6	6	6	0	15	22	12

Notes: [1]Includes MOA and ATCAA for all segments (PR1, PR2, PR3, and PR4) except for Gateway East and West ATCAAs.
[2]Numbers are rounded to the nearest whole number and do not represent the decimal number; as a result, not all sums will equal 100%.
Legend: ATCAA = Air Traffic Control Assigned Airspace; Exist. = Existing; PR = Powder River; Prop. = Proposed

Table 2.2-13 Alternative 2 Percent of Time by Altitude[1] Block for Proposed Day-to-Day Operations[2]

Aircraft	500–999 AGL		1,000–1,999 AGL		2,000–4,999 AGL		5,000 AGL–12,000 MSL		12,000–18,000 MSL		FL180–FL320		FL330–FL410		FL420–FL600	
	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	Exist.[3]	Prop.	Exist.	Prop.	Exist.	Prop.
B-1	4	1	8	1	4	1	2	5	5	2	77	85	0	5	0	0
B-2	0	0	0	0	0	0	5	5	5	5	90	40	0	40	0	10
B-52	0	1	7	1	1	1	0	3	7	4	84	50	0	39	0	1
Tanker	0	0	0	0	0	0	1	1	1	1	98	97	0	1	0	0
Transient	2	2	2	2	1	1	1	1	3	4	91	40	0	30	0	20

Notes: [1]AGL references are used in lower altitudes when clearance from terrain is a concern. Altitudes above 5,000 AGL are generally represented in MSL. Altitudes above 18,000 feet are presented in FL.
[2]Numbers are rounded to the nearest whole number and do not represent the decimal number; as a result, not all sums will equal 100%.
[3]The existing airspace does not exceed FL260, thus the percentages shown in this column are for FL180–FL260.
Legend: AGL = above ground level; Exist. = Existing; FL = Flight Level; MSL = mean sea level; Prop. = Proposed



Legend: ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; LFE = Large Force Exercise; PR = Powder River

Figure 2.2-6 Alternative 2 Proposed Changes to ATCAAs for LFEs

2.3 ALTERNATIVES ELIMINATED

The DAF considered other alternatives to the Proposed Action but eliminated them from further analysis since they did not meet the purpose and need or satisfy the selection standards defined in **Section 1.3.** Other alternatives considered and the reasons for eliminating from this EIS are as follows:

Use of airspace other than PRTC to meet all training requirements

The closest reliable airspace with the capacity for the required training is the Nevada Test and Training Range at Nellis AFB which is approximately 1,000 miles away. This range has significant demands from its own primary user, the weapons school, and outside units have limited opportunities to utilize the range. Similarly, the Utah Test and Training Range at Hill AFB is approximately 700 miles away and is also prioritized for testing and its primary users. This alternative was considered but eliminated due to the greatly increased fuel cost, transit times, and criteria pollutant emissions associated with traveling to other locations for day-to-day training. This alternative does not meet selection standards 1, 2, 3, or 5.

Use simulators to meet all training needs

The use of simulators to overcome existing training shortfalls was eliminated as a reasonable alternative. Though simulation technology has provided increased realism over the years, simulators still lack the external environment realism and the necessary level of fidelity or interoperability that provides new pilots with airmanship, critical thinking, and seasoning under real-world flight conditions. Simulators are currently used to the maximum extent possible within the objectives of each syllabus and provide good skills training that cannot be replicated accurately and/or safely in the aircraft, such as engine-out training. Therefore, use of simulators to overcome existing training shortfalls was not considered since it does not meet selection standards 2, 3, 4, or 5.

Raise altitudes of PR1, PR3, or PR4 ATCAAs for day-to-day operations

The Belle Fourche Electronic Scoring Site exists beneath PR 2 MOA/ATCAA and is currently used in conjunction with Gateway West ATCAA. Raising the altitudes of any other individual PR ATCAA would not provide the sufficient space for training since they are not connected to Gateway West ATCAA nor could the existing ground assets beneath PR 2 be used by aircraft training in the other PRTC ATCAAs. Moving the ground assets to a location beneath any of the other PR MOA/ATCAAs would require land leases and environmental impacts from ground disturbance. Moving the assets would result in time loss to the mission. This alternative does not meet selection standards 1 or 5.

2.4 RELEVANT LAWS AND REGULATIONS

This EIS has been prepared in accordance with applicable laws, statutes, regulations, and policies pertinent to the implementation of the Proposed Action to include:

- NEPA
- Clean Air Act (CAA)
- NHPA
- ESA

- Migratory Bird Treaty Act (MBTA)
- Bald and Golden Eagle Protection Act (BGEPA)
- Executive Order 12088, Federal Compliance with Pollution Control Standards
- Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks
- Executive Order 13175, Consultation and Coordination with Indian Tribal Governments

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3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

DoW NEPA Implementing Procedures requires consideration of whether the reasonably foreseeable effects of the proposed action are significant and the degree of the effects of the action. The analysis in this EIS considers the current conditions (i.e., baseline) of the affected environment and compares those to conditions that might occur should the Proposed Action or any alternative be implemented. Baseline conditions provide a benchmark against which an agency measures the effects of a Proposed Action. The differences in the conditions between the baseline and the Proposed Action reflect the magnitude of impacts relative to the various resources analyzed.

3.1.1 Documents Incorporated by Reference

The establishment and use of the PRTC as it exists today was evaluated in the 2014 *Environmental Impact Statement for Powder River Training Complex* (herein referred to as the 2014 EIS) and implemented by a ROD signed in January 2015 (DAF 2015). The 2014 EIS evaluated the potential impacts from the establishment of the PRTC and operations within that airspace, to include use of chaff and flares. Several resources were evaluated in detail to include: airspace/air traffic, noise, safety, air quality, physical sciences (geology, topography, soils, and water), biological sciences (plants and animals), cultural and historic resources, land use, socioeconomics, and environmental justice and protection of children. This EIS addresses modifications to the original design of the PRTC by raising the available altitude and increasing the number of days for LFE training. The Proposed Action analyzed within this EIS does not include any changes to the use of chaff and flares in PRTC as analyzed in the 2014 EIS, and therefore the use of chaff and flares at PRTC is not analyzed herein. The region of influence (ROI) for the proposed airspace modifications in this EIS is the same as the original EIS and in some cases the potential impact to many resources would not change with the proposed modifications. Therefore, the affected environment descriptions and the environmental impacts for many resources provided in the 2014 EIS are incorporated by reference to align with page limitations defined in DoW NEPA Implementing Procedures. In general, the No Action Alternative constitutes the impacts described in the 2014 EIS. The 2014 EIS document is available on the project website: www.prtcairspaceeis.com.

The *Environmental Impact Statement for B-21 Main Operating Base Beddown at Dyess AFB, Texas or Ellsworth AFB, South Dakota* analyzed the beddown of the new bomber aircraft, the B-21, at Ellsworth AFB (DAF 2021). The B-21 will replace the existing B-1s at Ellsworth AFB. The projected airfield operations at Ellsworth AFB evaluated in that EIS serve as No Action for this EIS (i.e., the Affected Environment). The Proposed Action in this EIS would not affect the projected airfield operations associated with the based aircraft (B-1 or the future B-21), but the increased capability for LFEs would bring more transients to the airfield during those events. The increase in transient operations from the increased LFEs at the airfield will be evaluated in the noise analysis for this EIS (see **Section 3.4**). The B-21 will ultimately use PRTC as its primary training airspace once the beddown is complete. The B-21 use of the airspace is a reasonably foreseeable action under the authority of the DAF and as such will be addressed in

Section 4.1, *Other Projects Considered in Environmental Effects*. The B-21 Beddown EIS is available on the project website: www.prtcairspaceeis.com.

3.1.2 Resources Eliminated from Detailed Analysis

Table 3.1-1 provides an overview of the resources analyzed in this EIS and addresses both DAF and FAA defined resources. A brief discussion for resources that were not carried forward for detailed analysis is provided for each resource after the table. Resources that are carried forward for detailed analysis may be impacted from the proposed changes to day-to-day operations or proposed changes to LFEs, or both.

Table 3.1-1 Environmental Resources Analyzed in the EIS

Resource	Potentially Impacted from Changes to Day-to-Day Operations	Potentially Impacted from Changes to LFEs	Carried Forward for Detailed Analysis
Airspace Management and Use	Yes	Yes	Yes
Safety	Yes	Yes	Yes
Noise	Yes	Yes	Yes
Air Quality	No	Yes	Yes
Natural Resources (Wildlife, Vegetation, and Protected Species)	No	Yes	Yes
Socioeconomics	No	Yes	Yes
Cultural Resources	No	Yes	Yes
Land Use	No	Yes	Yes
Visual Effects	No	No	No
Hazardous Materials and Wastes	No	No	No
Farmlands	No	No	No
Water Resources	No	No	No
Earth Resources	No	No	No
Natural Resources and Energy Supply	No	No	No
Coastal Zone	No	No	No

Legend: EIS = Environmental Impact Statement; LFE = Large Force Exercise

Visual Effects. Visual resources make up the aesthetic qualities of an area. The FAA Order 1050.1 Desk Reference requires analysis to determine the extent to which a Proposed Action and alternatives would produce light emissions that would create annoyance or interfere with activities or contrast with or detract from the visual character of the existing environment. The EIS analysis of visual effects does not evaluate the topic of light emissions further because the potential for light emissions would be associated only with lights on aircraft during nighttime training. Military aircraft training already occurs in the environment during nighttime and this would not substantially change with the Proposed Action. As shown in **Table 2.2-3** (Alternative 1 Day-to-Day Operations), **Table 2.2-7** (Alternative 1 LFE Operations), and **Table 2.2-13** (Alternative 2 Day-to-Day Operations), most operations in PRTC are in higher altitudes (above FL180) which would not create light emissions at the ground level. The potential for low-level flights to create a visual intrusion for cultural resources or traditional cultural places is addressed in **Section 3.8**, *Cultural Resources*.

Hazardous Materials and Wastes. Hazardous materials are identified and regulated under the Comprehensive Environmental Response, Compensation, and Liability Act; the Occupational

Safety and Health Act; and the Emergency Planning and Community Right-to-Know Act. Hazardous materials analysis typically considers the use and disposal of hazardous materials at a particular facility and discusses the total amount of material on the installation, environmental cleanup sites, and Standard Operating Procedures (SOPs) in processing hazardous materials. The Proposed Action would not change the types or amounts of hazardous materials or wastes stored, managed, or disposed of at Ellsworth AFB. Thus, this resource was not evaluated in detail in this EIS. In the rare event of an aircraft mishap or crash, hazardous materials could be introduced into the environment beneath the airspace. This is discussed in **Section 3.3**, *Safety*.

Farmlands. The Farmland Protection Policy Act regulates federal actions with the potential to convert farmland to non-agricultural uses. The proposal would not involve any ground disturbance or conversion of farmland to non-agricultural uses; therefore, farmlands were not evaluated in detail in this EIS.

Water Resources. Water Resources include surface water, groundwater, wetlands, and floodplains. This resource was fully analyzed in the 2014 EIS. The Proposed Action would be limited to the modification of airspace to support military training operations and would not include any components that would touch or directly affect the quantity, flows, percolation rate, or accessibility of surface or groundwater resources. Thus, this resource was not evaluated in detail in this EIS.

Earth Resources. Earth Resources include geology, topography, and soils. This resource was fully analyzed in the 2014 EIS for airspace operations. The Proposed Action and alternatives would be limited to the modification of airspace to support military training operations. There are no activities proposed that would impact the geology, topography, or soils in the affected environment. Thus, this resource was not evaluated in detail in this EIS.

Natural Resources and Energy Supply. A discussion of natural resources and energy supply is required under FAA NEPA guidance to determine a proposal's consumption of natural resources such as water, asphalt, aggregate, wood, etc., and use of energy supplies such as coal for electricity, natural gas for heating, etc. Consumption of natural resources and use of energy supplies would typically result from construction, operation, and maintenance activities of a proposed action. None of the alternatives evaluated in this EIS include the construction or maintenance of any facilities. The use of energy supplies would be jet fuel used during training operations; however, this is not expected to be a substantial increase or use of energy supplies beyond what is used currently. Therefore, natural resources and energy supply are not evaluated in detail in this EIS.

Coastal Zone. The Coastal Zone Management Act of 1972 was established to plan comprehensively for and manage development of the Nation's coastal land and water resources. There are no coastal zones within or near the ROI for this Proposed Action. Therefore, the Proposed Action and alternatives would not have any impact to coastal zone management.

3.2 AIRSPACE MANAGEMENT AND USE

Airspace management and use considers how airspace is designated, used, and administered in a manner that best accommodates the individual and common needs of military, commercial, general aviation, and other users of the airspace.

In the U.S., airspace is managed and controlled by the FAA. The FAA is solely responsible for developing plans and policy for the use of airspace and for managing airspace in such a manner that it ensures the safety of flight and that all users of the NAS can operate in a safe, secure, and efficient manner (49 U.S.C. 40103[b]). The FAA considers multiple and sometimes competing demands for airspace in relation to airport operations, air traffic service routes, military training airspace, and other special needs to determine how the NAS can best be structured to address all user requirements.

The DoW requests airspace from the FAA and schedules and uses airspace in accordance with the processes and procedures detailed in DoD Directive 5030.19, *DoD Responsibilities on Federal Aviation*, and FAA regulations. SUA identified for military and other governmental activities is charted and published by the National Aeronautical Charting Office in accordance with FAA Order JO 7400.2R, *Procedures for Handling Airspace Matters*. Airspace designated for military use is released to the FAA when the airspace is not needed for military requirements (DoD 2023). Descriptions of approved SUA, except temporary areas and controlled firing areas, are compiled and published once a year in FAA JO 7400.10, *SUA*. For MOAs which overlay public use airports, there is an airspace exclusion of 1,500 feet AGL and below within a 3 NM radius of public use airports. This exclusion may be extended when necessary.

FAA Order 7400.2R indicates that the airspace review and approval process and environmental impacts review should be conducted concurrently as much as possible; however, they are still separate processes. FAA's approval of either the DoW's aeronautical (SUA) request or the DoW's NEPA analysis does not automatically confer approval of the entire proposal. See FAA Order JO 7400.2R, Chapter 21 (Sections 3, 4, 5, and 6) and Appendices 7 and 8 for additional details on the SUA request and approval process, and coordination between FAA and DoW of NEPA documentation for projects involving the use of SUA.

Procedures governing the use of training areas and airspace operated and controlled by the DAF are included in Air Force Policy Directive 13-2, *Air Traffic, Airfield, Airspace and Range Management* and its implementing regulations. The DAF manages airspace in accordance with processes and procedures detailed in Department of the Air Force Manual (DAFMAN) 13-201, *Airspace Management*. DAFMAN 13-201 also provides the guidance and procedures used to develop and process SUA actions. It governs airspace management instructions on creating and maintaining airspace that allows the DAF to meet operational needs for military readiness. DAF bases supplement regulatory guidance in local flying instructions in conjunction with LOAs with the FAA, which expand guidance for operations within airspace.

3.2.1 Affected Environment

The establishment and use of the PRTC as it exists today was evaluated in the EIS for Powder River Training Complex and implemented by a ROD signed in January 2015 (DAF 2015). The PRTC is managed by the 28 BW and is the largest training airspace in the Continental U.S. The existing airspace structure consists of several MOAs and ATCAAs as described in Section 1.2, see specifically **Table 1.2-1** and **Figures 1.2-1 and 1.2-2**. No new airspace units are proposed in this EIS. All existing avoidance and exclusion measures, including minimum altitudes over towns, airport buffers, and sensitive site exclusions, remain unchanged under the Proposed Action (see **Section 1.2.2**).

Appendix C provides additional information on the NAS and airspace classification, general flight rules, and various types of airspace and air routes within PRTC.

3.2.2 Environmental Consequences

There are no defined significance criteria for airspace management and use. Airspace management and use is potentially impacted by proposed changes to day-to-day operations and changes to LFEs. Detailed descriptions of the analysis methodology and airspace impacts are provided in **Appendix C**; those impacts are summarized in the following sections.

3.2.2.1 Alternative 1

Impacts from Changes to Day-to-Day Operations

Under Alternative 1, the ceiling of PR 2 and Gateway West ATCAAs would increase from FL260 to FL600 for day-to-day operations. Scheduled times of use would change to Monday through Thursday 07:00 to 00:30 (7:00 a.m. to 12:30 a.m.) and Friday 07:00 to 18:00 (7:00 a.m. to 6:00 p.m.), with all other times still available by NOTAM.

Airport Operations

Potential impacts to airport operations would be associated with the change to the published times of use and NOTAM requirements. VFR operations to and from airports would not be restricted, though additional radio coordination may be required when transiting active airspace. Six public airports within the PRTC ROI have approaches that coincide with the airspace:

- Baker Municipal, Montana: RNAV approaches and missed approaches require altitudes up to 6,000 feet MSL within PR 3.
- Big Horn County, Montana: RNAV Runway 26 approach intersects PR 1 up to 10,000 feet MSL.
- Bowman Regional, North Dakota: RNAV Runway 13 and 31 approaches occur within PR 3 at 5,800 feet MSL.
- Colstrip, Montana: GPS approaches and departures intersect PR 1 up to 9,000 feet MSL.
- Ekalaka, Montana: RNAV approaches require altitudes up to 14,000 feet MSL with fixes in PR 2 and PR 3.
- Hulett Municipal, Wyoming: RNAV Runway 13 intersects PR 2 up to 7,600 feet MSL.

Potential impacts would be procedural and conditional, occurring primarily when instrument approaches are required due to instrument meteorological conditions. During such weather conditions, DAF maneuvering at the lower altitudes associated with these procedures is less likely, thus reducing the probability of operational conflict. Exact impacts would depend on weather conditions and unknown operational tempo at these airports. Review of radar data indicates that traffic associated with these airports occurred at a frequency of less than once per month, and in some cases not at all, suggesting limited routine use of the intersecting airspace.

Additionally, the proposed daily hours appear to have higher impacts to availability on these procedures, but upon review of historical NOTAM submissions via Denver ARTCC (ZDV), this airspace is currently scheduled nearly daily within the proposed hours. Therefore, the changes to the scheduled times simply reflect that of current daily usage vice an actual increase of scheduled or activation time. Thus, there are no anticipated impacts to airport operations due to proposed changes to day-to-day operations.

Civil Traffic

This analysis used a year of flight radar data (July 2024 to July 2025) to determine the volume of civil traffic that may potentially be impacted from the Proposed Action. During one year, 97,571 total flights crossed PR 2 and Gateway West at altitudes between FL260 and FL600. To focus on civil operations during times when the airspace would actually be active, military, unknown carriers, and weekend flights were removed from the analysis dataset. These exclusions, representing roughly 40 percent of the total flights, primarily reflect periods when the DAF does not schedule training, such as weekends. After filtering, 58,557 civil flights were further evaluated to determine the potential impacts.

For each civilian flight track that intersected the proposed areas (PR 2 and Gateway West between FL260 and FL600), the origin and destination airports were identified and tallied to determine the most frequently used "pairings." To evaluate the potential impact to civil traffic from increasing the altitude for military training in these areas, point-to-point distances (via great-circle routing) were calculated for each origin-destination pair. Although these straight-line paths do not reflect actual filed or flown routes, they serve as a conservative baseline for estimating minimum flight distances for the pairings. Alternative routings for each of the pairings were constructed to circumnavigate the proposed airspace laterally. Each rerouted path incorporated an intermediate navigational aid or fix guiding the aircraft around the lateral boundaries of the proposed airspace. The total rerouted distance was calculated by summing the segments from origin to fix and from fix to destination, with the difference from the baseline route (point-to-point via great-circle) used to determine the additional distance required to fly around the proposed airspace.

From the 58,557 civil flights analyzed, 4,089 unique origin–destination route pairings were identified. Most of these airport pairings occurred once to only a few times per year; however, 170 pairings operated with a frequency of at least once per week (52 times annually), representing nearly 78 percent of all remaining traffic and forming the core of the impact assessment. See **Appendix C** for full analysis on all routes.

Of these 170 routes, 52 percent of the great circle paths do not intersect any portion of the proposed airspace. Thus, the Proposed Action would have no impact to these routes. Among the remaining routes, only 12 route pairings would require a deviation greater than 10 NM to avoid the proposed area; 10 NM equates to approximately 1 minute and 20 seconds of additional flight time at 450 knots true airspeed. The most affected routes are shown in **Table 3.2-1**; as shown, two routes would have impacts of 4 to 6 minutes per flight while the others would be less affected.

Additional travel time would increase fuel usage which indirectly increases cost of operating the aircraft. Fuel costs vary widely based on aircraft type, operating weight, altitude, speed, atmospheric conditions, operator-specific procedures, and fuel prices themselves fluctuate over time and by location. Because of these inherent variables, it is not prudent to calculate or present a single total fuel cost associated with each alternative. Instead, **Appendix C** provides the methodology by which additional distance can be translated into additional time, fuel burn, and cost, allowing individual operators to assess potential impacts using parameters that reflect their specific aircraft, operating profile, and fuel pricing assumptions.

Table 3.2-1 Alternative 1 Day-to-Day Impacts to High-Frequency Routes

Route	Additional Time per Flight (minutes)	Annual Impact (hours)
Denver International Airport (CO) to Williston Basin International Airport (ND)	4.29	126.9
Bozeman Yellowstone International Airport (MT) to Chicago O'Hare International Airport (IL)	1.85	36.4
Billings Logan International Airport (MT) to Louisville Muhammad Ali International Airport (KY)	1.61	14.1
Billings Logan International Airport (MT) to Chicago O'Hare International Airport (IL)	3.59	12.5
Billings Logan International Airport (MT) to Sioux Falls Regional Airport (SD)	3.38	7.6
Bozeman Yellowstone International Airport (MT) to Chicago Midway International Airport (IL)	1.72	7.0
Bismarck Municipal Airport (ND) to Gillette–Campbell County Airport (WY)	6.09	6.7
Winnipeg James Armstrong Richardson International Airport (MB) to Palm Springs International Airport (CA)	1.49	3.5
Bozeman Yellowstone International Airport (MT) to Sioux Falls Regional Airport (SD)	1.75	2.6
Bozeman Yellowstone International Airport (MT) to Washington Dulles International Airport (VA)	1.87	2.3
Bert Mooney Airport (MT) to Sioux Falls Regional Airport (SD)	1.71	2.2
Vancouver International Airport (BC) to Louisville Muhammad Ali International Airport (KY)	1.55	1.4

Impacts from Changes to LFEs

Under Alternative 1, the available altitude for LFEs (the entire PRTC) would be raised from FL260 to FL600. Also proposed is an increase in the total number of LFE days from 10 to 30, and to extend the duration of individual LFEs from 3 days to 12 days.

Airport Operations

Potential impacts to airport operations would be associated with the change to the published times of use and NOTAM requirements. The only additional procedure impacted over that discussed from day-to-day is missed approach procedures at Bowman Regional, North Dakota that occur in the Gap C area at 6,000 feet MSL. The LFE days would be in place of daily operations, not in addition to, therefore, the impacts during LFEs would be like that as described for day-to-day operations.

Civil Traffic Volume

The methodology for assessing impacts to civil traffic from changes to LFEs was the same as described above. During the year of analysis, 170,457 total flights crossed the proposed LFE area at altitudes between FL260 and FL600. To focus on civil operations during times when the airspace would actually be active, military, unknown carrier, and weekend flights were removed from the dataset resulting in 121,492 civil flights for detailed evaluation.

From the 121,492 civil flights analyzed, 5,706 unique origin–destination route pairings were identified. Most occurred infrequently; however, 269 pairings operated at least once per week,

representing over 85 percent of all remaining traffic and forming the core of the impact assessment.

Similar to the day-to-day results, 52 percent of great circle paths do not intersect any portion of the proposed airspace. Thus, the Proposed Action would have no impact to these routes. Among the remaining routes, 42 route pairings would require a deviation greater than 10 NM to avoid the proposed area, equating to roughly 1 minute 20 seconds of additional flight time at 450 knots true airspeed. The 17 most affected routes are shown in **Table 3.2-2**. All other affected routes would result in less than three additional flight hours annually and less than three additional minutes per flight. See **Appendix C** for full analysis of all routes. As stated above for day-to-day operations, additional travel time would increase fuel usage which indirectly increases cost of operating the aircraft (see **Appendix C** for methodology to determine increased fuel cost for individual operators).

Table 3.2-2 Alternative 1 LFE Impacts to High-Frequency Routes

Route	Additional Time per Flight (minutes)	Annual Impact (hours)
Denver International Airport (CO) to Williston Basin International Airport (ND)	15.13	58.0
John F. Kennedy International Airport (NY) to Seattle–Tacoma International Airport (WA)	2.49	11.8
Denver International Airport (CO) to Dickinson Theodore Roosevelt Regional Airport (ND)	11.39	9.1
Newark Liberty International Airport (NJ) to Seattle–Tacoma International Airport (WA)	2.49	7.4
Bozeman Yellowstone International Airport (MT) to Chicago O'Hare International Airport (IL)	1.85	4.6
Denver International Airport (CO) to Minot International Airport (ND)	1.80	4.3
Bozeman Yellowstone International Airport (MT) to Minneapolis–Saint Paul International Airport (MN)	1.66	4.0
Raleigh–Durham International Airport (NC) to Seattle–Tacoma International Airport (WA)	2.05	3.8
Phoenix–Mesa Gateway Airport (AZ) to Minot International Airport (ND)	3.83	1.9
Billings Logan International Airport (MT) to Chicago O'Hare International Airport (IL)	3.59	1.7
Harry Reid International Airport (NV) to Minot International Airport (ND)	3.76	1.7
Bismarck Municipal Airport (ND) to Gillette–Campbell County Airport (WY)	9.02	1.7
Winnipeg James Armstrong Richardson International Airport (MB) to Harry Reid International Airport (NV)	3.49	1.2
Billings Logan International Airport (MT) to Sioux Falls Regional Airport (SD)	3.38	1.2
Regina International Airport (SK) to Denver International Airport (CO)	7.98	1.1
Winnipeg James Armstrong Richardson International Airport (MB) to Palm Springs International Airport (CA)	3.31	1.1
Regina International Airport (SK) to Licenciado Gustavo Díaz Ordaz International Airport (MX)	4.97	0.8

Increasing the LFE days from 10 to 30 days annually could increase Gap A/B/C MOA activation below FL260, potentially requiring minor rerouting for a small number of civil flights. Current usage below FL260 in these MOAs totals about 214 flights annually (approximately four per week), primarily light general aviation traffic. Under the Proposed Action, up to 20 additional

activation days could occur, conservatively impacting about 16 flights per year that historically transited these corridors.

Analysis shows that while most civil routes remain unaffected, a limited number of high-frequency pairings, such as Denver International Airport (Colorado) to Williston Basin International Airport (North Dakota) and Denver International Airport (Colorado) to Dickinson Theodore Roosevelt Regional Airport (North Dakota), would experience measurable deviations during LFE activation, with per-flight increases of several minutes. When adjusted for the proposed 30-day total, these impacts would be concentrated in a few routes and remain modest compared to overall traffic volumes.

3.2.2.2 Alternative 2

Impacts from Changes to Day-to-Day Operations

Under Alternative 2, the ceilings of PR 2 and the modified Gateway East and Gateway West ATCAAs would increase to FL600. Published times of use would be as described for Alternative 1.

Airport Operations

Potential effects to airports under Alternative 2 are the same as those described for Alternative 1 Day-to-Day operations.

Civil Traffic Volume

The methodology for assessing impacts to civil traffic from changes to Day-to-Day operations was the same as described above. During the year of analysis, 99,212 total flights crossed the PR 2, Gateway East, and Gateway West at altitudes between FL260 and FL600. To focus on civil operations during times when the airspace would actually be active, several flights were removed from the dataset resulting in 59,626 civil flights for detailed evaluation.

From the 59,626 flights, 4,183 unique origin–destination pairings were identified, with 171 occurring at least weekly accounting for 77.5 percent of remaining traffic.

Similar to Alternative 1 results, 51 percent of great circle routes do not intersect the proposed airspace. Thus, the Proposed Action would have no impact to these routes. Of the remaining routes, 15 pairings require deviations greater than 10 NM, equating to roughly 1 minute 20 seconds of additional flight time at 450 knots true speed. **Table 3.2-3** provides the most impacted high-frequency routes. As shown, only three routes result with impact greater than 4 minutes per flight and 6 routes with an impact greater than 10 hours per year, while the others would be less affected. Alternative 2 introduces minor differences from Alternative 1, and its effects are similar when compared to Alternative 1. While a few high-frequency routes experience measurable deviations, overall effects remain limited in scope and duration. See **Appendix C** for full analysis of all routes. As with Alternative 1, additional travel time would increase fuel usage which indirectly increases cost of operating the aircraft (see **Appendix C** for methodology to determine increased fuel cost for individual operators).

Table 3.2-3 Alternative 2 Day-to-Day Impacts to High-Frequency Routes

Route	Additional Time per Flight (minutes)	Annual Impact (hours)
Denver International Airport (CO) to Williston Basin International Airport (ND	4.29	127.3
Denver International Airport (CO) to Dickinson Theodore Roosevelt Regional Airport (ND)	5.24	73.7
Bozeman Yellowstone International Airport (MT) to Chicago O'Hare International Airport (IL)	1.85	36.4
Billings Logan International Airport (MT) to Louisville Muhammad Ali International Airport (KY)	1.61	14.1
Billings Logan International Airport (MT) to Chicago O'Hare International Airport (IL)	3.59	12.5
Bismarck Municipal Airport (ND) to Gillette–Campbell County Airport (WY)	9.02	10.2
Phoenix–Mesa Gateway Airport (AZ) to Minot International Airport (ND)	2.43	8.7
Billings Logan International Airport (MT) to Sioux Falls Regional Airport (SD)	3.38	7.6
Bozeman Yellowstone International Airport (MT) to Chicago Midway International Airport (IL)	1.72	7.0
Winnipeg James Armstrong Richardson International Airport (MB) to Palm Springs International Airport (CA)	1.49	3.5
Bozeman Yellowstone International Airport (MT) to Sioux Falls Regional Airport (SD)	1.75	2.6
Bozeman Yellowstone International Airport (MT) to Washington Dulles International Airport (VA)	1.87	2.3
Bismarck Municipal Airport (ND) to Harry Reid International Airport (NV)	1.64	2.3
Bert Mooney Airport (MT) to Sioux Falls Regional Airport (SD)	1.71	2.2
Vancouver International Airport (BC) to Louisville Muhammad Ali International Airport (KY)	1.55	1.5

Impacts from Changes to LFEs

Under Alternative 2, LFE parameters would be the same as described for Alternative 1. Accordingly, the impacts to airport operations and civil traffic during LFE activation are the same as those described for Alternative 1.

3.2.2.3 No Action Alternative

Under the No Action Alternative, none of the proposed airspace changes would occur. Airspace management and use would continue as described in **Section 3.2.1**. The PRTC would continue to be used for day-to-day operations and LFEs as it is currently; no change to the conditions under which civil air traffic operates currently.

3.3 SAFETY

This section addresses flight and ground safety associated with training within PRTC. Flight safety considers aircraft flight risks such as aircraft mishaps and Bird/Wildlife Aircraft Strike Hazard (BASH). Given the altitude changes would be to higher altitude blocks for this initiative, the ground safety section focuses on activities associated with crash response and fire management.

The DAF practices Operational Risk Management as outlined in DAF Instruction 91-202, *The U.S Air Force Mishap Prevention Program*. Requirements outlined in this document provide for a process to maintain readiness in peacetime and achieve success in combat while safeguarding people and resources. The safety analysis contained in the following sections addresses issues related to the health and well-being of both military personnel and civilians impacted by the training airspace. The FAA is responsible for ensuring safe and efficient use of U.S. airspace by military and civilian aircraft and for supporting national defense requirements. To fulfill these requirements, the FAA has established safety regulations, airspace management guidelines, a civil-military common system, and cooperative activities with the DoW.

3.3.1 Affected Environment

3.3.1.1 Flight Safety

Aircraft flight operations in MOAs/ATCAAs are governed by standard rules of flight. Additionally, specific procedures applicable to local operations are contained in installation SOPs and must be adhered to by all aircrews operating from each installation.

The FAA and DoW jointly manage ATCAA through formal agreements and operational protocols that ensure safe, efficient integration of military and civil traffic above FL180. When ATCAAs are activated for military training or exercises, the FAA retains positive control of all aircraft within the airspace, issuing clearances and rerouting civil flights as needed to avoid conflicts, while military operations are coordinated through real-time scheduling and direct communication with FAA en route centers (FAA Order JO 7110.65, Section 9-3-4). Military range controllers and FAA air traffic controllers collaborate to activate, deactivate, and manage ATCAA segments, with activation status published via NOTAMs and reflected in flight planning systems (FAA AIM 3-4-9; FAA Order JO 7400.2). The DoD's Joint Publication 3-52, *Joint Airspace Control*, further outlines procedures for coordination, emphasizing that military use of ATCAAs is subject to FAA approval and real-time oversight, and that civil aircraft are provided safe, predictable routing at all times. This collaborative approach ensures that ATCAA operations maintain safety, situational awareness, and equitable access for both military and civil users of the NAS.

The FAA and DoW jointly manage MOAs to safely accommodate military training while preserving access for civil aviation. MOAs are designated as non-regulatory SUA intended to separate certain military activities from Instrument Flight Rules (IFR) traffic; when a MOA is active, the FAA provides separation to IFR aircraft by rerouting or issuing clearances as necessary to avoid the airspace, unless IFR separation can be provided through the MOA (FAA Order JO 7110.65; FAA AIM 3-4-5). VFR aircraft are not prohibited from operating within MOAs and may transit the airspace without clearance, although pilots are advised to exercise caution and coordinate with the controlling agency when military activity is present. MOA boundaries, altitudes, and published times of use are depicted on aeronautical charts, with current activity status available through the controlling ATC facility and, when applicable, NOTAMs (FAA Order JO 7400.2; FAA AIM 3-4-5). Military use of MOAs is coordinated with FAA air traffic control (ATC) facilities through established scheduling procedures and real-time communication, ensuring that military training is conducted in a manner that maintains safety, situational awareness, and continued access for civil users of the NAS.

The primary safety concern regarding military training flights is the potential for aircraft mishaps (i.e., crashes) to occur, which could be caused by mid-air collisions with other aircraft or objects, weather difficulties, mechanical failures, pilot error, or bird/wildlife aircraft strikes. Flight risks apply to all aircraft, and they are not limited to military flight.

Flight Emergencies

When an aircraft experiences an emergency adjacent to or within MOAs/ATCAAs the FAA treats the situation with the highest priority, immediately coordinating with military or controlling agencies to clear the affected airspace and provide direct routing for the emergency aircraft; FAA Order JO 7110.65, *Air Traffic Control*, Section 2-1-4, mandates that ATC must prioritize aircraft in distress, including medical evacuations, and ensure that any necessary airspace (including MOAs, restricted areas, or ATCAAs) is made available for safe passage, overriding routine SUA restrictions to facilitate the most expeditious handling of the emergency. The Aeronautical Information Manual (AIM 6-1-2) also gives guidance to pilots on when to declare such emergencies so that priority is given to them when needed. These orders combined procedurally ensure that emergencies are always given the highest priority of any given flight scenario.

3.3.1.2 Flight Communications

Effective communication between civilian and military aircraft is essential for maintaining safety and situational awareness when operating in, transiting, or adjacent to SUA. The FAA and DoW have established protocols and regulatory requirements to ensure that all airspace users are informed and coordinated during such operations.

Pre-Flight Coordination and NOTAMs

Prior to flight, both civilian and military pilots are required to review NOTAMs and SUA status via the FAA's SUA website (https://sua.faa.gov/sua/siteFrame.app) and flight planning systems. NOTAMs provide real-time information on the activation status, boundaries, and operating times of SUA, enabling pilots to plan routes that avoid or safely transit active areas (FAA AIM Section 3; FAA Order JO 7400.2). Pilots obtain flight clearances by filing a flight plan with the FAA or relevant ATC authority, specifying their intended route, altitude, and timing. Before departure, they receive an official clearance from ATC that outlines their approved route, initial altitude, and any special instructions, and are required to follow this clearance throughout their flight unless amended by ATC due to airspace activity, weather, or operational needs (FAA AIM Section 5; FAA Order JO 7110.65).

Air-Ground Communications

When operating within or near SUA, civilian and military aircraft communicate with FAA ATC facilities responsible for the airspace. Civilian aircraft on IFR are under positive control and receive clearances, routing, and traffic advisories from ATC, which coordinates directly with military range controllers when SUA is active (FAA Order JO 7110.65, Section 9-3-4). Military aircraft operating in SUA also maintain continuous communication with ATC and, when required, with dedicated military range frequencies.

Entry and Transit Procedures

Civilian aircraft may enter MOAs without ATC clearance when operating under VFR, but are strongly encouraged to contact the controlling ATC facility for traffic advisories and to determine the status of military activity (FAA AIM 3-4-6). When military activity is underway, ATC provides advisories and, if necessary, reroutes civilian traffic to maintain separation and safety. In contrast, ATCAAs, which sometimes overlay MOAs typically above FL180, are always under positive ATC control; civilian aircraft may only enter ATCAAs with an IFR clearance, and ATC coordinates directly with military controllers to ensure safe integration and separation of civil and military traffic during ATCAA activation (FAA Order JO 7110.65, Section 9-3-4). This layered approach ensures that, regardless of altitude or airspace type, communication and coordination between civil and military users maintains safety and operational integrity throughout the NAS.

Frequency Changes and Handoffs

As aircraft transit different sectors or airspace boundaries, ATC coordinates frequency changes and handoffs between civilian and military controllers. This ensures continuous communication and situational awareness, with procedures outlined in FAA Order JO 7110.65 (Section 2-1-15).

Real-Time Status and Information Services

Automatic Dependent Surveillance-Broadcast (ADS-B) is a modern air traffic surveillance technology that uses onboard GPS to continuously broadcast an aircraft's position, altitude, velocity, and identification to air traffic controllers and other equipped aircraft. Adopted globally to enhance safety and situational awareness, ADS-B enables real-time tracking and separation of aircraft, supports more efficient routing, and provides pilots with direct traffic and weather information in the cockpit; in the U.S., ADS-B Out is required for most non-military aircraft operating in controlled airspace as of January 1, 2020 (see 14 CFR section 91.225).

Efforts are underway to improve real-time communication and status updates for SUA, including electronic flight bag integration and services like the Special Use Airspace Information Service, which provide pilots with current activation status and contact information for airspace managers (Public Law No: 116-283, Section 1085).

Mishaps

When a mishap occurs within SUA, the FAA and DoW work together through established protocols to ensure rapid, coordinated response and investigation. The FAA maintains positive control of the NAS and immediately prioritizes emergency access, suspending military activity and rerouting civil traffic as needed (FAA Order JO 7110.65). Military range controllers and FAA en route centers communicate in real time to secure the affected airspace, facilitate rescue or medical flights, and support incident investigation. Joint mishap response plans require both agencies to share information, coordinate on-scene activities, and restore normal operations as quickly and safely as possible. This collaborative approach ensures that both civil and military priorities are addressed, public safety is protected, and lessons learned are incorporated into future airspace management.

BASH

The national BASH program, led by the FAA and coordinated with the DoW, is designed to reduce the risk of bird and wildlife strikes to aircraft across the NAS. The program establishes best practices for hazard identification, risk assessment, and mitigation, including the use of radar, wildlife management, and pilot education (FAA Advisory Circular 150/5200-33C). The DAF maintains its own robust BASH program, outlined in Air Force Instruction (AFI) 91-202, which requires all Air Force bases and flying units to implement local BASH management plans, conduct regular wildlife surveys, and utilize tools such as the Avian Hazard Advisory System and Bird Avoidance Model for real-time risk assessment and flight planning. These systems track bird activity and migration patterns up to altitudes of 10,000 feet AGL for most species, with large migratory birds occasionally recorded as high as 15,000 feet AGL. Both agencies require pilots to check BASH advisories before flight, and military bases implement local wildlife management and avoidance procedures to reduce hazards at and near airfields.

3.3.1.3 Ground Safety

Emergency Response

A common concern to safety when identifying new SUA, is the reaction time of emergency and medical evacuation flights either in response to a fire, medical emergency, or other event impacting personnel on the ground within the lateral boundaries of the proposed airspace.

It is a well-established principle in U.S. airspace management that emergency and medical evacuation flights are given the highest priority by the FAA and ATC, regardless of SUA status. FAA Order JO 7110.65, *Air Traffic Control*, Section 2-1-4, states: "Provide priority to aircraft in distress, medical evacuation flights, and search and rescue missions." Additionally, FAA Order JO 7400.2, *Procedures for Handling Airspace Matters* and the AIM (6-1-2) require that when an emergency arises, ATC will immediately coordinate with military controlling agencies to clear the affected airspace, including MOAs and ATCAAs, for the emergency flight.

Crash/Fire Response

In the event of an aircraft crash within or near SUA, the FAA and DAF coordinate closely to ensure an immediate and effective crash/fire response. The FAA, as the civil airspace authority, suspends all conflicting air traffic and provides priority routing for emergency responders, while DAF activates its base and range emergency response teams—including fire, rescue, and hazardous materials units—according to established protocols (FAA Order JO 7110.65, Section 2-1-4; Department of the Air Force Instruction [DAFI] 91-202). Both agencies share real-time information and coordinate on-scene activities, with the FAA facilitating access for civilian emergency services and DAF securing the crash site, managing hazardous materials (such as fuel or hydrazine), and supporting investigation efforts. This joint response framework, outlined in the AIM (6-1-2) and DAF mishap plans, ensures public safety, rapid containment of fire or hazardous conditions, and efficient restoration of normal airspace operations.

Hazardous Materials Release

Operational aircraft consist of various components and fluids that may be hazardous if inadvertently released to the environment during an aircraft mishap or crash. A Hazardous Aerospace Material Mishap Emergency Response Integrated Process Team was chartered in

2000 by the Deputy Assistant Secretary of the Air Force for Environmental, Safety, and Occupational Health. The goals of the Hazardous Aerospace Material Mishap Emergency Response project were to identify and inventory all hazardous aerospace materials on DAF weapon systems and ensure procedures were in place to protect personnel from safety/health hazards associated with aerospace vehicle mishaps. The DAF has developed specific emergency response procedures for aircraft mishaps involving hazardous materials.

Emergency procedures include how to respond to known solid, liquid, and gaseous products; radioactive materials; composite materials; radar absorbing and conventional coatings materials; and other materials and situations that can pose health and safety hazards. Hazardous materials associated with most aircraft include jet fuels, ethylene glycol, and hydraulic fluid. In addition to these common materials, the emergency power unit for the F-16 fighter jet uses hydrazine, a highly volatile propellant, to restart the engine in case of emergency. None of the modern DAF fighters beyond the F-16 use hydrazine, and the only other aircraft in DAF inventory that still uses this system is the U-2 Dragon Lady which is highly unlikely to be utilized within PRTC and is being phased out in 2026. Under normal operation, an F-16's hydrazine is enclosed and does not get released. The main environmental risk is accidental release, such as a mishap.

Hydrazine is also used in agricultural chemicals, chemical blowing agents, pharmaceuticals, photography chemicals, boiler water treatment, and textile dyes. Acute (short-term) exposure to high levels of hydrazine may include irritation of the eyes, nose, and throat; dizziness; headache; nausea; pulmonary edema; seizures; and coma in humans (U.S. Environmental Protection Agency [EPA] 2000). Hydrazine rapidly degrades in the environment (EPA 2000).

Radioactive materials are used in small quantities for navigation systems, instruments, and some coatings. Composite materials are used in most aircraft in some form. Newer aircraft such as the F-22 and F-35 use extensive amounts of composite materials for the fuselage and the equipment. Older aircraft still have aluminum frames and skins but some equipment is made from composite materials to save weight. Once composite materials are put into use, they have fully hardened and are inert; however, the materials turn into hazardous materials when burned at high temperatures typical of an aircraft crash. The emergency procedures take into consideration the burning effects performed during tests on composite materials. The test program included full-scale fire testing of composite materials for toxicology and expected exposure to response personnel.

Some general conclusions included (Wright et al. 2003):

- Burn data suggest that the combustion characteristics of composite materials are roughly equivalent to other combustible materials. Combustion products released by burning composite materials are similar to those released from other solid combustibles.
- Burning of composite materials can release fibers that are respirable.
- Respirable fibers released from burning composite materials can penetrate into the lungs, causing respiratory irritation. Factors known to affect the toxicity of these inhaled fibers include dosage, physical dimensions, retention time in the lung, location of deposition in the lung, and solubility of the fibers in the lung.
- Exposed fibers along the edges of fragmented composite debris present a dermal puncture hazard. The skin can be irritated and sensitized if punctured by exposed fibers.
- The toxicity of combustion products from burning aircraft composite materials currently used does not appear to be exceptional. Types and quantities of combustion products

from burning composite materials fall within the same spectrum as other burning combustibles at an aircraft mishap site.
- No additional smoke toxicity hazards created by burning composite materials were identified.
- Personal protective equipment recommendations for firefighters responding to composite aircraft mishaps include self-contained breathing apparatus, standard firefighter protective clothing and/or proximity suits, and steel-tipped/shanked boots.

Conventional coating materials include a variety of materials that are applied to aircraft similar to paint designed to protect critical parts from extreme weather and temperature. Radar absorbing materials are also applied similar to paint to help aircraft from being detected by enemy radar.

The DAF follows a set of SOPs during aircraft mishaps to identify potential hazardous materials and situations, protect responding personnel and the environment from immediate hazards, and to provide guidelines for the ultimate cleanup and disposal of crash residues.

3.3.2 Environmental Consequences

There are no defined significance criteria for safety. Safety is potentially impacted from proposed changes to day-to-day operations and changes to LFEs; thus both of these actions have been considered in the environmental consequences discussion.

3.3.2.1 Alternative 1

Flight Safety

Flight Emergencies

Under Alternative 1, raising ATCAA ceilings and adjusting scheduling would not change how flight emergencies are handled; the FAA and DAF would continue to immediately suspend or relocate military training in the affected airspace at ATC's direction to ensure emergency flights have priority access.

Flight Communications

Flight communications in the PRTC would continue to rely on FAA-managed radar and Very High Frequency (VHF)/Ultra High Frequency (UHF) radio. The DAF and FAA would continue to maintain established SOPs and protocols for frequency handoffs, sector transitions, and recall of military aircraft only in areas where reliable radio contact is confirmed. While civil aircraft must continuously broadcast their position via ADS-B, military aircraft are exempt from ADS-B Out requirements during sensitive operations, training, or missions where broadcasting position could compromise security or tactics, as authorized by DoD Instruction 5030.61, AFI 11-301, and recognized by the FAA in 14 CFR section 91.225(g) and FAA Exemption No. 12555. There have been some requests from the public for the DAF to ensure their aircraft are utilizing ADS-B when operating in and to/from the PRTC; however, this would not be possible given the security concerns which could arise out of such broadcasts.

All parties would continue to use published frequencies and NOTAMs to ensure situational awareness and safe integration in the airspace, and these protocols would remain effective and robust under the proposed changes. Although concerns have been raised about Line of Sight communications in the PRTC, it is well established that at altitudes above FL260, VHF/UHF

radio and radar coverage are highly reliable due to the increased radio horizon and lack of terrain obstructions; FAA and International Civil Aviation Organization guidance confirm that continuous Line of Sight communications are the norm for high-altitude operations in Class A airspace (see FAA AIM 4-2-3; International Civil Aviation Organization Doc 4444, section 8.1.1).

Mishaps

LFEs would result in a higher number of sorties within the PRTC. While greater activity in this airspace could potentially increase the likelihood for mishaps, it is important to note that mishap rates are not determined solely by flight hours; they are influenced by factors such as mission complexity, aircraft type, weather, and operational tempo (Air Force Manual [AFMAN] 91-204; DAFI 91-202).

The FAA and DAF maintain robust safeguards to mitigate risk across the full altitude spectrum of PRTC operations. These measures include positive ATC control for IFR traffic in Class A airspace, real-time coordination during ATCAA activation, and adherence to joint civil-military protocols for SUA management (FAA Order JO 7110.65; FAA AIM 3-4-6; DoD/FAA SUA Management Memorandum of Understanding). For operations below FL180, military pilots follow installation SOPs and FAA advisories to maintain situational awareness and separation. Importantly, LFEs typically undergo more scrutiny at multiple levels of planning than day-to-day flights, incorporating detailed risk assessments, scheduling reviews, and coordination with FAA en route centers. Operational Risk Management processes outlined in AFI 91-202 and AFMAN 13-212V1 ensure that these additional sorties are subject to enhanced checks and balances, reinforcing safety despite the temporary increase in activity. Consequently, while the Proposed Action concentrates flight operations within PRTC, existing frameworks and layered oversight remain effective in maintaining low mishap rates and safe integration of civil and military traffic.

BASH

For day-to-day and LFEs within the PRTC, the vast majority of the proposed operations occur at FL180 and above, where the risk of bird or wildlife strikes is extremely low. National BASH data and DAF assessments confirm that strike rates at these altitudes are negligible because most bird activity occurs below 10,000 feet AGL, with only rare migratory species reaching up to 15,000 feet (FAA AC 150/5200-33C; AFMAN 91-212). At FL180 and higher, the probability of a strike approaches zero, making BASH a minimal concern. At lower altitudes (below 3,000 feet) BASH would be more of a concern; however, operations below this altitude would be limited and existing BASH protocols would remain effective, thus the overall risk of wildlife strikes would be insignificant.

Ground Safety

Emergency Response

The proposed changes to airspace altitude and scheduling within PRTC do not fundamentally alter the established emergency response protocols. The FAA and DAF would continue to prioritize emergency and medical evacuation flights, immediately clearing affected airspace and providing direct routing for responders as mandated by FAA Order JO 7110.65 and related guidance.

Crash/Fire Response

The procedures for crash and fire response within the PRTC would remain robust and unchanged. In the event of an aircraft mishap, the FAA immediately suspends conflicting air traffic and provides priority routing for emergency responders, while the DAF activates base and range emergency teams according to established protocols (FAA Order JO 7110.65, Section 2-1-4; DAFI 91-202).

Hazardous Materials Release

The potential for a hazardous materials release would continue to occur within the PRTC in the unlikely event of an aircraft mishap. Hazardous materials that could be introduced into the environment in the event of a mishap include jet fuels, ethylene glycol, and hydraulic fluid. In addition to these common materials, the emergency power unit for the single engine F-16 fighter jet uses hydrazine, a highly volatile propellant, to restart the engine in case of emergency. Radioactive materials are used in small quantities for navigation systems, instruments, and some coatings. Composite materials are used in most aircraft in some form.

When an aircraft crashes, it may release hydrocarbons. Those petroleum, oils, and lubricants not consumed in a fire could contaminate soil and water. The potential for contamination is dependent on several factors. The porosity of the surface soils would determine how rapidly contaminants are absorbed. The specific geologic structure in the region would determine the extent and direction of the contamination plume. The locations and characteristics of surface and groundwater in the area would also affect the extent of contamination to those resources.

F-16 aircraft carry a small quantity of hydrazine in a sealed canister that is designed to withstand crash impact damage. Hydrazine is a highly volatile propellant that contains toxic elements. It is carried on the F-16 as part of the emergency power unit. When used for this purpose, hydrazine is completely consumed, and poses no safety hazard. In any crash that is severe enough to rupture the canister, it is most likely that fire would also be involved. In this case, the hydrazine would also burn and be completely consumed. Any hazards associated with the brief time the hydrazine was burning would be very localized to the crash site and short term. Any fumes from hydrazine would be gone by the time first responders or any person could approach the crash site. In the unlikely event that the hydrazine should be released but not consumed by fire, impacts on soils and groundwater are likely to be of minor consequence. Hydrazine absorbs water at room temperature. It is incombustible in solution with water at concentrations of 40 percent or less and it evaporates at any given combination of constant meteorological conditions (i.e., temperature, humidity, wind speed, etc.) at a rate slightly slower (approximately 11 percent) than water.

Movement of hydrazine through natural soils has been shown to be slow and limited. Due to its absorption and natural decomposition processes, the probability of released hydrazine significantly contaminating groundwater is considered extremely low. However, if an accident occurred and the hydrazine canister were ruptured, no fire consumed the hydrazine, and quantities of hydrazine were to reach a surface water body, aquatic life in those areas experiencing high concentrations could be significantly impacted.

The DAF has SOPs in the event of an aircraft mishap to identify potential hazardous materials and situations, protect responding personnel and the environment from immediate hazards, and to provide guidelines for the ultimate cleanup and disposal of the crash residues. Aircraft

mishaps are rare; therefore, hazardous material releases from aircraft mishaps under Alternative 1 would be insignificant.

3.3.2.2 Alternative 2

The potential impacts to flight and ground safety under Alternative 2 would be the same as those described for Alternative 1. Alternative 2 would not introduce any new safety considerations or elevate existing risks to a degree that would be considered significant.

3.3.2.3 No Action Alternative

Under the No Action Alternative, existing flight and ground safety procedures described in **Sections 3.3.1.1 and 3.3.1.2** would continue to be followed within PRTC. During establishment of the PRTC, several measures were implemented to ensure safety and avoid encroaching on civil airports. Notably those included segmentation of the MOAs and ATCAAs; making some MOAs/ATCAAs only available during LFEs; excluding underlying civil airports from the MOAs; and issuing NOTAMs to alert civil users of planned military activity.

3.4 NOISE

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

The physical characteristics of noise include its intensity, frequency, and duration. Sound is created by acoustic energy, which produces pressure waves that travel through a medium, like air, and are sensed by the eardrum. This can be likened to the ripples in water that are produced when a stone is dropped into it. As the acoustic energy increases, the intensity or amplitude of these pressure waves increase, and the ear senses louder noise. The unit used to measure the intensity of sound is the decibel (dB). Sound intensity varies widely (from a soft whisper to a jet engine) and is measured on a logarithmic scale to accommodate this wide range. Human hearing sensitivity to differing sound pitch varies by frequency. To account for this effect, sound measured for environmental analysis utilizes A-weighting, which emphasizes sound roughly within the range of typical speech and de-emphasizes very low and very high frequency sounds.

The Noise Study developed in support of this EIS is provided in **Appendix D**. Detailed technical information concerning the noise modeling software, operational data inputs, and the modeling results are provided in the Noise Study and summarized in the following sections.

3.4.1 Regulatory Information

3.4.1.1 Noise Metrics

Many different types of noise metrics, or standards of measurement, have been developed by researchers to represent the effects of environmental noise. The accepted metrics supporting the assessment of noise from military aircraft operations are the Day-Night Average Sound Level (DNL), Onset-Rate Adjusted Day-Night Average Sound Level (L_{dnmr}), and C-weighted Day-Night Average Sound Level (CDNL). In addition to these standard cumulative noise metrics, other supplemental metrics are also used to provide additional descriptions of the noise exposure associated with aircraft operations. Each is briefly discussed below.

DNL and L_{dnmr}

The DNL is an A-weighted cumulative noise metric that measures noise based on annual average daily aircraft operations. DNL is the U.S. Government standard for modeling the cumulative noise exposure and assessing community noise impacts. DNL uses two time periods: daytime (acoustic day) and nighttime (acoustic night). Daytime hours are from 7:00 a.m. to 10:00 p.m., and nighttime hours are from 10:00 p.m. to 7:00 a.m. local time. DNL weights operations occurring during its nighttime period by adding 10 dB to their single event sound level.

When DNL is adjusted for the onset rate of the noise to account for the "surprise factor," the metric is L_{dnmr}. The onset rate adjustment was included in the model calculations; however, in some cases it was small enough to not make a difference in the DNL calculation. Noise model results in this EIS are reported in DNL and L_{dnmr}.

The DoW uses L_{dnmr} as the standard metric for assessing aircraft noise in training airspace. The FAA standard for assessing aircraft noise in airspace is DNL. Because this EIS has been developed to meet the NEPA requirements of both agencies, both of these were calculated and are presented in the results.

CDNL

CDNL is used to measure the effects of sonic booms that occur from aircraft flying at supersonic speeds. CDNL is similar to DNL, in that it is a cumulative metric that averages all of the sound energy produced in a single year. CDNL is based on C-weighted noise, which emphasizes lower frequency sound vibrations. C-weighting better targets the lower frequencies that are "felt," instead of "heard" – usually impulsive noise like explosions or sonic booms. CDNL weights nighttime events as described for DNL above.

Maximum Sound Level (L_{max}) and Sound Exposure Level (SEL)

A common metric used to describe a single aircraft noise event is the maximum sound level, or L_{max}, measured in dB. L_{max} is the highest A-weighted sound level that occurs during the aircraft overflight. L_{max} describes the maximum level of a noise event but does not take into account its duration. SEL, measured in dB, is a composite metric that represents both the magnitude and duration of an aircraft overflight. SEL is a measure of the total acoustic energy in the event, but does not directly represent the sound level heard at any given time. SEL is the building block for calculating DNL.

Overpressure

The intensity of individual sonic booms depends on several factors including aircraft size, shape, weight, altitude, and the maneuver being conducted at the time of the boom (e.g., climbing, diving, turning). The intensity of the boom is measured as an overpressure reported in pounds per square foot (psf). This is not an indicator of how loud a sonic boom is, but rather the overpressure is the pressure above normal atmospheric pressure created by the shock wave generated by a sonic boom measured in psf.

Classroom Learning Interference

A noisy environment can adversely affect and interfere with classroom learning. Various governmental organizations have identified both equivalent sound level (L_{eq}) and number of interfering events as suitable criteria for classroom impacts. Consistent with DoW recommendations, this study used an exterior L_{eq} of 60 dB (equivalent to 45 dB interior L_{eq} with windows open) as a screening criterion to determine schools surrounding the airfield at risk of classroom learning effects (Defense Noise Working Group [DNWG] 2009). Locations that exceed this threshold have been further analyzed by counting the number of events per hour above an interior L_{max} of 50 dB, which equates to the highest permissible classroom level for speech intelligibility.

3.4.1.2 Noise Induced Hearing Loss

Noise induced hearing loss risk has been extensively studied, with the consensus that populations exposed to noise greater than 80 dB DNL are at the greatest risk of potential hearing loss (DNWG 2013a). Because no person or place beneath any of the training airspace associated with this EIS or the airfield at Ellsworth AFB would be exposed to noise levels greater than 80 dB DNL, noise induced hearing loss is not discussed further in this analysis.

3.4.1.3 Subsonic and Supersonic Noise

For this EIS, two types of aircraft noise are assessed: subsonic noise and supersonic noise. Conventional subsonic noise is noise generated by an aircraft's engines and airframe. This is the most familiar form of aircraft noise.

When an aircraft flies at supersonic speeds (faster than the speed of sound), shock waves are generated resulting in a sonic boom. The shock wave forms a "cone" of pressurized air molecules which move outward and rearward in all directions from the aircraft. As the "cone" moves outward, upward, and away from the aircraft, it gets wider and its strength is reduced. The altitude at which the shock wave is created determines the distance shock waves travel before reaching the ground and affects the intensity of the boom. The higher the aircraft, the greater the distance the shock wave must travel before reaching receptors on the ground, reducing the intensity of the boom. In general, the width of the cone beneath the aircraft is about 1 mile for each 1,000 feet in altitude.

The shape and sound of the sonic boom resulting from supersonic flight depends on the aircraft's size, weight, geometry, flight altitude, speed, and type of maneuvering. Aircraft exceeding the speed of sound always create a sonic boom; however, not all supersonic flight activities will cause a boom audible at the ground. As altitude increases, air temperature decreases, and these layers of temperature change can cause booms to be reflected, or turned upward, and in some cases the boom never reaches the ground.

A sonic boom is characterized as an overpressure which is a rapid rise in pressure, followed by a rapid drop-off before the pressure returns to normal atmospheric levels. This change occurs very quickly (significantly less than 1 second). In the vast majority of cases, the overpressures created are well below levels that would cause physical injury or damage to structures. In rare cases, a sonic boom could cause physical damage, as to a window, if the overpressure is of sufficient magnitude. Sonic booms may also cause startle effects in humans and animals.

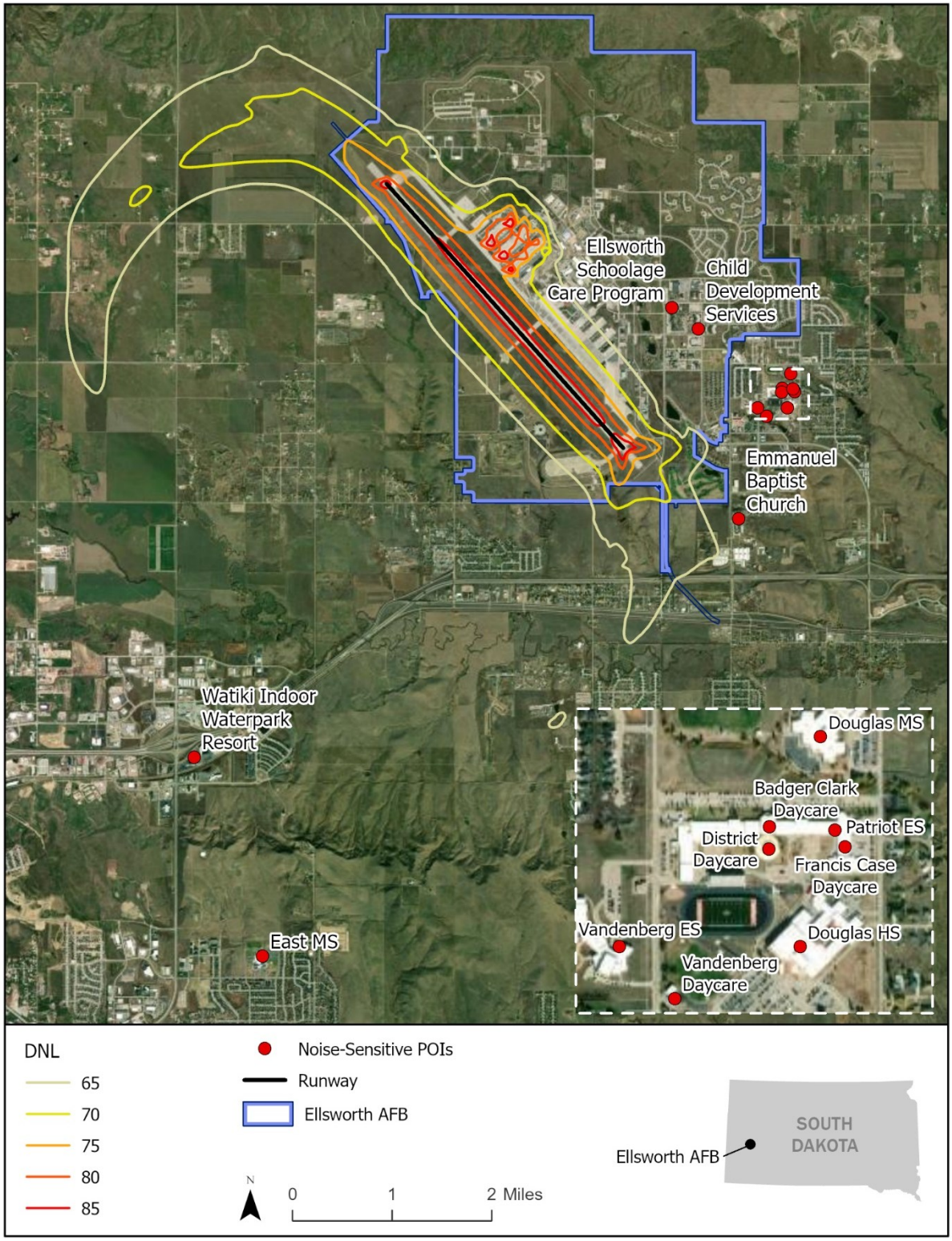
3.4.2 Affected Environment

Federal, state, and local governments regulate noise to prevent noise sources from affecting noise sensitive areas, such as residences, hospitals, and schools, and to protect human health and welfare. Federal agencies, such as the Department of Housing and Urban Development, have established health-based maximum noise exposure recommendations. Local agencies, including cities and counties, are responsible for defining and enforcing land use compatibility in various noise environments.

The affected environment for noise analysis in this EIS includes: (1) the airfield environment within the 65 dB DNL noise contour at Ellsworth AFB; and (2) the land area beneath the horizontal boundaries of PRTC.

3.4.2.1 Airfield Environment

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. While portions of the 65 dB DNL contour extend outside the installation boundary, there are no noise sensitive Points of Interest (POIs) (such as schools, daycare centers, places of worship, recreation areas, etc.) exposed to 65+ dB DNL (**Figure 3.4-1**). A number of selected POIs have been identified to provide a description of the potential changes to the noise environment in the vicinity of Ellsworth AFB associated with this Proposed Action (**Table 3.4-1**). As such, this table may not include all noise-sensitive facilities (schools, churches, daycares, etc.) outside of the 65 dB DNL contour.



Legend: AFB = Air Force Base; DNL = Day-Night Average Sound Level; ES = Elementary School; HS = High School; MS = Middle School; POI = Point of Interest

Figure 3.4-1 Existing DNL Contours and Noise-Sensitive POIs in Vicinity of Ellsworth AFB

Table 3.4-1 Noise Sensitive POIs in the Vicinity of Ellsworth AFB

POI Type	POI
Child Development Center	Badger Clark Daycare
Child Development Center	Child Development Services
Child Development Center	District Daycare
School	Douglas High School
School	Douglas Middle School
School	East Middle School
Child Development Center	Ellsworth School Age Care Program
Place of Worship	Emmanuel Baptist Church
Child Development Center	Francis Case Daycare
School	Patriot Elementary
Child Development Center	Vandenberg Daycare
School	Vandenberg Elementary
Recreation	Watiki Indoor Waterpark Resort

Legend: AFB = Air Force Base; POI = Point of Interest

3.4.2.2 Airspace Environment

The airspace described in **Section 2.0** is currently used by military aircraft. While many of these areas would be considered rural and generally quiet, there are locations where military aircraft-generated noise would be noticeable and potentially considered annoying, depending on the time of day. Within existing PRTC airspace, flights are typically widely dispersed, and, over the long term, are randomly located (with the exception of airspace edges where flights do not typically occur). The random nature of flights is an important part of training, allowing military aircrews to be flexible, and not accustomed to particular visual reference points. Based on this, no single location under a training airspace is expected to experience substantially different flight activity from another. Locations around the edge of airspace are expected to be overflown less frequently than locations deeper within the airspace. The appropriateness of modeling flight paths and noise as random within training airspace has been affirmed by a study that analyzed specially collected radar data in airspace and compared to noise monitoring in that same airspace (Bradley et al. 2003; Fidell et al. 2003).

As a result of the wide distribution of flights, noise heard on the ground beneath PRTC is sporadic. On some days, no aircraft are heard, and on other days, one or more aircraft at different altitudes and distances may be heard at any given location. Even in areas of the MOAs where no special flight restrictions apply (see **Section 1.2.2** for existing avoidances throughout the PRTC), experiencing noise from an aircraft that is directly overhead at the lowest possible altitude (500 feet AGL in some MOAs) would be relatively rare. The following factors limit the frequency of exposure to low-altitude overflights within any MOA:

- Large towns (population over 1,000) are avoided by 2,000 feet AGL.
- Small towns (population over 100) are avoided by 1,000 feet AGL.
- Flight at low altitude requires an extreme level of vigilance on the part of the aircrew, and time spent at the lowest available altitude would be only as needed to accomplish low-altitude training requirements.
- Aircraft operating in MOAs do not fly at sustained low-level altitudes or along the MOA floor for extended periods of time but rather dip down to lower levels on rare occasions as part of larger training tactics and maneuvers.

- The MOAs are very large and any particular location on the ground is overflown at low altitudes relatively infrequently.

The subsonic cumulative noise exposure within PRTC was estimated to range from 38 to 54 dB DNL in the 2014 EIS with the highest exposure in PR 1, PR 2, and PR 3 (50–54 dB DNL) as these are the primary areas used for training (**Table 3.4-2**).

Table 3.4-2 Existing Noise Exposure at PRTC

Airspace	L_{dnmr} (dB)	DNL (dB)
PR 1	51	50
PR 2	55	54
PR 3	51	50
PR 4	38	38
Gateway West	39	38
Gateway East	38	38
Gap A	46	46
Gap B	46	45
Gap C	38	38

Legend: dB = decibel; DNL = Day-Night Average Sound Level; L_{dnmr} = Onset-Rate Adjusted Day-Night Average Sound Level; PR = Powder River.

Supersonic flight only occurs during LFEs in which the entire complex is used with opposing forces typically staging in PR 1 at one end of the PRTC and PR 4 at the other, then proceeding from there in general west to east and east to west direction and conducting combat training mostly in the center of the complex. This results in primarily an elliptical area encompassing PR 2, PR 3, and Gap B where most supersonic flight occurs. Based on the current LFE parameters and analysis presented in the 2014 EIS, on average, four supersonic events could occur annually within the MOAs (at altitudes ranging from 10,000 feet AGL to 17,999 feet MSL), resulting in a total of less than 3 minutes per year of supersonic exposure. Approximately 156 events could occur annually within the ATCAAs (at altitudes ranging from 18,000 feet MSL to 26,000 feet MSL) for a total of about 61 minutes per year of supersonic exposure. The 2014 EIS estimated sonic booms when heard, would average 1.6 psf. The maximum cumulative supersonic noise exposure beneath the center (PR 2, PR 3, and Gap B) of the PRTC airspace is 36 dB CDNL. Areas towards the edges of the PRTC experience cumulative supersonic noise levels less than this.

3.4.3 Environmental Consequences

Noise analysis requires data that define aircraft activity in terms of time in the MOA/ATCAA airspace, as well as the speed, altitude, power setting, and position information. This analysis quantifies the anticipated subsonic and supersonic noise from military aircraft activity within the existing and proposed airspace and also considers changes in the noise exposure at the Ellsworth AFB airfield associated with transient aircraft participating in the LFEs.

The EPA has identified 55 dB DNL as a level that protects public health and welfare with an adequate margin of safety (EPA 1982). This means that 55 dB DNL is a threshold below which adverse noise effects are not expected to occur. According to the Federal Interagency Committee on Urban Noise (FICUN), noise exposure greater than 65 dB DNL is considered generally incompatible with residential, public use (i.e., schools), or recreational and entertainment areas (FICUN 1980).

The U.S. Army Public Health Command indicates that 62 C-weighted decibels (dBC) CDNL is the level at which one could expect a rise in annoyance similar to that of a DNL level of 65 dB for subsonic noise (U.S. Army Center for Health Promotion and Preventive Medicine 2005). FAA Order 1050.1G defines a significance threshold for impulsive noise sources (e.g., sonic booms) as actions that would result in noise exposure that meet or exceed 60 CDNL.

For airspace actions, FAA requires that an action proponent identify where noise will change by the following specified amounts in noise sensitive areas (FAA Order 1050.1G):

- For DNL 65 dB and higher: +/- DNL 1.5 dB (significant)
- For DNL 60 dB to <65 dB: +/- DNL 3 dB (reportable)
- For DNL 45 dB to <60 dB: +/- DNL 5 dB (reportable)

Per FAA Order 1050.1G, a noise sensitive area is defined as an area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife and waterfowl refuges, and cultural and historical sites. The FAA recognizes that there are settings where the 65 dB DNL standard for land use compatibility may not apply. These areas would likely be areas of extreme quiet, very rural areas, or natural areas with little human activity, such as wilderness areas or other protected natural areas.

There is generally public concern that aircraft noise has non-auditory health effects, which are physiological effects on health and well-being (i.e., stress response and cardiovascular effects) that are caused by exposure to aircraft noise. While there is a substantial amount of research on the topic, most of the studies concern chronic exposure to high levels of noise, like that experienced in an airport environment with hundreds of flights per day. The DNWG stated that the current state of scientific knowledge cannot yet support inference of a causal or consistent relationship between military aircraft noise exposure and non-auditory health consequences for exposed residents. The results of published studies of aircraft noise on human health are unclear. There is no scientific basis for concluding that aircraft noise has a negative non-auditory health impact (DNWG 2013b).

More recently, the Department of the Navy developed a detailed literature review on the non-auditory health effects of aircraft noise in support of the *Naval Air Station Whidbey Island Complex Growler EIS* (Department of the Navy 2018) and developed similar conclusions based on more recent research than the DNWG (2013b) used for its conclusions. This literature review included many recent papers on topics ranging from hypertension and heart disease, stroke, and mental health. Numerous research studies seem to indicate that aircraft noise may contribute to the risk of health disorders, along with other factors such as heredity, medical history, smoking, alcohol use, diet, exercise, and air pollution, but that the measured effect is small compared to these other factors and often not statistically significant (Department of the Navy 2018). The literature review also noted that the European Network on Noise and Health concluded that, "while the literature on non-auditory health effects of environmental noise is extensive, the scientific evidence of the relationship between noise and non-auditory health effects is still contradictory," in its summary report of 2013 (European Network on Noise and Health 2013). As a result, it is not possible to state that there is sound scientific evidence that aircraft noise is a significant contributor to health disorders (Department of the Navy 2018).

3.4.3.1 Alternative 1

Airfield Environment

DNL and SEL

Noise contours in the vicinity of Ellsworth AFB under Alternative 1 compared with the No Action Alternative are depicted in **Figure 3.4-2**. Acreage affected by DNL noise contours under Alternative 1 are quantified in **Table 3.4-3**. Under Alternative 1, 4,187 acres could be exposed to noise levels exceeding 65 dB DNL near Ellsworth AFB. This represents an increase of 2,482 acres from the No Action Alternative. The cumulative change in noise exposure at the airfield is associated with the increase in LFE days and additional transient fighter aircraft operations. Outside of the LFE days, the noise environment would remain the same. As with the existing conditions, the 65 dB DNL contour extends off the installation; however, no noise sensitive POIs (schools, childcare centers, places of worship, etc.) are within this contour and thus there would be no land use compatibility issues in accordance with FICUN.

Table 3.4-3 Alternative 1 Acreage Affected by Elevated Noise Levels

Noise Level (dB DNL)	No Action Alternative Acres Off-installation	Alternative 1 Acres Off-installation	Difference
65–69	1,352	2,535	+1,183
70–74	348	1,141	+793
75–79	5	511	+506
80–84	0	0	0
>85	0	0	0
Total	**1,705**	**4,187**	**2,482**

Legend: > = greater than; dB = decibel; DNL = day-night average sound level

A selected set of noise sensitive POIs outside the 65 dB DNL contour have been included in the analysis to provide a better description of the changes to noise exposure beyond this contour. The largest increase in DNL at the selected POIs would be 5 dB (**Table 3.4-4**). **Table 3.4-4** also provides a comparison of the Alternative 1 and No Action Alternative maximum SEL values at each of these POIs, which reflects the noise generated by a single overflight event. The SEL values would increase at most of these POIs attributed to the increased number of fighter aircraft operations during LFEs and would not be a routine occurrence.

Classroom Learning Interference

The school screening threshold of 60 dB L_{eq}(8hr) equates to an interior level of 45 dB L_{eq}(8hr) with windows open and represents the point at which studies have found classroom learning impacts (DNWG 2009, 2013a). Alternative 1 operations at Ellsworth AFB result in eight schools or daycares meeting or exceeding this threshold (**Table 3.4-5**). Additional analysis was done on those POIs that exceeded this threshold to determine the number of events and the time during an average school day where the noise would be at or above an indoor maximum (single event) sound level of 50 dB. The number of speech interfering events per hour does not change under Alternative 1. There is a minor increase in minutes above 50 dB of up to 2 minutes per day.

Thus, the proposed increase in airfield operations associated with LFEs would have a minimal impact on DNL, SEL, and classroom learning in the vicinity of Ellsworth AFB airfield.

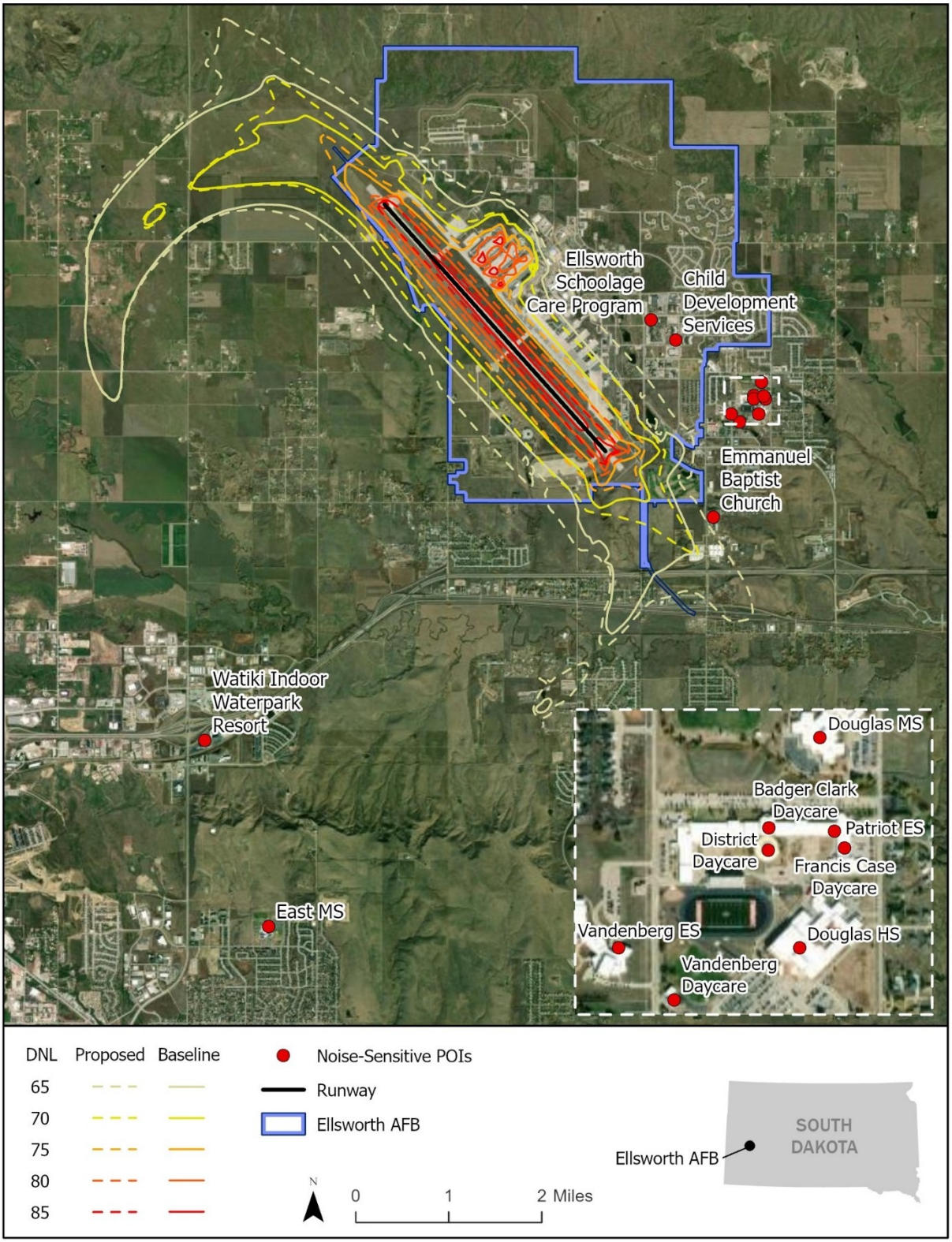


Figure 3.4-2 Comparison of Alternative 1 and No Action DNL Noise Contours and POIs in the Vicinity of Ellsworth AFB

Table 3.4-4 Alternative 1 Noise Levels at Representative POIs

POI	DNL (dB)			Maximum SEL (dB)		
	No Action Alternative	Alternative 1	Difference	No Action Alternative	Alternative 1	Difference
Badger Clark Daycare	52	57	+5	101	109	+8
Child Development Services	54	59	+5	103	105	+2
District Daycare	53	57	+4	101	109	+8
Douglas High School	55	58	+3	102	107	+5
Douglas Middle School	51	55	+4	101	109	+8
East Middle School	48	48	0	87	87	0
Ellsworth School Age Care Program	55	60	+5	104	109	+5
Emmanuel Baptist Church	59	64	+5	111	111	0
Francis Case Daycare	53	56	+3	101	107	+6
Patriot Elementary	52	56	+4	101	108	+7
Vandenberg Daycare	58	61	+3	103	109	+6
Vandenberg Elementary	58	61	+3	103	109	+6
Watiki Indoor Waterpark Resort	44	45	+1	84	85	+1

Note: POIs presented in this table are provided to help understand the noise environment in the vicinity of Ellsworth AFB. As such, this table may not include all noise-sensitive facilities (schools, churches, daycares, etc.) outside of the 65 dB DNL contour.

Legend: dB = decibel; DNL = day-night average sound level; POI = Point of Interest; SEL = sound exposure level

Table 3.4-5 Alternative 1 Classroom Learning Interference

POI	Leq(8hr) dB			Speech Interfering Events per Hour			Time above 50 dB Minutes per 8-hour day		
	No Action Alternative	Alternative 1	Difference	No Action Alternative	Alternative 1	Difference	No Action Alternative	Alternative 1	Difference
Badger Clark Daycare	56	60	+4	1	1	0	2	3	+1
Child Development Services	54	61	+7	1	1	0	3	4	+1
District Daycare	56	61	+5	1	1	0	2	3	+1
Douglas High School	58	62	+4	1	1	0	2	3	+1
Douglas Middle School	53	59	+6						
East Middle School	44	45	+1						
Ellsworth School Age Care Program	55	62	+7	1	1	0	3	4	+1
Francis Case Daycare	55	60	+5	1	1	0	2	3	+1
Patriot Elementary	55	59	+4						
Vandenberg Daycare	61	64	+3	1	1	0	2	4	+2
Vandenberg Elementary	61	64	+3	1	1	0	2	4	+2

Legend: dB = decibel; $L_{eq}(8h)$ = 8-hour equivalent sound level; POI = Point of Interest

Airspace Environment

Subsonic Noise (DNL)

This noise exposure analysis is performed modeling the busiest month of the year within the PRTC. Assuming 20 flying days per month, LFE training could occur a maximum of 10 of those days. The remaining 10 days are modeled as normal day-to-day operations. **Table 3.4-6** displays the cumulative noise exposure below the PRTC airspaces. These results, derived from busy month data, provide the highest noise exposure for the area. Months without LFE training would be slightly quieter than the levels reported below. B-1 operations remain the greatest contributor to the noise environment at PRTC.

Table 3.4-6 Alternative 1 Noise Exposure Levels at PRTC

Airspace	L_{dnmr} (dB)			DNL (dB)			FAA Significance Determination
	No Action Alternative	Alternative 1	Change	No Action Alternative	Alternative 1	Change	
PR 1	51	48	-3	50	47	-3	Insignificant
PR 2	55	50	-5	54	49	-5	Reportable[1]
PR 3	51	48	-3	50	47	-3	Insignificant
PR 4	38	40	2	38	40	2	Insignificant
Gateway West	39	38	-1	38	38	0	Insignificant
Gateway East	38	39	1	38	39	1	Insignificant
Gap A	46	48	2	46	47	1	Insignificant
Gap B	46	47	1	45	46	1	Insignificant
Gap C	38	39	1	38	39	1	Insignificant

Note: [1] +/- 5 dB DNL change for DNL 45 dB to <60 dB is "reportable" per FAA Order 1050.1G.
Legend: dB = decibel; DNL = Day-Night Average Sound Level; L_{dnmr} = Onset-Rate Adjusted Day-Night Average Sound Level.

Increases to noise exposure below PR 4, Gateway East, and Gap A, B, and C MOAs are due solely to the additional 1,740 annual LFE training sorties within the PTRC. Raising the airspace ceiling under Alternative 1 allows for aircraft, particularly the B-1, to perform training at higher altitudes than under the existing conditions. Moving operations from the dominate noise contributor to higher altitudes would result in improvements to the noise environment below PR 1, PR 2, PR 3, and Gateway West under Alternative 1. Areas beneath PR 4, Gateway East, and Gap A, B, and C MOAs would experience increases of 1 to 2 dB L_{dnmr}/DNL.

Noise exposure beneath PRTC would range from 38 to 50 dB DNL, thus, no sensitive noise receptors would be exposed to 65 dB DNL or greater, which is the DoW threshold for land use recommendations for noise sensitive land uses such as residences, schools, daycares, and hospitals. In most places there would be a reduction in noise exposure or an unnoticeable change. The change in noise exposure beneath PR 2 would be considered "reportable" in accordance with FAA Order 1050.1G since the change is +/- 5 dB; however, the noise exposure would be less than the No Action Alternative and does not present a negative impact, thus further analysis on supplemental metrics is not necessary.

Supersonic Noise (CDNL)

Under Alternative 1, the maximum cumulative noise exposure beneath the center (PR 2, PR 3, and Gap B) of the PRTC airspace would be 51 dB CDNL, a 15 dB increase over the existing conditions. This increase is attributable to the increase in fighter aircraft participating in LFEs

which are authorized to fly supersonic down to 10,000 feet AGL. Areas towards the edges of the PRTC would experience slightly lower noise levels. The CDNL would not exceed 62 CDNL indicating there would be no land use compatibility concerns nor would it exceed the significance criteria determined by FAA Order 1050.1G.

Single Event Noise Metrics

While the DoW and FAA standards for subsonic and supersonic noise analysis are the cumulative noise metrics (DNL and CDNL) described in the previous sections, the noise analysis in support of this EIS also modeled estimates for single event metrics, which describe the noise or overpressure an observer would experience during an actual aircraft overflight. These metrics are not indicators of significance but rather provide supplemental information to the public, stakeholders, and decision-makers on the experience for observers on the ground.

Low-level Overflights

There would be no lowering of airspace floors with the Proposed Action, thus no change to where low-level overflights can occur within PRTC nor any changes to the noise exposure from a single overflight. However, increasing the number of LFE days would slightly increase the probability of experiencing such a flight. As shown in **Table 3.4-7** the probability of experiencing an overflight at the lowest altitude within the Day-to-Day airspace during any given week would decrease when compared to the existing conditions. The probability of experiencing an overflight at the lowest possible altitude during LFE training would increase slightly with the increase in LFE days and the increased fighter aircraft sorties (**Table 3.4-8**). During LFEs, the entire PRTC is used, so this table presents the spaces grouped together by lowest altitude. The Gateway East and West ATCAAs would also be used during these events, but no low level-flights would occur in these spaces since the floor would be FL180.

Table 3.4-7 Alternative 1 Probability[1] of Overflight at Lowest Altitude for Day-to-Day Training

Airspace	Lowest Altitude Available for Use	Probability of Overflight at Lowest Altitude (Day-to-Day) No Action Alternative	Probability of Overflight at Lowest Altitude (Day-to-Day) Alternative 1	Difference
PR 1 MOA	500 feet AGL	3%	1%	-2%
PR 2 MOA	500 feet AGL	3%	1%	-1%
PR 3 MOA	500 feet AGL	4%	1%	-3%
PR 4 MOA	12,000 feet MSL	3%	2%	-1%

Note: [1]Probability per week of experiencing a low-level overflight at any given point beneath the MOA.
Legend: % = percent; AGL = above ground level; MOA = Military Operations Area; MSL = mean sea level; PR = Powder River

Table 3.4-8 Alternative 1 Probability[1] of Overflight at Lowest Altitude for LFE Training

Airspace	Lowest Altitude Available for Use	Probability of Overflight at Lowest Altitude (LFEs) No Action Alternative	Probability of Overflight at Lowest Altitude (LFEs) Alternative 1	Difference
PR 1, 2, 3 and Gap A, B MOAs	500 feet AGL	1%	2%	+1%
PR 4 and Gap C MOAs	12,000 feet MSL	1%	11%	+10%

Note: [1]Probability of experiencing a low-level overflight at any given point beneath the MOA during a week with an LFE.
Legend: % = percent; AGL = above ground level; LFE = Large Force Exercise; MOA = Military Operations Area; MSL = mean sea level; PR = Powder River

Table 3.4-9 provides single-event calculations for a representative set of aircraft that would operate within PRTC. Total day-to-day operations at the low-altitude level would remain unchanged. During day-to-day training, low-level flights by the bomber aircraft are possible and could result in a peak noise exposure of up to 117 dB (see **Table 3.4-9**). During LFE events, low-level flights by both bombers and fighter aircraft are possible and a range of peak noise exposure could be experienced (see **Table 3.4-9**). The peak noise exposures in **Table 3.4-9** would occur for flights at the lowest possible altitude within PRTC which varies by location. The Gateway East and West ATCAAs do not have MOAs below, thus the lowest possible flight in those areas would be at FL180 (approximately 18,000 feet) and the peak exposure at that level is provided in **Table 3.4-9** for awareness. To provide a frame of reference, the average noise level for some common noise sources include: firecrackers (140 dB), a rock band concert (120 dB), a lawnmower (95 dB), a vacuum cleaner 10 feet away (85 dB), and a garbage disposal (75 dB).

Table 3.4-9 Maximum Noise Exposure by Aircraft Types and Altitudes

Aircraft[2]	500-foot Overflight (L_{max} in dB)[1]	12,000-foot Overflight (L_{max} in dB)	18,000-foot Overflight (L_{max} in dB)
Day-to-Day and LFEs			
B-1	117	86	80
B-2[1]	n/a	71	64
B-52[1]	n/a	76	69
LFEs Only			
F-16	115	78	71
F-18	124	84	78
F-22	120	84	78
F-35	119	85	78

Notes: [1]All aircraft modeled using maximum "MIL" (or military) power setting at 500 feet since use of the afterburner (or "A/B") power setting would be extremely unlikely at this level. The L_{max} presented for the higher altitudes (12,000 and 18,000 feet) are modeled using A/B power setting.
[2]B-2 and B-52 do not fly at low levels.
Legend: dB = decibel; LFE = Large Force Exercise; L_{max} = Maximum Sound Level; n/a = not applicable

Supersonic Overpressure

The location and intensity of individual sonic booms depend on several factors including aircraft size, shape, weight, altitude, and the maneuver being conducted at the time of the boom (e.g., climbing, diving, turning). **Table 3.4-10** shows calculated maximum overpressures in psf for the B-1 and representative transient fighter aircraft within PRTC. The overpressure could be possible for supersonic speed at the lowest authorized altitude and is the same as the existing conditions.

As described in **Section 3.4.2.2**, even in areas where no special flight restrictions apply, experiencing an overflight, particularly one at supersonic speed, that is directly overhead at the lowest possible altitude would be relatively rare. All of the overpressures presented in **Table 3.4-10** are currently possible given the existing authorized altitudes. An LFE day under the Proposed Action would be like a current LFE day but there would be more of them so the possibility of experiencing a sonic boom would slightly increase.

Table 3.4-10 Maximum Sonic Boom Overpressures

Aircraft	Lowest Supersonic Flight Altitude	Overpressure (psf)
B-1	20,000 feet MSL	5.31
F-16	10,000 feet AGL	4.24
F-22	10,000 feet AGL	5.37
F-35	10,000 feet AGL	4.9

Legend: AGL = above ground level; MSL = mean sea level; psf = pounds per square foot

As described in **Section 3.4.2.2**, supersonic flight would be concentrated in the center of the complex (PR 2, PR 3, and Gap B) and is less likely on the outer edges of the complex. The psf is not an indicator of how loud a sonic boom is, but rather the pressure above normal atmospheric pressure created by the shock wave generated by a sonic boom. This change in pressure occurs very quickly (i.e., in significantly less than 1 second). For comparison and better understanding of psf some common events and their associated psf are provided in **Table 3.4-11**. Supersonic flight and the corresponding overpressures would only be possible during LFEs and limited to no more than 30 days per year.

Table 3.4-11 Typical Impulsive Event Overpressure

Peak Overpressure	Decibel	Example Noise Source
0.3 psf	117 dB	Distant thunder
2 psf	134 dB	Thunder resulting from lightning strikes at one kilometer
4 psf	140 dB	Car door slam from inside standard sedan with windows raised
5 psf	142 dB	Handgun at one meter
12 psf	149 dB	Fireworks display from viewing stand

Legend: dB = decibel; psf = pounds per square foot

3.4.3.2 Alternative 2

The proposed changes to LFEs under Alternative 2 are the same as Alternative 1. The impacts to the Ellsworth AFB airfield from the additional LFE days would be the same as described for Alternative 1.

The cumulative noise exposure analysis is performed modeling the busiest month of the year within the PRTC. Assuming 20 flying days per month, LFE training could occur a maximum of 10 of those days under Alternative 2. The remaining 10 days are modeled as normal day-to-day operations. The Gateway East ATCAA would be available for day-to-day training under Alternative 2 (it is currently not available day-to-day) and the DNL would be 39 dB DNL. This would be an increase of 1 dB DNL from the No Action scenario which would be considered insignificant according to FAA Order 1050.1G. The subsonic noise exposure beneath all other airspaces would be identical to Alternative 1. Supersonic noise exposure, which is only possible during LFEs, under Alternative 2 would be identical to Alternative 1.

3.4.3.3 No Action Alternative

Under the No Action Alternative, the noise environment would not change from the existing conditions as described in **Section 3.4.2**. The DNL and CDNL associated with training would not be above 65 DNL or 62 CDNL for any airspace.

3.5 AIR QUALITY

Air quality is defined by ambient air concentrations of specific pollutants determined by the EPA to be of concern with respect to the health and welfare of the public. For this analysis, air quality impacts are assessed against national standards for ambient air quality and hazardous air pollutants (HAPs) as well as contributions to greenhouse gas (GHG) emissions. For air quality purposes, aircraft activities in the mixing zone (less than or equal to 3,000 feet altitude) are considered (EPA 2025a).

3.5.1 Regulatory Information

3.5.1.1 Criteria Pollutants

The major pollutants of concern, called "criteria pollutants," are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), total suspended particulate matter less than or equal to 10 (PM_{10}) and 2.5 ($PM_{2.5}$) micrometers in aerodynamic diameter, and lead (Pb). The EPA has established National Ambient Air Quality Standards (NAAQS) for these pollutants as shown in **Table 3.5-1**.

Ambient air quality refers to the atmospheric concentration of a specific pollutant that occurs at a particular geographic location. Ambient air quality concentrations are generally reported as a mass per unit volume (e.g., micrograms per cubic meter of air) or as a volume fraction of the air (e.g., parts per million by volume). The ambient air quality concentrations at a particular location are determined by the interactions of emissions, meteorology, and chemistry. Emission considerations include the types, amounts, and locations of pollutants emitted into the atmosphere. Meteorological considerations include wind and precipitation patterns affecting the distribution, dilution, and removal of pollutant emissions. Chemical reactions can transform pollutant emissions into other chemical substances.

3.5.1.2 Hazardous Air Pollutants

In addition to the NAAQS for criteria pollutants, national standards exist for HAPs, which are regulated under Section 112(b) of the 1990 CAA Amendments.

Aircraft gas turbine engines burn fuel more efficiently than most mobile sources. Because most fuel is consumed at higher power settings and most operational time is spent at cruise, greater than 99 percent of fuel undergoes complete combustion and is efficiently converted to carbon dioxide (CO_2) and water. Additionally, most aircraft activity within PRTC occurs at altitudes above 3,000 feet. HAP emissions are greatest under idle conditions when the engines are operating in a less efficient cycle (EPA 2009). This condition would occur in the airfield environment and not within airspace.

Table 3.5-1 National Ambient Air Quality Standards

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
CO		primary	8 hours	9 parts per million	Not to be exceeded more than once per year
			1 hour	35 parts per million	
Pb		primary and secondary	Rolling 3-month period	0.15 micrograms per cubic meter[1]	Not to be exceeded
NO_2		primary	1 hour	100 parts per billion	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 parts per billion[2]	Annual mean
O_3		primary and secondary	8 hours	0.070 parts per million[3]	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle pollution	$PM_{2.5}$	primary	1 year	9.0 micrograms per cubic meter	Annual mean, averaged over 3 years
		secondary	1 year	15.0 micrograms per cubic meter	Annual mean, averaged over 3 years
		primary and secondary	24 hours	35 micrograms per cubic meter	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 micrograms per cubic meter	Not to be exceeded more than once per year on average over 3 years
SO_2		primary	1 hour	75 parts per billion[4]	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 parts per million	Not to be exceeded more than once per year

Notes: [1]In areas designated nonattainment for the lead standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 micrograms per cubic meter as a calendar quarter average) also remain in effect.
[2]The level of the annual nitrogen dioxide standard is 0.053 parts per million. It is shown here in terms of parts per billion for the purposes of clearer comparison to the 1-hour standard level.
[3]Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) ozone standards additionally remain in effect in some areas. Revocation of the previous (2008) ozone standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O3 standards.
[4]The previous sulfur dioxide standards (0.14 parts per million 24-hour and 0.03 parts per million annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous sulfur dioxide standards or is not meeting the requirements of a State Implementation Plan call under the previous sulfur dioxide standards (40 CFR 50.4(3)). A State Implementation Plan call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the require NAAQS.

Legend: CO = carbon monoxide; NO_2 = nitrogen dioxide; O^3 = ozone; Pb = lead; $PM^{2.5}$ = particulate matter less than or equal to 2.5 microns; PM_{10} = particulate matter less than or equal to 10 microns; SO_2 = sulfur dioxide

Source: EPA 2025b.

3.5.1.3 General Conformity Rule

The EPA designates an area as in attainment when it complies with the NAAQS. Areas that violate these ambient air quality standards are designated as nonattainment areas. Areas that have improved air quality from nonattainment to attainment are designated as maintenance areas but are still required to demonstrate the ability to maintain attainment of the standards for 20 years following the redesignation to attainment. Areas that lack monitoring data to demonstrate attainment or nonattainment status are designated as unclassified and are treated as attainment areas for regulatory purposes. When an area is designated in nonattainment and/or in maintenance, the CAA Section 176(c), *General Conformity Rule*, is applied. The intent of this rule is to ensure that federal actions do not adversely affect the timely attainment of air quality standards in areas of nonattainment or maintenance.

3.5.1.4 Greenhouse Gas Emissions

GHGs are gases that trap heat in the atmosphere. Both natural processes and human activities generate these emissions. The EPA has identified CO_2, methane, nitrous oxide, and fluorinated gases as the most common GHGs (EPA 2025c). The dominant GHG emitted is CO_2. Each GHG is assigned a heat-trapping capacity, and is standardized to CO_2, which has a value of one. Emissions of a GHG are multiplied by its heat-trapping capacity to calculate the total equivalent emissions of carbon dioxide (CO_2e). These emissions come mainly from the burning of fossil fuels (coal, oil, and gas), with contributions from forest clearing, agricultural practices, and other activities. The potential effects of proposed GHG emissions are by nature global since most individual anthropogenic sources of GHG emissions are not large enough to have a noticeable effect on atmospheric conditions. Therefore, GHG emissions are included for aircraft activity at all altitudes.

3.5.2 Affected Environment

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 attainment status are provided in **Table 3.5-2**.

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 PM_{10} (1987 standard) (EPA 2025d).

The Lame Deer nonattainment area in Rosebud County falls below the PRTC airspace; therefore, a General Conformity applicability evaluation is required for Rosebud County, Montana. For purposes of the General Conformity evaluation, it was conservatively assumed that all proposed PRTC activity would occur over Rosebud County.

In Wyoming, Campbell, Crook, and Weston Counties are in attainment for all pollutants. A portion of Sheridan County, Wyoming, was previously in nonattainment for PM_{10} (1987 standard), but was redesignated to maintenance in May 2018 after achieving attainment . However, the Sheridan maintenance area falls outside the PRTC ROI, so a General Conformity applicability evaluation is not required for Sheridan County.

Table 3.5-2 Attainment Status for Affected Counties

State	County	Attainment Status
North Dakota	Adams	Attainment for all pollutants
	Billings	Attainment for all pollutants
	Bowman	Attainment for all pollutants
	Grant	Attainment for all pollutants
	Golden Valley	Attainment for all pollutants
	Hettinger	Attainment for all pollutants
	Morton	Attainment for all pollutants
	Slope	Attainment for all pollutants
	Stark	Attainment for all pollutants
	Sioux	Attainment for all pollutants
South Dakota	Butte	Attainment for all pollutants
	Corson	Attainment for all pollutants
	Harding	Attainment for all pollutants
	Lawrence	Attainment for all pollutants
	Meade	Attainment for all pollutants
	Pennington	Attainment for all pollutants
	Perkins	Attainment for all pollutants
	Ziebach	Attainment for all pollutants
Montana	Big Horn	Attainment for all pollutants
	Carter	Attainment for all pollutants
	Custer	Attainment for all pollutants
	Fallon	Attainment for all pollutants
	Powder River	Attainment for all pollutants
	Treasure	Attainment for all pollutants
	Rosebud	Portion Nonattainment for PM_{10}; Attainment for all other pollutants
Wyoming	Campbell	Attainment for all pollutants
	Crook	Attainment for all pollutants
	Sheridan	Portion Maintenance for PM_{10}; Attainment for all other pollutants[1]
	Weston	Attainment for all pollutants

Note: [1]The portion of Sheridan County, Wyoming that is a maintenance area for PM_{10} is not covered by the PRTC airspace.

Therefore, to analyze air quality impacts, this analysis has two ROIs defined as (1) the nonattainment area for PM_{10} within Rosebud County and (2) all other counties below the airspace which are in attainment.

The CAA gives special air quality protection to National Parks larger than 6,000 acres and national Wilderness Areas larger than 5,000 acres that were in existence when the CAA was amended in 1977. These are "Class I" areas. There are two federal Class I areas (Theodore Roosevelt National Park and Badlands/Sage Creek Wilderness) and one non-federal, Tribal-designated Class I area (Northern Cheyenne Reservation) within 60 miles of PRTC. Non-federal, Tribal-designated Class I areas are lands within the exterior boundaries of reservations of federally recognized Indian tribes which are redesignated by the appropriate tribal government.

3.5.3 Environmental Consequences

The environmental impact methodology for air quality impacts presented in this EIS complies with DAFMAN 32-7002, *Environmental Compliance and Pollution Prevention* (13 June 2025). The air analysis for aircraft operations factors in the engine types used in the aircraft, the emission factors associated with those flight modes, and other relevant details. Criteria pollutant

emissions were analyzed for flight at or below 3,000 feet AGL and GHG emissions were analyzed for all operations, regardless of flight altitude. These data are included in the DAF Air Conformity Applicability Model (ACAM) used for analysis. The ACAM results, along with detailed emission calculations and assumptions, are provided in **Appendix E.**

ACAM version 5.0.24.a was used to provide emissions estimates for the primary aircraft that would use the airspace. ACAM provides estimated air emissions from proposed federal actions for each specific criteria and precursor pollutant as defined in the NAAQS. Operational modes are used as the basis of the emission estimates. The Proposed Action would also include an additional 400 temporary personnel per LFE. Emissions for personnel commutes are included in the emission calculations. Emissions were calculated for all criteria pollutants, with the exception of lead, which is excluded from the air quality analysis, as there are no lead emission sources associated with the Proposed Action.

The CAA Section 176(c), *General Conformity*, requires federal agencies to demonstrate that their proposed activities would conform to the applicable State Implementation Plans for attainment of the NAAQS. General conformity applies to nonattainment and maintenance areas. If the emissions from a federal action proposed in a nonattainment area exceed annual *de minimis* thresholds identified in the rule, a formal conformity determination is required of that action. For the Rosebud PM_{10} nonattainment area, the General Conformity applicability threshold is 100 tons per year.

For attainment area criteria pollutants, the air quality analysis used the EPA's Prevention of Significant Deterioration permitting threshold of 250 tons per year as an indicator of the local significance of potential impacts to air quality. The Prevention of Significant Deterioration permitting threshold represents the level below which a stationary source may acceptably emit without triggering the requirement to obtain a permit. Thus, if the intensity of any net emissions increase for a Proposed Action or alternative is below 250 tons per year, the indication is that the air quality impacts would not be significant for that pollutant. Similarly, for HAPs, thresholds of 10 tons per year for any individual HAP, or 25 tons per year for total HAPs are used as indicators of significant impacts.

3.5.3.1 Alternative 1

Under Alternative 1, the number of sorties for the day-to-day activities would not change from the baseline. The increase in duration and quantity of LFEs would result in an increase of sorties, both in the airfield and airspace, as well as an increase in personnel commutes. This would result in an increase in emissions in the mixing zone. **Table 3.5-3** provides the estimated annual PM_{10} emissions in tons per year for aircraft activities below 3,000 feet altitude within the Rosebud County nonattainment area for PM_{10}. The analysis conservatively assumes that all proposed PRTC airspace activity would occur over Rosebud County.

Table 3.5-3 Alternative 1 Estimated PM_{10} Emissions over Rosebud County Nonattainment Area in Tons per Year

Activity	PM_{10}
Aircraft Activity – Airspace	1.06
Threshold	100
Exceed Threshold?	No

Legend: PM_{10} = particulate matter less than or equal to 10 microns in diameter

The PM_{10} emissions from aircraft activities within Rosebud County would be below the General Conformity threshold of 100 tons per year; therefore, a conformity determination is not required. A General Conformity Record of Conformity Analysis is provided in **Appendix E**.

Table 3.5-4 provides the estimated annual criteria pollutant emissions in tons per year for aircraft activities below 3,000 feet altitude and personnel commutes for all counties below the PRTC airspace which are in attainment.

Table 3.5-4 Alternative 1 Estimated Criteria Pollutant Emissions in Tons per Year

Activity	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Aircraft Activity - Airfield	2.23	18.10	31.19	1.90	3.07	2.71
Aircraft Activity - Airspace	0.15	21.34	0.85	1.07	1.06	0.94
Temporary Personnel Commutes - LFEs	0.13	0.07	1.69	0.00	0.01	0.00
Total Emissions	2.51	39.51	33.74	2.96	4.13	3.65
Threshold	250	250	250	250	250	250
Exceed Threshold?	No	No	No	No	No	No

Legend: CO = carbon monoxide; NO_x = nitrogen oxides; SO_x = sulfur oxides; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; VOC = volatile organic compound

Estimated emissions from aircraft activities and personnel commutes are below the thresholds for all pollutants; therefore, the Proposed Action would not be expected to result in significant impacts and would not be expected to cause an exceedance of any NAAQS standard.

There are two federal Class I areas (Theodore Roosevelt National Park and Badlands/Sage Creek Wilderness) and one non-federal, Tribal-designated Class I area (Northern Cheyenne Reservation) within 60 miles of the PRTC airspace. The Northern Cheyenne Reservation is already excluded from PRTC airspace, and aircraft maintain a minimum altitude of 12,000 feet, so there would be no air quality impacts. The Theodore Roosevelt National Park and Badlands/Sage Creek Wilderness are well outside the boundaries of the PRTC. Given that the proposed emissions are well below the NAAQS threshold and only a fraction of the operations would occur within the 3,000-foot mixing height emissions from PRTC airspace activities would not be considered impactful to the Class I areas. Additionally, under the Proposed Action, the percentage of time spent within the 3,000-foot mixing height for both day-to-day and LFE operations would decrease compared to existing conditions (see Table 2.2-3 and 2.2-7 for percentage of operations by altitude band).

HAP emissions were calculated for the additional transient aircraft for the most common HAPs at idle conditions. **Table 3.5-5** provides the estimated annual HAP emissions in tons per year for additional transient aircraft associated with the increase in LFEs.

Table 3.5-5 Alternative 1 Estimated HAP Emissions in Tons per Year

Aircraft	Emissions (tons)		
	Benzene	Formaldehyde	Total HAPs
F-18E/F	0.04	0.09	0.14
F-22	0.01	0.14	0.15
F-35A	0.01	0.08	0.09
Tanker (KC-135)	0.00	0.00	0.00
P-8	0.00	0.00	0.00
UAV	0.00	0.01	0.01
Total Emissions	0.07	0.33	0.40
HAP Threshold	10	10	25
Exceed Threshold?	No	No	No

Legend: HAP = Hazardous Air Pollutant

Estimated HAP emissions are well below the 10-ton per year threshold for an individual HAP, and the 25-ton per year threshold for total HAPs.

GHG emissions were calculated for all proposed aircraft activities, both below and above 3,000 feet altitude, as well as proposed LFE commuting activities. **Table 3.5-6** provides the estimated annual GHG emissions in tons per year for Alternative 1.

Table 3.5-6 Alternative 1 Estimated GHG Emissions in Tons per Year

Activity	CH_4	N_2O	CO_2	CO2e
Aircraft Activity - Airfield	0.21	0.04	5,108	5,125
Aircraft Activity - Airspace	2.99	0.58	71,009	71,247
Temporary Personnel Commutes - LFEs	0.01	0.00	157	158
Total Emissions	3.21	0.63	76,274	76,530

Legend: CH_4 = methane; CO_2 = carbon dioxide; CO_2e = carbon dioxide equivalent; N_2O = nitrous oxide

The estimated annual GHG emissions would be equivalent to the emissions from 12,888 cars driving the national average annual mileage of 13,476 miles per year.

3.5.3.2 Alternative 2

Air quality impacts under Alternative 2 would be the same as under Alternative 1. The number and duration of day-to-day sorties would not change, and the proposed number and duration of LFE sorties would be the same as Alternative 1. The only difference would be the airspace in which the training activities occur, and these differences would occur at altitudes over 3,000 feet, which do not affect the air quality in the mixing zone.

3.5.3.3 No Action Alternative

Under the No Action Alternative, the air quality conditions would remain unchanged. Air quality is generally in attainment throughout the four-state region of PRTC. Current aircraft training operations within PRTC were assessed in the 2014 EIS and operations at the airfield were recently assessed in the B-21 Beddown EIS (DAF 2021), and criteria pollutant emissions did not exceed the general conformity threshold for any pollutant in any of the states.

3.6 NATURAL RESOURCES

For this project, natural resources include wildlife, domestic animals, and special-status species (those protected under federal law). Vegetation would not be affected by the Proposed Action, which involves no ground-disturbing activities; therefore, it will not be discussed further, except in the context of providing habitat for wildlife.

Wildlife includes animal species (amphibians, reptiles, birds, and mammals) with the exception of those identified as special-status species. Special-status species are animal species listed as endangered, threatened, or proposed for listing by the USFWS under the ESA as well as their designated critical habitats; protected by the MBTA; or protected by the BGEPA.

3.6.1 Affected Environment

Two Ecoregions underlie the airspace: Middle Rockies and Northwestern Great Plains. Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; they are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components (EPA 2025e).

The Northwestern Great Plains ecoregion comprises approximately 92 percent of the land beneath airspace. This ecoregion is characterized by the Missouri Plateau section of the Great Plains. The ecoregion is a semiarid rolling plain of shale, siltstone, and sandstone punctuated by occasional buttes and badlands. Native grasslands within the Northwestern Great Plains persist in areas of steep or broken topography (EPA 2013). The region is primarily flat but has occasional valleys and foothills that support woodlands (Bailey 1995).

The Middle Rockies ecoregion covers approximately 8 percent of land beneath the airspace and comprises a landscape of mountains with Douglas-fir, subalpine fir, and Engelmann spruce forests, as well as some large alpine areas. Forests within the ecoregion can have open canopies. The foothills are partly wooded or shrub- and grass-covered. The intermontane valleys are grass- and/or shrub-covered and contain a mosaic of terrestrial and aquatic fauna that is distinct from the nearby mountains. Many perennial streams occur and differentiate the intermontane valleys from the Northwestern Great Plains (EPA 2013).

3.6.1.1 Wildlife

Lands beneath the airspace support habitat for a variety of wildlife species. Areas with permanent or persistent water resources are areas where wildlife may concentrate. Grasslands, shrublands, and woodlands also provide habitat for mammals, birds, reptiles, and amphibians.

Common mammals found in these communities include pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), whitetail deer (*Odocoileus virginianus*), coyote (*Canis latrans*), badger (*Taxidea taxus*), whitetail jackrabbit (*Lepus townsendii*), desert cottontail (*Sylvilagus audubonii*), prairie dog (*Cynomys*), and thirteen-lined ground squirrel (*Ictidomys tridecemlineatus*) (Bailey 1995).

Common birds include sage grouse (*Centrocercus urophasianus*), greater prairie chickens (*Tympanuchus cupido*), sharp-tailed grouse (*Tympanuchus phasianellus*), horned lark (*Eremophila alpestris*), lark bunting (*Calamospiza melanocorys*), and western meadowlark (*Sturnella neglecta*). Two bird species are unique to the shortgrass prairies east of the Rockies,

the mountain plover (*Charadrius montanus*) and McCown's longspur (*Rhynchophanes mccownii*) (Bailey 1995).

3.6.1.2 Domestic Animals

Some of the grassland beneath the airspace is used for the grazing and rearing of livestock. The majority of livestock are cattle, followed by sheep and horses.

3.6.1.3 Special Status Species

Federally Listed Species

There are 11 ESA-listed species that have the potential to occur beneath PRTC airspace (USFWS 2025a-j, **Table 3.6-1)**. There is no critical habitat beneath the PRTC airspace (USFWS 2025a-j).

Table 3.6-1 ESA Species with Potential to Occur Beneath PRTC Airspace

Species	Status	Potential PRTC Occurrence
Mammals		
Black-footed ferret (*Mustela nigripes*)	Experimental Non-essential[1]	PR 4 MOA
Northern long-eared bat (*Myotis septentrionalis*)	Endangered	PR 1–4 MOAs, Gap A–C MOAs, Gateway East and West ATCAAs
Tricolored bat (*Perimyotis subflavus*)	Proposed Endangered	Gateway West ATCAA
Birds		
Piping plover (*Charadrius melodus*)	Threatened	PR 3–4 MOAs, Gap C MOA, Gateway East ATCAA
Rufa red knot (*Calidris canutus rufa*)	Threatened	PR 2–4 MOAs, Gap B–C MOAs, Gateway East and West ATCAAs
Whooping crane (*Grus americana*)	Endangered	PR 3–4 MOAs, Gap C MOA, Gateway East ATCAA
Fish		
Pallid sturgeon (*Scaphirhynchus albus*)	Endangered	PR 1–3 MOAs, Gap A–B MOAs
Invertebrates		
Monarch butterfly (*Danaus plexippus*)	Proposed Threatened	PR 1–4 MOAs, Gap A–C MOAs, Gateway East and West ATCAAs
Suckley's cuckoo bumble bee *(Bombus suckleyi)*	Proposed Endangered	PR 1–4 MOAs, Gap A–C MOAs, Gateway East and West ATCAAs
Western regal fritillary (*Argynnis idalia occidentalis*)	Proposed Threatened	PR 1–4 MOAs, Gap A–C MOAs, Gateway East and West ATCAAs
Plants		
Ute's ladies'-tresses (*Spiranthes diluvialis*)	Threatened	PR 1–2 MOAs, Gap A MOA, Gateway West ATCAA

Note: [1]Experimental, non-essential populations are reintroduced federally listed species that are not essential to the continued existence of the species.
Legend: ATCAA = Air Traffic Control Assigned Airspace; ESA = Endangered Species Act; MOA = Military Operations Area; PR = Powder River; PRTC = Powder River Training Complex
Source: USFWS 2025a-j

The USFWS was petitioned to list greater sage-grouse (*Centrocercus urophasianus*) numerous times between 1999 and 2003. In 2010, USFWS determined that the species was warranted for listing, but precluded due to higher listing priorities (USFWS 2010). In 2015, USFWS determined that listing was not warranted at the time because conservation efforts implemented at the federal, state, and private level had ameliorated the primary threats to the species (USFWS

2015b). Management of greater sage-grouse and its habitats is the responsibility of state agencies and federal land management agencies. This species occurs throughout the western U.S. including the states below PRTC; however, habitat loss has greatly reduced its distribution and numbers (Schroeder et al. 2020). As of 2025, there were no breeding males located in North Dakota (Wilson 2025). Greater sage-grouse males perform courtship displays on leks and females nest and brood in nearby sagebrush shrubland (USFWS 2015b). The states beneath PRTC manage sage grouse core areas, those areas that encompass a majority of the breeding leks.

Because the Proposed Action involves changes to airspace configuration and use, effects to special status species are limited to those resulting from exposure to noise. There would be no ground disturbance and *therefore there would be no effect on Ute's ladies'-tresses.*

The effects of aircraft noise on fish and invertebrates summarized in Manci et al. (1988) suggest that fish are not sensitive to in-air noise or sonic booms. Although studies of longer periods of noise exposure have documented effects on invertebrate behavior and reproductive success, brief, intermittent noise exposure did not appear to negatively affect the invertebrate species studied and most invertebrates hear poorly in the frequency range of aircraft noise (Bowles 1995). *Therefore, a no effect determination has been made for pallid sturgeon, monarch butterfly, Suckley's cuckoo bumblebee, and Western regal fritillary.*

Black-footed ferret. The black-footed ferret is endemic to North America and was historically found across the Great Plains, mountain basins, and semi-arid grasslands. Because black-footed ferrets depend entirely on prairie dogs for food and shelter (utilizing their burrows), their range and habitat align with the ranges of black-tailed prairie dog (*Cynomys ludovicianus*), Gunnison's prairie dog (*C. gunnisonii*), and the white-tailed prairie dog (*C. leucurus*) (Hillman and Clark 1980; USFWS 2013). The species is generally a nocturnal predator (Clark et al. 1986). In the wild, the breeding season occurs from mid-March through early April (National Park Service [NPS] 2020). The species remains vulnerable to several threats, including disease, loss of habitat, and related declines in prey (NPS 2020). As a non-essential experimental population, black-footed ferrets are exempt from the requirement to designate critical habitat (USFWS 2019).

Northern long-eared bat. Northern long-eared bat is a wide-ranging species occurring across much of the eastern and north central U.S. and all Canadian provinces from the Atlantic coast west to the southern Northwest Territories and eastern British Columbia (USFWS 2022). The Northern long-eared bat roosts in caves and other cavities such as abandoned mines during the winter. Throughout summer and portions of fall and spring, they roost in forested areas. They primarily forage in wooded areas to feed on moths, flies, leafhoppers, caddisflies, beetles, and arachnids (USFWS 2022). During late summer and early autumn, Northern long-eared bats migrate from their summering sites to swarming sites, where mating likely occurs (Johnson et al. 2015). The predominant threats to the Northern long-eared bat are white-nose syndrome and habitat loss (USFWS 2022). Critical habitat for this species has not been designated.

Tricolored bat. The tricolored bat is wide ranging across the eastern and central U.S. and portions of southern Canada, Mexico, and Central America (Smith et al. 2022). Tricolored bats primarily roost in the foliage of deciduous hardwood trees in the spring, summer, and fall. In the winter, tricolored bats hibernate in caves and other subterranean habitats (USFWS 2021). Tricolored bats converge at cave and mine entrances between mid-August and mid-October to swarm and mate. The species disperses from winter hibernacula to summer roosting habitat in

the spring. Tricolored bats emerge early in the evening and forage at treetop level or above but may forage closer to ground later in the evening, and are known to commonly forage over waterways and forest edges (USFWS 2021). Similar to the northern long-eared bat, the primary threats to this species include white-nose syndrome and habitat loss (USFWS 2021). Critical habitat for this species has not been designated.

Piping plover. The Northern Great Plains breeding population of piping plover extends from Nebraska, north along the Missouri River through South Dakota, North Dakota, and eastern Montana as well as alkaline lakes along the Missouri River Coteau (a large plateau that extends north and east of the Missouri River in North Dakota, Montana, and into Canada) (USFWS 2015a). In the Northern Great Plains, piping plovers breed and raise young on sparsely vegetated sandbars found in rivers and on shorelines of alkaline lakes and reservoirs. On wintering grounds, piping plovers forage and roost along a variety of habitats including barrier and mainland beaches, algal flats, salt marshes, and coastal lagoons (USFWS 2015a). Piping plovers start to arrive on breeding grounds in early April, begin nesting in mid-to-late April, and hatch from late May through early July. The species appears to be low-density migrants throughout its range and do not have regularly-used stopover sites (USFWS 2015a). Changes in the quality and quantity of riverine habitat is the primary threat to piping plovers. Human disturbance, predation, and invasive plants further reduce the quality of breeding and wintering grounds (USFWS 2015a). Critical habitat for wintering piping plovers was designated in 2001, including for the Great Lakes and Northern Great Plains breeding populations; however, no piping plover critical habitat occurs below the PRTC airspace.

Rufa red knot. This species occurs primarily along the coasts but can also migrate across areas of open ocean and land (USFWS 2020). In the U.S., rufa red knots use both coastal and interior routes during migration, including the Central, Mississippi, and Atlantic flyways. Most records in the interior states show small numbers of knots, but there are multiple records in every inland state (USFWS 2014). Rufa red knots use areas within North Dakota and Montana for stopovers, and there are clusters of sighting records along tributaries of the Mississippi River and along the Great Lakes (USFWS 2014). The red knot breeds in the central Canadian Arctic, from the islands of northern Hudson Bay to the Foxe Basin shorelines of Prince Charles and Baffin Islands, and west to Victoria Island. Red knots generally nest in dry, slightly elevated tundra locations, often on windswept slopes with little vegetation. Pair bonds form soon after the birds arrive on the breeding grounds in late May or early June (USFWS 2020). Primary threats to the rufa red knot include loss of habitat, disruption of natural predator cycles on the breeding grounds, and reduced prey availability throughout the nonbreeding range (USFWS 2020). The USFWS has proposed critical habitat designation for the rufa red knot; however, none occurs below the PRTC airspace.

Whooping crane. The whooping crane occurs only in Canada and the U.S. (Canadian Wildlife Service and USFWS 2007). The whooping crane breeds, migrates, winters, and forages in a variety of habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, rivers, and agricultural fields (Canadian Wildlife Service and USFWS 2007). Autumn migration normally begins in mid-September, with most birds arriving on the wintering grounds between late October and mid-November (Canadian Wildlife Service and USFWS 2007). During migration, whooping cranes stop over on wide shallow river flats, and they winter mainly in coastal marshes and estuaries (Cornell University 2025). Whooping cranes could use land beneath the PRTC as a migration corridor and stopover habitat. Historically, population declines

were caused by shooting and loss of prairie habitat to agricultural development. Current threats to whooping cranes include human disturbance and habitat loss and degradation (Canadian Wildlife Service and USFWS 2007). No critical habitat for the whooping crane is found beneath PTRC airspace.

Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act

The MBTA (16 U.S.C. 703-712) prohibits the take of protected migratory bird species, including their nests, feathers, parts, or eggs. Take is defined under MBTA as "pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect." Over 325 species of migratory birds have the potential to occur beneath the airspace (Avian Knowledge Network 2021). These species use a variety of habitats but may be more concentrated near areas with more resources, such as water sources.

Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected by the BGEPA (16 U.S.C. 668–668c), which prohibits the take of eagle species, including their parts, feathers, nests, and eggs. Take is defined under BGEPA as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." These species could be present beneath all of the airspace year-round. Bald eagles typically breed near rivers, lakes, and reservoirs where there are trees capable of supporting large nests (Buehler 2022). In this region, the bald eagle breeding season is between October 15 and August 31 (USFWS 2025a-j). Wintering bald eagles concentrate near aquatic habitats but also may occur in other areas with sufficient food resources and roost sites (Buehler 2022).

In the U.S., golden eagles breed west of the 100th meridian (Katzner et al. 2020). In this region, the golden eagle nesting season is between December 1 and August 31. Golden eagles forage in open grassland or shrubland near to large cliffs or trees where they nest (Katzner et al. 2020). Typically, this species is associated with areas of high topographic relief that allows for the development of up-drafts for foraging flights (Katzner et al. 2020). Populations of this species may be non-migratory, partially migratory, or short- or long-distance migratory. In western North America, eagles nesting south of 55 degrees north are often not migratory (including all of the PRTC), and those occurring north of 55 degrees north are migratory (Katzner et al. 2020).

3.6.2 Environmental Consequences

Determination of the significance of potential effects to natural resources is based on: (1) the importance (legal, commercial, recreational, ecological, scientific) of the resource, (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. Effects would be significant if species or habitats of special concern would be adversely affected over relatively large areas or disturbances would cause reductions in population size or distribution of a species of special concern.

The FAA Order 1050.1G significance threshold for biological resources is defined as: the USFWS or National Marine Fisheries Service determines that the action would be likely to jeopardize the continued existence of a federally listed threatened or endangered species or would result in the destruction or adverse modification of federally designated critical habitat. The Proposed Action would not cause these effects, thus the impacts to listed species from this Proposed Action would not be significant in accordance with this reference.

This analysis focuses on wildlife and special-status species that occur or potentially occur beneath PRTC airspace, which could be impacted by noise from the Proposed Action and alternatives. In addition to the significance threshold defined above, factors to consider for biological resource effects defined in FAA Order 1050.1G includes whether the Proposed Action would have the potential for:

- A long-term or permanent loss of unlisted plant or wildlife species, i.e., extirpation of the species from a large project area;
- Adverse impacts to special status species (e.g., state species of concern, species proposed for listing, migratory birds, bald and golden eagles) or their habitats;
- Substantial loss, reduction, degradation, disturbance, or fragmentation of native species' habitats or their populations; or
- Adverse impacts on a species' reproductive success rates, natural mortality rates, non-natural mortality (e.g., road kills and hunting), or ability to sustain the minimum population levels required for population maintenance.

A Biological Evaluation was provided to USFWS for Section 7 consultation. The USFWS provided concurrence with the DAF's determinations on July 14, 2026 (**Appendix F**). Those determinations are summarized below.

3.6.2.1 Alternative 1

Because the Proposed Action involves changes to airspace configuration and use, effects to wildlife, domestic animals, and special status species are those resulting from exposure to aircraft noise and BASH. Continuous, intense noise exposure has been shown to cause health effects in laboratory experiments, but extensive experiments show that intermittent noise, such as aircraft overflights, does not (Bowles 1995). This is because animals' ears recover between the intermittent exposures. Animal species differ greatly in their responses to noise. Potential noise effects are summarized below.

Wildlife

Mammals. Sound levels above 90 dB may be associated with a number of behaviors such as retreat from the sound source, freezing, or a strong startle response (Manci et al.1988). If a noise arouses an animal (i.e., gets their attention, wakes them, or increases their activity), the increased activity has the potential to affect its metabolic rate. A few studies have documented increases in activity after aircraft approaches, but responses were fairly mild, such as taking a few steps or walking away slowly from the site of the disturbance (Bowles 1995). Early studies of terrestrial mammals showed that noise levels of 120 dBA could damage mammals' ears, and levels of 95 dBA could cause temporary loss of hearing acuity.

Bell (1972) reviewed reports and studies of animal response to sonic booms. Specific reactions differ according to the species involved, whether the animal is alone, or whether the animal has been previously exposed to sonic booms. Trampling, moving, raising the head, stampeding, jumping, and running are among the reactions reported. Reactions vary from boom to boom and are not predictable, but animal reactions to booms were found to be similar to their reactions to low-altitude subsonic airplane flights, helicopters, and sudden noises (Bell 1972).

While it has been speculated that repeated aircraft overflight (e.g., surveillance flights along a pipeline) could affect large carnivores by causing changes in home ranges, foraging patterns, and

breeding behavior (Dufour 1980), these effects have not been borne out in subsequent studies, and Bowles (1995) indicated that acute exposure to noise (i.e., brief and occasional) only damaged an animals' hearing at levels above 140 dB.

Wolves have been shown to be disturbed by low-altitude flights that were 25 to 1,000 feet AGL. However, they adapt to aircraft overflights and noise as long as they were not being hunted from aircraft (Dufour 1980). Incidental observations of wolves and bears exposed to fixed-wing aircraft and helicopters indicated a stronger reaction to helicopters. Wolves were less disturbed by helicopters than other large mammals such as wild ungulates, while individual grizzly bears showed the greatest response of any animal species observed (Manci et al. 1988). Wolves are known to inhabit areas with human disturbance but may adjust time-of-day activity or other behaviors (Frey 2018). This suggests that wolves may adapt behavior to temporary noise disturbances but are unlikely to show significant behavior change or other negative impacts from temporary overhead military flights.

Cats have one of the broadest known hearing ranges among mammals (Heffner and Heffner 1985). Larger cats are able to hear faint low-frequency sounds better than smaller species, allowing them to communicate more effectively over greater distances (Kitchener et al. 2010). Undomesticated cats rely on hearing to detect and capture prey. The potential for noise to mask prey detection is unlikely for intermittent brief noise exposures such as military jet overflight.

Ungulate reactions to aircraft overflights and noise are typically minor behavioral reactions. Behavioral reactions may be related to the history of disturbances by humans and aircraft. Minor behavioral reactions would include turning to orient toward the aircraft. Moderate responses to disturbance may be nervous behaviors, such as trotting a short distance. Escape behavior would represent a typical severe response, but it is rarely observed in response to overflights above 500 feet AGL (Bowles 1995; Dufour 1980).

Landon et al. (2003) found that Sonoran pronghorn tend to select areas with the lower noise levels and avoid areas with the higher noise levels. However, whether pronghorn avoid these areas because of the noise or because of other human-related activities is unknown. In a number of studies of the endangered Sonoran pronghorn, behaviors were observed to be similar with and without anthropogenic stimuli with some minor change in activity during rotary-wing or multiple aircraft overflights. Animals quickly returned to activities, and the temporary change in behavior was not detrimental (Krausman et al. 2004; Krausman and Harris 2002). Overall, the data from this study found that behavior patterns of Sonoran Pronghorn were similar with and without the presence of military stimuli (Krausman et al. 2004). Female ungulates with young may be more responsive to overflights than at other times of the year. Female desert bighorn sheep with lambs were more likely to exhibit vigilant behavior (Krausman et al. 1998) as were female caribou with calves (Murphy et al. 1993). Although few studies have been conducted on the response of wild ungulates to sonic booms, these disturbances appear to have little to no adverse effects. Workman et al. (1992) studied the physiological and behavioral responses of captive pronghorn, elk, and bighorn sheep to sonic booms. All three species exhibited an increase in heart rate that lasted for 30 to 90 seconds in response to their first exposure to a sonic boom. Behaviorally, the animals responded to their first exposure to a sonic boom by running a short distance (less than 30 feet reported for elk). After successive sonic booms, the heart rate response decreased greatly, and the animals remained alert but did not run. The authors suggested the animals became habituated in response to successive exposures (Workman et al. 1992).

Nocturnal mammals have the most sensitive hearing among terrestrial vertebrates; however hibernating mammals are difficult to arouse with noise (Bowles 1995; Bowles et al. 1995). Studies have shown that bats are less likely to feed in areas with distracting noise sources (Schaub et al. 2008; Siemers and Schaub 2011). Bat responses to aircraft noise could be similar to responses described for other mammals and would likely include startle or alerting to the noise source (Dufour 1980). Studies of the effects of noise on bats have not documented any behavioral responses to jet or other noise, including during hibernation (Dalton and Dalton 1993 and 3D/Environmental 1996, as cited in Delaney 2002). Another concern for bat species would be masking of echolocation pulses that could disrupt flight or foraging. A study on New Zealand long-tailed bats found that low-level aircraft activity did not mask echolocation pulses since the aircraft noise was most intense at less than 10 kilohertz (kHz); and, bat echolocation pulses are 40 kHz. There were no statistically significant differences in mean bat activity during and after overflights compared with pre-aircraft activity (Le Roux and Waas 2012).

A study was conducted from 1991 to 1994 evaluating the effects of low-altitude aircraft overflights on small mammals, specifically heteromyid rodents, within the Barry M. Goldwater Air Force Range, Arizona (Bowles et al. 1995). The results of this study indicated that many of the small mammal species within the study area spent the day in burrows or dens, which was thought to protect them from aircraft noise. However, the A-weighted sound exposure level in the burrows averaged less than 3 dB lower than at 1.2 meters above the surface, so the burrows only provided a buffer from the noise. Significant attenuation was seen only above 1,300 Hertz (Hz), and heteromyid rodents are able to hear well down to 100 Hz and were therefore likely to hear the aircraft sounds in their burrows (Bowles et al. 1995). Although the data suggested that the aircraft noise reached the small mammals in their burrows, no significant differences in small mammal species diversity, population numbers, and animal weights were found between the sound-exposed areas and control areas not exposed to sound. This suggests that the small rodents' populations were not affected by aircraft noise. Few field studies on the effects of aircraft noise on small mammals have been conducted, but those that have suggest no population level effects from airport noise (Bowles 1995).

Birds. In comparison to humans, birds typically hear less well over a narrower frequency bandwidth (Dooling and Popper 2007). The majority of the published literature on bird hearing focuses on terrestrial birds and their ability to hear in air. A review of 32 terrestrial and marine species reveals that birds generally have greatest hearing sensitivity between 1 and 4 kHz, and very few can hear below 20 Hz (Beason 2004). Most concerns related to the effects of noise on birds involve the masking of communications among members of the same species reducing the detectability of biologically relevant signals, including the sounds of predators and prey, and temporarily or permanently decreasing hearing sensitivity (Dooling and Popper 2007). A study of captive zebra finches given a choice of foraging in noisy and quiet areas found no significant difference in the amount of time birds spent in noisy and quiet areas though those foraging in noisy areas spent more time being vigilant, resulting in less efficient foraging than those in quiet areas (Evans et al. 2018). In a study of ovenbirds, Habib et al. (2007) found chronic noise exposure near compressor stations affected pairing success, attributable to masking and distorting the song of breeding males on territories. In birds, hearing loss is difficult to characterize since birds regenerate hair cells even after substantial losses that can result in temporary threshold shifts (Bowles 1995).

In a literature review of raptor responses to aircraft noise, Manci et al. (1988) found that most raptors did not show a negative response to overflights. When negative responses were observed, they were predominantly associated with rotor-winged aircraft or jet aircraft that were repeatedly passing within 0.5 mile of a nest. Ellis et al. (1991) performed a study to estimate the effects of low-level military jet aircraft and mid- to high-altitude sonic booms (both actual and simulated) on nesting peregrine falcons and seven other raptors (common black hawk, Harris' hawk, zone-tailed hawk, red-tailed hawk, golden eagle, prairie falcon, and bald eagle). Re-occupancy and productivity rates were within or above expected values for self-sustaining populations. In a 1997 helicopter overflight study, Mexican spotted owls did not flush from a nest or perch unless a helicopter was as close as 330 feet (Delaney et al. 1999). Researchers in Colorado found that Mexican spotted owl responses to F-16 overflights were often less significant than responses to naturally occurring events such as thunderstorms. Similarly, Delaney et al. (1999) found that Mexican spotted owls quickly returned to normal day-roosting behavior after being disturbed by helicopters. A 6-year study within the Gila National Forest found that low-level aircraft overflight had no effect on occupancy of Mexican spotted owl activity centers and found no correlations among measures of aircraft exposure and nesting success (Air Combat Command [ACC] 2008). Movement and flight as a behavioral response to overflights has been treated as a potential concern since it exposes the owl, chicks, or eggs to predation. However, the results of the 6-year study showed that Mexican spotted owl flights in response to military jet overflights were so rare that the rate could not be distinguished from normal rates of flight. In fact, females were never observed flushing from nests in response to military jets or other low-flying aircraft. Observations during this study confirmed that flight and flushing responses are close-range defensive responses (ACC 2008).

Manci et al. (1988) noted that aircraft can be particularly disturbing to waterfowl. The USFWS Waterfowl Management Handbook (Korschgen and Dahlgren 1992) lists "loud noise" caused by aircraft as the top disturbance category for waterfowl. Several studies showed that migratory waterfowl (e.g., ducks and geese) expend more energy when exposed to repeated aircraft overflights, at least in the short term (Bowles 1995). Waterfowl are sensitive to disturbance because of their aggregation into large flocks during their migration and overwintering. In the PRTC area, concentrations of waterfowl would be present during seasonal migrations along the Pacific Flyway, where they would stop over to feed and rest in large waterbodies. When at rest, the flocks are typically in water bodies or wetlands exposed to the open sky and subject to aerial and ground predation. Taking flight is their defense against either type of predation. Waterfowl flocks seem to be as sensitive as their most responsive individual in the flock, so that larger flocks would have a greater chance of responding than small flocks (Bowles 1995).

A study performed on black ducks and wood ducks showed that ducks habituated to both visual and auditory aircraft activity over the course of 17 days (Conomy et al. 1998), suggesting that waterfowl may initially react to aircraft activity, but the disturbances would be unlikely to represent significant harm over time.

In a study evaluating the impacts of military and civilian overflights on water birds beneath a MOA in North Carolina, no evidence was found that visual or acoustic stimuli from military aircraft flying between 2,100 feet AGL and 3,500 feet AGL elicited behavioral stress responses that would negatively impact nesting colonial waterbird demographic rates (Hillman 2012).

Birds occasionally run, fly, or crowd in the presence of a sonic boom (Bell 1972). Bell (1972) also examined the effects of booms on eggs hatched under commercial conditions, and no effects

on hatching success were found. Teer and Truett (1973) conducted a study near Glen Rose, Texas, to determine whether occurrence of sonic booms created by overflying aircraft were adversely affecting reproduction of wild birds. The examination area was subject to sonic booms occurring two or three times a week, and the control area was essentially free from sonic boom disturbance. In the final analysis, there was no evidence found that sonic boom disturbance affected phases of bird reproduction and the overpressures had no effects on hatching success, growth rates, or mortality (Teer and Truett 1973).

Reptiles and Amphibians. Effects of noise on these species rely on scientific literature; however, these taxa are underrepresented in noise studies (Shannon et al. 2016). Studies have shown varying responses to noise stimulus in amphibians and reptiles. Responses to noise in reptiles and amphibians, like all taxa, depend on how each species detects noise. Snake species lack external ears and ear drums; however, snakes can sense vibrations from noise through their inner ear and their somatosensory system (Zdenek et al. 2023; Tadic 2023). Other reptiles and amphibians can hear; however, have limited hearing range and sensitivity to noise varies between species and guilds (Bowles 1995).

Short-term behavioral responses in reptiles and amphibians have included freezing and emergence at inappropriate times, but it is unclear if these were due more to vibrations or the noise itself (Bowles 1995). During and after an overflight, frogs may remain 'frozen' for a brief period and may temporarily cease breeding calls. A study from 2005 concluded that certain species of acoustically active, pond-dwelling frogs decrease their call rate when exposed to airplane flyby or motorcycle engine playbacks. However, another species increased calling under the same acoustic conditions. These findings suggest that frogs change their calling behavior to avoid acoustic masking and frog communities' vocalizations may be temporarily altered by anthropogenic noises (Sun and Narins 2005). However, data do not suggest that this causes harm to frog populations (Sun and Narins 2005).

Responses to noise in reptiles differ by species. A study conducted at Fort Carson on Colorado checkered whiptails found that individual lizards spent less time moving and more time eating during flyovers. Additionally, the study found an increase in ketones, a potential stress response (Kepas et al. 2023). Snake species responses to airborne noise have been studied in a laboratory setting. Zdenek et al. (2023) found that behavior responses to airborne noise differed by genus. Some snakes moved away from the sound, displaying an avoidance behavior, while other species exhibited defensive behaviors to sound (Zdenek et al. 2023). No studies have been completed on behavior responses of Thamnophis snakes to vibration or noise stimuli.

Based on predicted levels of noise and sonic booms (refer to **Tables 3.4-9 and 3.4-10**), the proposed modifications to airspace configuration and use would be expected to have temporary minor effects to wildlife inhabiting land beneath the airspace.

Domestic Animals

Behavioral reactions to jet aircraft noise in domestic animals vary with species; however, observations of livestock exposed to sonic booms have generally consisted of startle reactions that were considered minimal (Manci et al. 1988). In a study of the effects to the anatomy of swine ears from aircraft noise, animals exposed to trials of aircraft noise of 120 dB to 135 dB showed no injury to the gross anatomy of the ear or the organ of corti compared to a control group (Dufour 1980). In another study, nursing sows, baby pigs, and adult pigs during mating were observed to show initial alarm followed by indifference at noise sources from 104 to 120

dB (Dufour 1980). These researchers considered that swine were able to tolerate and even become accustomed to noise up to at least 120 dB (Dufour 1980). It is expected that domestic animals and livestock beneath the proposed airspace would have a behavioral reaction to an overflight but the intensity of that reaction would vary greatly with the species and other environmental conditions at the time of the overflight. These studies indicate that these animals would habituate to the noise over time if it occurred with some regularity and such noise would not have a long-term impact. Animals experiencing an overflight for the first time would likely alert or startle, but it is not expected that this would have a detrimental impact to the animal's overall health. Given the volume of proposed airspace where flights would occur and the low frequence of a flight in the exact same path on a regular basis, no single location is expected to be subjected to repeated or continuous low-level overflights or sonic booms.

Horses have a wide auditory range of approximately 55 Hz–33.3 kHz and have the ability to detect low frequency sound better than many mammals including primates (Heffner and Heffner 1983). As compared to humans, horses are able to detect higher frequency sound than humans and humans can detect lower frequency sounds than horses. As prey species, horses evolved to identify predators by sound and typically respond with freezing followed by erratic movements or "flight" response (Hole et al. 2023). Horses have been observed to show fright responses, such as jumping or galloping around, to jet aircraft (Dufour 1980). Horses can often habituate to a noise, but this varies greatly depending on the individual horse's temperament and training. Their reaction is usually strongest when the noise resembles that of a predator, that is, a quiet rustling would elicit a stronger response than a high-speed train (The British Horse Society n.d.).

While the studies on the effect of aircraft noise on pregnant mares are somewhat limited, LeBlanc et al. performed a study that focused on changes in pregnancy success, behavior, cardiac function, hormonal production, and rate of habituation in response to F-14 overflights (LeBlanc et al. 1991). The study found that pregnant mares habituated to jet noise after a few exposures. All of the mares showed flight posture after the first noise exposure but at no time did any of them strike or run into stall walls. Since the mares in this study were kept in stalls during the noise exposure events, it was speculated that in a large, open environment the response would have been stronger (galloping farther distance or faster). There were no differences in pregnancy success when compared to a control group. Since all of the mares habituated to the noise, it was recommended that new mares remain in familiar stalls until their reaction to overflights could be gauged and they become habituated (LeBlanc et al. 1991). Since the overflights associated with the Proposed Action are not expected to occur with regularity at any one location, any pregnant mares that happen to be beneath the flight path of a low-level flight would likely startle but their reaction is not anticipated to result in pregnancy loss.

Horseback riding is a common practice beneath the PRTC airspace. While it is possible that a horseback rider may experience an overflight, it is not expected that this would be a regular situation given the volume of airspace. It is assumed that a horse would startle and possibly spin or bolt in response to an overflight, although the response would vary greatly with each individual animal. In support of the Report to Congress: Potential Impacts of Aircraft Overflights of National Forest Service System Wildernesses, a review of USFS annual reports for a 10-year period found three accidents were reported in which aircraft startled the horse and threw the rider (USFS 1992). Also in this study, national visitor surveys about accidents found that 1,180 visits reported an "accident," but none of those accidents were related to aircraft overflights. These

survey results indicate that while there is potential for aircraft to cause accidents (to include startling horses), incidents are rare.

Ranches beneath the PRTC are avoided by 2,000 feet seasonally (during calving and weaning) and at other times to the extent possible as defined in **Table 1.2-2**. Based on predicted single event noise exposure and sonic booms (refer to **Tables 3.4-7 through 3.4-11**), the proposed modifications to airspace configuration and use would be expected to have temporary minor effects to domestic animals inhabiting land beneath the airspace.

Special Status Species – Federally Listed Species

Species-specific research on the impacts of military aircraft noise on the black-footed ferret, Northern long-eared bat, tricolored bat, piping plover, and rufa red knot is not available. Thus, the effects discussion relies on available scientific studies on related species. There is limited research on the impacts of other aircraft or vehicle disturbance to whooping crane on its breeding grounds. The potential impacts associated with the proposed training activities to special-status species would be the same as those described for wildlife (**Section 3.6.2.1**). Based on predicted noise levels and sonic booms (**Tables 3.4-7 through 3.4-11**), the proposed modifications to airspace configuration and use would be expected to have temporary minor effects to special status species inhabiting land beneath the airspace. These species are not expected to be significantly affected by noise associated with the Proposed Action. In accordance with Section 7 of the ESA, the DAF is consulting with USFWS and this consultation will be complete prior to the Final EIS (**Appendix F**). A summary of the potential impacts from aircraft noise and the effects determination provided in the Biological Evaluation is summarized below for each federally protected species The Proposed Action would not have a significant impact on federally listed species.

Black-footed ferret. The black-footed ferret, which is designated an experimental, nonessential population, has the potential to occur beneath the PR 4 MOA/ATCAA. Responses to overflights would be similar to those described for other mammals. However, the black-footed ferret is a nocturnal predator and appears above ground at irregular intervals for irregular durations. Though the potential for exposure to overflights is unlikely, the proposed overflights could disturb individuals overflown. The maximum sound level that could be experienced is 86 dB, as is currently the case. **Tables 3.4-7 and 3.4-8** illustrate probability of experiencing the maximum sound level during day-to-day training and LFEs. A range of overpressures would continue to be possible beneath depending on the type of aircraft, up to a maximum of 5.37 psf (see **Table 3.4-10**). Supersonic flight can occur as low as 10,000 feet for fighter aircraft and 20,000 for bomber aircraft but 95 percent would occur in the ATCAAs, above 18,000 feet (it should be noted that there is no low MOA at PR 4 and the floor is 12,000 feet MSL). Therefore, given the limited potential interaction with overflights because of their nocturnal nature and limited distribution, it is expected that noise disturbance from the Proposed Action on the black-footed ferret would be minor and temporary. *Therefore, the Proposed Action may affect but is not likely to adversely affect experimental non-essential population of black-footed ferret.*

Northern long-eared bat. The endangered Northern long-eared bat has the potential to occur beneath the PR 1–4 MOAs/ATCAAs, Gap A–C MOAs/ATCAAs, and the Gateway East and West ATCAAs. Responses to overflights would be the same as those described above for other mammals. It is possible that bats could exhibit temporary behavioral responses to aircraft overflights, but these would be brief, uncommon, and localized. Northern long-eared bats are

nocturnal foragers and are considered to be rare in the states below the airspace with only a few locations with documentation of presence. Though the potential for exposure to overflights is unlikely, the proposed overflights could disturb individuals overflown. The maximum sound level that could be experienced ranges from 80–124 dB, as is currently the case. **Tables 3.4-7** and **Table 3.4-8** illustrate probability of experiencing the maximum sound level during day-to-day training and LFEs. A range of overpressures would continue to be possible beneath depending on the type of aircraft, up to a maximum of 5.37 psf (see **Table 3.4-10**). Supersonic flight can occur as low as 10,000 feet for fighter aircraft and 20,000 for bomber aircraft but 95 percent would occur in the ATCAAs, above 18,000 feet. Therefore, given the limited potential interaction with overflights because of their nocturnal nature, it is expected that noise disturbance to bats would be minor and temporary. *Therefore, the Proposed Action may affect but is not likely to adversely affect the Northern long-eared bat.*

Tricolored bat. The proposed endangered tricolored bat has the potential to occur beneath the Gateway West ATCAA. Responses to overflights would be the same as those described above for other mammals. It is possible that bats could exhibit temporary behavioral responses to aircraft overflights, but these would be brief, uncommon, and localized. Similar to the Northern long-eared bat, tricolored bats are nocturnal and are considered to be rare in the states below the airspace with only a few locations with documentation of presence. Though the potential for exposure to overflights is unlikely, the proposed overflights could disturb individuals overflown.

The maximum sound level that could be experienced is 80 dB, as is currently the case, since this species is found only beneath an ATCAA (which has a floor of FL180, approximately 18,000 feet). A range of overpressures would continue to be possible depending on the type of aircraft, up to a maximum of 5.31 psf. Given the limited potential interaction with overflights because of their nocturnal nature, it is expected that noise disturbance to bats would be minor and temporary. *Therefore, the Proposed Action may affect but is not likely to adversely affect the tricolored bat.*

Piping plover. The threatened piping plover has the potential to occur beneath the PR 3–4 MOAs/ATCAAs, Gap C MOA/ATCAA, and the Gateway East ATCAA. The Northern Great Plains population is most commonly found in the Alkali Lakes and the Missouri River, both of which lie outside the PRTC airspace. Minimal documentation of presence is found in the states below the airspace. Though the species is rare, and potential for exposure to overflights is extremely unlikely, the proposed overflights could disturb individuals overflown. Responses to overflights would be the same as those described above for other birds. The maximum sound level that could be experienced ranges from 80–124 dB, as is currently the case. **Tables 3.4-7** and **Table 3.4-8** illustrate probability of experiencing the maximum sound level during day-to-day training and LFEs. A range of overpressures would continue to be possible depending on the type of aircraft, up to a maximum of 5.37 psf (see **Table 3.4-10**). Supersonic flight can occur as low as 10,000 feet for fighter aircraft and 20,000 for bomber aircraft but 95 percent would occur in the ATCAAs, above 18,000 feet. *Therefore, the Proposed Action may affect but is not likely to adversely affect the piping plove*r.

Rufa red knot. The threatened rufa red knot has the potential to occur beneath the PR 2–4 MOAs/ATCAAs, Gap B–C MOAs/ATCAAs, and the Gateway East and West ATCAAs. Rufa red knots have the potential to use North Dakota and Montana for stopovers; however, the species is considered a rare migrant in the area beneath the PRTC airspace. Though the species is rare and only has the potential to occur during migration, and potential for exposure to

overflights is extremely unlikely, the proposed overflights could disturb individuals overflown. Responses to overflights would be the same as those described above for other birds. The maximum sound level that could be experienced ranges from 80–124 dB, as is currently the case. **Tables 3.4-7** and **Table 3.4-8** illustrate probability of experiencing the maximum sound level during day-to-day training and LFEs. A range of overpressures would continue to be possible depending on the type of aircraft, up to a maximum of 5.37 psf (see **Table 3.4-10**). Supersonic flight can occur as low as 10,000 feet for fighter aircraft and 20,000 for bomber aircraft but 95 percent would occur in the ATCAAs, above 18,000 feet. *Therefore, the Proposed Action may affect but is not likely to adversely affect the rufa red knot.*

Whooping crane. The endangered whooping crane has the potential to occur beneath the PR 3–4 MOAs/ATCAAs, Gap C MOA/ATCAA, and the Gateway East ATCAA. This species could potentially use these areas during migration and for stopover habitat; however, there has been minimal documentation of presence of the whooping crane with only one to two sighting locations per state in the area underneath the airspace. Though the species is rare and only has the potential to occur during migration, and potential for exposure to overflights is extremely unlikely, the proposed overflights could disturb individuals overflown. Whooping cranes on their breeding grounds have been observed to be sensitive to noise disturbance within 1,000 meters, regardless of the type of stimulus (Lewis and Stack 1992). Responses to overflights would be the same as those described above for other birds, and low probability for overflights to be within the 1,000-meter threshold to cause disturbance. The maximum sound level that could be experienced ranges from 80–124 dB, as is currently the case. **Tables 3.4-7** and **Table 3.4-8** illustrate probability of experiencing the maximum sound level during day-to-day training and LFEs. A range of overpressures would continue to be possible depending on the type of aircraft, up to a maximum of 5.37 psf (see **Table 3.4-10**). Supersonic flight can occur as low as 10,000 feet for fighter aircraft and 20,000 for bomber aircraft but 95 percent would occur in the ATCAAs, above 18,000 feet. *Therefore, the Proposed Action may affect but is not likely to adversely affect the whooping crane.*

Special Status Species – MBTA and BGEPA

The potential impacts to migratory birds associated with the proposed training activities would be the same as those described for wildlife (**Section 3.6.2.1**). The Proposed Action is not expected to result in take of migratory birds. Take, under MBTA, is defined under regulation to include actions or attempt to "pursue, hunt, shoot, wound, kill, trap, capture, or collect" a migratory bird species listed under 50 CFR 10.13. In addition the Proposed Action is a military readiness activity. Under the MBTA, regulations applicable to military readiness activities (50 CFR 21.42), the USFWS authorizes take of migratory birds incidental to military readiness activities provided it does not result in a significant adverse effect on a population of a migratory bird species. The proposed training would not result in a significant adverse impact on any population of a migratory bird species.

Effects to bald eagles and golden eagles would be as described above (**Section 3.6.2.1**) for raptors. Raptors generally do not exhibit a negative response to aircraft unless the aircraft is in close proximity (i.e., 0.5 mile); further, overflights have not been shown to affect breeding success or habitat occupancy (Manci et al. 1988; Ellis et al. 1991; Delaney et al. 1999; ACC 2008). Under the Proposed Action, aircraft would not fly within close proximity to eagle nests;

therefore, no negative behavioral responses are anticipated. Incidental take of bald and golden eagles is not expected to occur.

BASH

As discussed in Section 3.3, BASH programs exist at every installation with an active flying mission. BASH programs identify seasonal concentrations of birds and provide guidance for pilots to maintain appropriate elevational and lateral separation to avoid or minimize the potential for collision. The DAF maintains the Avian Hazard Advisory System (AHAS) to detect and assess the risk of a bird strike. AHAS utilizes RADAR and weather data to predict and monitor the presence of birds in airspace (Air Force Safety Center 2015). AHAS, together with each unit's BASH Management Plan, is used to evaluate bird strike risks and manage flight operations. When an increased risk is identified, limits are placed on low-altitude flights and some types of training (e.g., multiple approaches, closed pattern work) and special briefings are provided to pilots whenever the potential exists for greater bird-strike risks within airspace.

Under the Proposed Action, aircrews would operate in the same airspace as they do currently. Flight altitudes of the listed bird species may interact with the floors of some of the existing airspace (PR1 Low, PR2 Low, PR3 Low, Gap A Low, and Gap B Low MOAs). Because no airspace floors would be lowered; because listed species are rare and occur seasonally in the Action Area; and with the implementation of the safety measures described above, the potential for bird aircraft strikes is so low as to be discountable and therefore may affect but is not likely to adversely affect the three listed bird species.

The tricolored bat has the potential to occur under the Gateway West ATCAA (airspace floor approximately 18,000 feet). Tricolored bats flights are low level (e.g., 3-6 feet above tree canopy, Caire et al 1984). Therefore, tricolored bat would not occur in training airspace, and there would be no effect from of aircraft strike.

3.6.2.2 Alternative 2

Under Alternative 2, the Gateway East ATCAA would be available for day-to-day training and the DNL would be 39 dB, an increase of 1 dB DNL from the No Action scenario (see Section 3.4.3.2). There are no additional wildlife, domestic animals, and special status species under Gateway East ATCAA than those described under Alternative 1. The subsonic noise exposure beneath all other airspaces would be identical to Alternative 1. Supersonic noise exposure under Alternative 2 would be identical to Alternative 1. Therefore, the potential impacts to wildlife, domestic animals, and special-status species associated with aircraft noise and BASH would be the same as that described for Alternative 1.

3.6.2.3 No Action Alternative

Under the No Action Alternative, natural resources conditions would remain unchanged. Most of the aircraft operations would continue to be at higher altitudes above FL180 (see **Section 1.2.3**) with limited potential for noise impacts to wildlife and livestock. Wildlife and livestock would continue to be exposed to some sonic booms during LFEs. Low-level overflights and sonic booms would continue to temporarily startle or disturb animals beneath PRTC. The PR 4 MOA was charted without a low MOA to reduce potential concerns on heavy migratory waterfowl use in that area.

3.7 SOCIOECONOMICS

Socioeconomics describes aspects of a project that are social or economic in nature, or a combination of the two. Socioeconomic impacts resulting from the use of the PRTC were described in detail in the 2014 EIS, which found no effect to property values or population. Mitigations for potential effects to ranching operations and civilian airports were adopted (see **Section 1.2.2**). These mitigations would remain in place under the Proposed Action and the proposed airspace modifications would not change the socioeconomic impacts described in the 2014 EIS. This socioeconomic analysis examines the effects of additional military personnel traveling to the Ellsworth AFB area on a temporary duty basis to participate in an LFE. Potential impacts to civil aviation and public airports are analyzed in **Section 3.2** of this EIS.

3.7.1 Affected Environment

Ellsworth AFB is located in Meade and Pennington Counties in South Dakota, which comprise the ROI. In 2023, the population of the ROI was 142,378, most of these in Pennington County in the communities of Rapid City and Box Elder (U.S. Census Bureau 2023). Ellsworth AFB employs approximately 4,100 active-duty military and civilian employees (DAF 2023).

The total Gross Domestic Product in 2023 dollars for the ROI was approximately $9.4 billion (Bureau of Economic Analysis 2023a). Of this total, approximately $590 million was in the accommodation and food services industry (Bureau of Economic Analysis 2023b). The accommodation and food services sector would be the most likely sector to be impacted by TDY personnel that are participating in LFE events at Ellsworth AFB. In addition, the area has a number of hotels and lodging options which provide over 5,000 rooms within Rapid City alone (Visit Rapid City 2025a).

3.7.2 Environmental Consequences

Per FAA Order 1050.1G, there are no significance thresholds for socioeconomic impacts. Factors to consider in the analysis include whether the proposal would disrupt or divide the physical arrangement of an established community; cause extensive relocation when sufficient replacement housing is unavailable; cause extensive relocation of community businesses that would cause severe economic hardship; disrupt local traffic patterns and substantially reduce the level of service on roads; or produce a substantial change in the community tax base.

3.7.2.1 Alternative 1

An estimated 400 TDY personnel would travel to Ellsworth AFB for the duration of each 12-day LFE. These personnel would stay in hotels for the duration of the event, with each event accounting for 5,600 person days. **Table 3.7-1** shows the estimated local spending based on the standard daily lodging and meals and incidental expenses rates. The estimated annual spending could result in an increase of approximately $2,990,400 in local spending annually, a beneficial effect to the local economy. This would amount to approximately 0.5 percent of the annual Gross Domestic Product of $590 million for the accommodation and food services industry within the ROI.

Table 3.7-1 Estimated Local Spending During LFEs

Local Spending	Days[1]	Daily Rate	Total
Lodging	5,600	$110	$616,000
Meals and Incidental Expenses	5,600	$68	$380,800
Per LFE Total			$996,800
Annual Total			$2,990,400

Note: [1]It is assumed TDY personnel would arrive 1–2 days prior to an LFE event, thus each person would spend 14 nights in a hotel
Legend: LFE = Large Force Exercise
Source: U.S. General Services Administration 2025.

Existing hotels, restaurants, and other services are anticipated to have the capacity to accommodate the 400 TDY personnel during LFEs. The ROI already supports a large number of visitors due to the key travel and tourism industry for the area. For example, Rapid City alone accommodated 3.9 million visitors in 2024 (Visit Rapid City 2025b). Therefore, the addition of 400 TDY personnel during LFEs is not expected to significantly alter the capacity of existing hotels, restaurants, or other services within the ROI.

3.7.2.2 Alternative 2

Effects of Alternative 2 would be the same as described for Alternative 1. Temporary minor beneficial impacts to local communities would result from an increase in TDY personnel.

3.7.2.3 No Action Alternative

Under the No Action Alternative, there would be no change to existing socioeconomic environment conditions.

3.8 CULTURAL RESOURCES

Cultural resources can be broadly defined as pre-contact and post-contact historic sites and districts; structures; artifacts; features that display evidence of human activity; and landscapes and features that play a fundamental role in a specific community's identity, beliefs, or value system. Cultural resources can be divided into three major categories: archaeological resources (pre-contact and post-contact), architectural resources, and traditional cultural places/sacred sites.

Archaeological resources are locations where human activity measurably altered the earth or left deposits of physical remains (e.g., tools, projectile points, or bottles). "Pre-contact" refers to resources that predate contact with Europeans. These resources can range from a scatter composed of a few artifacts to village sites and rock art. "Post-contact" refers to resources that postdate contact with Europeans. Archaeological resources can include campsites, roads, fences, trails, dumps, battlegrounds, mines, and a variety of other features.

Architectural resources include standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance. Architectural resources generally must be more than 50 years old to be considered for protection under existing cultural resource laws. However, more recent structures, such as Cold War-era military buildings, may warrant protection if they have exceptional characteristics and the potential to be historically significant structures.

Traditional cultural places can include a building, structure, object, site, or district that may be listed or eligible for listing in the National Register of Historic Places (NRHP) for its significance to a living community because of its association with cultural beliefs, customs, or

practices that are rooted in the community's history and that are important in maintaining the community's cultural identity (NPS 2024). Traditional cultural places can include archaeological resources, buildings, neighborhoods, landscapes, prominent topographic features, habitats, plants, animals, and minerals that Native Americans or other groups consider essential for the continuance of traditional cultures. *Sacred sites* are "any specific, discrete, narrowly delineated location that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion, provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site" (Executive Order 13007).

Historic properties considered to be significant, known or unknown, warrant consideration with regards to adverse impacts resulting from a proposed action. To be considered significant, archaeological or architectural resources must meet one or more criteria as defined in 36 CFR 60.4 for inclusion in the NRHP. The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

a) that are associated with events that have made a significant contribution to the broad patterns of our history; or

b) that are associated with the lives of persons significant in our past; or

c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

d) that have yielded, or may be likely to yield, information important in prehistory or history.

Several federal laws and regulations have been established to manage cultural resources, including the NHPA (54 U.S.C. 300101 et seq.), the Archaeological and Historic Preservation Act (6 U.S.C. 469-469c), the American Indian Religious Freedom Act (42 U.S.C. 1996), the Archaeological Resources Protection Act (16 U.S.C. 470aa-470mm), and the Native American Graves Protection and Repatriation Act (25 U.S.C. 300101 et seq.).

Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments*, of November 6, 2000, charges all executive departments and federal agencies with engaging in regular, meaningful, and robust consultation with Tribal Nation officials in the development of federal policies that have Tribal implications. On November 30, 2022, President Biden released a *Memorandum on Uniform Standards for Tribal Consultation* which established uniform minimum standards to be implemented across all federal agencies regarding how Tribal consultations are to be conducted. This memorandum was designed to respond to the input received from Tribal Nations regarding Tribal consultation, improve and streamline the consultation process for both Tribal Nations and federal participants, and ensure more consistency in how agencies initiate, provide notice for, conduct, record, and report on Tribal consultations. Additionally, DoD Instruction 4710.02, *DoD Interactions with Federally Recognized Tribes,* DAFI 90-2002, *Interactions with Federally Recognized Tribes,* and

DAFMAN 32-7003, *Environmental Conservation,* emphasize the importance of respecting and consulting with Tribal governments on a government-to-government basis in recognition of their sovereignty as a nation.

Section 106 of the NHPA requires all federal agencies to consider the effects of their undertakings on historic properties and seek to avoid, minimize, or mitigate adverse effects to these properties (36 CFR 800.1(a)). Section 106 also requires agencies to consult with federally recognized Tribal Nations that attach religious and cultural significance to historic properties that may be affected by an undertaking. In addition, agencies must involve stakeholders including representatives of local governments, individuals and organizations with a demonstrated interest in the undertaking, and the public.

3.8.1 Affected Environment

The affected environment for cultural resources is based on the establishment of the APE of an undertaking, through consultation with Montana, North Dakota, South Dakota, and Wyoming SHPOs. An APE is defined in 36 CFR section 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." The APE, and therefore the affected environment, for this project includes lands located beneath existing PRTC. The APE was provided to all SHPOs during scoping for the EIS (July 2025) and all provided their concurrence with the APE.

3.8.1.1 Historic Properties

DAF identified historic properties within the four states (and associated counties) under the PRTC airspace. The historic properties include architectural resources, archaeological resources, and traditional cultural places. Because the APE for this Proposed Action is the same as the APE under the 2014 EIS, DAF utilized the list of historic properties from the 2014 analysis as a starting point for the current effort. This list was verified for accuracy and supplemented with more recent information from databases of properties listed in or eligible for listing in the NRHP as well as state registers of historic properties and National Historic Landmarks. The comprehensive list of properties considered in the analysis, organized by state, can be found in **Appendix G, Enclosure A.** Government-to-government consultation is ongoing, and additional traditional cultural places may be identified through this process.

3.8.1.2 Programmatic Agreement and Existing Avoidances for Cultural Resources

A Programmatic Agreement among Ellsworth AFB, the SHPOs of Montana, North Dakota, South Dakota, and Wyoming, and the Advisory Council on Historic Preservation was developed in conjunction with the establishment of the PRTC addressed in the 2014 EIS (the PRTC as it exists today). The Agreement outlined communication protocols and reporting requirements between the consulting parties, and stipulated certain avoidance, minimization, or mitigation of adverse effects. Some of these mitigation measures were addressed with the initial airspace design while others are implemented during aircraft operations (see also **Section 1.2.2**):

- The Northern Cheyenne Reservation (including Deer Medicine Rocks National Historic Landmark) is excluded from the PR 1 Low MOA, thus flights remain above 12,000 feet MSL (in the High MOA and ATCAA only).

- There is no PR 4 Low MOA and flights remain above 12,000 feet MSL (in the High MOA and ATCAA only) which excludes the Cheyenne River Reservation, the Standing Rock Reservation, and all historic properties from low-level overflights.
- The Little Bighorn Battlefield (beneath PR 1) is avoided by 5,000 feet AGL +/- 1 hour park hours.
- No supersonic flight is authorized over the Little Bighorn National Monument (beneath PR 1).
- Flights must cross perpendicularly to the Tongue River (beneath PR 1) which is associated with Wolf Mountain Battlefields/Where Big Crow Walked Back and Forth National Historic Landmark.
- Devils Tower National Monument, Deadwood National Historic Landmark, and Bear Butte National Historic Landmark are beneath the Gateway West ATCAA; thus, all flights are above FL180 (approximately 18,000 feet).
- Temporary or seasonal avoidance areas for specific ceremonies and events as identified by the Tribes.

None of the avoidances noted above would be changed with this Proposed Action. An updated Programmatic Agreement is being developed concurrently with this EIS.

3.8.2 Environmental Consequences

Impact analysis for cultural resources focuses on assessing whether the Proposed Action or alternatives have the potential to affect cultural resources that are listed in the NRHP (which include traditional cultural places) or have traditional significance for Native American groups. An adverse effect is any action that may directly or indirectly change the characteristics that make the historic property eligible for listing in the NRHP. If an adverse effect is identified, the federal agency consults with the SHPO/Tribal Historic Preservation Officer, federally recognized Tribal Nations, and if applicable, the Secretary of the Interior to develop measures to avoid, minimize, or mitigate the adverse effects of the undertaking.

Analysis of potential adverse effects on historic properties, including traditional cultural places, is based on the following considerations: (1) physically altering, damaging, or destroying all or part of a resource; (2) altering characteristics of the surrounding environment that contribute to resource significance; (3) introducing visual, audible, or atmospheric elements that are out of character with the property or alter its setting; or (4) neglecting the resource to the extent that it deteriorates or is destroyed. The potential for effect associated with this Proposed Action is limited to number (3) introducing visual or audible elements that are out of character.

The DAF is consulting with the SHPOs of Montana, Wyoming, North Dakota, and South Dakota, the NPS, and American Indian Tribes on the potential impacts to cultural resources and traditional cultural places. See **Appendix G** for consultation documentation and associated correspondence.

3.8.2.1 Alternative 1

Actions described in **Section 2.2.1.1** for changes to day-to-day operations include raising the available altitude for day-to-day training which would not create new visual or noise intrusions within the APE. All existing avoidances to protect historic properties beneath PRTC would

remain in place (see **Section 3.8.1.2**). Thus, this portion of the Proposed Action would have no adverse effect to historic properties.

Actions described in **Section 2.2.1.2** for changes to LFEs may potentially affect historic properties. The elements warranting consideration for effects to historic properties include:

- Increasing the total sorties for LFEs would increase the potential for subsonic and supersonic noise intrusions.
- Increasing the annual total days for LFEs from 10 to 30 total would increase the potential for visual intrusions of low-level overflights during these events.

Noise Intrusion

Noise intrusion at historic properties could occur in the form of subsonic noise from low-level overflights and sonic booms associated with supersonic flights during LFEs.

Subsonic Noise

Low-level overflights (those flights within the MOAs) have the potential to generate the most noise intrusion for an observer on the ground or disturb the setting for an historic property. As shown in **Table 3.4-8** (**Section 3.4.3.1**, *Alternative 1, Single-Event Noise Metrics*), low-level overflights (down to 500 feet AGL) would continue to be possible in PR 1, 2, 3 and Gap A, B MOAs. The PR 4 and Gap C MOAs do not have a low MOA, thus flights in these areas would be limited to above 12,000 feet MSL. The Gateway East and West ATCAAs have no underlying MOAs, thus no low-level flights are possible in these areas. Increasing the total LFE days would increase the frequency and/or probability of experiencing a low-level overflight during those events; however, as shown, the probability of experiencing an overflight at the lowest possible altitude would continue to be rare. When these low-level overflights do occur, the maximum noise would range from 117 dB for the bombers to 124 dB for the fighters (see **Table 3.4-9**). This peak noise would occur for about 1/8 of a second.

Experimental data and models show that damage to architectural resources, including adobe buildings, is unlikely to be caused by subsonic noise and vibrations from aircraft overflights (Battis 1988; Sutherland 1990; King 1985; King et al. 1988). Subsonic noise-related vibration damage to structures requires high dB levels generated at close proximity to the structures and in a low frequency range (USFS 1992; Battis 1983, 1988). Aircraft must generate a maximum sound level of at least 120 dB to potentially result in structural damage (Battis 1988) and, even at 130 dB, structural damage is unlikely. Sutherland (1990) found that the probability of damage to a poorly constructed or poorly maintained wood frame building is less than 0.3 percent even when the building is directly under a large, high-speed aircraft flying only a few hundred feet above ground level. Conservatively, only sounds lasting more than 1 second above a sound level of 130 dB are potentially damaging to structural components (Committee on Hearing, Bioacoustics, and Biomechanics 1977). Maximum sound levels shown in **Table 3.4-9** would last for a fraction of a second and would not exceed this value. Given the existing avoidances for specific historic properties beneath PRTC (see **Section 3.8.1.2**), the short duration of the potential exposure, no potential for structural damage, and the rarity of these events for any given point on the ground, subsonic noise from low-level overflights would not have a significant impact to cultural resources.

Supersonic Noise

The potential for sonic booms would only be possible for a total of 30 days annually. Supersonic flights of fighter aircraft could occur in MOAs (10,000 feet AGL and above) while supersonic flight of the B-1 would be limited to ATCAAs only (20,000 feet MSL) (this is the same as current conditions). As shown in **Table 3.4-10**, the calculated maximum overpressures in psf for the B-1 and representative transient fighter aircraft at the lowest possible altitudes would be 5.31 and 4.24–5.37, respectively, within PRTC. Most sonic booms would average much less as they would occur in much higher altitudes. The intensity of sonic booms would vary, and these values represent the maximum possible psf. As described in **Section 3.4.2.2**, supersonic flight would be concentrated in the center of the complex (PR 2, PR 3, and Gap B) and is less likely on the outer edges of the complex.

Sonic booms could be described as ranging from the sound of distant thunder to a sharp double crack (see **Section 3.4.3.1**, *Alternative 1, Single-Event Noise Metrics*, for additional information on sonic booms). Sonic booms can be associated with structural damage. Most damage claims are for fragile or brittle objects, such as glass and plaster. There is a large degree of variability in damage experience, and much damage depends on the pre-existing condition of a structure.

Tests by the DAF on sonic booms have found that most structures in good condition are not affected by sonic booms with a peak overpressure of less than 16 psf. Tests by the National Aeronautics and Space Administration have shown that structures in good condition are undamaged by overpressures of up to 11 psf. Damage to plaster is in a comparable range of glass but depends on the condition of the plaster. Adobe faces risks similar to plaster, but assessment is complicated by adobe structures being exposed to weather, where they can deteriorate in the absence of any specific loads. Typical outdoor structures, such as buildings, windmills, radio towers, etc., are resilient and routinely subject to wind loads far in excess of sonic boom overpressures. In general, structural damage from sonic booms should be expected only for overpressures over 10 psf (Plotkin and Sutherland 1990).

Some prehistoric archaeological sites could contain natural structures such as rock shelters or caves, and petroglyphs or pictographs, which are etched or painted onto the rock surfaces. However, studies have found that these types of natural formations are not affected by noise vibrations, such as sonic booms, any more than by natural erosion, wind, or seismic activity (Battis 1983). A more recent study from 1999 analyzed sonic boom effects at four selected petroglyph/pictograph sites on Nellis Air Force Range and adjacent overflight lands (White and Orndorff 1999). Visual observation of the physical properties at each of these sites determined that the rock panel degradation was consistent with natural weathering and chemical alteration process and not the result of sonic booms (White and Orndorff 1999).

Given the overpressure values shown in **Table 3.4-10**, the intensity of the sonic booms within PRTC and the infrequency and the random nature of the sonic booms suggest that structural damage to historic structures would be unlikely. Given the existing avoidances for specific historic properties beneath PRTC (see **Section 3.8.1.2**) and the assessment above, supersonic noise and sonic booms would not have a significant impact to cultural resources.

Visual Intrusion

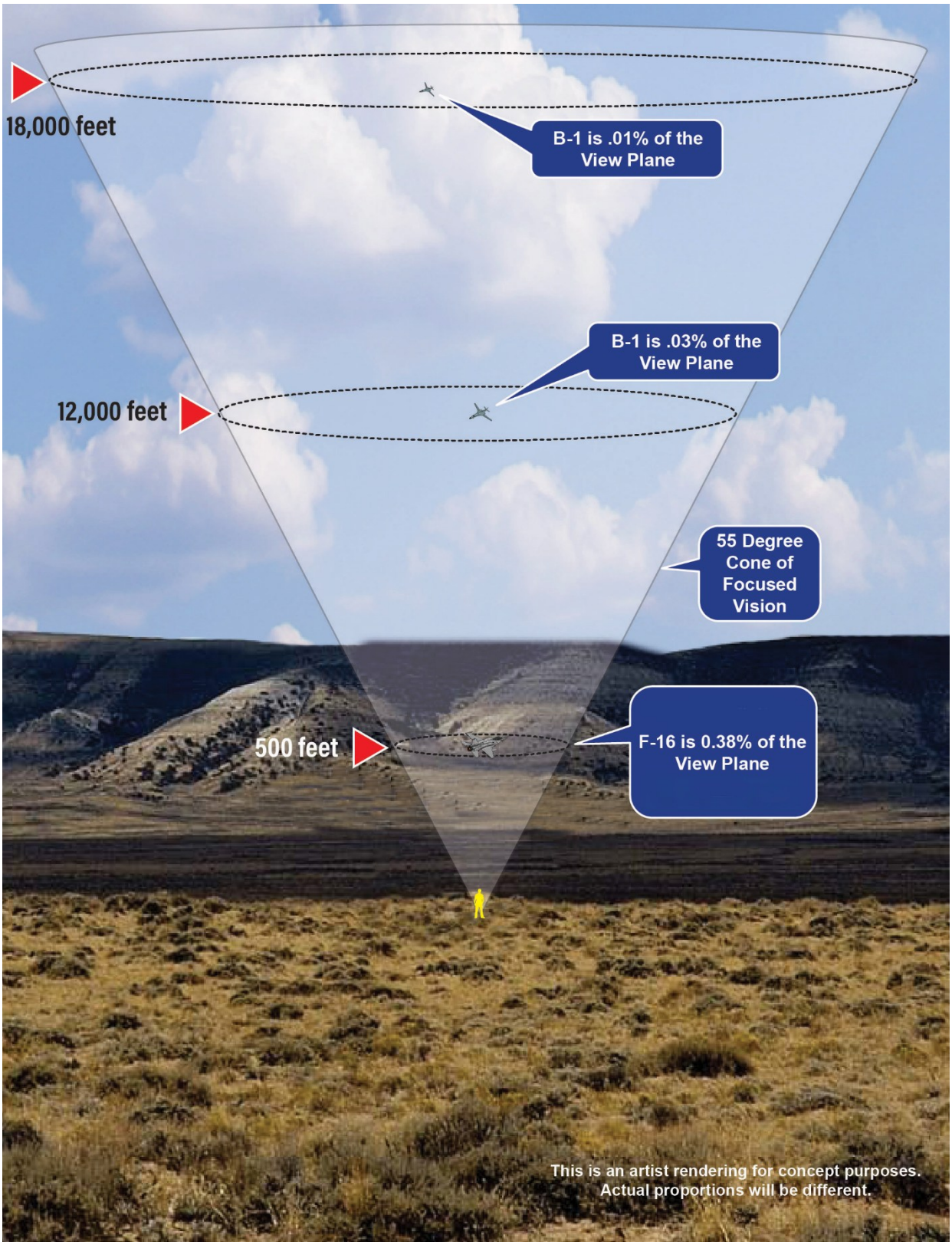
There are no defined significance criteria for visual effects. The proposed increase in LFE days would increase the potential for visual intrusion at historic properties. The analysis considers the

visibility, frequency, duration, and proximity of aircraft overflights within the surrounding visual environment for cultural resources. No physical changes would occur to the properties or surrounding land surface.

Potential visual impacts resulting from the proposed increase in LFE days would have short-term effects from aircraft overflight. Low-level overflights have the potential to generate visual intrusion for an observer on the ground or disturb the visual setting for an historic property. Individuals could see the visual intrusion as an annoyance and an impact upon the experience value of the historic or cultural site. As described in **Section 3.4.3.1**, low-level overflights would continue to be possible in PR 1, 2, 3 and Gap A, B MOAs at an altitude as low as 500 feet AGL. However, the PR 4 and Gap C MOAs do not have a low MOA and therefore flights are limited to above 12,000 feet MSL. The Gateway East and West ATCAAs have no MOAs below, thus no low-level flights are possible in these areas.

Visibility depends on the distance between the aircraft and the viewer. **Figure 3.8-1** presents the visual effect of a B-1 and F-16 aircraft to an observer at a spot under the PRTC airspace. The typical person has focused vision within an area represented by a 45- to 60-degree cone. Using a 55-degree cone of focused vision for this analysis, a 146-foot-long B-1, flying at 12,000 feet MSL, would occupy only approximately 0.03 percent of the horizontal plane of that cone of vision. At 18,000 feet MSL, it would occupy approximately 0.01 percent. Fighter aircraft, such as the F-16, are substantially smaller and would occupy a smaller portion of the horizontal planes and at 500 feet AGL would occupy approximately 0.38 percent. Under the Proposed Action, the day-to-day and LFE operations would occur at higher altitudes (up to 60,000 feet MSL) than they do currently and there would not be a recognizable change to the experience on the ground. Visibility is also affected by intervening objects such as landforms, vegetation, or structures that block the viewer from seeing the aircraft, particularly when aircraft are traveling at lower altitudes. Based on this analysis, visual intrusion caused by transit of the training aircraft would not be expected to diminish the visual qualities of any cultural resources.

Viewer response and interpretation of aircraft overflight varies. Depending upon cultural and instinctual perceptions of danger and sensitivity of the presence of an overflight, visual effects of overflights may have an indirect impact on qualities valued by an individual. During tribal ceremonies, overflights at any altitude could be seen as an unwelcome visual intrusion. As described in **Section 3.8.1.2**, several avoidance, minimization, or mitigation of adverse effects measures were incorporated into the PRTC structure as well as communication protocols between Ellsworth AFB and the Tribes to reduce adverse effects.



Legend: % = percent; LFE = Large Force Exercise

Figure 3.8-1 Visual Perspective of Aircraft at Various Altitudes

Overall, increasing the total LFE days would increase the frequency and/or probability of experiencing a low-level overflight during those events in the PRTC; however, the probability of experiencing an overflight at the lowest possible altitude would continue to be rare. Visual effects to any overflown historic property would be sporadic and temporary, given the infrequency of flights, the speed of the aircraft in transit, the size of the PRTC, and the dispersal of historic properties. The Proposed Action would not result in any physical changes to the visual setting of underlying lands and has no potential to change the visual or aesthetic quality of any landscape. Ellsworth AFB would continue to implement temporary avoidance areas for specific tribal ceremonies or events at the request of the tribes. Thus, the Proposed Action would not have significant impacts regarding visual intrusion.

3.8.2.2 Alternative 2

As with Alternative 1, the actions to improve day-to-day training would increase the available altitude which would not create new visual or noise intrusions for cultural resources. All existing avoidances to protect historic properties would remain in place (see **Section 3.8.1.2**).

The potential impacts from increasing total sorties and total days for LFEs would potentially result in noise and visual intrusions during these events. These impacts would be the same as described for Alternative 1, **Section 3.8.2.1** and would not be significant.

3.8.2.3 No Action Alternative

Under the No Action Alternative, the impact to cultural resources beneath the PRTC would remain unchanged. As evaluated in the 2014 EIS, cultural resources could experience an average of approximately one sonic boom per day for up to 10 days per year during LFEs. The infrequency and random nature of the sonic booms suggest that structural damage to historic properties would not be expected. Avoidances prescribed to certain cultural resources during the establishment of the PRTC were discussed in **Section 1.2.2** and illustrated on **Figure 1.2-3**.

3.9 LAND USE

Land use considers general land use patterns, land ownership, land management plans, and special use areas.

3.9.1 Affected Environment

The PRTC overlies approximately 34,000 square miles of land within 29 counties and four states, the majority of which is private land. Detailed description of ownership and management was provided in the 2014 EIS (DAF 2015). The proposed changes to PRTC would not change land ownership or prohibit any planned land uses or management activities, thus those topics will not be discussed further in this EIS.

This land use analysis will focus on special use areas that are protected for particular resource values or attributes such as National Grasslands, Parks and Monuments, Wilderness Areas, Wildlife Refuges, etc. These noise sensitive areas often rely on the quietness of the area to maintain their protected values.

3.9.2 Environmental Consequences

There are no defined criteria for significance for land use. The determination that a land use impact is significant is normally dependent on the significance of other impact categories,

particularly noise. This land use analysis addresses the potential change in the noise environment at noise sensitive areas beneath the PRTC.

3.9.2.1 Alternative 1

Table 3.9-1 provides a list of special use areas beneath PRTC that are susceptible to noise. Please note the Gateway East and West ATCAAs have not been included in this table since aircraft activity in those spaces would be above FL180 which would have no potential to have significant noise impacts to special use areas. The Gap MOAs have been included in this table; however, they are only available for military training during LFEs. As illustrated, the projected change in DNL would be minimal in all the airspace areas and would be well below levels indicating high potential for community annoyance or land use restrictions (65 DNL). The noise environment in these special use areas would be similar to what is experienced under the current operations and in many locations the noise exposure would be reduced.

Sonic booms would only be possible during LFEs which would be limited to no more than a total of 30 days per year. The maximum cumulative supersonic noise exposure beneath the center (PR 2, PR 3, and Gap B) of the PRTC airspace would be 51 dB CDNL. Areas towards the edges of the PRTC would experience slightly lower noise levels. The CDNL would not exceed 62 CDNL indicating there would be no land use compatibility concerns nor would it exceed the significance criteria determined by FAA Order 1050.1G. As shown in **Table 3.4-10**, the intensity of sonic booms would continue to vary within PRTC and experiencing the maximum overpressure in **Table 3.4-10** would be rare.

Many of the areas in **Table 3.9-1** also offer recreation and tourism opportunities. Most of the land beneath PRTC offers wide open remote spaces that are popular for camping, hunting, fishing, nature viewing, hiking, biking, and scenic driving. While the cumulative noise values are relatively low in all areas, experiencing a low-level overflight may be startling or annoying to an individual recreating in these areas for the enjoyment of quiet and solitude. It is expected this would be a rare event at any single location given the limited amount of time aircraft are projected to be at low-level and the large area encompassed by PRTC (see **Section 3.4.3.1**). The total day-to-day training operations would not increase but would occur at higher altitudes and would not be a recognizable change to the experience on the ground. Increasing the LFE days to a total of up to 30 days per year and allowing LFEs of longer duration (up to 10 fly days per event, with no weekend flying) could be a recognizable change during those individual events. However, it would still be relatively rare to experience a low-level overflight or sonic boom given the large area of PRTC and the fact that military training would be limited to weekdays avoiding weekend activity when recreation would tend to be higher or more popular.

3.9.2.2 Alternative 2

The potential impacts associated with land use would be the same as those described for Alternative 1. Under Alternative 2, the Gateway East ATCAA would be available for day-to-day training, which would be a change from the current environment. However, this would be an ATCAA only and all aircraft overflights would be above FL180 with no noticeable changes in the noise environment at special use areas on the ground.

Table 3.9-1 Special Use Areas in PRTC

Special Use Area by Airspace	Subsonic Noise		
	Existing DNL	Proposed DNL	Change
PR 1			
Little Bighorn Battlefield National Monument[1] Custer National Forest Two Leggins Fishing Access Site Poker Jim Research Natural Area Buffalo Creek and Zook Creek Wilderness Study Areas Hells Half Acre Area of Critical Concern	50	47	-3
PR 2			
Thunder Basin National Grassland Capitol Rock National Landmark Black Hills National Forest Wickham Gulch Camp Recreation Site Finger Buttes Area of Critical Environmental Concern	54	49	-5
PR 3			
Little Missouri National Grassland Custer National Forest Buffalo Creek Wilderness Study Area White Lake National Wildlife Refuge South Sandstone Reservoir Medicine Rocks State Park Stewart Lake National Wildlife Refuge Spring Creek, Speck Davis Pond, Alkali Creek, Cedar Lake Wildlife Management Area Bowman Haley Lake	50	47	-3
PR 4 (no low MOA)			
Grand River National Grassland Cedar River National Grassland Dakota Prairie National Grasslands Pretty Rock National Wildlife Refuge Owen Lake, McIntosh, Lemmon Lake, North Lemmon Lake, Indian Creek, C.C. Lee, Dogtown, Vobejda Dam, Shadehill Reservoir Game Production Areas Lake Tschida Hugh Glass State Recreation Area Shadehill Reservoir State Recreation Area Llewellyn Johns State Recreation Area	38	40	2
Gap A (LFEs only)			
Custer National Forest	46	47	1
Gap B (LFEs only)			
Custer National Forest Medicine Rocks State Park Macnab Pond Recreation Site	45	46	1
Gap C (no low MOA; LFEs only)			
Grand River National Grassland Dakota Prairie National Grasslands	38	39	1

Note: [1]Existing avoidance of 5,000 feet AGL +/- 1 hour park hours. No supersonic overflights over the Monument.
Legend: DNL = Day-Night Average Sound Level; LFE = Large Force Exercise; MOA = Military Operations Area; PR = Powder River

3.9.2.3 No Action Alternative

Under the No Action Alternative, the land use conditions would remain unchanged. Special use areas and/or noise sensitive areas beneath PRTC would continue to be intermittently exposed to sonic booms and low-level overflights contributing to the overall noise environment. As shown in **Section 3.4.2.2**, the DNL and CDNL associated with existing training would not be above 65 DNL or 52 CDNL for any airspace which would not be a significant impact to land use or present a compatibility concern. Specific avoidances for noise sensitive areas were developed during the establishment of the PRTC and would remain in place (see **Section 1.2.2**).

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4.0 OTHER CONSIDERATIONS UNDER NEPA

4.1 OTHER PROJECTS CONSIDERED IN ENVIRONMENTAL EFFECTS

This section analyzes other reasonably foreseeable DAF projects that should be considered in the environmental effects of the Proposed Action. These projects are limited to those that could have incremental effects when added to the effects of the Proposed Action. Incremental effects can result from actions with individually minor but collectively significant effects taking place over a period of time. These effects are most likely to arise when a relationship exists between a proposed action and other actions expected to occur in a similar location or during a similar time.

This analysis considers the following three fundamental questions:

- Does a relationship exist such that affected resource areas of the Proposed Action might interact with the potentially affected resource areas of reasonably foreseeable actions?
- If one or more of the affected resource areas of the Proposed Action and another reasonably foreseeable action could be expected to interact, would the Proposed Action be affected by impacts of the other future action?
- If such a relationship exists, then does an assessment reveal any potentially significant impacts not identified when the Proposed Action is considered alone?

To the extent it assists in reasoned decision-making, DAF may, but is not required to by NEPA, analyze environmental effects from other projects separate in time, or separate in place, or that fall outside of DAF's regulatory authority, or that would have to be initiated by a third party. If DAF determines that such analysis would assist in reasoned decision-making, it will document this determination in the EIS and explain where it drew a reasonable and manageable line relating to the consideration of such effects from such separate projects. There were no such projects identified; thus, the scope of this analysis is limited to other reasonably foreseeable DAF projects that could potentially affect the same resources as the Proposed Action.

The *Environmental Impact Statement for B-21 Main Operating Base Beddown at Dyess AFB, Texas or Ellsworth AFB, South Dakota* analyzed the beddown of the new bomber aircraft, the B-21, at Ellsworth AFB (DAF 2021). The B-21 will replace the existing B-1s at Ellsworth AFB and will use the PRTC as their primary training airspace. This action may interact with effects of the Proposed Action in noise (which has indirect impacts to cultural resources, natural resources, and land use) and airspace management as discussed in detail below.

4.1.1 Noise

The noise analysis in the airspace environment presented in this EIS (**Section 3.4 and Appendix D**) did not include B-21 operations (it should be noted that the airfield environment did include B-21 operations as explained in **Section 2.1.2.2**). At the time of preparation of this EIS, the TTPs or specifics on training requirements for the B-21 were not known to a level required to do a quantitative noise modeling analysis in the airspace. As stated in the B-21 Beddown EIS (DAF 2021), the B-21 would generally operate at higher altitudes than the B-1 that it will replace. In addition, the B-21 is expected to be quieter than the B-1. According to the beddown analysis (DAF 2021), it is expected that the B-21s would contribute an additional 1,143 annual operations to the baseline operations within PRTC, with the majority of those occurring in PR 2. While the operations overall would increase, they would be at a higher altitude and would be performed by a quieter aircraft which would not contribute to low-level overflights or increase the noise at the

ground level as assessed in **Section 3.4**. The projected DNL in PR 2, as assessed in this EIS, is 49 DNL, increasing operations above FL180 in PR 2 by 1,143 would result in a negligible to non-existent DNL change. Given that there would be no noticeable change to the DNL and no change with regards to the frequency of low-level overflights, there would be no changes to other resources such as cultural resources, natural resources, or land use from the noise of B-21 operations within PRTC. The Proposed Action would not result in significant noise impacts and there would be no meaningful additive impact from the B-21 beddown.

4.1.2 Airspace Management

As addressed in the B-21 Beddown EIS, the B-21 would use the PRTC as its primary training area. The training requirements for the B-21 are not currently known, but expected they would train in higher altitudes than the B-1 they are replacing. The potential impacts to airspace management described for the Proposed Action (**Section 3.2.2**) are associated with increasing the available altitude of the PRTC and the activation times and are not aircraft specific. Therefore, replacing the B-1 with the B-21 would not contribute to or change the impacts described in **Section 3.2.2**.

4.2 Irreversible or Irretrievable Commitment of Resources

Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of non-renewable resources such as metal and fuel, and natural or cultural resources. These resources are irretrievable in that they would be used for this project when they could have been used for other purposes. Human labor is also considered an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

Fuel consumption would be the only irreversible commitment of resource under this Proposed Action. The jet fuel consumption from operations within the proposed PRTC would be similar to what is currently expended. There would be no other irreversible or irretrievable commitment of resources. There would be no unavoidable destruction of natural resources.

4.3 Relationship Between Short-Term Use of the Environment and Long-Term Productivity

NEPA requires an analysis of the relationship between a project's short-term impacts on the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development site reduces future flexibility in pursuing other options, or that using a parcel of land or other resources often eliminates the possibility of other uses at that site.

The Proposed Action would involve expanding the airspace available for military training. While establishing these areas would limit non-military use of the airspace during times the MOAs/ATCAAs are active, this impact is not expected to be significant (see Section 3.2) or impact the long-term productivity of the area. The FAA may recall the airspace at any time further reducing the impacts to long-term productivity.

5.0 MITIGATION MEASURES

The purpose of mitigation is to lessen, reduce, or eliminate potential significant or adverse impacts of an action on affected resources. Mitigation includes:

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

Mitigation Measures are specific to a Proposed Action and are developed in coordination with cooperating agencies, regulatory agencies, and other stakeholders for an EIS. The DAF will prepare a separate Mitigation and Monitoring Plan (if applicable) after the ROD is signed that details the specific and legally binding Mitigation Measures.

The establishment and publication of the current PRTC includes several mitigation measures to reduce the impact of the action on several resource areas to include cultural resources, safety, and airspace management (see **Section 1.2.2** for specific avoidances defined in PRTC). The current dimensions and altitude stratifications were a result of mitigation determined in consultation with FAA.

A Programmatic Agreement was developed after the 2014 EIS between Ellsworth AFB, the SHPOs of Montana, Wyoming, North Dakota, and South Dakota, and the Advisory Council on Historic Preservation with input from formal consultations with American Indian Tribes. The agreement includes several measures to reduce impacts on the Tribes. As part of this EIS, an updated Programmatic Agreement will be prepared to ensure continued military operations in PRTC are executed in a manner to reduce adverse impacts to the Tribes. Consultation with the Tribes and development of the Programmatic Agreement is occurring concurrent with the EIS. The specific avoidances defined in the previous Programmatic Agreement would not be changed with this Proposed Action (see **Section 3.8.1.2**).

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APPENDIX A
GLOSSARY

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Air Traffic Control Assigned Airspace (ATCAA). ATCAAs are not published on aeronautical charts and exist only when made available for users by the Federal Aviation Administration (FAA). ATCAAs are designated in Letter of Agreement (LOA) with the FAA and can be used to extend the usable airspace above the designated ceiling of a Military Operations Area (MOA). When requested, ATCAA is released by the FAA for use when not required for other air traffic control purposes (notably, commercial air traffic). The FAA can recall it at any time. ATCAAs can support the same training activities that occur in MOAs. An ATCAA typically has the same horizontal boundaries of the underlying MOA and an agreed upon ceiling. Civilian and commercial traffic may transit an active ATCAA under FAA air traffic control guidance and procedures.

Altitude. The vertical elevation of an object above a surface. Altitude references for aircraft operations are presented in several units of measure: feet above ground level (AGL), feet above mean sea level (MSL), and Flight Level (FL). Definitions of these terms are as follows:

- **Above Ground Level** (AGL): AGL references are usually used at lower altitudes (almost always below 10,000 feet), when clearance from terrain is more of a concern for aircraft operation.
- **Mean Sea Level** (MSL): MSL altitudes are used most commonly across aviation when operating at or below 18,000 feet when clearance from terrain is less of a concern for aircraft operation.
- **Flight Level** (FL): FL is used to describe the cruising altitudes for aircraft traveling long distances above 18,000 feet. Flight Levels are given in hundreds of feet, e.g., FL300 is 30,000 feet.

Chaff. Chaff and flares are the principal defensive countermeasures dispensed by military aircraft to avoid detection or attack by enemy air defense systems and keep aircraft from being successfully targeted by weapons. A bundle of chaff consists of approximately 5 to 5.6 million aluminum-coated silica fibers. When dispensed from aircraft, the fibers form an electronic "cloud" that breaks the radar signal and temporarily hides the maneuvering aircraft from radar detection. The chaff bundle is packed inside a 1-inch by 1-inch by 8-inch rectangular tube or cartridge. The cartridge remains in the aircraft after the chaff bundle is deployed. Each chaff bundle has a 1-inch by 1-inch felt spacer that falls to the ground along with two 1-inch square by 0.125-inch thick plastic end caps.

Controlling Agency. The FAA Air Traffic Control facility that exercises control of the airspace when the Special Use Airspace (SUA) area is not activated, a military Air Traffic Control facility may be assigned as the controlling agency.

Flare. Chaff and flares are the principal defensive countermeasures dispensed by military aircraft to avoid detection or attack by enemy air defense systems and keep aircraft from being successfully targeted by weapons. Flares ejected from aircraft provide high-temperature heat sources that mislead heat-sensitive or heat-seeking targeting systems. Flares are primarily mixtures of magnesium and Teflon (polytetrafluoroethylene) molded into rectangular shapes (approximately 1-inch by 1-inch by 8 inches long). An individual flare weighs approximately 6.9 ounces. Typically, flares are wrapped with an aluminum-coated mylar or filament-reinforced tape (similar to duct tape) and inserted into an aluminum (0.03-inch thick) case that is closed with a felt spacer and a small plastic end cap. The aluminum case remains inside the aircraft once the flare is deployed.

Instrument Flight Rules (IFR). Rules governing the procedures for conducting instrument flight in accordance with 14 Code of Federal Regulations (CFR) Part 91.

Military Operations Area (MOA). A MOA is a type of SUA designated to contain non-hazardous, military flight activities, such as basic air combat maneuvers, low-altitude operations, etc. MOAs have defined spatial boundaries, as well as times when the airspace is available for military training. Specific activities allowed in MOAs, such as use of chaff and flares or supersonic flight, are considered attributes and can vary for different MOAs. As with restricted areas, MOAs can be designated as joint use and released by the using agency to the controlling agency which provides for the operation of non-participating aircraft through this airspace when it is not in use.

Non-participating civil and military aircraft flying under Visual Flight Rules (VFR) may transit an active MOA by employing see-and-avoid procedures. When operating under IFR, non-participating aircraft must receive air traffic control clearance to enter an active MOA. All regulations governing the rules of flight apply within MOAs, to include right-of-way rules and minimum safe altitudes.

Letter of Agreement (LOA). An LOA is developed when the FAA Air Traffic Manager deems it necessary to clarify responsibilities of other persons/facilities/organizations when specific operational/procedural needs require their cooperation and concurrence.

Sortie. A sortie is the flight of a single aircraft consisting of a takeoff, mission, and landing.

Special Activity Airspace (SAA). Airspace with defined dimensions within the National Airspace System wherein limitations may be imposed upon operations for national defense, homeland security, public interest, or public safety. SAA includes but is not limited to the following: ATCAA, Altitude Reservations (ALTRV), Military Training Routes (MTR), Air Refueling Tracks and Anchors, Temporary Flight Restrictions (TFR), Special Security Instructions (SSI), etc. Special Use Airspace (SUA) is a subset of SAA.

Special Use Airspace (SUA). SUA consists of defined dimensions of airspace wherein activities must be confined because of their nature, or wherein limitations are imposed upon non-participating aircraft operations, or both. The vertical limits of SUA are defined by designated altitude floors (the lowest altitude) and ceilings (the highest altitude). SUA is depicted on aeronautical charts by name with the altitudes, times of scheduled use, the controlling agency and the using agency. The controlling agency is the FAA Air Traffic Control facility that exercises control of the airspace when the SUA is not activated. The using agency is the military unit or other organization whose activity established the requirement for the SUA. A listing of all regulatory and non-regulatory SUA is published annually in FAA Order JO 7400.10E, *Special Use Airspace*.

Using Agency. The military unit or other organization whose activity established the requirement for the SUA. The using agency is responsible for ensuring that: (1) the airspace is only used for its designated purpose; (2) proper scheduling procedures are established and utilized; (3) the controlling agency is kept informed of changes in scheduled activity, to include the completion of activities for the day; and (4) a point of contact is made available to enable the controlling agency to verify schedules, and coordinate access for emergencies, weather diversions, etc.

Visual Flight Rules (VFR). The regulations that specify the cloud and visibility limitations for aircraft operating with visual reference. The basic premise of VFR is that the pilot would be able to navigate and manipulate the aircraft with external cues only.

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APPENDIX B
PUBLIC INVOLVEMENT

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PUBLIC INVOLVEMENT

for the

ENVIRONMENTAL IMPACT STATEMENT FOR OPTIMIZATION OF POWDER RIVER TRAINING COMPLEX

Ellsworth Air Force Base

Scoping: July 11, 2025 through September 9, 2025

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1.0 BACKGROUND

The National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] section 4321 et seq.) establishes national policies and goals for the protection of the environment. The scoping process documented in this plan complied with public participation requirements of NEPA. The public involvement actions described in this plan complied with and satisfied the requirements of both the Department of the Air Force (DAF) and the Federal Aviation Administration (FAA).

Public involvement is an integral part of developing a comprehensive Environmental Impact Statement (EIS). Specifically, NEPA requires a process called "scoping" to involve the public early in the assessment process, as well as to solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed and the methods by which potential impacts are evaluated.

This Appendix presents a summary of the scoping process conducted by the DAF for the EIS for the Optimization of the Powder River Training Complex.

2.0 SCOPING PROCESS

The scoping comment period took place from July 11, 2025 through September 9, 2025. Initiation of the scoping process began with publication of the Notice of Intent (NOI) in the *Federal Register*. The DAF notified the public and government entities of its intent to prepare an EIS, identified the scoping period, requested comments, and announced that in-person and virtual scoping meetings were being held.

2.1 SCOPING PUBLIC NOTIFICATION

Several methods were used to notify the public of opportunities for involvement and methods to comment. These methods included:

- Publishing the NOI in the *Federal Register*
- Mailing coordination letters to federal, state, and local agencies; elected officials; and interested parties in North Dakota, South Dakota, Wyoming, and Montana
- Initiating government-to-government consultation through letters sent to American Indian Tribes
- Placing newspaper display advertisements in local and state newspapers
- Publishing notices on the installation website by Public Affairs
- Issuing Press Releases concurrent with the NOI publication and in advance of the meetings by Public Affairs
- Creating and maintaining a publicly accessible website at www.PRTCairspaceEIS.com.

2.1.1 Federal Notice of Intent

The NOI was published in the *Federal Register* on July 11, 2025 (**Enclosure A**). The notice provided an overview of the Proposed Action and Alternatives and the DAF's intent to prepare an EIS to study the potential environmental impacts. The NOI also announced the public scoping meeting dates and locations. The NOI officially started the scoping comment period, during which time the DAF accepted public comments.

2.1.2 Interagency and Government-to-Government Coordination

The DAF initiated direct contact with potentially interested and affected government agencies, government representatives, elected officials, and other interested parties potentially affected through distribution of letters. The interagency letters and letters to elected officials were concurrent with publication of the NOI and newspaper advertisements. The letters contained similar content as the NOI and provided an overview of the Proposed Action and the DAF's intent to prepare an EIS. The letters announced the beginning of the scoping process, provided a map of the airspace, included a list of scoping meeting dates and locations, and requested that comments be submitted no later than September 9, 2025 to ensure consideration in the Draft EIS.

Concurrent with the interagency coordination, letters were sent via email (the preferred method of communication) to 24 American Indian Tribes potentially affected by the Proposed Action and Alternatives to initiate Government-to-Government consultation. The Tribal members were invited to the scoping meetings to participate in the NEPA process and Tribal leaders were given a single point of contact to support National Historic Preservation Act Section 106 consultation. Tribes were not given a comment deadline as Government-to-Government consultation will occur throughout the NEPA process.

Enclosure B contains a representative sample of the letters and associated enclosures that were distributed as well as the distribution list for the letters.

2.1.3 Press Release and Newspaper Advertisements

The DAF published display advertisements in local newspapers approximately 2 weeks prior to the first scoping meeting (**Table 1**). The advertisements provided the meeting information for the location applicable to that paper's distribution area. A sample of the newspaper advertisement can be found in **Enclosure C**.

Table 1. Newspaper Advertisements

Newspaper	Publication Date(s)
Bowman County Pioneer	Friday July 11, 2025
Fallon County Times	Friday July 11, 2025
Black Hills Pioneer	Friday July 11, 2025 Saturday July 12, 2025
Sundance Times	Thursday July 17, 2025
Rapid City Journal	Saturday July 12, 2025 Tuesday July 15, 2025
Native Sun News Today	Wednesday July 16, 2025
Independent Press	Wednesday July 16, 2025
Big Horn County News	Wednesday July 16, 2025
Grant County News	Thursday July 17, 2025
Bison Courier	Thursday July 17, 2025
The Profit	Tuesday July 15, 2025
Pierre Capital Journal	Thursday July 17, 2025
The Bismarck Tribune	Friday July 11, 2025 Saturday July 12, 2025
Casper Star Tribune	Friday July 19, 2025 Saturday July 22, 2025

2.1.4 Project Website

The project website (https://www.PRTCairspaceEIS.com) provided information about the Proposed Action and Alternatives, project schedule and meeting locations, virtual meeting registration, copies of all documents and materials presented at the public meetings, comment methods, and online comment submittal form. The site will be continually updated as the NEPA process progresses and used to notify the public of any changes to the schedule or project.

2.2 SCOPING MEETINGS

Nine in-person scoping meetings were hosted throughout North Dakota, South Dakota, Wyoming, and Montana. In addition, three virtual scoping meetings were held during the scoping period. **Table 2** lists the dates and locations of the meetings.

Table 2. Schedule and Location of Scoping Meetings

Date	Location
July 28, 2025	Hardin High School Commons Area 721 North Miles Ave Hardin, MT 59034
July 29, 2025	St. Labre Soaring Eagle Gymnasium 112 St. Labre Campus Dr Ashland, MT 59003
July 30, 2025	Fallon County Fair – Exhibit Hall 3440 Highway 7 Baker, MT 59313
July 31, 2025	Bowman County Fairgrounds – West Wing 12 Highway 12 E Bowman, ND 58623
August 1, 2025	Elgin Community Center 305 North Main St Elgin, ND 58533
August 11, 2025	Spearfish High School – CTE Center 1725 North Main St Spearfish, SD 57783
August 12, 2025	Bison School Gymnasium 200 West Carr St Bison, SD 57620
August 13, 2025	Crook County School District Gymnasium 122 State Highway 585 Sundance, WY 82729
August 14, 2025	Western Dakota Technical College Event Center 800 Mickelson Dr. Rapid City, SD 57703
August 19, 2025	Virtual #1
August 20, 2025	Virtual #2
August 21, 2025	Virtual #3

The in-person scoping meetings were conducted in an "open house" format in which attendees could communicate individually with DAF personnel and review the information at their own pace. Handout materials (Welcome Fact Sheet) were provided at the sign-in table. Poster displays described: what is an EIS and the NEPA process; the Proposed Action; types of airspace at Powder River Training Complex

(PRTC); the current PRTC structure; preliminary alternatives; and opportunities for public involvement in the NEPA process. At the airspace-related poster stations, an additional handout was available that provided details of the current PRTC structure. Blank comment sheets were available at comment tables at each meeting. Handouts and posters are available on the project website (https://www.PRTCairspaceEIS.com).

The virtual meetings were moderated by contractor staff and began with a welcome and project presentation. The presentation included narrations for each of the posters that were on display at the in-person meetings. These narrations were also available on the project website. After the project presentation, the DAF representatives responded to questions submitted by meeting attendees.

In total, 54 people participated in the scoping meetings. **Table 3** presents the number of attendees who signed in at each meeting (all attendees were requested to sign in; however, it was not mandatory to do so) by attendee type.

Table 3. Meeting Participation

Attendees	Hardin MT 7/28/25	Ashland MT 7/29/25	Baker MT 7/30/25	Bowman ND 7/31/25	Elgin ND 8/1/25	Spearfish SD 8/11/25	Bison SD 8/12/25	Sundance WY 8/13/25	Rapid City SD 8/14/25	Virtual 1 8/19/25	Virtual 2 8/20/25	Virtual 3 8/24/25
Members of the Public	--	5	4	6	1	3	4	1	5	1	--	--
Elected Official	--	--	4	1	1	1	2	--	--	--	1	--
Federal Agency	--	--	--	--	--	--	--	--	--	--	--	--
Tribe	--	--	--	--	--	--	--	--	--	--	--	--
State, Local Agency	--	--	--	--	--	--	--	1	--	2	--	--
Airport, Aviation Group	--	--	3	1	2	--	--	3	--	--	--	--
NGO/Other	--	--	--	--	--	--	--	--	--	2	--	--
Media present?	No	No	No	Yes	No	No	No	No	Yes	No	No	--
Meeting Total	0	5	11	8	4	4	6	5	5	5	1	0
Scoping Total												**54**

Legend: NGO = Non-Government Organization

3.0 SCOPING COMMENT SUMMARY

The public could comment during the scoping period through multiple methods:

- **Written Comment Form –** written comment forms were provided at all scoping meetings; they could be completed and submitted during or after the scoping meeting. Written comment forms were also available for download on the project website.
- **Standard Mail or through Project Website –** The DAF invited the public to submit comments by U.S. Postal Service or electronically through the project website. The mailing address and website were announced in the NOI, coordination letters, press release(s), display advertisements in local newspapers, on the poster displays, and in handout materials disseminated at all scoping meetings.

The total number of comments received during the scoping comment period (July 11, 2025 through September 9, 2025) and the method of submittal is summarized in **Table 4**. A summary of the comments by commenter affiliation is provided in **Table 5**. Duplicate comments (a comment submitted by the same individual via more than one method) were not counted in these tallies.

Table 4. Comments and Method of Submittal

Method of Submittal	Number of Comments
Submitted at Public Meeting	2
Hard Copy Mailed	13
Submitted via Website	16
Total	**31**

Table 5. Commenter Affiliation

Affiliation	Number of Comments
Member of the Public (or no affiliation)	12
Tribe	0
Federal Agency	1
State or Local Agency	3
Elected Official/County Commission	7
Aviation Group	2
Airport	6
Other Non-Government Organization	0
Total	**31**

The general concerns expressed by the community are summarized below. These concerns were considered to determine the scope of analysis presented in the EIS.

General Aviation or Airport Concerns

- Gaps in the very high frequency (VHF) radio coverage and radar visibility in certain portions of the airspace; compounds the safety issue experienced due to the fact that there are three Air Traffic Control (ATC) centers.
- XWA is a United States Port of Entry and operates a General Aviation Facility for U.S. Customs and Border Protection. Assess impacts to international aircraft operations that utilize XWA's Port of Entry and subsequently require transition through the proposed airspace to reach their destinations.

- Future route development could be hindered if carriers perceive recurring operational inefficiencies when transitioning through this airspace, limiting the state's ability to expand service to southern and western destinations.

Other Foreseeable Projects

- Proposed airport development being planned approximately 8 miles north of Rapid City that is very close to the training complex area and Ellsworth Air Force Base (AFB) that will add private jet traffic to the area. Also, Rapid City is annexing land west of Rapid City Airport that is underneath the runway corridor anticipating more expansion of air traffic.

Recommendations for Proposed Action or Alternatives

- Explore consolidating the ATC centers for the PRTC.
- Establish dedicated VHF communication frequence and enhance radar coverage.
- Request the floor of the PRTC 3 Low Military Operations Area (MOA) be raised to 12,000 feet mean sea level (MSL).
- Other Special Use Airspace (SUA) complexes, such as those surrounding Eielson AFB in Alaska, make effective use of the Special Use Airspace Information Service (SUAIS). We believe that a similarly robust system should be implemented at the PRTC.

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ENCLOSURE A
NOTICE OF INTENT

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overestimate of respondents to the information collection. If all 615 U.S. producers and all 3,641 importers introduced new children's sleepwear garments each year, the total number of respondents to the information collection would be 4,256 (615 + 3,641). As noted above, the actual number of respondents is likely lower.

Estimated Time per Response: PRA burden associated with testing and recordkeeping of each sleepwear item is approximately three hours.

Total Estimated Annual Burden: The 50 largest domestic manufacturers and the 100 largest importers may each introduce an average of 100 new children's sleepwear items annually. The annual burden for the 50 large domestic manufacturers and the 100 largest importers is estimated at 45,000 hours for PRA burden associated with testing and recordkeeping (150 firms × 100 items × 3 hours). Without adjusting for possible double-counting, CPSC staff estimates that the remaining 565 manufacturers and 3,541 importers may each introduce an average of 10 new children's sleepwear items, for a total burden of 123,180 hours (4,106 × 10 items × 3 hours.) Therefore, the total estimated potential annual burden imposed by the standard and regulations on all manufacturers and importers of children's sleepwear will be about 168,180 hours (45,000 + 123,180).

Total Estimated Annual Cost to Respondents: Using compensation data available from the U.S. Bureau of Labor Statistics, ''Employer Costs for Employee Compensation,'' December 2024, Table 4, total compensation for management, professional, and related workers in goods-producing private industries, *http://www.bls.gov/ncs,* the annual cost to the industry is estimated to be $12,748,044 based on an hourly wage of $75.80 × 168,180 hours.

Request for Comments:

The Commission solicits written comments from all interested persons about the proposed collection of information. The Commission specifically solicits information relevant to the following topics:

- whether the collection of information described above is necessary for the proper performance of the Commission's functions, including whether the information would have practical utility;
- whether the estimated burden of the proposed collection of information is accurate;
- whether the quality, utility, and clarity of the information to be collected could be enhanced; and
- whether the burden imposed by the collection of information could be minimized by use of automated, electronic or other technological collection techniques, or other forms of information technology.

Alberta E. Mills,

Secretary, Consumer Product Safety Commission.

[FR Doc. 2025–13013 Filed 7–10–25; 8:45 am]

BILLING CODE 6355–01–P

DEPARTMENT OF DEFENSE

Department of the Air Force

Notice of Intent To Prepare an Environmental Impact Statement for Optimization of the Powder River Training Complex

AGENCY: Department of the Air Force, Department of Defense.

ACTION: Notice of intent.

SUMMARY: The Department of the Air Force (DAF) is issuing this Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) to assess the potential social, economic, and environmental impacts associated with optimization of the Powder River Training Complex (PRTC) (Unique Identification Number EISX–007–57–UAF–1729171028). The EIS will analyze the potential impacts from improvements to the airspace structure at PRTC to address shortfalls in day-to-day training for aircrews from Ellsworth Air Force Base (AFB) and Minot AFB and increasing Large Force Exercise (LFE) capability at PRTC to meet threats to National Security. The Federal Aviation Administration (FAA) is participating as a cooperating agency.

DATES: A public scoping period will run through September 9, 2025. Comments will be accepted at any time during the environmental impact analysis process; however, to ensure DAF has sufficient time to consider public scoping comments during preparation of the Draft EIS, please submit comments within the defined scoping period. A schedule is provided on the project website (*www.PRTCairspaceEIS.com*) and will be updated as the project progresses.

DAF invites the public, stakeholders, and other interested parties to attend a public scoping meeting. Scoping meetings will be held on the following dates, times, and locations:

- July 28, 2025, 5:00 p.m.–7:00 p.m., Hardin, MT
- July 29, 2025, 5:00 p.m.–7:00 p.m., Ashland, MT
- July 30, 2025, 5:00 p.m.–7:00 p.m., Baker, MT
- July 31, 2025, 5:00 p.m.–7:00 p.m., Bowman, ND
- August 1, 2025, 5:00 p.m.–7:00 p.m., Elgin, ND
- August 11, 2025, 5:00 p.m.–7:00 p.m., Spearfish, SD
- August 12, 2025, 5:00 p.m.–7:00 p.m., Bison, SD
- August 13, 2025, 5:00 p.m.–7:00 p.m., Sundance, WY
- August 14, 2025, 5:00 p.m.–7:00 p.m., Rapid City, SD
- August 19, 2025, 5:00 p.m.–6:00 p.m., Virtual Meeting #1
- August 20, 2025, 5:00 p.m.–6:00 p.m., Virtual Meeting #2
- August 21, 2025, 5:00 p.m.–6:00 p.m., Virtual Meeting #3

All meeting times are in mountain time. For information on the virtual scoping meetings and to view meeting materials please see the project website (*www.PRTCairspaceEIS.com*).

ADDRESSES: The addresses for the in-person public scoping meetings listed in the **DATES** section will be published in local newspapers and on the project website a minimum of 15 days prior to the meetings. Written scoping comments can be submitted at an in-person scoping meeting, via the project website (*www.PRTCairspaceEIS.com*), or via postal mail to Attn. PRTC Airspace EIS, 501 Butler Farm Rd., Suite H, Hampton, VA 23666.

FOR FURTHER INFORMATION CONTACT: For inquiries regarding accommodations under the Americans with Disability Act, please contact Grace Keesling, NEPA Project Manager at *AFCEC.CIE.airspace.workflow@us.af.mil,* or by phone at 1–380–458–2617.

SUPPLEMENTARY INFORMATION: The purpose of the Proposed Action is to facilitate training that ensures combat effectiveness and aircrew survivability. The Proposed Action is needed because the current PRTC does not allow aircrews to complete required high altitude day-to-day and LFE training, and because current limitations on LFEs prevent realistic training that ensures mission readiness and aircrew survivability.

DAF is considering two alternatives to implement the Proposed Action and the No Action Alternative.

For Alternative 1, the ceiling of two of the primary airspace segments used for day-to-day training (named Powder River 2 and Gateway West Air Traffic Control Assigned Airspaces [ATCAAs]) would be raised to 60,000 feet from the current 26,000 feet, improving the high-altitude training capability. This

alternative also includes an administrative change to the published times of use to align with how the complex is currently used for day-to-day training. Under Alternative 1, the ceiling of all the PRTC airspace would be raised to 60,000 feet during LFEs and increase the LFE days from 10 days total per year to a total of 30 days per year. Increasing the duration and frequency of LFEs would increase the total sorties conducted within PRTC by 50 percent for a total of 4,974.

For Alternative 2, the ceiling of Powder River 2, Gateway West, and Gateway East ATCAAs would be raised to 60,000 feet from the current 26,000 feet for day-to-day training. Currently Gateway East ATCAA is only available for LFEs. Under this alternative, Gateway East ATCAA would now be available for day-to-day training and the lateral dimensions of the Gateway West ATCAA would be reduced. Other changes would be the same as Alternative 1 and include an administrative change to the published times of use for day-to-day training, raising the ceiling of the entire complex to 60,000 feet during LFEs and increasing the LFE days to a total of 30 days per year.

For the No Action Alternative, DAF would not implement changes to the airspace structure or increase the total LFE days. Use of the PRTC for day-to-day training and LFEs would continue as it does currently.

The DAF and Cooperating Agencies will determine the scope of the analysis by soliciting comments from interested local, state, and federally elected officials and agencies, federally recognized Native American tribes, as well as interested members of the public. Comments are requested on identification of potential alternatives, information, and analyses relevant to the Proposed Action.

Tommy W. Lee,

Acting Air Force Federal Register Liaison Officer.

[FR Doc. 2025–12981 Filed 7–10–25; 8:45 am]

BILLING CODE 3911–44–P

DEPARTMENT OF DEFENSE

Office of the Secretary

[Docket ID: DoD–2024–OS–0132]

Submission for OMB Review; Comment Request

AGENCY: Office of the Under Secretary of Defense for Intelligence and Security (OUSD(I&S)), Department of Defense (DoD).

ACTION: 30-Day information collection notice.

SUMMARY: The DoD has submitted to the Office of Management and Budget (OMB) for clearance the following proposal for collection of information under the provisions of the Paperwork Reduction Act.

DATES: Consideration will be given to all comments received by August 11, 2025.

ADDRESSES: Written comments and recommendations for the proposed information collection should be sent within 30 days of publication of this notice to *www.reginfo.gov/public/do/PRAMain.* Find this particular information collection by selecting ''Currently under 30-day Review—Open for Public Comments'' or by using the search function.

FOR FURTHER INFORMATION CONTACT: Reginald Lucas, (571) 372–7574, *whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil.*

SUPPLEMENTARY INFORMATION:

Title; Associated Form; and OMB Number: National Industrial Security Program Contracts Classification System; DD Form 254; OMB Control Number 0704–0567.

Type of Request: Extension.

Number of Respondents: 8,800.

Responses per Respondent: 6.

Annual Responses: 52,800.

Average Burden per Response: 36 minutes.

Annual Burden Hours: 31,680.

Needs and Uses: Pursuant to 48 CFR 27, in conjunction with subpart 4.4 of the Federal Acquisition Regulation, contracting officers shall determine whether access to classified information may be required by a contractor during contract performance. DoD Components shall use the DD Form 254, ''Contract Security Classification Specification,'' as an attachment to contracts or agreements requiring access to classified information by U.S. contractors. The DD Form 254 is used to identify the classified areas of information involved in a contract and the specific items of information that require protection. The National Industrial Security Program Contract Classification System (NCCS) is the electronic repository for the DD Form 254. NCCS expedites the processing and distribution of contract classification specifications for contracts requiring access to classified information. NCCS also has a built-in automated process for the Request for Approval to Subcontract and provides workflow support for the Facility Clearance Request and National Interest Determination processes.

Affected Public: Business or other for-profit.

Frequency: On occasion.

Respondent's Obligation: Voluntary.

DoD Clearance Officer: Mr. Reginald Lucas.

Dated: July 8, 2025.

Stephanie J. Bost,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 2025–12907 Filed 7–10–25; 8:45 am]

BILLING CODE 6001–FR–P

DEPARTMENT OF EDUCATION

National Assessment Governing Board

Committee and Quarterly Board Meetings

AGENCY: National Assessment Governing Board, Department of Education.

ACTION: Notice of open and closed meetings.

SUMMARY: This notice sets forth the agenda, time, and instructions to access the National Assessment Governing Board's (hereafter referred to as the Board or Governing Board) standing committee meetings and quarterly Governing Board meeting. This notice provides information to members of the public who may be interested in attending the meetings and/or providing written comments related to the work of the Governing Board. The meetings will be held either in person and/or virtually, as noted below. Members of the public must register in advance to attend the meetings virtually. A registration link will be posted on the Governing Board's website, *www.nagb.gov,* five (5) business days prior to each meeting.

DATES: The Quarterly Board Meeting will be held on the following dates:

- July 31, 2025, from 9:00 a.m. to 4:45 p.m., ET
- August 1, 2025, from 8:30 a.m. to 11:40 a.m., ET

ADDRESSES: Hotel AKA, 625 First Street, Alexandria, VA 22314

FOR FURTHER INFORMATION CONTACT: Angela Scott, Designated Federal Officer (DFO) for the Governing Board, 400 Maryland Avenue SW, Washington, DC 20202, telephone: (202) 245–6234, email: *Angela.Scott@ed.gov.*

SUPPLEMENTARY INFORMATION: *Statutory Authority and Function:* The Governing Board is established under the National Assessment of Educational Progress Authorization Act (20 U.S.C. 9621). Information on the Governing Board and its work can be found at *www.nagb.gov.* Notice of the meetings is required under section 1009(a)(2) of 5 U.S.C. chapter 10

ENCLOSURE B
INTERAGENCY AND GOVERNMENT-TO-GOVERNMENT COORDINATION

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Optimization of Powder River Training Complex EIS

Scoping Phase Coordination Letters Matrix

Letter Template	Recipients	No. Recipients	Signature Authority	Shipping Method
Scoping Stakeholder	Members of Congress State Legislature, Mayors	12 81	28BW	Congress - Email from HAF (2 weeks prior to NOI) All others - Click N Ship (tracking capability)
Scoping General Memo	County Commission Fed, State Agencies Non-government Organizations Airports	94 40 13 23	none	USPS
Scoping_SHPOs	SHPOs	4	28BW	Email from 28BW Click N Ship hard copy follow-up
Scoping_Tribes	Tribes (THPO and President for each)	48	28BW	Email from 28BW Click N Ship hard copy follow-up
TOTAL		**315**		

Stakeholder	Office	Sol.	First	Last
North Dakota				
U.S. Senate	ND Senator	Senator	Kevin	Cramer
	ND Senator	Senator	John	Hoeven
ND District at Large	119th U.S. House	Representative	Julie	Fedorchak
South Dakota				
U.S. Senate	SD Senator	Senator	John	Thune
	SD Senator	Senator	Mike	Rounds
SD District at Large	119th U.S. House	Representative	Dusty	Johnson
Wyoming				
U.S. Senate	WY Senator	Senator	John	Barrasso
	WY Senator	Senator	Cynthia	Lummis
WY District at Large	119th U.S. House	Representative	Harriet	Hageman
Montana				
U.S. Senate	MT Senator	Senator	Tim	Sheehy
	MT Senator	Senator	Steve	Daines
MT District 2	119th U.S. House	Representative	Troy	Downing

Stakeholder	Office	Sol.	First	Last
North Dakota				
State of ND	Governor	The Honorable	Kelly	Armstrong
ND House District 31	State House District	Representative	Dawson	Holle
ND House District 31	State House District	Representative	Karen M.	Rohr
ND House District 36	State House District	Representative	Dori	Hauck
ND House District 36	State House District	Representative	Ty	Dressler
ND House District 39	State House District	Representative	Keith	Kempenich
ND House District 39	State House District	Representative	Mike	Schatz
ND Senate District 31	State Senate District	Senator	Donald	Schaible
ND Senate District 36	State Senate District	Senator	Desiree Van	Oosting
ND Senate District 39	State Senate District	Senator	Greg	Kessel
South Dakota				
State of SD	Governor	The Honorable	Kristi	Noem
SD House District 28A	State House District	Representative	Jana	Hunt
SD House District 28B	State House District	Representative	Travis	Ismay
SD House District 29	State House District	Representative	Terri	Jorgenson
SD House District 29	State House District	Representative	Kathy	Rice
SD House District 30	State House District	Representative	Tim	Goodwin
SD House District 30	State House District	Representative	Trish	Ladner
SD House District 31	State House District	Representative	Mary J.	Fitzgerald
SD House District 31	State House District	Representative	Scott	Odenbach
SD Senate District 28	State Senate District	Senator	Sam	Marty
SD Senate District 29	State Senate District	Senator	John	Carley
SD Senate District 30	State Senate District	Senator	Amber	Hulse
SD Senate District 31	State Senate District	Senator	Randy	Deibert
Wyoming				
State of WY	Governor	The Honorable	Mark	Gordon
WY House District 1	State House District	Representative	Chip	Neiman
WY House District 30	State House District	Representative	Tom	Kelly
WY House District 40	State House District	Representative	Marilyn	Connoly
WY House District 52	State House District	Representative	Reuben	Tarver
WY Senate District 1	State Senate District	Senator	Chip	Newman
WY Senate District 22	State Senate District	Senator	Andrew	Byron
Montana				
State of MT	Governor	The Honorable	Greg	Gianforte
MT House District 34	State House District	Representative	Jerry	Schillinger
MT House District 35	State House District	Representative	Gary	Parry
MT House District 41	State House District	Representative	Jade	Sookis
MT House District 42	State House District	Representative	Sidney	Fitzpatrick
MT Senate District 17	State Senate District	Senator	Bob	Phalen

MT Senate District 18	State Senate District	Senator	Steve	Hinebauch
MT Senate District 21	State Senate District	Senator	Gayle	Lammers
North Dakota				
City of Bucyrus	Mayor	Mayor	Roger	Warbis
City of Amidon	Mayor	Mayor	L. K	Lorge
City of Marmarth	No Mayor Listed			
City of Mott	Mayor	Mayor	Troy	Mosbrucker
City of Reeder	Mayor	Mayor	Wesley	Schwarzwalte
City of Haynes	Mayor	Mayor	Sarah	Chadwick
City of Scranton	Mayor	Mayor	Jason	Anderson
City of Rhame	Mayor	Mayor	Rocky	Wallman
City of Gascoyne	Mayor	Mayor	Garth	Logsdon
City of Bowman	No Mayor Listed			
City of New Leipzig	Mayor	Mayor	Kelly	Roth
City of Elgin	Mayor	Mayor	Ronald	Bartz
City of Carson	Mayor	Mayor	Dawn	Hanson
City of Leith	Mayor	Mayor	Ryan	Schock
City of Hettinger	Mayor	Mayor	James	Lindquist
South Dakota				
Town of Morristown	No Mayor Listed			
Town of Fruitdale	No Mayor Listed			
Town of Camp Crook	No Mayor Listed			
City of Sturgis	Mayor	Mayor	Kevin	Forrester
Town of Buffalo	No Mayor Listed			
City of Lemmon	Mayor	Mayor	Matthew	Barnes
City of Belle Fourche	Mayor	Mayor	Randy	Schmidt
City of Whitewood	Mayor	Mayor	Mitch	Harmon
Town of Nisland	No Mayor Listed			
City of Newell	Mayor	Mayor	Tara	Tennis
City of McIntosh	No Mayor Listed			
Town of Bison	No Mayor Listed			
City of Spearfish	Mayor	Mayor	John	Senden
City of Lead	Mayor	Mayor	Ron	Everett
City of Central City	No Mayor Listed			
City of Deadwood	Mayor	Mayor	Dave	Ruth, Jr.
Wyoming				
Town of Hulett	Mayor	Mayor	Ted	Parsons
Town of Pine Haven	Mayor	Mayor	Karla	Brandenburg
Town of Sundance	Mayor	Mayor	Paul S.	Brooks
Town of Upton	Mayor	Mayor	Nick	Trandahl
Town of Moorcroft	Mayor	Mayor	Ben	Glenn
Montana				
Town of Ekalaka	Mayor	Mayor	Buck	Kratzer
Town of Lodge Grass	Mayor	Mayor	Quincy	Dabney

Town of Plevna	Mayor	Mayor	Gary	Thielen
City of Baker	Mayor	Mayor	Steve	Zachmann
Town of Broadus	Mayor	Mayor	Chad	Gatlin
City of Hardin	Mayor	Mayor	Joe	Purcell
City of Colstrip	Mayor	Mayor	John	Williams

Stakeholder	Office	Sol.	First	Last
North Dakota				
Sioux County	County Commissioner		Terry	Comeau
Sioux County	Commission Chairman	Mr.	Larry	Silbernagel
Sioux County	County Commissioner	Mr.	Kenneth "Bruiser'	Snider
Hettinger County	Commission Chairman	Mr.	Devan	Laufer
Hettinger County	County Commissioner	Mr.	Thomas "Tom"	Geerts
Hettinger County	County Commissioner	Mr.	Todd	Lutz
Stark County	Commission Chairman	Mr.	Dean	Franchuk
Stark County	Commisson Vice Chairman	Mr.	Neal	Messer
Stark County	County Commissioner	Mr.	Paul	Clarys
Stark County	County Commissioner	Mr.	Bernie	Marsh
Stark County	County Commissioner	Mr.	Cory	White
Bowman County	Commission Chairman	Mr.	Rick	Braaten
Bowman County	County Commissioner	Mr.	Pine	Abrahamson
Bowman County	County Commissioner	Mr.	Josh	Buchmann
Bowman County	County Commissioner	Mr.	Jerid	Janikowski
Bowman County	County Commissioner	Mr.	Jerry	Jeffers
Golden Valley County	Commission Chairperson	Mr.	Adam	Smith
Golden Valley County	County Commissioner	Mr.	Rory	Farstveet
Golden Valley County	County Commissioner	Mr.	Robert "Bob"	Schmeling
Slope County	Commission Chairman	Mr.	Scott	Ouradnik
Slope County	County Commissioner	Mr.	Mike	Sonsalla
Slope County	County Commissioner	Mr.	Mike	Teske
Adams County	Commisson Vice Chairman	Mr.	Kevin	Pagel
Adams County	Commission Chairman	Mr.	Dustin	Laufer
Adams County	County Commissioner	Mr.	Anthony	Larson
Billings County	County Commissioner	Mr.	Lester	Iverson
Billings County	County Commissioner	Mr.	Steve	Klym
Billings County	County Commissioner	Mr.	Dean	Rodne
Grant County	Commission Chairman	Mr.	Alton	Zenker
Grant County	County Commissioner	Mr.	AlRoy	Hochhalter
Grant County	County Commissioner	Mr.	Marty	Meyer
Morton County	County Commissioner	Mr.	Nathan	Boehm
Morton County	County Commissioner	Ms.	Jackie	Buckley
Morton County	County Commissioner	Mr.	Ron	Leingang
Morton County	County Commissioner	Mr.	Raymond	Morrell
Morton County	County Commissioner	Mr.	Andrew	Zachmeier
South Dakota				
Butte County	Commission Chairman District 1	Mr.	James	Ager
Butte County	Commisson Vice Chairman District 2	Ms.	Karrol	Herman

Butte County	County Commissioner District 3	Mr.	Chad	Erk
Butte County	County Commissioner District 4	Mr.	Terry	Batterman
Butte County	County Commissioner District 5	Mr.	Frank	Walton
Corson County	County Commissioner 1	Mr.	Shawn	Hinsz
Corson County	County Commissioner 2	Mr.	Darren	Bauer
Corson County	County Commissioner 3	Mr.	Jacob	Nehl
Corson County	County Commissioner 4	Mr.	Lucas	Sutherland
Corson County	County Commissioner 5	Mr.	Ben	Bieber
Harding County				
Lawrence County	Commission Chairman	Mr.	Bob	Ewing
Lawrence County	Commisson Vice Chairman	Mr.	Brandon	Flanagan
Meade County	County Executive Director	Ms.	Rhea	Crane
Pennington County	Commission Chairman	Mr.	Lloyd	LaCroix
Pennington County	Commisson Vice Chairman	Mr.	Ron	Rossknecht
Perkins County	Commission Chairman	Mr.	Kyle	Carmichael
Perkins County	Commisson Vice Chairman	Mr.	Rusty	Foster
Ziebach County	County Commissioner	Mr.	Tucker	Stocklin
Ziebach County	County Commissioner	Mr.	Bill	Henderson
Ziebach County	County Commissioner	Mr.	Rick	Farlee
Ziebach County	County Commissioner	Mr.	Shane	Farlee
Ziebach County	County Commissioner	Mr.	David	Pesicka
Wyoming				
Campbell County	County Commissioner	Mr.	Del	Shelstad
Campbell County	County Commissioner	Mr.	Jim	Ford
Campbell County	County Commissioner	Mr.	Kelley	McCreery
Campbell County	County Commissioner	Mr.	Scott	Clem
Campbell County	County Commissioner	Mr.	Bob	Jordan
Crook County	Commission Chairman	Mr.	Fred M.	Devish
Crook County	Commisson Vice Chairman	Mr.	Kelly B.	Dennis
Sheridan County	Commission Chairman	Mr.	Nick	Siddle
Sheridan County	County Commissioner	Mr.	Lonnie	Wright
Sheridan County	County Commissioner	Mr.	Tom	Ringley
Sheridan County	County Commissioner	Ms.	Holly	Jennings
Sheridan County	County Commissioner	Ms.	Christi	Haswell
Weston County	Commission Chairman	Mr.	Don	Taylor
Weston County	Commisson Vice Chairman	Mr.	Garrett	Borton
Weston County	County Commissioner	Mr.	Nathan	Todd
Weston County	County Commissioner	Mr.	Ed	Wagoner
Weston County	County Commissioner	Ms.	Vera	Huber
Montana				
Big Horn County	County Commissioner District 1	Mr.	George Real	Bird III
Big Horn County	County Commissioner District 2	Mr.	Lawrence Pete	Big Hair
Big Horn County	County Commissioner District 3	Mr.	Larry	Vandersloot
Carter County	Commisson Chairman	Mr.	Rod	Tauck

County Stakeholders

Carter County	Commisson Vice Chairman	Mr.	Mike	Watkins
Custer County	Chairman District 1	Mr.	Jason	Strouf
Custer County	Commissioner District 2	Mr.	Jeff	Faycosh
Custer County	Commissioner District 3	Mr.	Kevin	Krausz
Fallon County	Commissioner	Mr.	Roy	Rost
Fallon County	Commissioner	Mr.	Kevin	Braun
Fallon County	Commission Chairperson	Mr.	Steve	Baldwin
Powder River County	Commission Chairman		Lee	Randall
Powder River County	County Commissioner	Mr.	John	Olson
Powder River County	County Commissioner	Ms.	Lori	Fortner
Rosebud County	County Commissioner District 1	Mr.	Robert E.	Lee
Rosebud County	County Commissioner District 2	Mr.	Scott	Hein
Rosebud County	County Commissioner District 3	Mr.	Ed	Joiner
Treasure County	Commission Chair		Marlo	Moehr

Stakeholder/Name of Agency	POC Role/Title	Sol.	First	Last
U.S. EPA, Region 8	Administrator	Ms.	KC	Becker
BOR Dakotas Area Office	Area Manager	Mr.	Joe	Hall
BOR Dakotas Area Office	Deputy Area Manager	Mr.	Scott	Hettinger
NPS Regions 3, 4, and 5	Regional Director	Mr.	Bert	Frost
BLM Eastern Montana/Dakotas District Office	District Manager	Ms.	Wendy	Warren
BLM Montana/Dakotas State Office	State Director	Ms.	Sonya	German
BLM Montana/Dakotas State Office	Associate State Director	Mr.	Scott	Height
Bureau of Indian Affairs, Great Plains Region				
USFWS Mountain-Prairie Region	Regional Director	Mr.	Matt	Hogan
NPS Regions 6, 7, and 8				
Bureau of Indian Affairs, Rocky Mountain Region				
North Dakota				
North Dakota Department of Environmental Quality	Director	Mr.	David	Glatt
North Dakota Game and Fish Department	Director	Mr.	Jeb	Williams
North Dakota Department of Transportation	Director	Mr.	Ron	Henke
BLM North Dakota Field Office				
North Dakota State Historic Preservation Office	Director	Mr.	Bill	Peterson
USFWS North Dakota Ecological Services Field Office	North Dakota Deputy Field Supervisor	Mr.	Luke	Toso
Office of Governor North Dakota Indian Affairs Commission	Executive Director	Mr.	Nathan	Davis
South Dakota				
South Dakota Department of Agriculture & Natural Resource	Rapid City Office			
South Dakota Department of Agriculture & Natural Resource	Department Secretary	Mr.	Hunter	Roberts
South Dakota Game, Fish and Parks	Chair	Ms.	Stephanie	Rissler
South Dakota Aeronautics Commission Office				
South Dakota Department of Transportation	Rapid City Region			
BLM South Dakota Field Office				
USFWS South Dakota Ecological Services Field Office	ND/SD Project Leader	Mr.	Christopher	Swanson
South Dakota State Historical Society	Interim State Historic Preservation Offic	Ms.	Jenna Carlson	Dietmeier
Wyoming				
Wyoming Department of Environmental Quality	Director	Mr.	Todd	Parfitt
Wyoming Game and Fish Department	Sheridan Regional Office			
Wyoming Department of Transportation	Director	Mr.	Darin J.	Westby
BOR Wyoming Area Office	Area Manager		Lyle	Myler
BLM Wyoming State Office	State Director	Mr.	Andrew	Archuleta
BLM Wyoming State Office	Associate State Director		Kris	Kirby
BLM High Plains District Office	District Manager	Mr.	Kevin	Christensen
BLM Buffalo Field Office	Field Manager	Mr.	Todd	Yeager
BLM Newcastle Field Office	Field Manager	Mr.	Chad	Krause
USFWS Wyoming Ecological Services Field Office	Wyoming Field Supervisor	Mr.	Tyler	Abbott
Wyoming State Historic Preservation Office	Deputy Director	Ms.	Sara	Sheen
Montana				
Montana Department of Environmental Quality	Director	Mr.	Christopher	Dorrington
Montana Fish, Wildife and Parks	Director	Mr.	Dustin	Temple
Montana Department of Transportation	Director	Mr.	Malcolm	Long
Montana Department of Transportation	Deputy Director	Mr.	Larry	Flynn
BOR Montana Area Office	Area Manager		Ryan	Newman
Montana Historical Society	Director	Ms.	Molly	Kruckenberg
USFWS Montana Ecological Services Field Office	Montana Field Supervisor		Amity	Bass

Stakeholder/Name of Agency	City	Sol.	First	Last
North Dakota				
Bowman Regional Airport	Bowman		Brent	Kline
Elgin Municipal Airport	Elgin		Aaron	Levorsen
Hettinger/JB Lindquist Regional	Hettinger		Jay B.	Lindquist
Mott Municipal Airport	Mott		Derek	Mayer
Hagen Airport	Reeder		Bruce	Hagen
Dilse Airstrip	Scranton		Ted D.	Dilse
South Dakota				
Belle Fourche Municipal Airport	Belle Fourche		James	Deranleau
Bison Municipal Airport	Bison		Paula	Kopren
Harding County Airport	Buffalo		Will	Henderson
Lemmon Municipal Airport	Lemmon		Mike	Ginther
Black Hills-Clyde Ice Field Airport	Spearfish		Channing	Wagner
Wyoming				
Ipy Ranch Airport	Hulett		George	White
Thompson Creek Oilfield Airport	Hulett		Ted H.	Williams
Hulett Municipal Airport	Hulett		Town of Hulett	
Keyhole Airport	Moorcroft		George B.	Waters
Taylor Field Airport	Sundance		Guy David	Taylor
Upton Municipal Airport	Upton		Lori	Materi
Montana				
Colstrip Airport	Colstrip		Brian	Schwend
Ekalaka Airport	Ekalaka		Troy	Fruit
Broadus Airport	Broadus		John	Olsen
St. Labre Mission Airport	Ashland		Tana	McNac
Fairgrounds Airpark	Hardin		Ed	Auker
Baker Municipal Airport	Baker		Rodger	Meggers

Stakeholder/Name of Agency	POC Role/Title	Sol.	First	Last
National Business Aviation Association	President	Mr.	Edward	Bolen
Airlines for America	Managing Director	Ms.	Marli	Collier
Aircraft Owners and Pilots Association	Senior Vice President of Government	Mr.	Jim	Coon
Center for Biological Diversity	Northern Rockies Director	Ms.	Kristine	Akland
North Dakota				
North Dakota Aviation Association	Chair	Mr.	Tanner	Overland
South Dakota				
South Dakota Pilots Association	President	Mr.	Dale	Knuth
Wyoming				
Sheridan Pilots Association	President	Mr.	J.T.	Grainger
Wyoming Pilots Association	No POC listed			
Montana				
Montana Pilots Association	President	Mr.	Tim	Robertson
Wild Montana	President	Mr.	Tim	Lynch
Montana Land Reliance	Managing Director	Mr.	Kendall	Van Dyk
Preserve Montana	Executive Director	Ms.	Jenny	Buddenborg
Montana Environmental Information Cente	Executive Director	Ms.	Cari	Kimbell

Powder River Training Complex Optimization EIS *Tribal Consultation List*	
No.	**Tribe Name**
1	Apache Tribe of Oklahoma
2	Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation, Montana
3	Black Feet Nation
4	Cheyenne and Arapaho Tribes
5	Cheyenne River Sioux Tribe of the Cheyenne River Reservation, South Dakota
6	Chippewa Cree Indians of the Rocky Boy's Reservation, Montana
7	Confederated Salish and Kootenai Tribes of the Flathead Reservation
8	Crow Creek Sioux Tribe of the Crow Creek Reservation, South Dakota
9	Crow Tribe of Montana
10	Eastern Shoshone Tribe (Shoshone Tribe of the Wind River Reservation)
11	Flandreau Santee Sioux Tribe of South Dakota
12	Fort Belknap Indian Community of the Fort Belknap Reservation of Montana
13	Lower Brule Sioux Tribe of the Lower Brule Reservation, South Dakota
14	Northern Arapaho
15	Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation, Montana
16	Oglala Sioux Tribe
17	Rosebud Sioux Tribe of the Rosebud Indian Reservation, South Dakota
18	Shoshone-Bannock Tribes of the Fort Hall Reservation
19	Sisseton-Wahpeton Oyate of the Lake Traverse Reservation, South Dakota
20	Spirit Lake Tribe, North Dakota
21	Standing Rock Sioux Tribe of North and South Dakota
22	Three Affiliated Tribes of the Fort Berthold Reservation, North Dakota
23	Turtle Mountain Band of Chippewa Indians of North Dakota
24	Yankton Sioux Tribe of South Dakota

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 28TH BOMB WING (AFGSC)
ELLSWORTH AIR FORCE BASE SOUTH DAKOTA

Colonel Derek C. Oakley, USAF
Commander
1958 Scott Dr
Ellsworth AFB SD 57706-4710

The Honorable John Barrasso
WY Senator
307 Dirksen Senate Office Building
Washington DC 20510

Dear Senator Barrasso

Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, the Department of the Air Force (DAF) is preparing an Environmental Impact Statement (EIS) to evaluate the potential environmental impacts of addressing shortfalls in aircrew readiness in the Powder River Training Complex (PRTC). The PRTC is the training airspace used by aircrews at Ellsworth Air Force Base (AFB) and Minot AFB for day-to-day training and it is also used for Large Force Exercises (LFEs) a few times a year that bring together joint forces to participate in realistic combat training scenarios. The PRTC was originally established in 2015 and overlies parts of South Dakota, North Dakota, Wyoming, and Montana. The proposed action includes improvements to the airspace structure to address shortfalls in day-to-day training and increasing LFE capability to meet emerging threats to National Security. We encourage you to visit our project website for additional details: www.PRTCairspaceEIS.com.

We request your participation and solicit your comments on the preliminary alternatives and the scope of environmental issues to be addressed in the Draft EIS. Written comments may be submitted on the project website, www.PRTCairspaceEIS.com, at an in-person public meeting, or by mailing to PRTC Airspace EIS, c/o Stantec, 501 Butler Farm Rd., Suite H, Hampton, VA 23666. Please provide your comments no later than **September 9, 2025** to ensure consideration in the Draft EIS.

The DAF has identified two preliminary alternatives to evaluate in the EIS along with the No Action Alternative:

For Alternative 1, the ceiling of two of the primary airspace segments used for day-to-day training, named Powder River (PR) 2 and Gateway West Air Traffic Control Assigned Airspaces (ATCAAs), would be raised to 60,000 feet from the current 26,000 feet improving the high-altitude training capability. This alternative also includes an administrative change to the published times of use to align with how the complex is currently used for day-to-day training.

Scoping_Congress Sample

Also under Alternative 1, the ceiling of all the PRTC airspace would be raised to 60,000 feet during LFEs and increase the LFE days from 10 days total per year to a total of 30 days per year. See Enclosure 1 for illustrations of the proposed airspace changes.

For Alternative 2, the ceiling of three airspace segments would be raised to 60,000 feet from the current 26,000 feet to include PR 2, Gateway West, and Gateway East ATCAAs. Currently Gateway East ATCAAs is only available for LFEs. Under this alternative the lateral dimensions of Gateway West and Gateway East ATCAAs would be reduced. Other changes would be the same as Alternative 1 and include an administrative change to the published time of use for day-to-day training, raising the ceiling of the entire complex to 60,000 feet during LFEs, and increasing the total LFE days to 30 days per year. See Enclosure 2 for illustrations of the proposed airspace changes.

For the No Action Alternative, DAF would not implement changes to the airspace structure or increase the total LFE days. Use of the PRTC for day-to-day training and LFEs would continue as it does currently.

The DAF published a Notice of Intent to prepare the EIS in the Federal Register initiating the scoping phase of the project, which is the first opportunity for public and stakeholder involvement in the NEPA process. The DAF is hosting several in-person and virtual public meetings to provide information on the proposed action and the preliminary alternatives described above. See Enclosure 3 for a list of meeting dates and locations. We encourage you to visit the project website where you can obtain additional information about the project and preview all the materials that will be on display at the meetings.

Sincerely

OAKLEY.DEREK.CHRISTIAN.1141333921

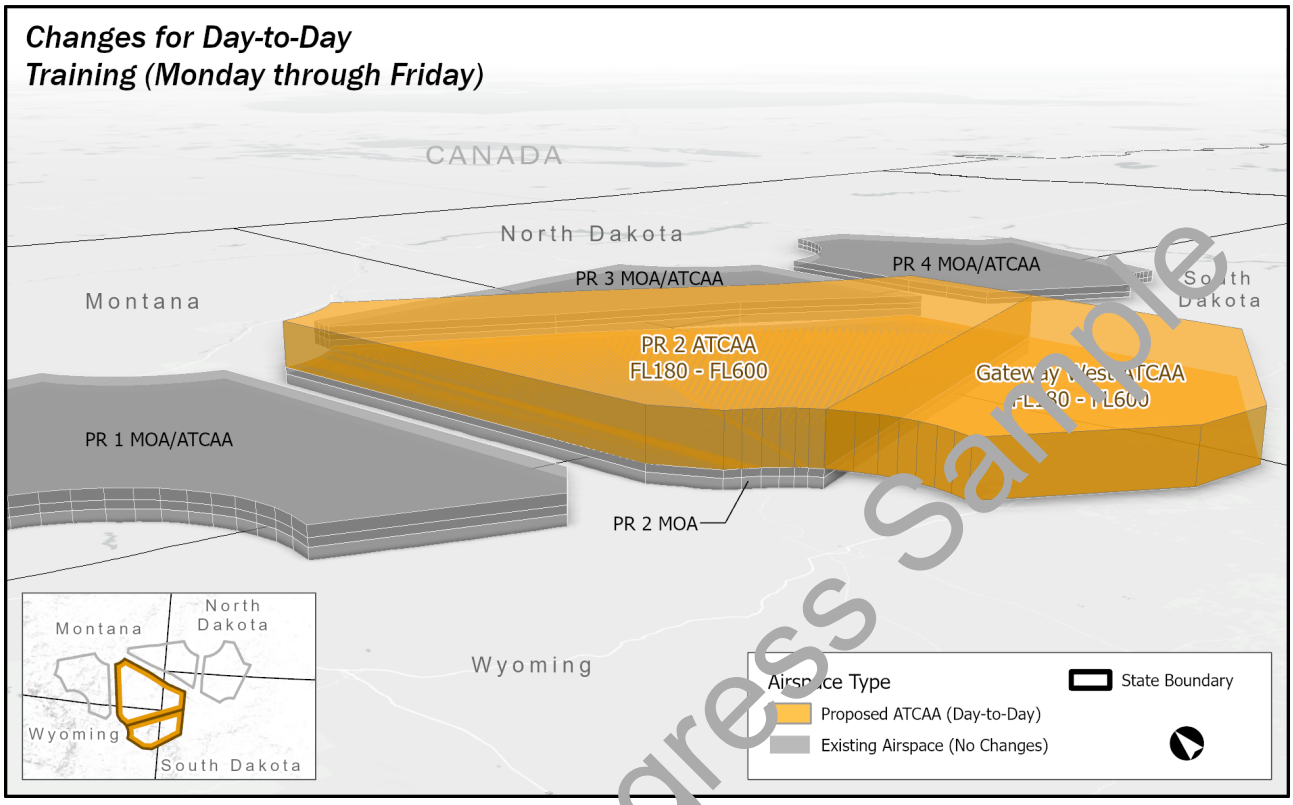
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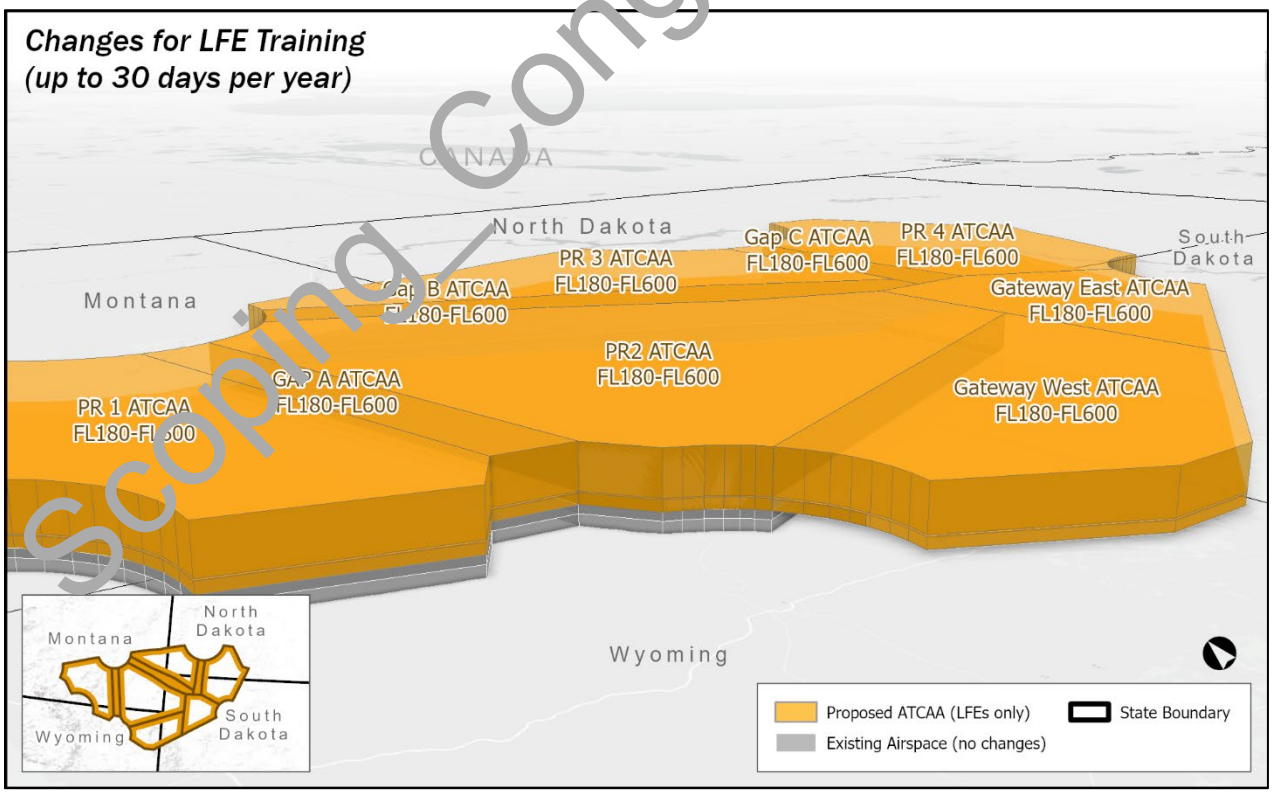
DEREK C. OAKLEY, Colonel, USAF
Commander

3 Attachments:
1. Enclosure 1 - Alternative 1 Proposed Airspace Modifications
2. Enclosure 2 - Alternative 2 Proposed Airspace Modifications
3. Enclosure 3 - Public Meetings

Scoping_Congress Sample

Enclosure 1 – Alternative 1 Proposed Airspace Modifications

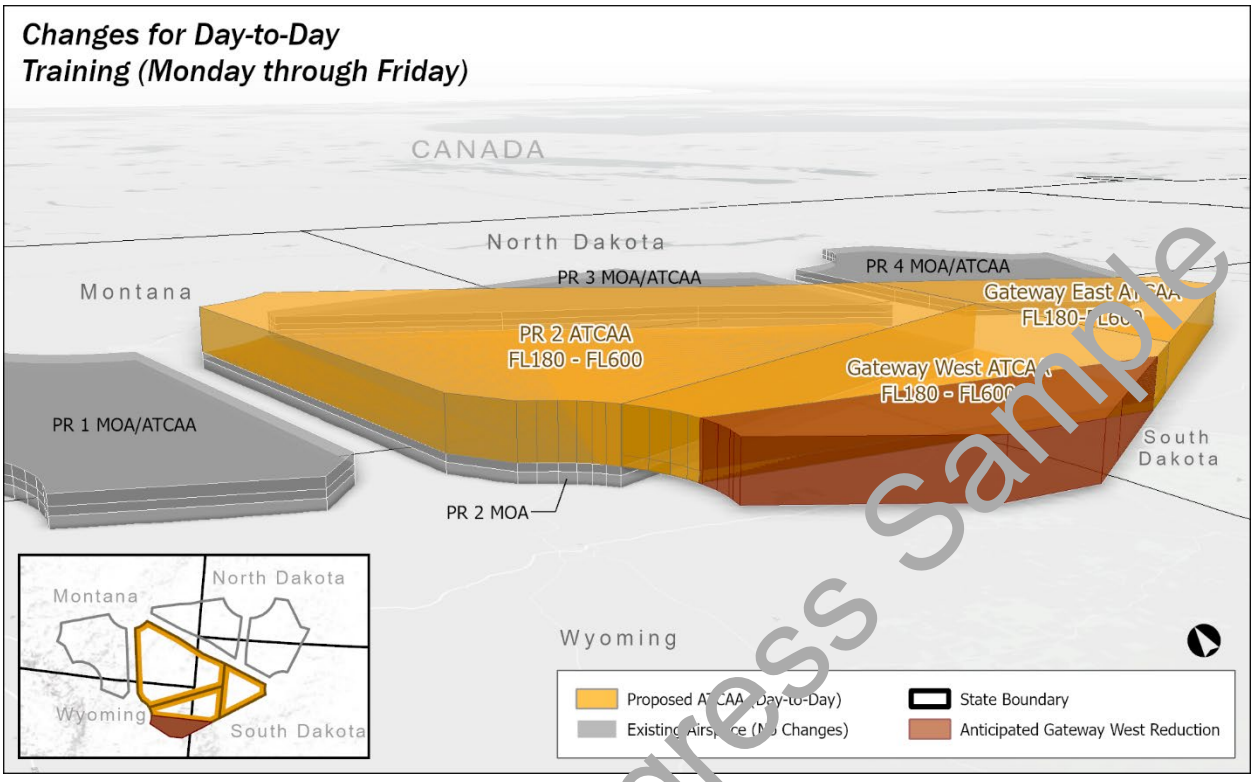


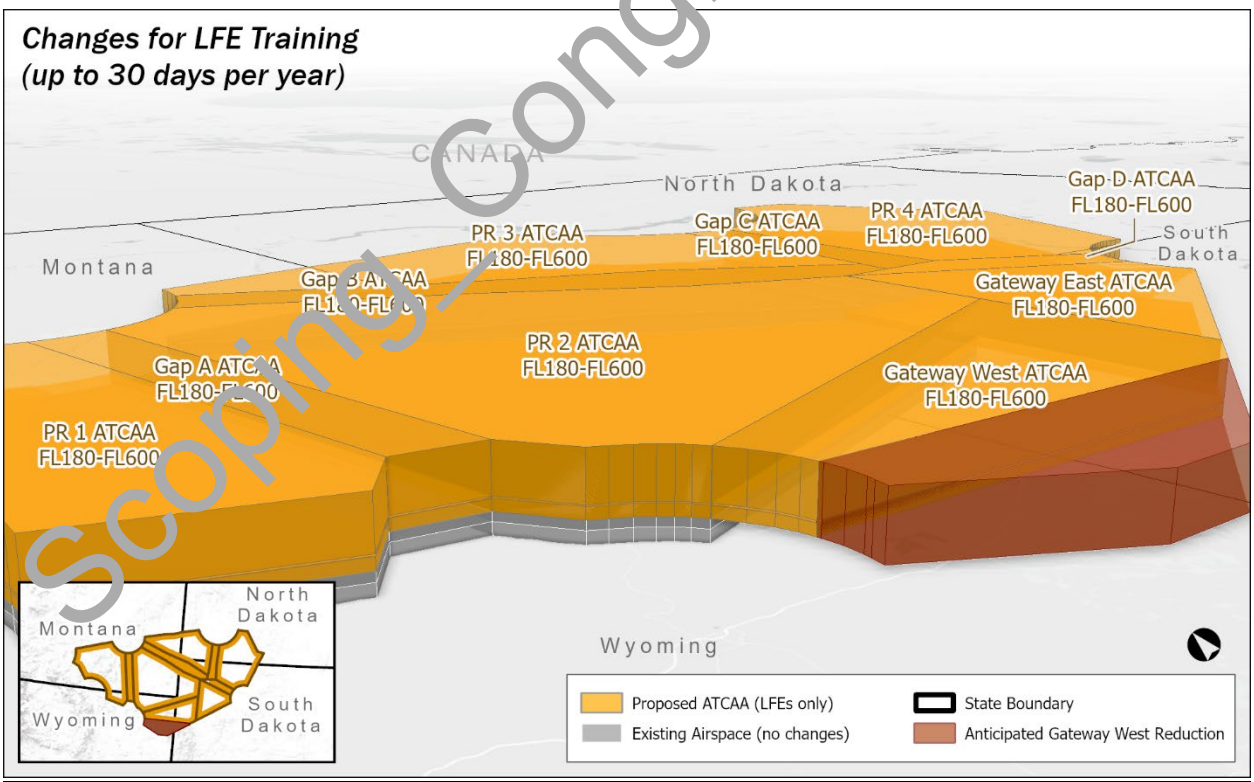


Scoping – Congress Sample

Legend: ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level (represents hundreds of feet, i.e., FL180 is 18,000 feet); LFE = Large Force Exercise; MOA = Military Operations Area

Enclosure 2 – Alternative 2 Proposed Airspace Modifications





Scoping_Congress Sample

Legend: ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level (represents hundreds of feet, i.e., FL180 is 18,000 feet); LFE = Large Force Exercise; MOA = Military Operations Area

Enclosure 3 - Public Meetings

The DAF is hosting several in-person and virtual public meetings. The in-person meetings are Open House style, please attend at your convenience during the advertised time. The virtual meetings will begin with welcome remarks and an overview of the Proposed Action followed by a question-and-answer session.

City, State	Date	Time (Mountain Time)	Location
Hardin, MT	July 28, 2025	5:00 – 7:00 p.m.	Hardin High School Commons Area 721 North Miles Ave Hardin, MT 59034
Ashland, MT	July 29, 2025	5:00 – 7:00 p.m.	St. Labre Soaring Eagle Gymnasium 112 St. Labre Campus Dr Ashland, MT 59003
Baker, MT	July 30, 2025	5:00 – 7:00 p.m.	Fallon County Fair – Exhibit Hall 3440 Highway 7 Baker, MT 59313
Bowman, ND	July 31, 2025	5:00 – 7:00 p.m.	Bowman County Fairgrounds – West Wing 12 Highway 12 E Bowman, ND 58623
Elgin, ND	August 1, 2025	5:00 – 7:00 p.m.	Elgin Community Center 305 North Main St Elgin, ND 58533
Spearfish, SD	August 11, 2025	5:00 – 7:00 p.m.	Spearfish High School - CTE Center 1725 North Main St Spearfish, SD 57783
Bison, SD	August 12, 2025	5:00 – 7:00 p.m.	Bison School Gym 200 West Carr St Bison, SD 57620
Sundance, WY	August 13, 2025	5:00 – 7:00 p.m.	Crook County School District Gymnasium 122 State Highway 585 Sundance, WY 82729
Rapid City, SD	August 14, 2025	5:00 – 7:00 p.m.	Western Dakota Technical College Event Center 800 Mickelson Dr Rapid City, SD 57703
Virtual Meeting #1	August 19, 2025	5:00 – 6:00 p.m.	Please register on the project website: www.PRTCairspaceEIS.com
Virtual Meeting #2	August 20, 2025	5:00 – 6:00 p.m.	
Virtual Meeting #3	August 21, 2025	5:00 – 6:00 p.m.	

Scoping – Congress Sample

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 28TH BOMB WING (AFGSC)
ELLSWORTH AIR FORCE BASE SOUTH DAKOTA

Colonel Derek C. Oakley, USAF
Commander
1958 Scott Dr
Ellsworth AFB SD 57706-4710

Senator Greg Kessel
State Senate District
P.O. Box 1006
Belfield North Dakota 58622-1006

Dear Senator Kessel

Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, the Department of the Air Force (DAF) is preparing an Environmental Impact Statement (EIS) to evaluate the potential environmental impacts of addressing shortfalls in aircrew readiness in the Powder River Training Complex (PRTC). The PRTC is the training airspace used by aircrews at Ellsworth Air Force Base (AFB) and Minot AFB for day-to-day training and it is also used for Large Force Exercises (LFEs) a few times a year that bring together joint forces to participate in realistic combat training scenarios. The PRTC was originally established in 2015 and overlies parts of South Dakota, North Dakota, Wyoming, and Montana. The proposed action includes improvements to the airspace structure to address shortfalls in day-to-day training and increasing LFE capability to meet emerging threats to National Security. We encourage you to visit our project website for additional details: www.PRTCairspaceEIS.com.

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Scoping_State Elected Sample

published times of use to align with how the complex is currently used for day-to-day training. Also under Alternative 1, the ceiling of all the PRTC airspace would be raised to 60,000 feet during LFEs and increase the LFE days from 10 days total per year to a total of 30 days per year. See Enclosure 1 for illustrations of the proposed airspace changes.

For Alternative 2, the ceiling of three airspace segments would be raised to 60,000 feet from the current 26,000 feet to include PR 2, Gateway West, and Gateway East ATCAAs. Currently Gateway East ATCAAs is only available for LFEs. Under this alternative the lateral dimensions of Gateway West and Gateway East ATCAAs would be reduced. Other changes would be the same as Alternative 1 and include an administrative change to the published times of use for day-to-day training, raising the ceiling of the entire complex to 60,000 feet during LFEs, and increasing the total LFE days to 30 days per year. See Enclosure 2 for illustrations of the proposed airspace changes.

For the No Action Alternative, DAF would not implement changes to the airspace structure or increase the total LFE days. Use of the PRTC for day-to-day training and LFEs would continue as it does currently.

The DAF published a Notice of Intent to prepare the EIS in the Federal Register initiating the scoping phase of the project, which is the first opportunity for public and stakeholder involvement in the NEPA process. The DAF is hosting several in-person and virtual public meetings to provide information on the proposed action and the preliminary alternatives described above. See Enclosure 3 for a list of meeting dates and locations. We encourage you to visit the project website where you can obtain additional information about the project and preview all the materials that will be on display at the meetings.

Sincerely

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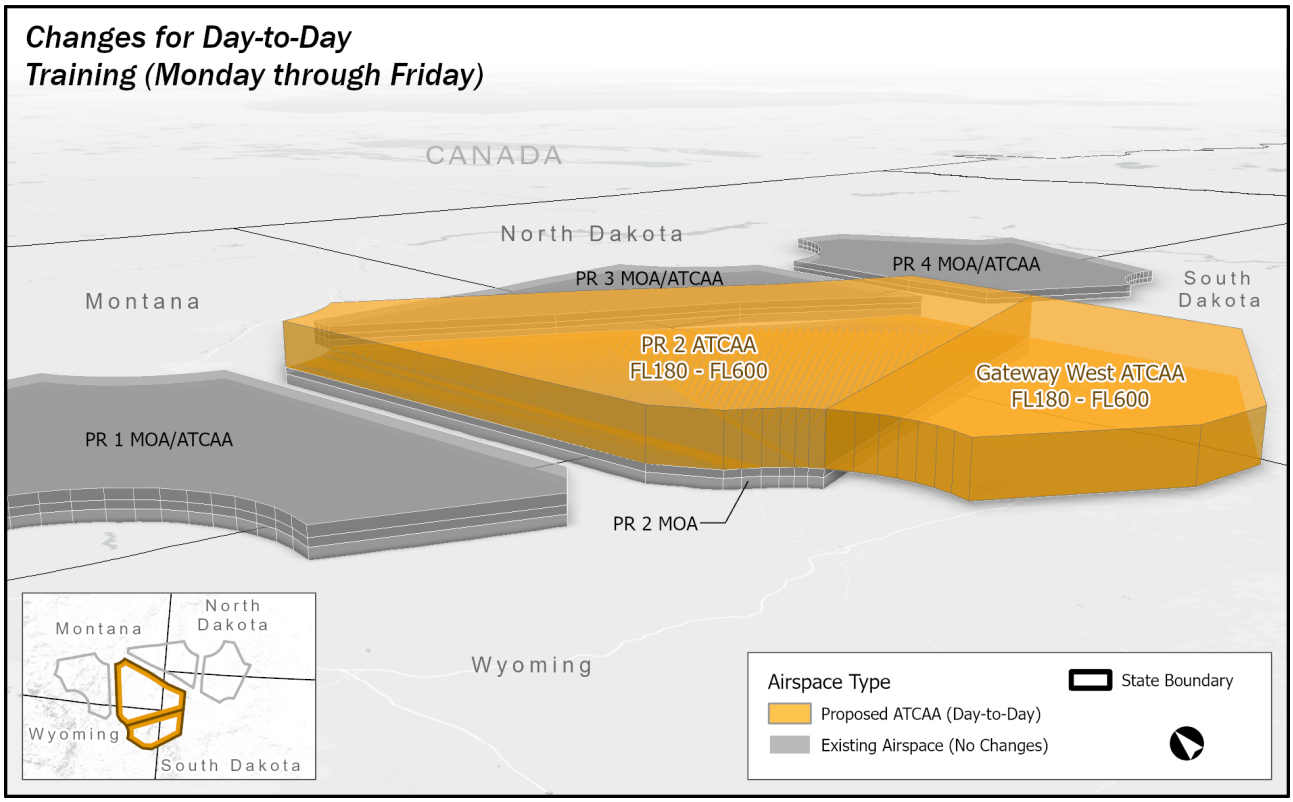
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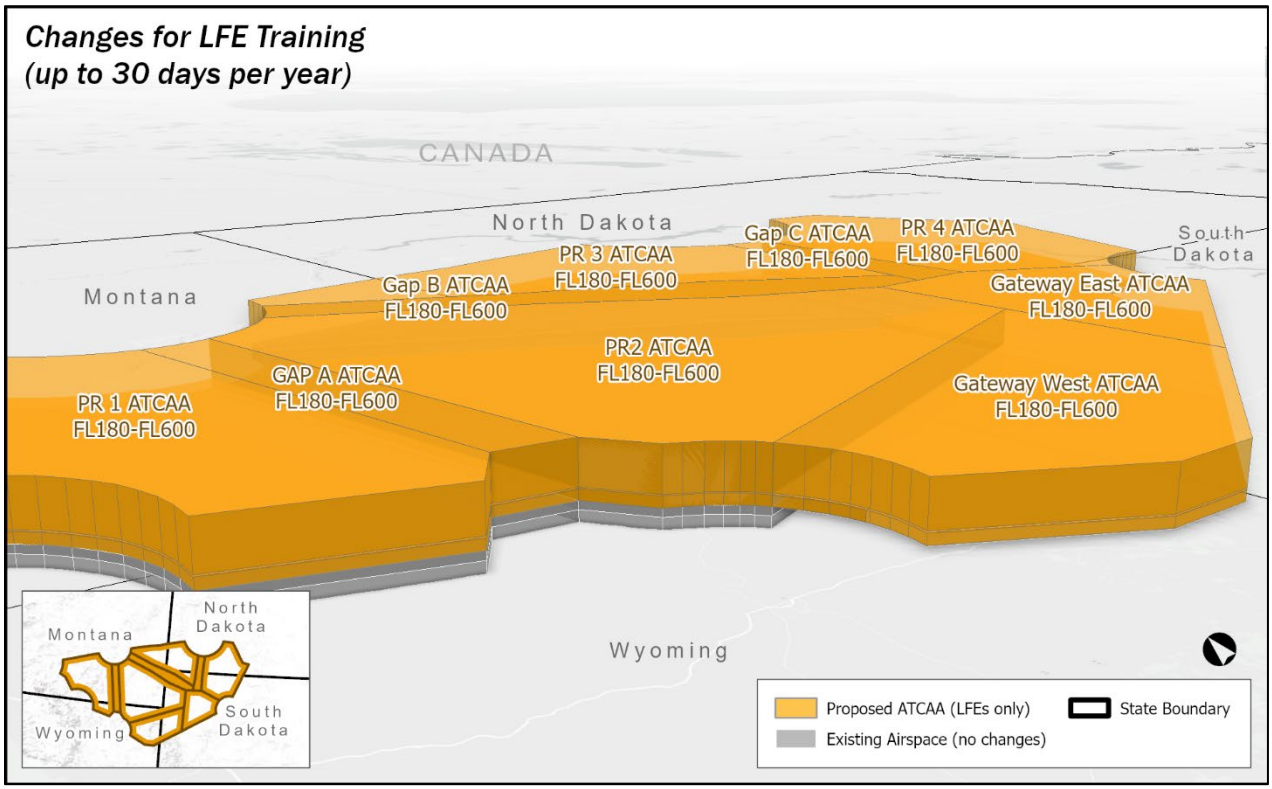
DEREK C. OAKLEY, Colonel, USAF
Commander

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Scoping_State Elected Sample

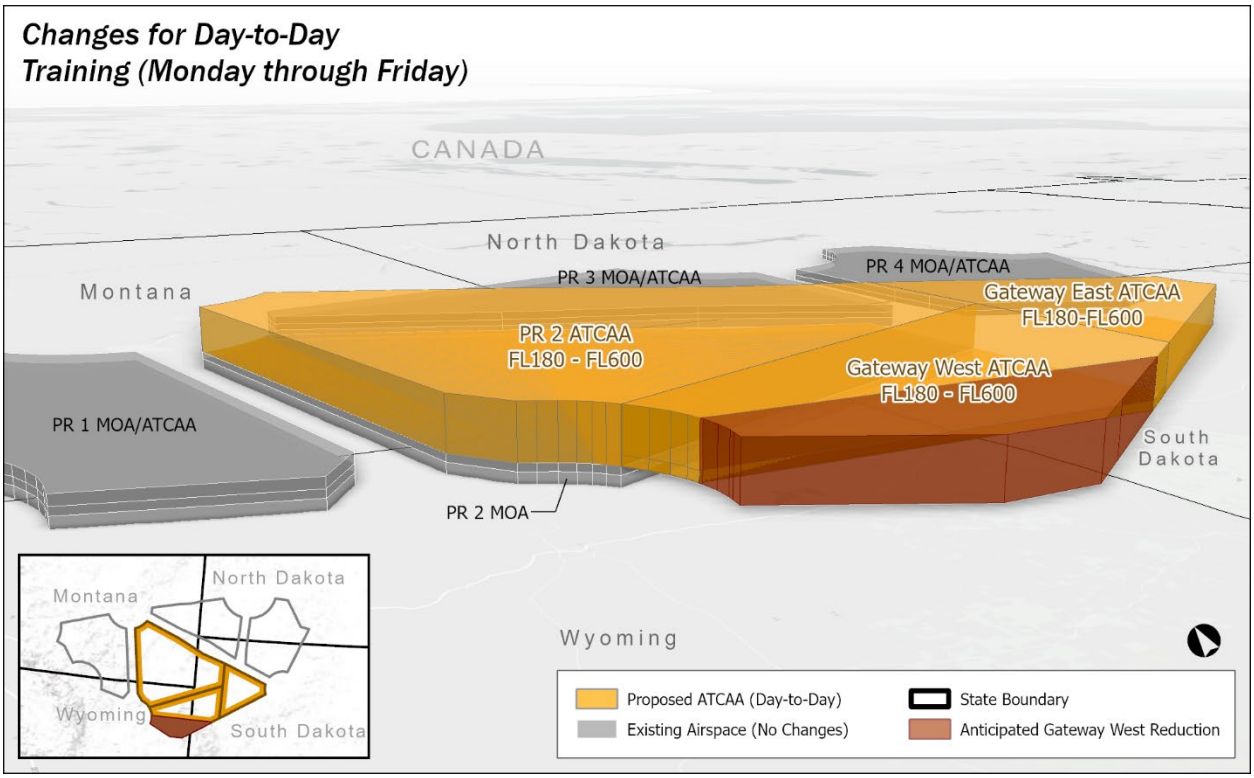
Enclosure 1 – Alternative 1 Proposed Airspace Modifications

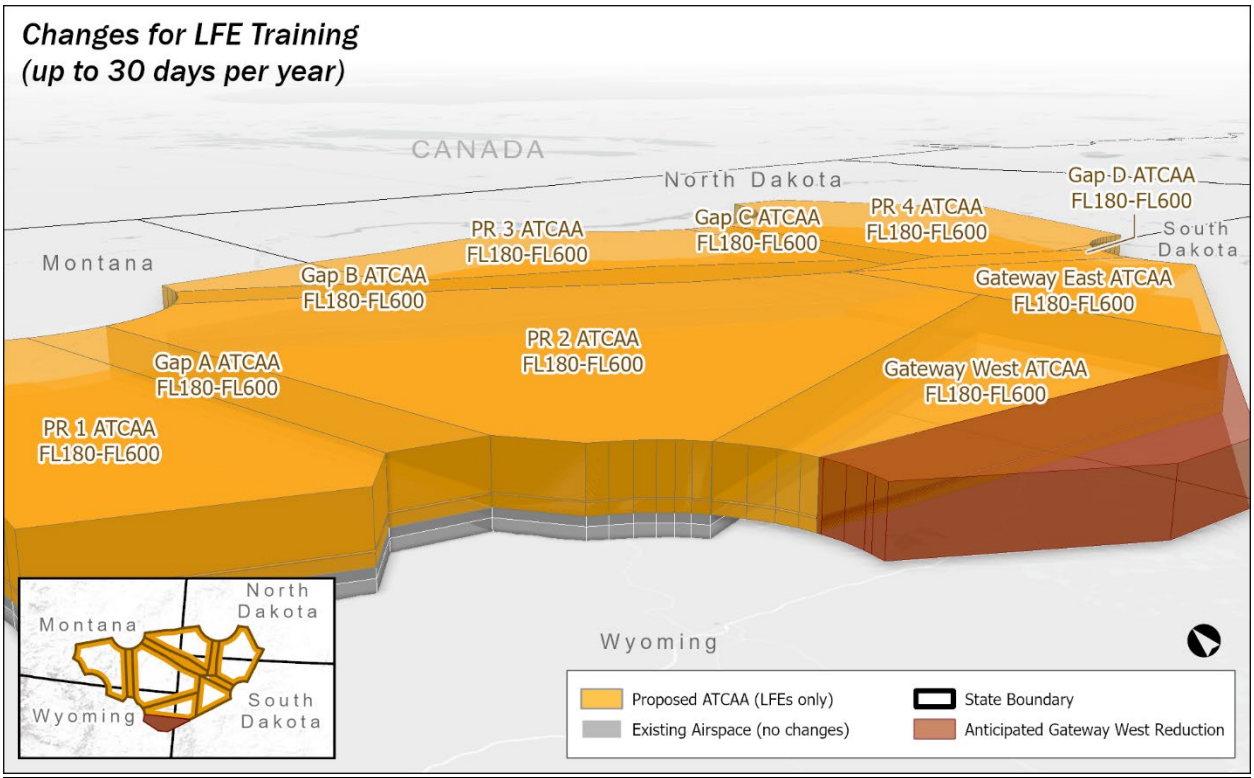




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Enclosure 2 – Alternative 2 Proposed Airspace Modifications





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Enclosure 3 - Public Meetings

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 28TH BOMB WING (AFGSC)
ELLSWORTH AIR FORCE BASE SOUTH DAKOTA

Colonel Derek C. Oakley, USAF
Commander
1958 Scott Dr
Ellsworth AFB SD 57706-4710

Ms. Molly Kruckenberg
Director
Montana Historical Society
P.O. Box 201201
Helena Montana 59620-1201

Dear Ms. Kruckenberg

Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, the Department of the Air Force (DAF) is preparing an Environmental Impact Statement (EIS) to evaluate the potential environmental impacts of addressing shortfalls in aircrew readiness in the Powder River Training Complex (PRTC). The PRTC is the training airspace used by aircrews at Ellsworth Air Force Base (AFB) and Minot AFB for day-to-day training and it is also used for Large Force Exercises (LFEs) a few times a year that bring together joint forces to participate in realistic combat training scenarios. The PRTC was originally established in 2015 and overlies parts of South Dakota, North Dakota, Wyoming, and Montana. The proposed action includes improvements to the airspace structure to address shortfalls in day-to-day training and increasing LFE capability to meet emerging threats to National Security. We encourage you to visit our project website for additional details: www.PRTCairspaceEIS.com.

The DAF has identified two preliminary alternatives to evaluate in the EIS along with the No Action Alternative:

For Alternative 1, the ceiling of two of the primary airspace segments used for day-to-day training, named Powder River (PR) 2 and Gateway West Air Traffic Control Assigned Airspaces (ATCAAs), would be raised to 60,000 feet from the current 26,000 feet improving the high-altitude training capability. This alternative also includes an administrative change to the published times of use to align with how the complex is currently used for day-to-day training. Also under Alternative 1, the ceiling of all the PRTC airspace would be raised to 60,000 feet during LFEs and increase the LFE days from 10 days to 30 days per year. See Enclosure 1 for illustrations of the proposed airspace changes under Alternative 1.

For Alternative 2, the ceiling of three airspace segments would be raised to 60,000 feet from the current 26,000 feet to include PR 2, Gateway West, and Gateway East ATCAAs. Currently Gateway East ATCAAs is only available for LFEs. Under this alternative, the lateral dimensions of Gateway West and Gateway East ATCAAs would be reduced. Other changes would be the same as Alternative 1 and would include an administrative change to the published times of use for day-to-day training, raising the ceiling of the entire complex to 60,000 feet during LFEs, and increasing the total LFE days to 30 days per year. See Enclosure 2 for illustrations of the proposed airspace changes under Alternative 2.

Scoping_SHPO Sample

For the No Action Alternative, DAF would not implement changes to the airspace structure or increase the total LFE days. Use of the PRTC for day-to-day training and LFEs would continue as it does currently.

The DAF is hosting several in-person and virtual public meetings to provide information on the proposed action and the preliminary alternatives described above. We would like to invite you to attend any of these meetings as part of the NEPA and Section 106 processes. See Enclosure 3 for a list of meeting dates and locations. We encourage you to visit the project website where you can obtain additional information about the project and preview all the materials that will be on display at the meetings.

The DAF is requesting to formally initiate consultation pursuant to Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations at 36 CFR Part 800, Protection of Historic Properties. The DAF has determined that the project is an undertaking pursuant to Section 106 and that consultation will be carried out in parallel with the NEPA process, see Enclosure 4. The project is in the "scoping phase," during which time the DAF is seeking your concurrence with the Area of Potential Effects (APE), see Enclosure 5. The APE is the same for both alternatives. We respectfully request concurrence with the APE within 60 days of receipt of this letter to align with the mandated NEPA timeline. After the scoping period, the DAF will continue consultation first on the identification of historic properties, and then on the assessment of effects to historic properties. This consultation will inform the Draft EIS analysis, and you will be notified when the Draft EIS is available for review and comment.

The DAF is committed to sustained, meaningful and respectful consultation, and appreciates your input at this early stage to inform the path forward for this undertaking and the EIS. My point of contact for this project is Mr. John Carriero, Cultural Resources Manager, who can be reached via email at john.carreiro@us.af.mil, phone at 605-385-2690, or mail at 28 CES/CIE, 2125 Scott Dr, Ellsworth AFB SD 57706. Please reach out if you have any questions or would like to discuss this project in more detail. I look forward to receiving any input you may have regarding this endeavor and our continued consultation. Thank you in advance for your assistance in this effort.

Sincerely

OAKLEY.DEREK.CHRISTIAN.1141333921

Digitally signed by OAKLEY.DEREK.CHRISTIAN.1141333921
Date: 2025.07.01 06:55:41 -06'00'

DEREK C. OAKLEY, Colonel, USAF
Commander

6 Attachments:
1. Request for Concurrence
2. Enclosure 1 - Alternative 1 Proposed Airspace Modifications
3. Enclosure 2 - Alternative 2 Proposed Airspace Modifications
4. Enclosure 3 - Public Meetings
5. Enclosure 4 - NEPA and NHPA Process Timeline
6. Enclosure 5 - Area of Potential Effect

Scoping_SHPO Sample

REQUEST FOR CONCURRENCE

The Montana SHPO **concurs** with the Area of Potential Effect (APE) for the proposed undertaking (Alternatives 1 and 2).

_____

Molly Kruckenberg Date
Director
Montana Historical Society

The Montana SHPO **does not concur** with the APE for the proposed undertaking (Alternatives 1 and 2) and provides the following comments.

_____

Molly Kruckenberg Date
Director
Montana Historical Society

Comments: _____

_____

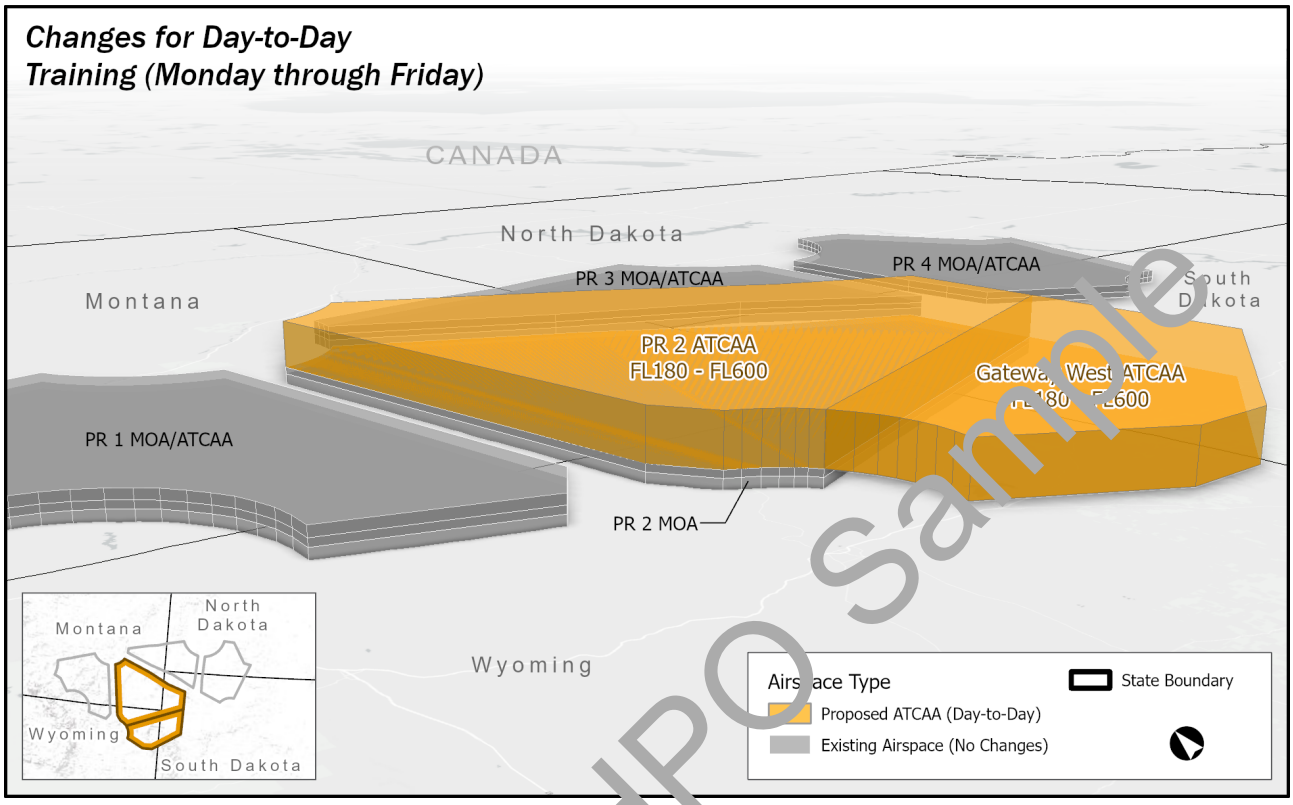
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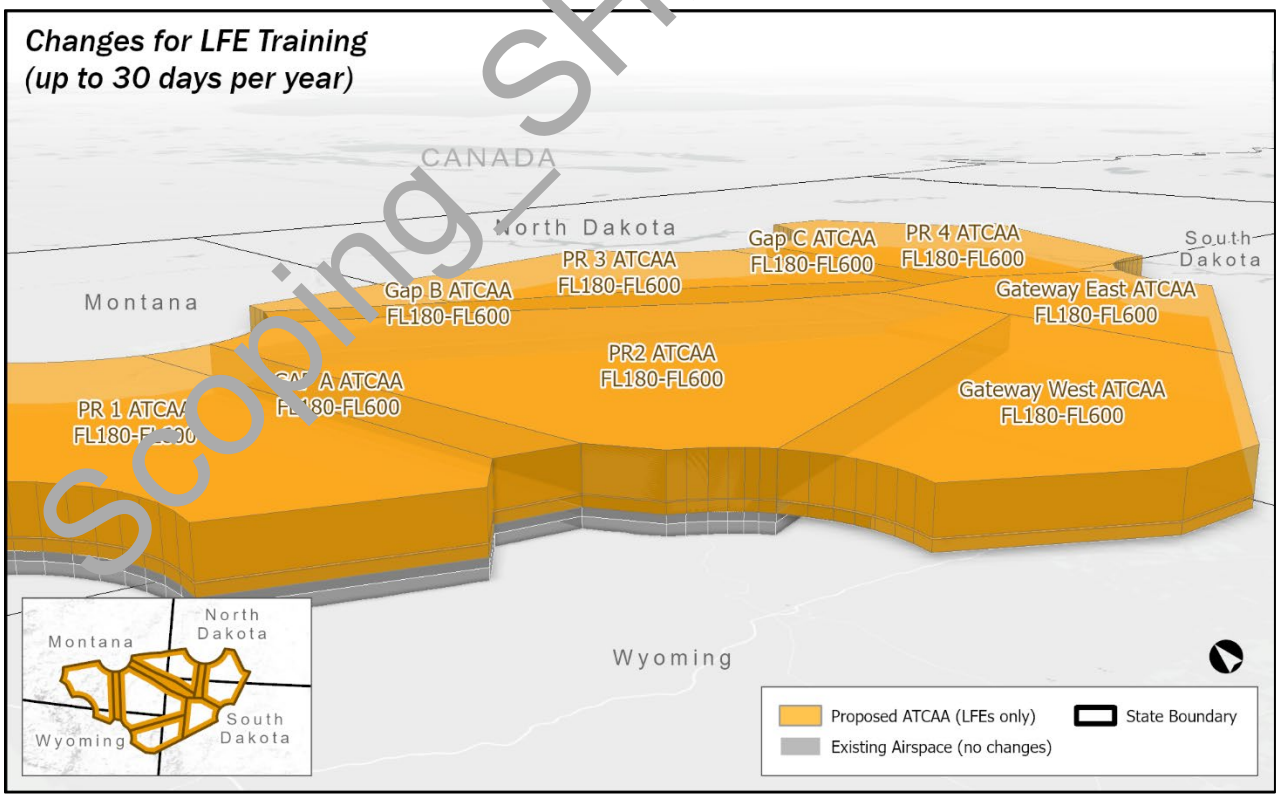
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Scoping_SHPO Sample

Enclosure 1 –Alternative 1 Proposed Airspace Modifications

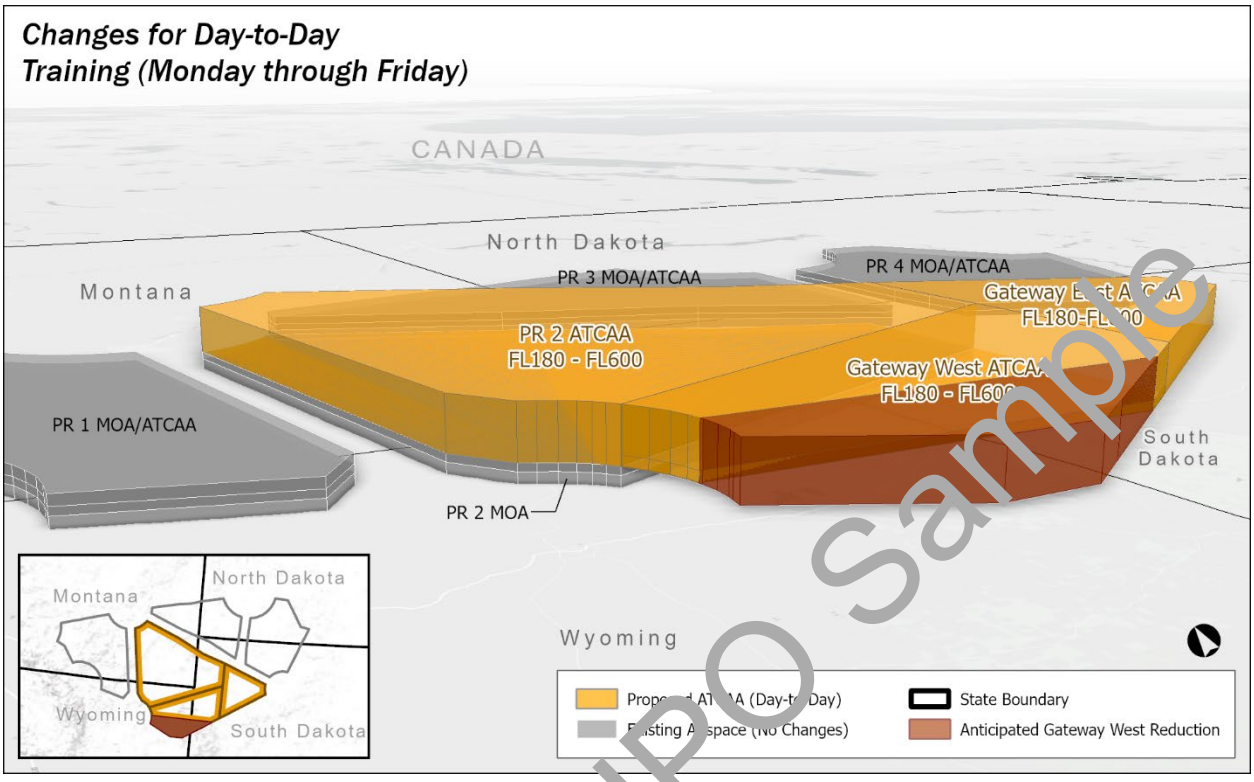


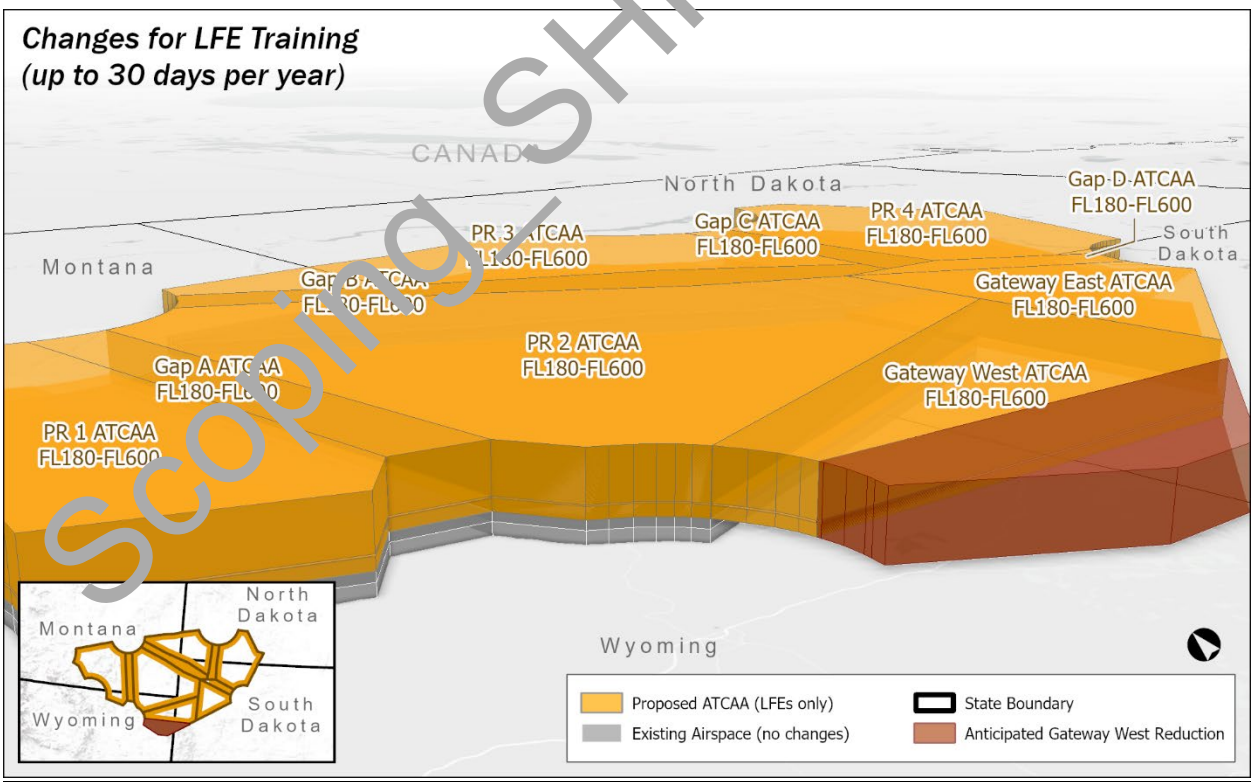


Scoping_SHPO Sample

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Enclosure 2 – Alternative 2 Proposed Airspace Modifications





Scoping – SHPO Sample

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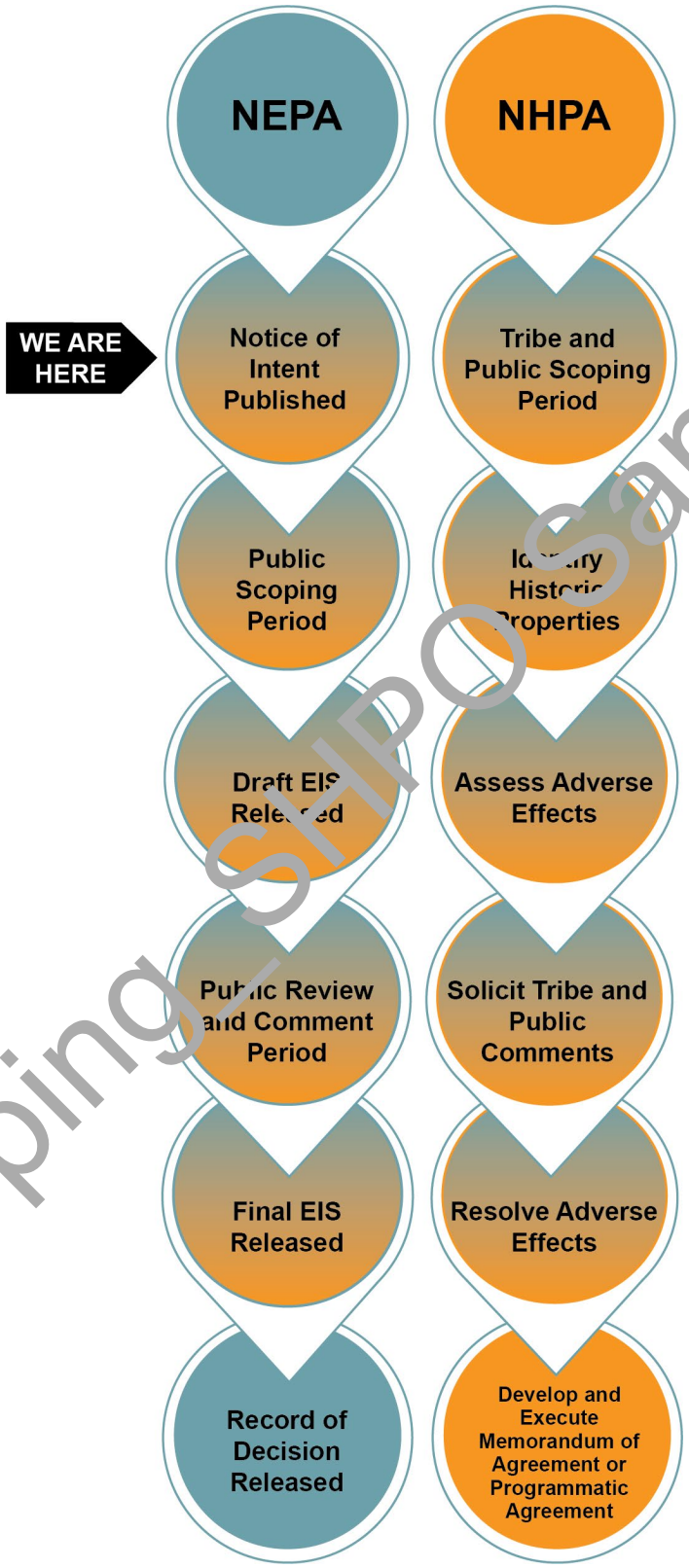
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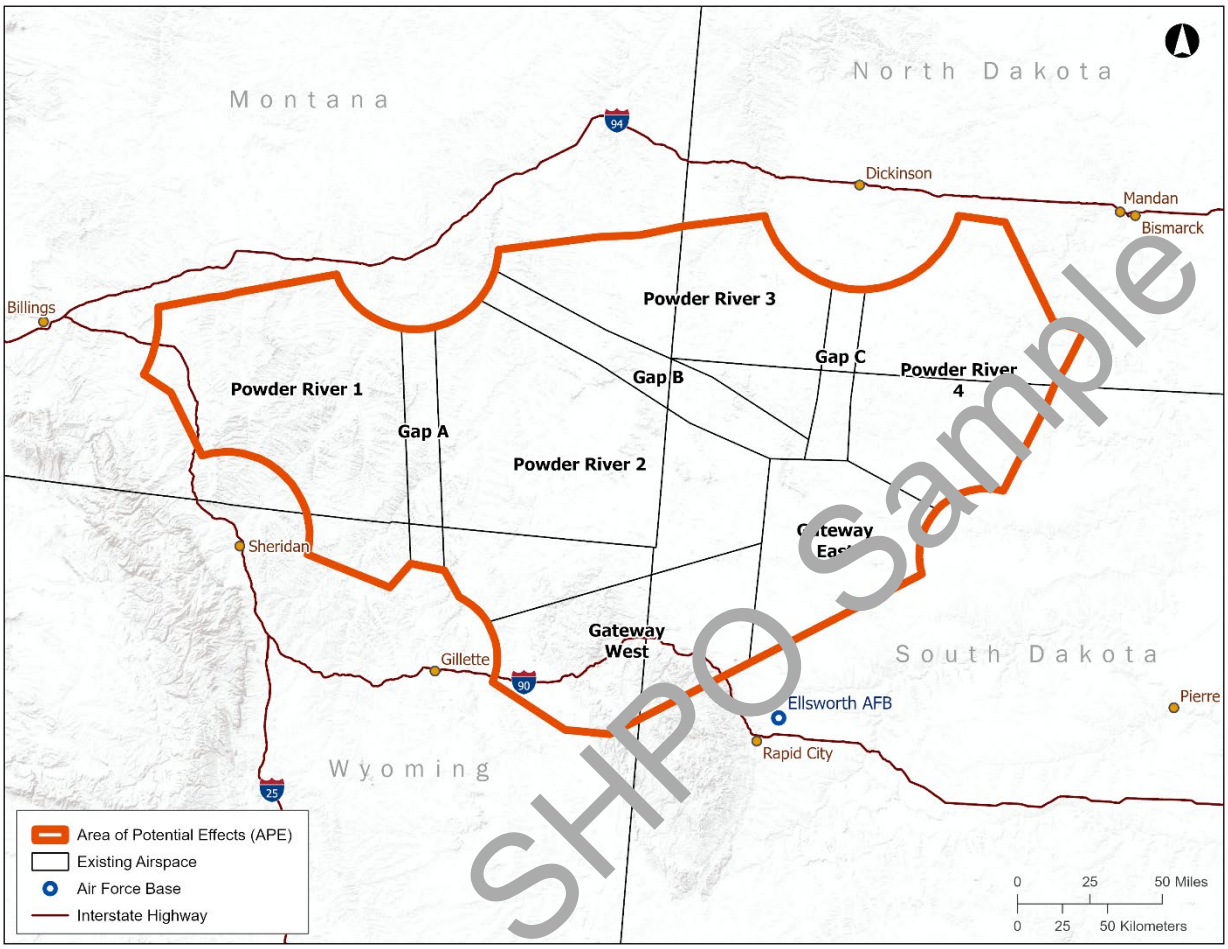
Scoping_SHPO Sample

Enclosure 4 – NEPA and NHPA Process Timeline



Scoping - SHPO sample

Enclosure 5 – Area of Potential Effects



Scoping_SHPO Sample

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 28TH BOMB WING (AFGSC)
ELLSWORTH AIR FORCE BASE SOUTH DAKOTA

Colonel Derek C. Oakley, USAF
Commander
1958 Scott Dr
Ellsworth AFB SD 57706-4710

President Gene Small
Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation, Montana
600 Cheyenne Ave
PO Box 128
Lame Deer, MT 59043

Dear President Small

Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, the Department of the Air Force (DAF) is preparing an Environmental Impact Statement (EIS) to evaluate the potential environmental impacts of addressing shortfalls in aircrew readiness in the Powder River Training Complex (PRTC). The PRTC is the training airspace used by aircrews at Ellsworth Air Force Base (AFB) and Minot AFB for day-to-day training and it is also used for Large Force Exercises (LFEs) a few times a year that bring together joint forces to participate in realistic combat training scenarios. The PRTC was originally established in 2015 and overlies parts of South Dakota, North Dakota, Wyoming, and Montana. The proposed action includes improvements to the airspace structure to address shortfalls in day-to-day training and increasing LFE capability to meet emerging threats to National Security. We encourage you to visit our project website for additional details www.PRTCairspaceEIS.com.

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Scoping – Tribes Sample

The DAF is hosting several in-person and virtual public meetings to provide information on the proposed action and the preliminary alternatives described above. We would like to invite all members of your community to attend any of these meetings as part of the NEPA process. See Enclosure 3 for a list of meeting dates and locations. We encourage you to visit the project website where you can obtain additional information about the project and preview all the materials that will be on display at the meetings.

We are requesting to initiate government-to government consultation with your community pursuant to Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations at 36 CFR Part 800, Protection of Historic Properties. The DAF has determined that the current project is an undertaking pursuant to Section 106 and that assessment will be carried out in parallel to the NEPA process, see Enclosure 4. The project is in the "scoping phase" during which time the DAF is seeking your concurrence with the Area of Potential Effects (APE), see Enclosure 5, and any information you wish to share regarding properties of traditional or cultural significance that you feel should be considered in the assessment of effects to historic properties. The assessment of effects to historic properties will be developed concurrent with the development of the Draft EIS. While there is no formal timeline for this consultation effort, we respectfully request you provide your comments or identify properties we should consider within 60 days of receipt of this letter to align with the mandated NEPA timeline (Fiscal Responsibility Act of 2023, 42 United States Code 4321 et seq.). The assessment of effects to historic properties and the Draft EIS will be provided to you for review and comment prior to any decision on the implementation of the Proposed Action.

The DAF is committed to sustained, meaningful, and respectful consultation with federally recognized Indian Tribes. My point of contact for this project is Mr. John Carriero, Cultural Resources Manager, who can be reached via email at john.carreiro@us.af.mil, phone at 605-385-2690, or mail at 28 CES/CIE, 2125 Scott Dr, Ellsworth AFB SD 57706. Please reach out if you have any questions or would like to discuss this project in more detail. Should your tribe have no further interest in this project, please let us know in writing, via email or letter. I look forward to receiving any input you may have regarding this endeavor and our continued consultation. Thank you in advance for your assistance in this effort.

Sincerely

OAKLEY.DEREK.CHRISTIAN.1141333921

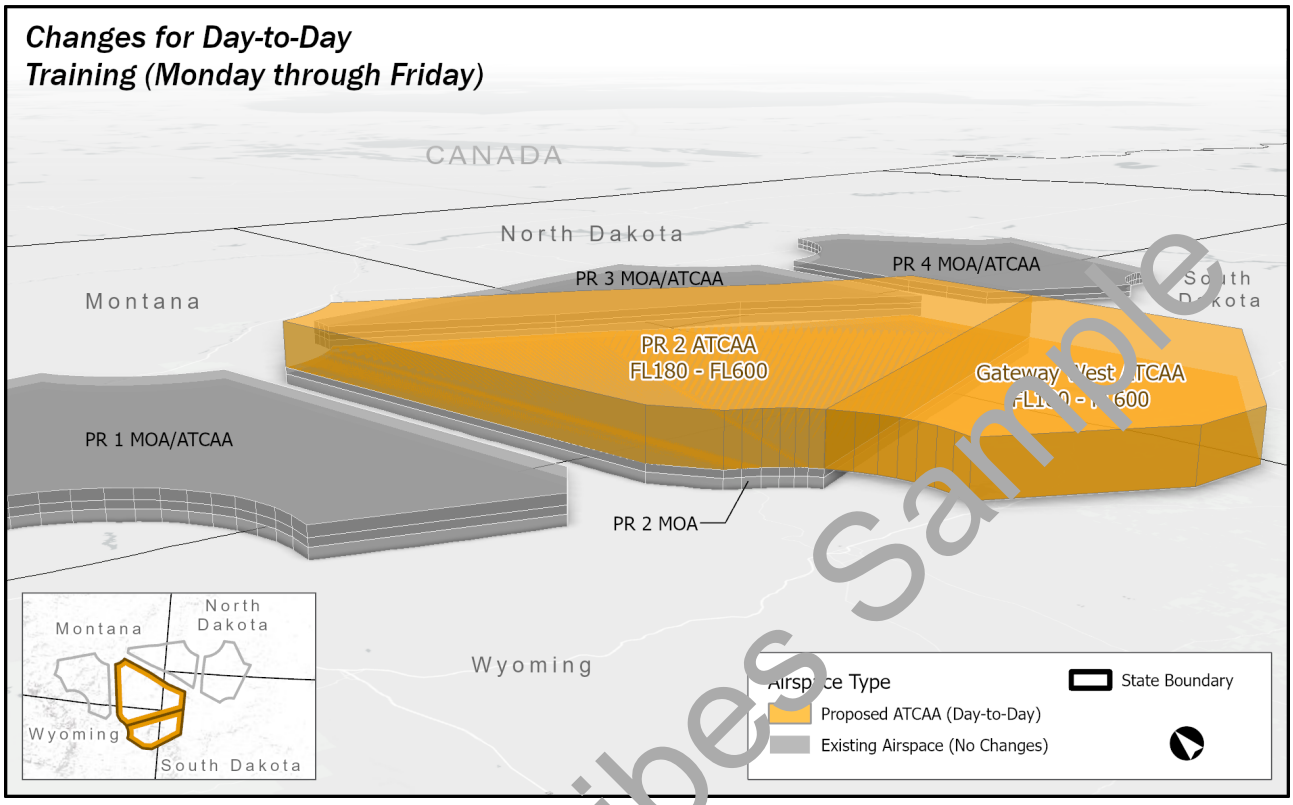
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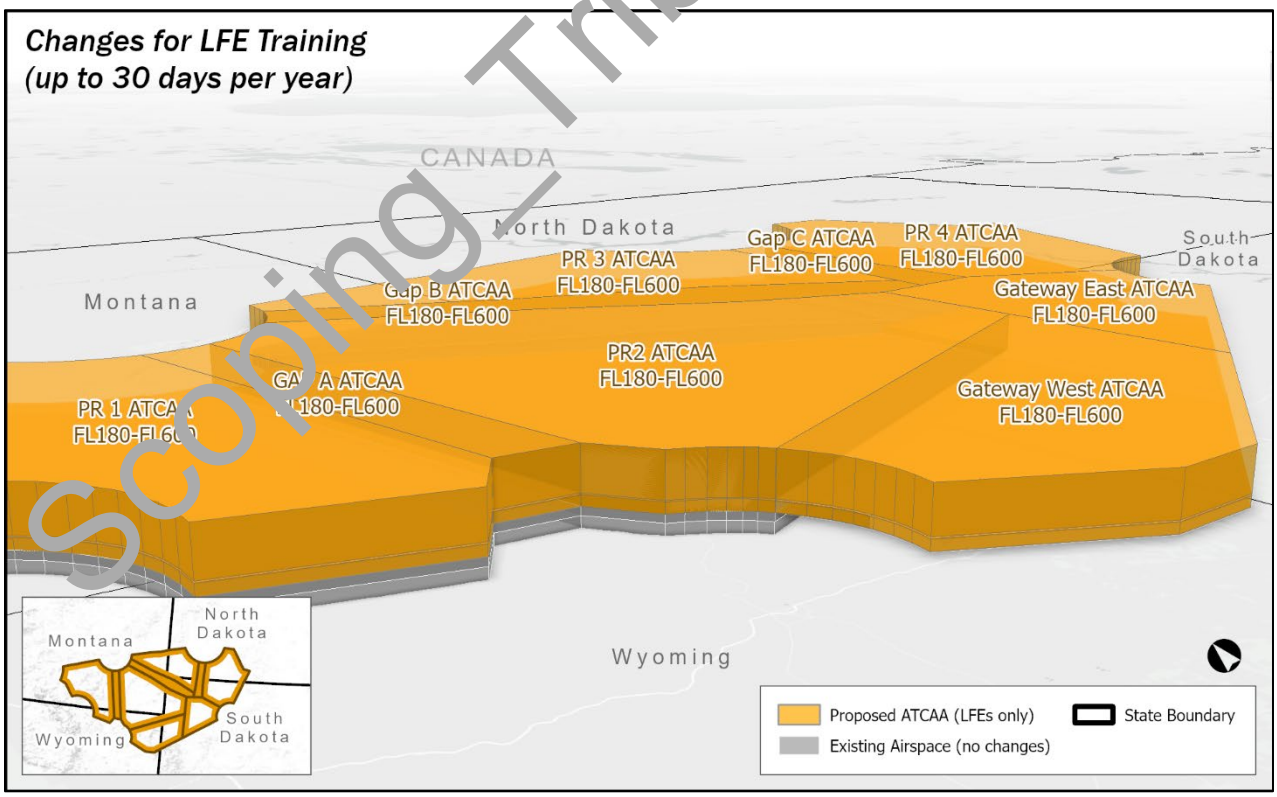
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Scoping_Tribes Sample

Enclosure 1 – Alternative 1 Proposed Airspace Modifications

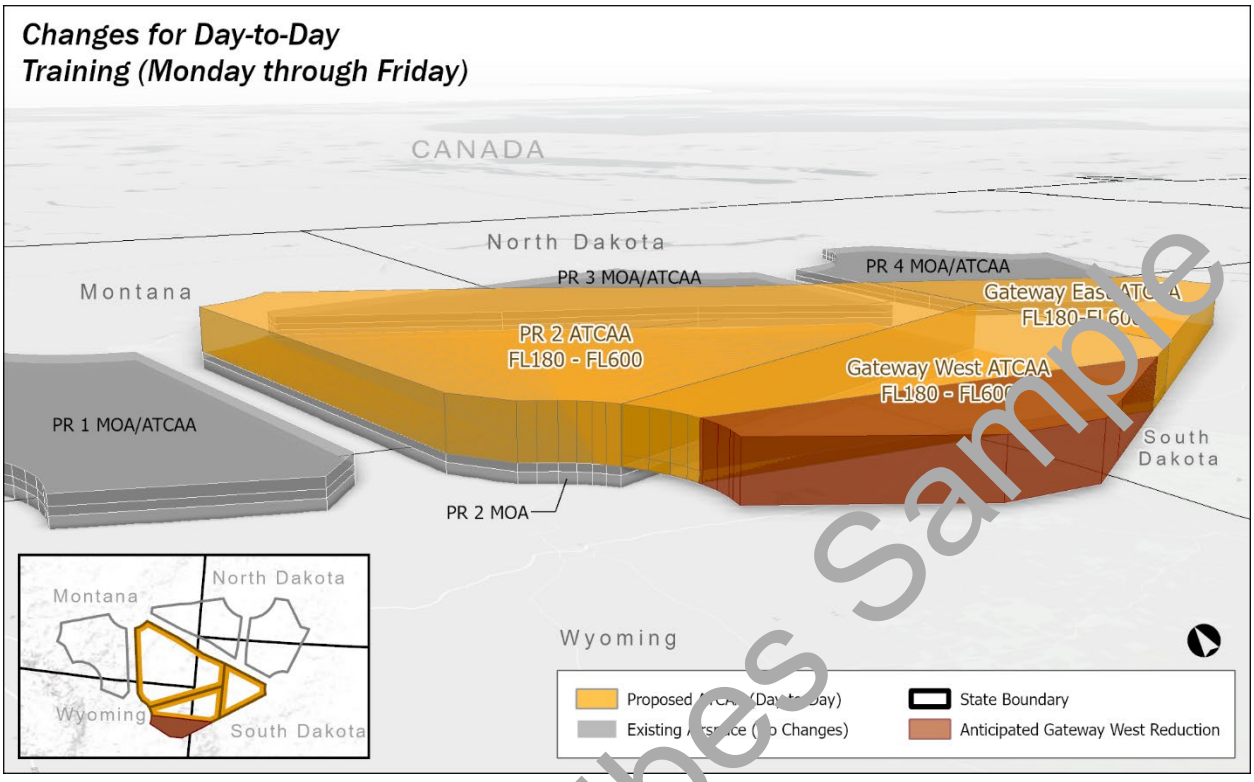


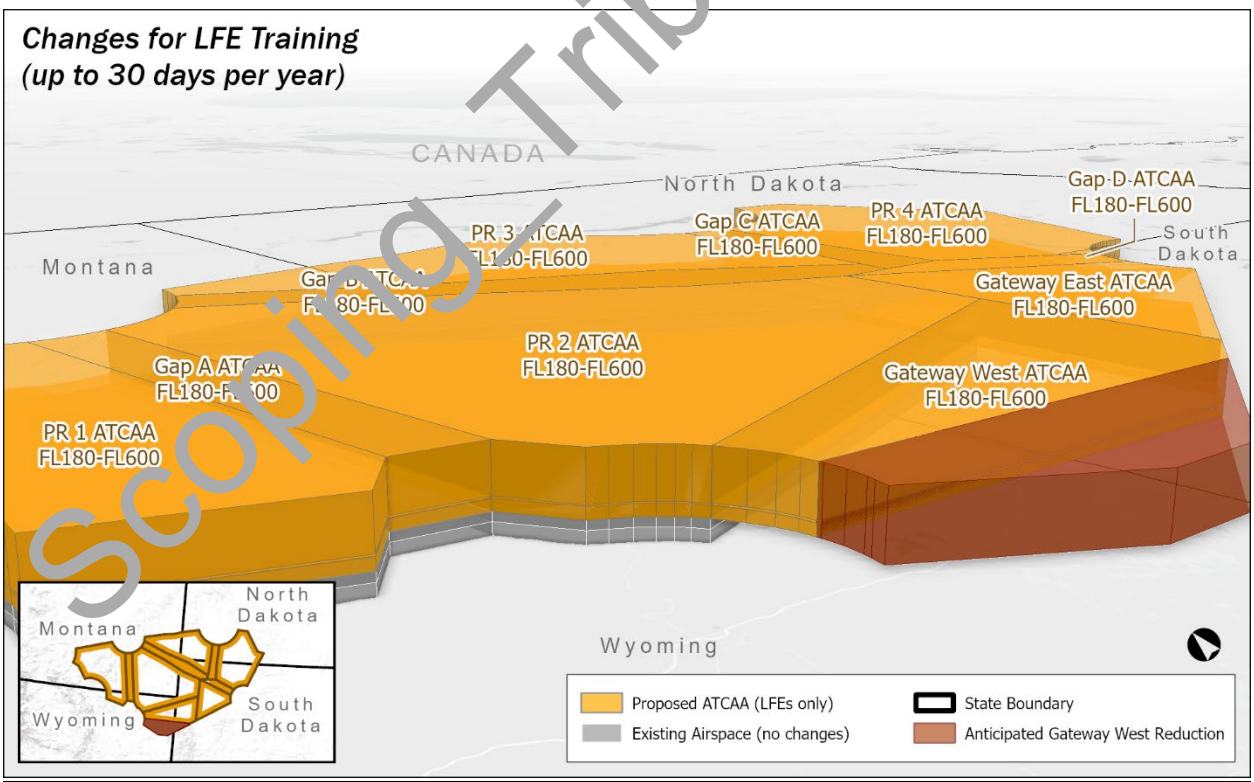


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Enclosure 2 – Alternative 2 Proposed Airspace Modifications





Scoping – Tribes Sample

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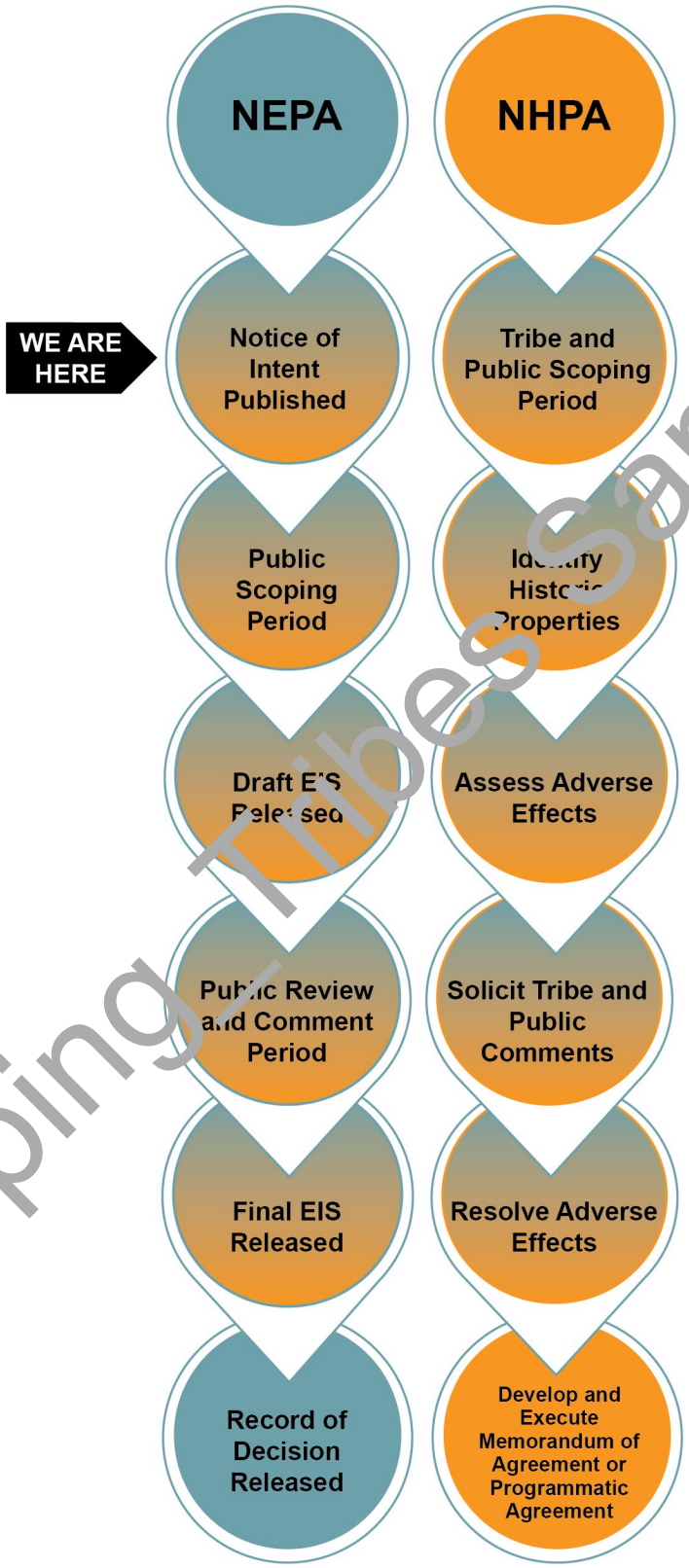
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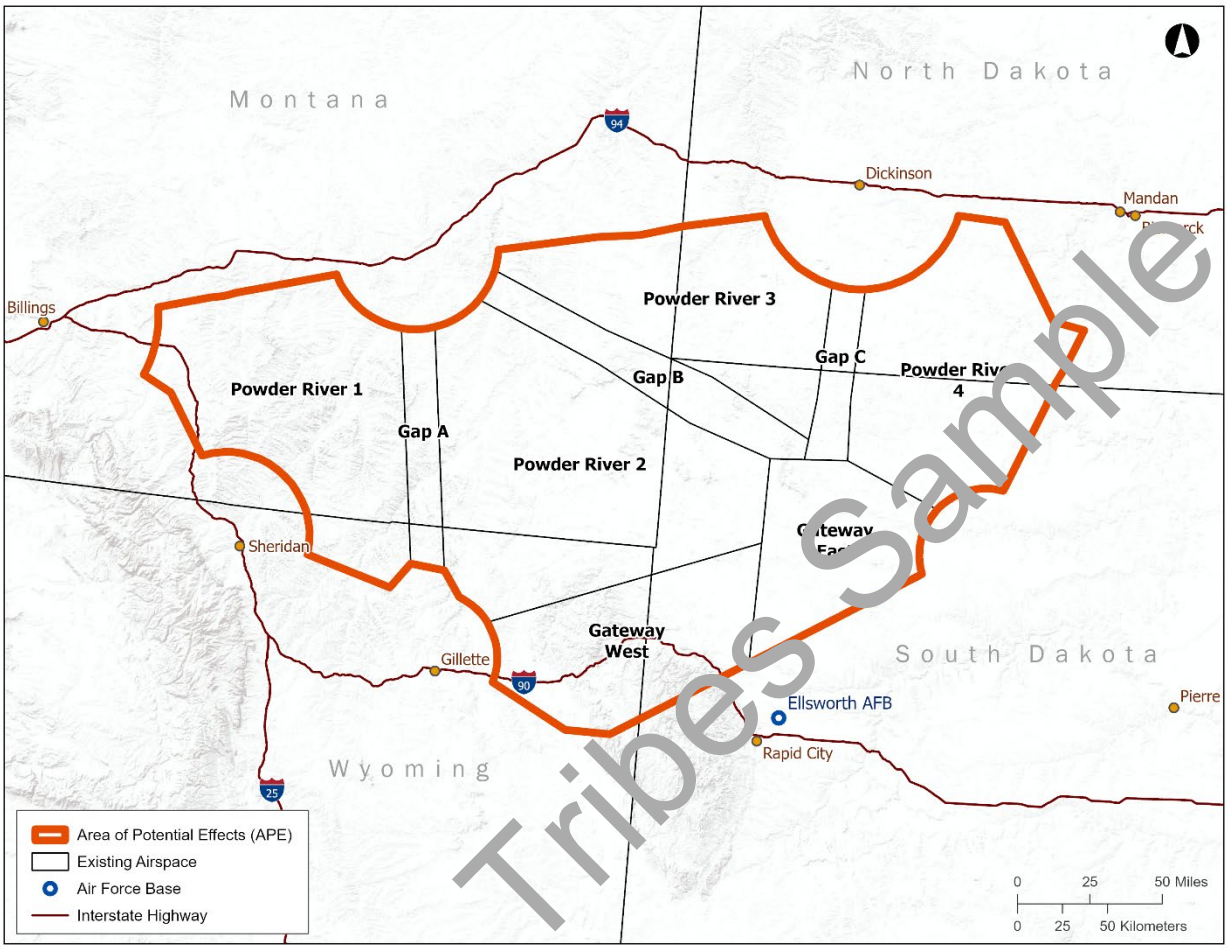
Scoping_Tribes Sample

Enclosure 4 – NEPA and NHPA Process Timeline



Scoping - Tribes Sample

Enclosure 5 – Area of Potential Effects



Scoping_Tribes Sample

ENCLOSURE C
SAMPLE NEWSPAPER ADVERTISEMENT

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NorthWestern Energy, Montana utility board dial back electricity rate increase

AMANDA EGGERT
Montana Free Press



CREDIT: AMANDA EGGERT / MTFP

Approximately 50 people gathered outside the Montana Public Service Commission headquarters in Helena on June 9, 2025, to protest NorthWestern Energy's request to collect another $156.5 million annually from its customers' base rates.

NorthWestern Energy customers will see some relief, at least temporarily, from the increased rates the utility has been charging customers for the past month and a half.

Late last month Montana's largest utility filed an electricity rate structure with state regulators seeking to replace the rate hike the company implemented in late May with a more modest increase outlined in a settlement the utility reached this spring with the Montana Consumer Counsel and about a dozen of its largest customers.

Under the new rate structure, the average Montana household using 750 kilowatts of electricity should expect to spend $115 per month on that portion of their power bill. Under the now-moot rates that NorthWestern put into place without regulators' approval in late May, that figure was $119.

NorthWestern's move to roll back some of its earlier rate increase, a possibility the company's CEO Brian Bird signaled a willingness to do last month, created confusion among the five Republican officials Montanans elected to serve on the Public Service Commission and the state employees who work at the agency. During the commission's July 1 meeting, commissioners and agency staff grappled with where utility authority ends and commission authority begins, ambiguity in Montana law for such situations and the utility's motivations for voluntarily backing off its self-implemented rate hike.

The rate NorthWestern incorporated in customers' bills in May, without regulators' approval, relied on a little-known, rarely used state law that allows a monopoly utility to adopt its proposed rate structure if the PSC hasn't acted on its rate hike request within nine months. Under that law, the utility must refund customers any charges the commission deems excessive — with interest.

With a 3-2 vote on July 1, the commission agreed to go along with NorthWestern's proposal to replace the self-implemented rates with the ones outlined in the settlement. Commissioners Jeff Welborn and Anne "Annie" Bukacek followed the lead of commission Vice President Jennifer Fielder in adopting the recommendation of Lucas Hamilton, the agency's top lawyer.

After outlining the legal questions at play and the applicability of a somewhat similar scenario involving a water and wastewater utility in Big Sky named HLH, Hamilton told commissioners at their morning business meeting that maintaining higher rates that even the utility no longer wants would be an "absurd result" and called for the commission to deem the settlement rates appropriate.

"In this particular circumstance, given NorthWestern's posture, given that no party in this proceeding has advocated for a rate as high as NorthWestern's originally proposed rate … I would submit to you that it is better to avoid the result where the rates are higher," Hamilton said.

Fielder moved successfully to codify that approach "so that we can see these rates reduced and see the company stop overcharging customers … effective immediately."

PSC President Brad Molnar and Commissioner Randy Pinocci voted against Fielder's motion.

Molnar argued that the commission's decision in the HLH matter was too dissimilar from the current proceedings to offer a "high-quality guide."

"The HLH case is very different from NorthWestern Energy's demand to implement a different rate to replace the current one. The stipulations were agreed to by all and never challenged by the PSC. I don't think there's a single penny in [NorthWestern Energy's] rate case that isn't contested," he said. "The [NorthWestern] rate decrease may be illusory and the increase may be simply stalled."

Molnar offered that the utility may be using the rate decrease as a "communications tool" to shore up public opinion following its unpopular self-implemented increase. He argued that the more prudent course of action would be to ratchet rates back down to the interim rates the commission signed off

More ENERGY | A16

Independent Press
Serving all of Rosebud County

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PUBLIC NOTICE

The Department of the Air Force (DAF) is preparing an Environmental Impact Statement (EIS) to analyze potential environmental impacts associated with the proposed optimization of the Powder River Training Complex (PRTC) to support aircrew training.

Proposed Action: The Proposed Action includes: (1) improvements to the airspace structure at PRTC to address shortfalls in day-to-day training for aircrews from Ellsworth and Minot Air Force Bases and (2) increasing Large Force Exercise capability at PRTC to meet threats to National Security. The PRTC airspace overlies portions of South Dakota, North Dakota, Wyoming, and Montana.

Public Comments: The DAF is soliciting comments on the preliminary alternatives, environmental and social concerns, and any other relevant information, studies, or analyses that should be considered in the development of the Draft EIS. Written comments can be submitted at in-person public meetings, online at the project website (www.PRTCairspaceEIS.com), or by mailing to: PRTC Airspace EIS, c/o Stantec, 501 Butler Farm Rd., Suite H, Hampton, VA 23666. Please submit comments by **September 9, 2025** to ensure sufficient time for consideration in the Draft EIS.

In-Person Public Meeting: An in-person public meeting in your area is identified below (please see website for full list of meetings). All meetings will be open-house style; there will not be a formal presentation; please attend at your convenience during the times listed. DAF representatives will be available to answer questions about the proposal.

July 29, 2025, 5:00 – 7:00pm
St. Labre Soaring Eagle Gymnasium
112 St. Labre Campus Dr
Ashland, MT 59003

Virtual Meeting: Virtual meetings will be held on August 19, 20, and 21, 2025. Please visit the project website to register for a virtual meeting.

APPENDIX C
AIRSPACE IMPACT ANALYSIS

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ACRONYMS AND ABBREVIATIONS

ADS-B	Automatic Dependent Surveillance Broadcast
AGL	Above Ground Level
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
ATS	Air Traffic Service
CFA	Controlled Firing Area
CFR	Code of Federal Regulations
DAF	Department of the Air Force
DoD	Department of Defense
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
FAF	Final Approach Fix
FAR	Federal Aviation Regulations
FL	Flight Level
GA	General Aviation
GPS	Global Positioning System
IAF	Initial Approach Fixes
IAP	Instrument Approach Procedure
IFR	Instrument Flight Rules
ILS/LOC	Instrument Landing System/Localizer
IR	Instrument Route
JO	Joint Order
KTAS	Knots True Airspeed
L/MF	Low/Medium Frequency
MOA	Military Operations Area
MSL	Mean Sea Level
MTR	Military Training Route
NAS	National Airspace System
NAVAID	Navigational Aid
NM	Nautical Mile
NOTAM	Notice to Airmen
NSA	National Security Area
PDARS	Performance Data Analysis and Reporting System
RNAV	Area Navigation
ROI	Region of Influence
SUA	Special Use Airspace
U.S.	United States
USC	United States Code
VFR	Visual Flight Rules
VOR	Very High Frequency Omnidirectional Range
VR	Visual Route

1.0 INTRODUCTION

1.1 NATIONAL AIRSPACE SYSTEM

The National Airspace System (NAS) is a network of two categories of airspace. Regulatory airspace is an airspace that is governed specifically by the formal rules within Federal Aviation Regulations (FAR) Part 73, whereas non-regulatory airspace generally relies on advisories and warnings. Within these categories, there are four types of airspace: controlled airspace, uncontrolled airspace, special use airspace (SUA), and other airspace. The category and type of airspace is determined by the complexity and density of aircraft movements, the nature of the operations conducted within the airspace, the level of safety required, and national and public interest. The NAS also includes air navigation facilities, equipment and services, airports and landing areas, aeronautical charts, information and services, rules and regulations, procedures and technical information, and manpower and material (Federal Aviation Administration [FAA] 2025a). Airspace management and use considers how airspace is designated, used, and administered in a manner that best accommodates the individual and common needs of military, commercial, general aviation, and other users of the airspace.

In the United States (U.S.), airspace is managed and controlled by the FAA. The FAA is solely responsible for developing plans and policy for the use of airspace and for managing airspace in such a manner that it ensures the safety of flight and that all users of the NAS can operate in a safe, secure, and efficient manner (49 U.S. Code [U.S.C.] 40103[b]). The FAA considers multiple and sometimes competing demands for airspace in relation to airport operations, Air Traffic Service (ATS) Routes, military training airspace, and other special needs to determine how the NAS can best be structured to address all user requirements.

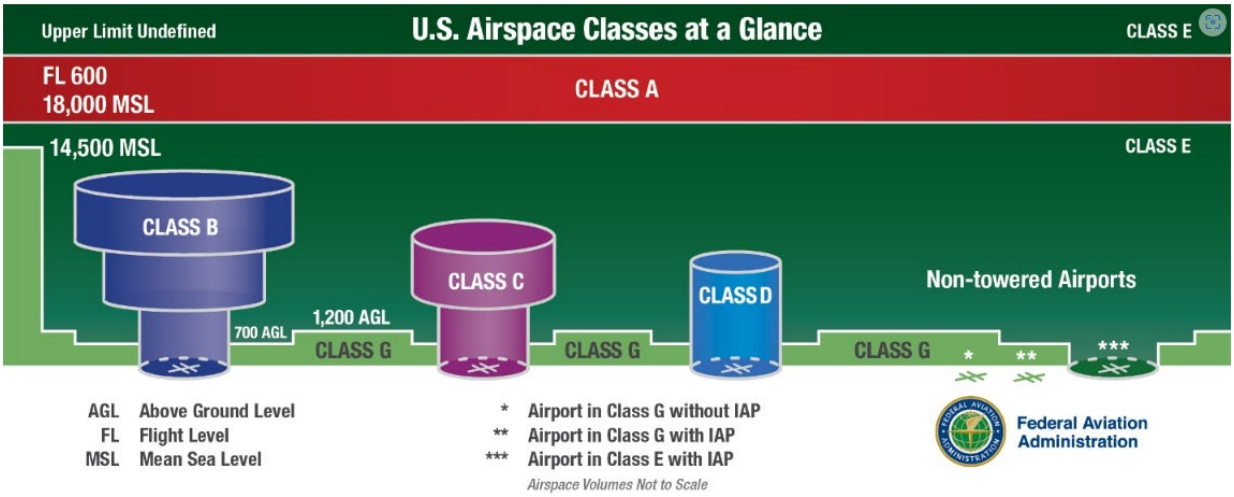
The Department of Defense (DoD) requests airspace from the FAA and schedules and uses airspace in accordance with the processes and procedures detailed in DoD Directive 5030.19, *DoD Responsibilities on Federal Aviation*, and FAA regulations. SUA identified for military and other governmental activities is charted and published by the National Aeronautical Charting Office in accordance with *FAA Order JO 7400.2R*, *Procedures for Handling Airspace Matters* (FAA 2025b). Descriptions of approved SUA, except temporary areas and controlled firing areas, are compiled and published once a year in *FAA Joint Order (JO) 7400.10G*, SUA (FAA 2025c). For military operations areas (MOAs) which overlay public use airports, there is an airspace exclusion of 1,500 feet above ground level (AGL) and below within a 3 nautical mile (NM) radius. This exclusion may be extended when necessary. If the MOA floor extends below 1,200 feet AGL over a charted private airport, coordination should be conducted with the airport operator to accommodate airport operations (FAA 2025b). Airspace designated for military use is released to the FAA when the airspace is not needed for military requirements (DoD 2023).

Procedures governing the use of training areas and airspace operated and controlled by the Department of the Air Force (DAF) are included in Air Force Policy Directive 13-2, *Air Traffic, Airfield, Airspace and Range Management* and its implementing regulations. The DAF manages airspace in accordance with processes and procedures detailed in Air Force Manual 13-201, *Airspace Management*, which also provides guidance and procedures used to develop and process SUA actions. It governs airspace management instructions on creating and maintaining airspace that allows the DAF to meet operational needs for readiness, and this includes the airspace required to support the flight training necessary to ensure pilot proficiency (DAF 2025). DAF bases supplement regulatory guidance in local flying

instructions in conjunction with letters of agreement with the FAA, which expand guidance for operations within this airspace.

1.2 AIRSPACE CLASSIFICATION

Airspace is a three-dimensional resource defined by latitude, longitude, and altitude. There are six classes of airspace, A, B, C, D, E (controlled), and G (uncontrolled) that are available to all users (civilian and military) (**Figure 1.2-1**). The airspace classes dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace (**Table 1.2-1**).



Legend: IAP = Instrument Approach Procedure

Figure 1.2-1 Airspace Classification

Controlled airspace is airspace of defined dimensions within which air traffic control (ATC) service is provided to support airport operations and en route transit from place to place (FAA 2025d). Controlled airspace is categorized into five classes, Classes A through E.

Uncontrolled airspace is designated as Class G airspace. Within the Continental U.S. and out to 12 NM offshore, Class G airspace includes all airspace up to 14,500 feet mean sea level (MSL) that has not been designated as Class A, B, C, D, or E. Class G airspace has no specific prohibitions associated with its use. Class G airspace is described as uncontrolled because there are no entry requirements, and ATC service is not guaranteed.

Table 1.2-1 Airspace Classification Requirements

Airspace	Class A	Class B	Class C	Class D	Class E	Class G
General Definition	Controlled airspace from 18,000 feet MSL up to and including FL600.	Controlled airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of each Class B airspace area is individually tailored and consists of a surface area and two or more layers.	Although the configuration of each Class C airspace area is individually tailored, the airspace usually consists of a 5 NM radius core surface area of controlled airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower and are serviced by radar approach control.	Controlled airspace that extends upward from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower.	Controlled airspace designated to serve a variety of terminal or en route purposes. Class E airspace is often designated for an airport where instrument procedures exist without the presence of a control tower and as extensions to Class B, C, D, and E surface areas.	Uncontrolled airspace that has not been designated as Class A, B, C, D, or E.
Entry Requirements	Air Traffic Control Clearance	Air Traffic Control Clearance	Two-way communication with Air Traffic Control/Control Tower, an operable radar beacon transponder with automatic altitude reporting capability and operable ADS-B Out equipment.	Two-way radio communication is established with the Air Traffic Control facility providing services.	No specific requirement.	None
Two-Way Radio Communication	Required	Required	Required	Required	Required only under IFR flight plan[1].	Not required[1]

Airspace	Class A	Class B	Class C	Class D	Class E	Class G
VFR Visibility Minimum[2]	NA	3 SM	3 SM	3 SM	Below 10,000 feet MSL 3 SM At or above 10,000 feet MSL: 5 SM	Below 1,200 feet AGL (regardless of MSL): Day: 1 SM; Night: 3 SM; Above 1,200 feet AGL and less than 10,000 feet MSL: Day: 1 SM; Night: 3 SM More than 1200 feet AGL and at or above 10,000 MSL: 5 SM.
Traffic Advisories	Yes	Yes	Yes	Workload Permitting	Workload Permitting	Workload Permitting

Notes: [1]Unless a temporary tower is present.
[2]Minimum distance from clouds varies by airspace class and altitude.
Legend: ADS-B = Automatic Dependent Surveillance-Broadcast; AGL = Above Ground Level; FL = Flight Level; IFR = Instrument Flight Rules; MSL = Mean Sea Level; NA = Not Applicable; NM = Nautical Mile; SM = Statute Mile; VFR = Visual Flight Rules.
Source: FAA 2025d.

The airspace described above, and in **Figure 1.2-1** (except Class G airspace) is regulatory. Non-regulatory airspace includes MOAs, warning areas, alert areas, controlled firing areas and national security areas. Within these two categories of airspace, there are four subcategories, controlled, uncontrolled, SUA and other airspace (FAA 2025d).

1.3 GENERAL FLIGHT RULES AND RESOURCES

There are specific operational requirements for each class of airspace. Some airspace, such as Class A, requires users to operate under instrument flight rules (IFR), while other airspace allows for visual flight rules (VFR), and in many cases IFR/VFR operate within the same space. The FAA produces charts and publications to guide civil and military flights within the NAS. Aviators can find specific information on airspace and regulatory requirements in VFR/IFR Navigation Charts, Planning Charts, and a variety of supplementary charts and publications (FAA 2025d). These aeronautical charts depict information necessary for flight operations, such as ATS routes (victor airways and jet routes), military training routes (MTRs), aerial refueling tracks, public and private airports, and available aids to navigation.

FAA JO 7110.65BB, *Air Traffic Control*, establishes procedures and phraseology for use by personnel who provide ATC services within the NAS (FAA 2025e). The primary purpose of the ATC system is to prevent a collision involving aircraft operating in the NAS. The ATC system is designed to give first priority (duty priority) to separating aircraft, issuing safety alerts, and providing support to national security and homeland defense activities. Behind duty priority is the ATC system's operational priority, which provides service to aircraft on a "first come, first served" basis with the following exceptions (list is not all inclusive): aircraft in distress, air ambulance flights, presidential aircraft and support elements,

active air defense missions and other national security related flights, and flight check aircraft (FAA 2025e).

1.4 SPECIAL USE AIRSPACE

SUA is an airspace of defined dimensions where activities must be confined due to their nature and where limitations are imposed on aircraft operations that are not a part of those activities (non-participating aircraft). This airspace is defined by designated altitude ceilings and floors and horizontal boundaries described in geographic coordinates. Prohibited and restricted areas are regulatory SUA. Warning areas, MOAs, alert areas, controlled firing areas (CFAs), and national security areas (NSAs) are nonregulatory SUA. Brief descriptions of SUA are below. Full descriptions (except CFAs) are contained in aeronautical charts and in *FAA JO 7400.10G* (FAA 2025c).

1.4.1 Types of Special Use Airspace and Air Traffic Control Assigned Airspace

1.4.1.1 Alert Areas

Alert areas are depicted on aeronautical charts to inform non-participating pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity. Pilots should be particularly alert when flying in these areas. All activity within an alert area must be conducted in accordance with Code of Federal Regulations (CFR), without waiver, and pilots of participating aircraft, as well as pilots transiting the area, must be equally responsible for collision avoidance (FAA 2025d).

1.4.1.2 Controlled Firing Area (CFA)

CFAs contain activities which, if not conducted in a controlled environment, could be hazardous to non-participating aircraft. The distinguishing feature of the CFA, as compared to other SUA, is that its activities are suspended immediately when spotter aircraft, radar, or ground lookout positions indicate an aircraft might be approaching the area. There is no need to chart CFAs since they do not cause a non-participating aircraft to change its flight path (FAA 2025d).

1.4.1.3 Military Operations Area (MOA)

MOAs consist of airspace with defined vertical and lateral limits established for the purpose of separating certain military training activities from IFR traffic. Whenever a MOA is being used, non-participating IFR traffic may be cleared through a MOA if IFR separation can be provided by ATC. Otherwise, ATC reroutes or restricts non-participating IFR traffic. VFR traffic, which is permitted up to 18,000 feet, is not prohibited from flying within an active MOA and does so at their own risk (FAA 2025d).

1.4.1.4 National Security Area (NSA)

NSAs consist of airspace of defined vertical and lateral dimensions established at locations where there is a requirement for increased security and safety of ground facilities. Pilots are requested to voluntarily avoid flying through NSA. When it is necessary to provide a greater level of security and safety, flight in NSAs may be temporarily prohibited by regulation under the provisions of 14 CFR section 99.7. Regulatory prohibitions will be issued by System Operations Security and disseminated via Notice to Airmen (NOTAM) (FAA 2025d).

1.4.1.5 Prohibited Area

Prohibited areas contain airspace of defined dimensions identified by an area on the surface of the earth within which the flight of aircraft is prohibited. Such areas are established for security or other reasons associated with the national welfare. These areas are published in the *Federal Register* and are depicted on aeronautical charts (FAA 2025d).

1.4.1.6 Restricted Area

Restricted areas consist of airspace with defined vertical and lateral limits within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Activities in these areas must be confined because of their nature or limitations imposed upon aircraft operations that are not part of those activities or both. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft, such as artillery firing, aerial gunnery, or guided missiles (FAA 2025d).

1.4.1.7 Warning Area

A warning area is airspace of defined dimensions, extending from 3 NM outward from the coast of the U.S., that contains activity that may be hazardous to non-participating aircraft. The purpose of such warning areas is to warn non-participating pilots of the potential danger. A warning area may be located over domestic or international waters or both (FAA 2025d).

1.4.1.8 Air Traffic Control Assigned Airspace (ATCAA)

ATCAA is airspace of defined vertical and lateral limits, assigned by ATC, for the purpose of providing air traffic segregation between the specified activities being conducted within the assigned airspace and other IFR traffic. ATCAAs are not classified as SUA and are not published on aeronautical charts but rather designated in a Letter of Agreement with the FAA. An ATCAA can be used for the same types of activities as a MOA and usually overlays a MOA within Class A airspace (18,000–60,000 feet). Non-military aircraft may fly in ATCAA during military training so long as ATC can maintain IFR separation from military aircraft; only non-hazardous military activities may be undertaken in an ATCAA (FAA 2025d).

1.4.2 SUA Scheduling and Activation

Several different terms are used to describe the use of the SUA at various times during the day. The definitions are below and illustrated in **Figure 1.4-1**, which shows how these terms apply to use of a SUA during a notional day. In this example, SUA refers to MOAs. The FAA annually publishes a listing of regulatory and non-regulatory airspace, to include the times of use and the using and scheduling agency, in this case the DAF. The below scheduling and activation information is provided for baseline understanding only; individual airspaces have unique nuances and procedures defined in applicable letters of agreement that may differ from the notional schedule.

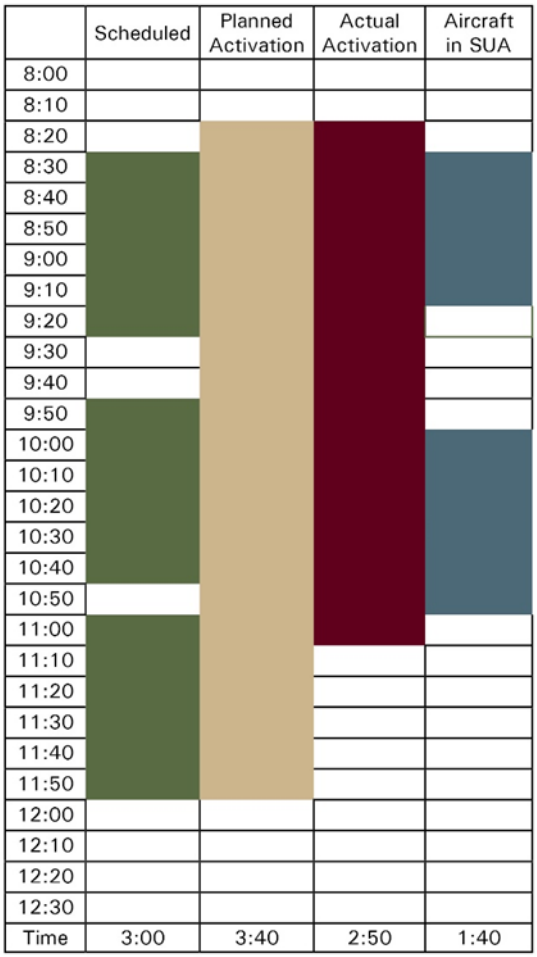


Figure 1.4-1 Notional Partial-Day Schedule for SUA

Scheduled. When a military flying unit wants to use a particular SUA, it will be scheduled ahead of time with central scheduling for discreet time blocks. For instance, in order to accomplish a particular training event, a squadron may schedule a restricted area for 1 hour, with the intent of having multiple aircraft use it for that hour. In **Figure 1.4-1**, the green bars show three separate 1-hour periods.

Planned Activation. When military users schedule a particular SUA for discreet blocks of time, with only short times in between, the airspace will generally be considered "active" during this down period. The process of returning airspace for a short period of time would generate more work for controllers while not providing appreciable benefit to potential airspace users. In the example shown in **Figure 1.4-1**, there are two short "gap" times between military scheduled use, one of 20 minutes, and one of 30 minutes. In cases like these, the planned activation time (shown as tan) will include those small gaps. It is generally more efficient for all users of the airspace to plan for airspace activation times that cover these small discreet gaps. Also note that the activation typically begins slightly before the arrival of the first military user, so essentially there should be no delay for entering into the SUA. In the example shown in **Figure 1.4-1**, the planned activation would begin 10 minutes prior to the first user and last until the last user leaves the airspace, per the schedule. SUA activation times can be retrieved from the FAA's SUA website, https:/sua.faa.gov.

Actual Activation. This is the amount of time that the SUA is activated in real time, and accounts for any changes from the plan. In the example shown in **Figure 1.4-1**, the actual activation time is shown in maroon. The airspace is activated as planned at 8:20, 10 minutes prior to the first scheduled user's arrival in the airspace. It is kept activated (per the plan) until it is apparent that the third user, scheduled to begin at 11:00, will not be using the airspace, at which time the SUA is deactivated, and is therefore available for other uses. A cancellation of scheduled SUA time can happen for a multitude of reasons, including maintenance problems with the aircraft or weather conditions that preclude the aircraft from either flying or completing the training as planned. Actual activation of a SUA is what would restrict VFR/IFR aircraft from flying through that section of airspace.

Aircraft in SUA. This is simply the time that military aircraft are present in the activated SUA. In the example shown in **Figure 1.4-1**, aircraft presence in the SUA is shown with the blue bars. The first scheduled user arrives on time at 8:30 and departs about 10 minutes early at 9:20 (perhaps from training being complete, being low on fuel, or some other reason). The second event shown is scheduled from 9:50 until 10:50, but the aircraft arrives to the airspace late (at 10:00) and leaves per their schedule. The third event is cancelled and will not use the airspace as scheduled. When the ATC learns that the SUA will not be used as scheduled, the FAA is informed through internal coordination procedures, and the SUA deactivated. Once deactivated, ATC will allow aircraft to travel through the confines of the SUA. Non-participating aircraft will be rerouted or vectored by ATC to ensure approved separation exits. Aircraft using a MEDEVAC callsign are afforded priority handling where the MOA would be required to go "cold" to allow a transition through. Emergency aircraft have the right-of-way over all other air traffic and would also have the MOA go "cold" to allow a transition. The pilot of civil aircraft should always plan for deviations around active MOAs.

In summary, **Figure 1.4-1** shows four different schedule terms commonly used when discussing the use of SUA. In this example, the hypothetical SUA was "scheduled" for 3 hours. It was planned to be activated for a single long block of 3 hours, 40 minutes. Its actual activation time (in real time) was just 2 hours and 50 minutes. During actual activation, there were military aircraft actively present in the MOA for an hour and 40 minutes. This section and **Figure 1.4-1** highlight that aircraft are not present for the full published times of use. Aircraft presence will vary on any given day depending on the training event.

1.4.3 SUA General Operating Procedures

Operations within SUA are generally conducted under VFR and with some IFR exceptions. MOAs, for instance, are established to separate certain military activities from IFR traffic. Non-participating IFR traffic may be cleared through the airspace if ATC can provide IFR separation. Pilots operating under VFR are not prohibited from transiting an active MOA but should exercise extreme caution when military activity is being conducted. Pilots can request the status of a MOA by contacting the flight service stations within 100 miles of the area or by contacting the using or controlling agency (FAA 2025d). Additionally, the FAA maintains an informational SUA website to assist pilots and aircrew with flight planning and familiarization (FAA 2025f).

1.5 AIR TRAFFIC SERVICE (ATS) ROUTES AND OTHER ROUTING PROCEDURES

ATS routes are specified routes designed to channel the flow of air traffic as necessary for the safe and efficient management of air traffic operations (FAA 2025b). Domestic ATS routes are defined in 14 CFR

section 71.13*, Classification of Air Traffic Service (ATS) Routes*. Route designators and significant points defining the routes are listed in FAA Order JO 7400.11*, Airspace Designations and Reporting Points*.

1.5.1 Low Altitude ATS Route Structure

The published low altitude route structure in the U.S. consists of Very High Frequency Omnidirectional Range (VOR) Federal airways, Low/Medium Frequency (L/MF) Federal airways, and low altitude area navigation (RNAV) routes. The low altitude route structure is for use from 1,200 feet above the surface (or in some instances higher) up to, but not including, 18,000 feet MSL. Applicable elements of the low altitude ATS route structure are published on the IFR Enroute Low Altitude-U.S. chart series. Low altitude routes are designated as Class E airspace (FAA 2025g).

1.5.1.1 VOR Federal Airways

The VOR Federal Airway system is an air traffic system based on a series of ground-based line-of-sight VOR navigational aids (NAVAIDs) that serve as a type of omnidirectional beacon and are spaced no greater than 80 NM apart. VOR Federal Airways are typically depicted in black on aeronautical charts and identified by a "V" followed by the airway number (i.e., V12). As such, these routes are commonly referred to as "Victor" routes (FAA 2025g).

1.5.1.2 L/MF Federal Airways

L/MF Federal Airways are predicated solely on L/MF NAVAIDs and are depicted in brown on aeronautical charts. L/MF routes are identified by a color name and number (i.e., Amber One) and are therefore regularly referred to as colored airways. Green and Red airways are plotted east and west. Amber and Blue airways are plotted north and south. Segments of L/MF airways are used to supplement VOR Federal Airways in Alaska. This is due to the rugged terrain characteristics coupled with line-of-sight limitations of VOR NAVAIDS. The result is that L/MF NAVAIDs provide greater reliability to transmit signals over longer distances in such instances (FAA 2025g).

1.5.1.3 Low Altitude RNAV Routes

RNAV is a method of navigation that permits aircraft operation on any desired flight path within the coverage of ground-based or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these. In the future, there will be a continued increase in dependence on the use of RNAV in lieu of routes defined by ground-based navigation aids (FAA 2025d). Low altitude RNAV routes, also known as T-routes, are normally depicted in blue on aeronautical charts and identified by the letter "T" (i.e., T205). T-routes are available for use by Global Positioning System (GPS) or GPS/Wide Area Augmentation System (WAAS) equipped aircraft (FAA 2025g).

1.5.2 High Altitude ATS Route Structure

The published high altitude route structure in the U.S. consists of jet routes and high altitude RNAV routes. The high-altitude route structure is for use at and above 18,000 feet MSL. Applicable elements of the high altitude ATS route structure are published on the IFR En Route High Altitude-U.S. chart series. The high-altitude route structure is contained within Class A airspace (FAA 2025g).

1.5.2.1 Jet Routes

The jet route system consists of jet routes established from 18,000 feet MSL to Flight Level (FL) 450 inclusive. Jet routes are depicted in black on aeronautical charts and are identified by a "J" (Jet) followed by the airway number (i.e., J12). Jet routes, like VOR airways, are based on VOR NAVAIDs, except in Alaska, where again they may be supplemented by L/MF NAVAIDs (FAA 2025g).

1.5.2.2 High Altitude RNAV Routes (Q-Routes)

RNAV routes are also available in the high-altitude structure. In this case, RNAV routes are typically labeled with the letter "Q" followed by the airway number (i.e., Q13) and therefore are commonly referred to as Q-routes. These Q-routes are available for use by RNAV equipped aircraft between 18,000 feet MSL and FL450 inclusive. Q-routes are depicted in blue on En Route High-Altitude Charts (FAA 2025g).

1.5.3 Other Routes

1.5.3.1 Military Training Routes

Among the wide variety of tactics toward which the military services must train, is "low level" combat tactics proficiency. The required maneuvers and high speeds are such that they may occasionally make the see-and-avoid aspect of VFR flight more difficult without increased vigilance in areas containing such operations. In an effort to ensure the greatest practical level of safety for all flight operations, the MTR program was conceived. The routes above 1,500 feet AGL are developed to be flown, to the maximum extent possible, under IFR. The routes at 1,500 feet AGL and below are generally developed to be flown under VFR. Generally, MTRs are established below 10,000 feet MSL for operations at speeds in excess of 250 knots. IFR MTRs, annotated by IR (for Instrument Route) followed by three or four characters (i.e., IR1206) are utilized for operations conducted in accordance with IFR regardless of weather conditions. VFR MTRs, annotated by VR (for Visual Route) followed by three or four characters (i.e., VR1207) are utilized for operations conducted in accordance with VFR except flight visibility must be 5 miles or more; and flights must not be conducted below a ceiling of less than 3,000 feet AGL. Both are depicted on IFR En Route Low Altitude Charts and VFR Sectional Aeronautical Charts (FAA 2025d).

1.5.3.2 Published VFR Routes

Published VFR routes for transitioning around, under, and through complex airspace, such as Class B airspace, were developed through a number of FAA and industry initiatives. "VFR Flyway," "VFR Corridor," and "VFR Transition Route" have all been used when describing this type of airspace.

A VFR Flyway is defined as a general flight path not defined as a specific course, for use by pilots in planning flights into, out of, through, or near complex terminal airspace to avoid Class B airspace. An ATC clearance is NOT required to fly these routes.

The design of a few of the first Class B airspace areas provided a corridor for the passage of uncontrolled traffic. A VFR corridor is defined as airspace through Class B airspace, with defined vertical and lateral boundaries, in which aircraft may operate without an ATC clearance or communication with ATC. These corridors are, in effect, a "hole" through Class B airspace.

To accommodate VFR traffic through terminal airspace, VFR Transition Routes and Helicopter Routes were developed. These routes are defined as specific VFR flight courses. Communication with ATC

where the route transitions Class B, Class C, and/or Class D airspace is required. In addition to communication requirements, a clearance is required to operate in Class B airspace. Both routes are meant to ease coordination between pilots and controllers (FAA 2025d).

1.5.4 Terminal Procedures

1.5.4.1 Departure Procedures

Instrument departure procedures are available at certain airports that enable ease of coordination between departure control and the pilot, provide efficient departure for aircraft to their appropriate enroute structure, and most importantly provide proper obstacle clearance for pilots who abide by the procedures (FAA 2025d).

1.5.4.2 Standard Terminal Arrival (STAR) Procedures

A STAR is an ATC-coded IFR arrival route established for application to arriving IFR aircraft destined for certain airports. STARs simplify clearance delivery procedures and also facilitate transition between enroute and instrument approach procedures (IAP) (FAA 2025d).

1.5.4.3 Instrument Approach Procedures (IAP)

IAPs are based on joint civil and military criteria contained in the U.S. Standard for Terminal Instrument Procedures (TERPS.) The design of IAPs based on criteria contained in TERPS takes into account the interrelationship between airports, facilities, and the surrounding environment, terrain, obstacles, noise sensitivity, etc. Appropriate altitudes, courses, headings, distances, and other limitations are specified and, once approved, the procedures are published and distributed by government and commercial cartographers as instrument approach charts. IAPs designed to provide an IFR descent from the enroute environment to a point where a safe landing can be made, and a qualified pilot, with a properly equipped and certified aircraft that adheres to the altitudes, flight paths, and weather minimums depicted on the IAP chart or vectors and altitudes issued by the radar controller, is assured of terrain and obstruction clearance and runway or airport alignment during approach for landing (FAA 2025d).

2.0 METHODOLOGY FOR ANALYSIS

This study is focused on the proposed action as described in the Environmental Impact Statement (EIS) for the Optimization of Powder River Training Complex (PRTC). As outlined in this document, the DAF is proposing to address shortfalls in aircrew readiness by improving day-to-day training and increasing the capability of Large Force Exercises (LFEs) hosted at PRTC to meet emerging threats to National Security. The Proposed Action includes:

- Actions to improve training capability of LFEs:
  - Raise the available altitude to FL600
  - Increase the total days allowed annually from 10 days to 30 days
  - Increase duration allowed for individual LFEs from 3 days to 12 days
- Actions to improve day-to-day operations:
  - Raise the ceiling of the most used ATCAAs (PR 2, Gateway East, and Gateway West) from FL260 to FL600
  - Change times of use for PRTC to 07:00 to 00:30 (07:00 a.m. to 12:30 a.m.) Monday to Thursday, 07:00 to 18:00 (07:00 a.m. to 06:00 p.m.) Friday, and other times by NOTAM

2.1 IMPACTS TO CIVIL AIR TRAFFIC

2.1.1 Data Source

FAA's Performance Data Analysis and Reporting System (PDARS) data was used to analyze the existing civil traffic in the project's area of influence. The PDARS continuously collects flight plan and radar track data from systems located at Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control Facilities, and ATC towers. The dataset in this study is based on recorded flight data from 1 July 2024 to 1 July 2025. A full year was analyzed to adequately cover any seasonal fluctuations in use.

2.1.2 Filtering of Flight Tracks

For each proposed airspace area, historical radar-based flight tracks were analyzed to identify those that intersect the lateral and vertical boundaries during proposed times of operation. For Day-to-Day operations, the analysis assumes routine activation of the airspace in accordance with proposed times, and flight data were filtered accordingly. This filtering was designed to quantify the number of civil aircraft that would potentially be affected by airspace activation during specified days and times. While additional activation periods may be coordinated via NOTAM, the study focuses on these primary windows to ensure consistency and relevance. For LFE operations, no time filter was used, assuming the proponent would likely not keep to specific times during LFEs. In all cases, military and unidentified aircraft were excluded to isolate potential impacts to general aviation and commercial traffic.

2.1.3 Impacts on Flight and Rerouting Methodology

For each civilian flight track that intersected the proposed areas, the origin and destination airports were identified and tallied to determine the most frequently used airport pairs. While the dataset included thousands of unique origin-destination combinations-many of which occurred only once or infrequently,

the analysis was refined to include only those combinations that occurred with at least once a week frequency to ensure the results remain representative of likely affected traffic while maintaining analytical clarity. Military aircraft were excluded under the assumption that the DoD activation of the proposed SUA implies acceptance of any operational impacts to other DoD assets during periods of activation.

To evaluate the potential impact of the proposed airspace areas, point-to-point (via great-circle routing) distances were calculated for each origin-destination pair. Although these straight-line paths do not reflect actual filed or flown routes, they serve as a conservative baseline for estimating minimum flight distances and the impacts of airspace implementation along the route. In many cases, the great-circle routing did not intersect the proposed Special Activity Airspace (SAA)[1]. An analysis was conducted to identify any obvious justification for traveling through the SAA. One such case was identified, which is due to ensuring the flight remains within domestic airspace vice navigate through Canadian airspace. In such cases, an intermediate point was added to the baseline route to ensure the effects of such cases were captured. No other apparent justification for modification of baseline routes was identified.

Alternative routes were constructed to circumnavigate the SAA laterally by a given flight. Each rerouted path incorporated an intermediate NAVAID or fix guiding the aircraft around the lateral boundaries of the airspace in question. The total rerouted distance was calculated by summing the segments from origin to fix and from fix to destination, with the difference from the baseline route used to determine the effects of additional distance flown.

Flight time effects were then calculated by applying representative cruise true airspeeds (TAS). Knots True Airspeed (KTAS) was used based on the below altitude band airspeed assumptions in a zero-wind situation. The intent was for the speeds to reflect steady-state cruise conditions that are consistent with published planning:

- **300 feet AGL–14,000 feet MSL:**
    - 170 KTAS
    - Reflects a mix of general aviation, light turboprops, and climbing or descending commercial aircraft. The average was heavily weighted to account for slower speeds below 10,000 feet (120–170 KTAS).
- **10,000–14,000 feet MSL:**
    - 220 KTAS
    - Most traffic consists of fast turboprops and entry-level business jets.
- **14,000–18,000 feet MSL:**
    - 330 KTAS
    - Typical of regional jets, mid-size business jets, and potential decelerating/accelerating larger commercial aircraft.

[1] Special Activity Airspace (SAA) refers to airspace designated for operations that may cause limitations on other aircraft. In this document, the term SAA refers collectively to SUA and ATCAAs.

- **FL180 and Above:**
  - 450 KTAS
  - Consistent with domestic enroute cruise speeds for commercial and business jets.

2.2 FUEL COSTS

From a fuel-planning perspective, reroutes are generally a manageable and routine consideration, but they do introduce a small, predictable cost component in addition to added time.

Fuel costs vary widely based on aircraft type, operating weight, altitude, speed, atmospheric conditions, operator-specific procedures, and fuel prices themselves fluctuate over time and by location. Because of these inherent variables, it is not prudent to calculate or present a single total fuel cost associated with each alternative. Instead, this section is provided to describe the methodology by which additional distance can be translated into additional time, fuel burn, and cost, allowing individual operators to assess potential impacts using parameters that reflect their specific aircraft, operating profile, and fuel pricing assumptions.

When an aircraft is required to fly additional distance at cruise, that added distance translates into additional time at a known speed, which directly results in increased fuel burn and fuel cost. While the per-flight impact is typically modest, it is accounted for to ensure the full scope of operational and cost effects is understood.

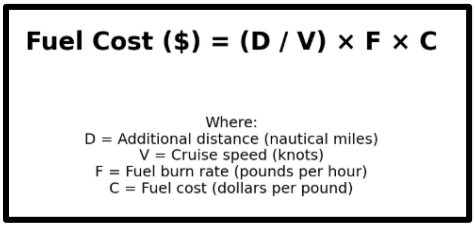


Figure 2.1-1 Basic Fuel Cost Calculation

Example A: An airliner cruising at FL300 at approximately 450 KTAS that is required to fly an additional 37.5 nautical miles would incur about five minutes of additional flight time. Using a representative narrowbody cruise fuel burn of approximately 5,000 pounds per hour, five minutes of additional flight results in roughly 420 pounds of additional fuel consumed, which equates to an incremental fuel cost of approximately $525 per occurrence, assuming a fuel cost of $1.25 per pound.

Example B: A single-engine aircraft operating at approximately 2,500 feet MSL and 120 KTAS that flies an additional 10 nautical miles would also incur about five minutes of additional flight time. At an average fuel burn of approximately 10 gallons per hour, this equates to about five pounds of additional fuel consumed, resulting in an incremental fuel cost of approximately $6 per occurrence at $1.25 per pound.

2.3 AIRPORTS IN THE REGION OF INFLUENCE

FAA air traffic controllers are responsible for ensuring the safe flight of aircraft through the NAS. Requirements for reporting airport aircraft operations are detailed in FAA JO 7210.55G, *Operational Data Reporting Requirements* (FAA 2017). This analysis uses airport data operations reported to the FAA as the basis for analyzing the potential effects on aircraft operations at airports located beneath, or in close proximity to the existing and proposed SUA.

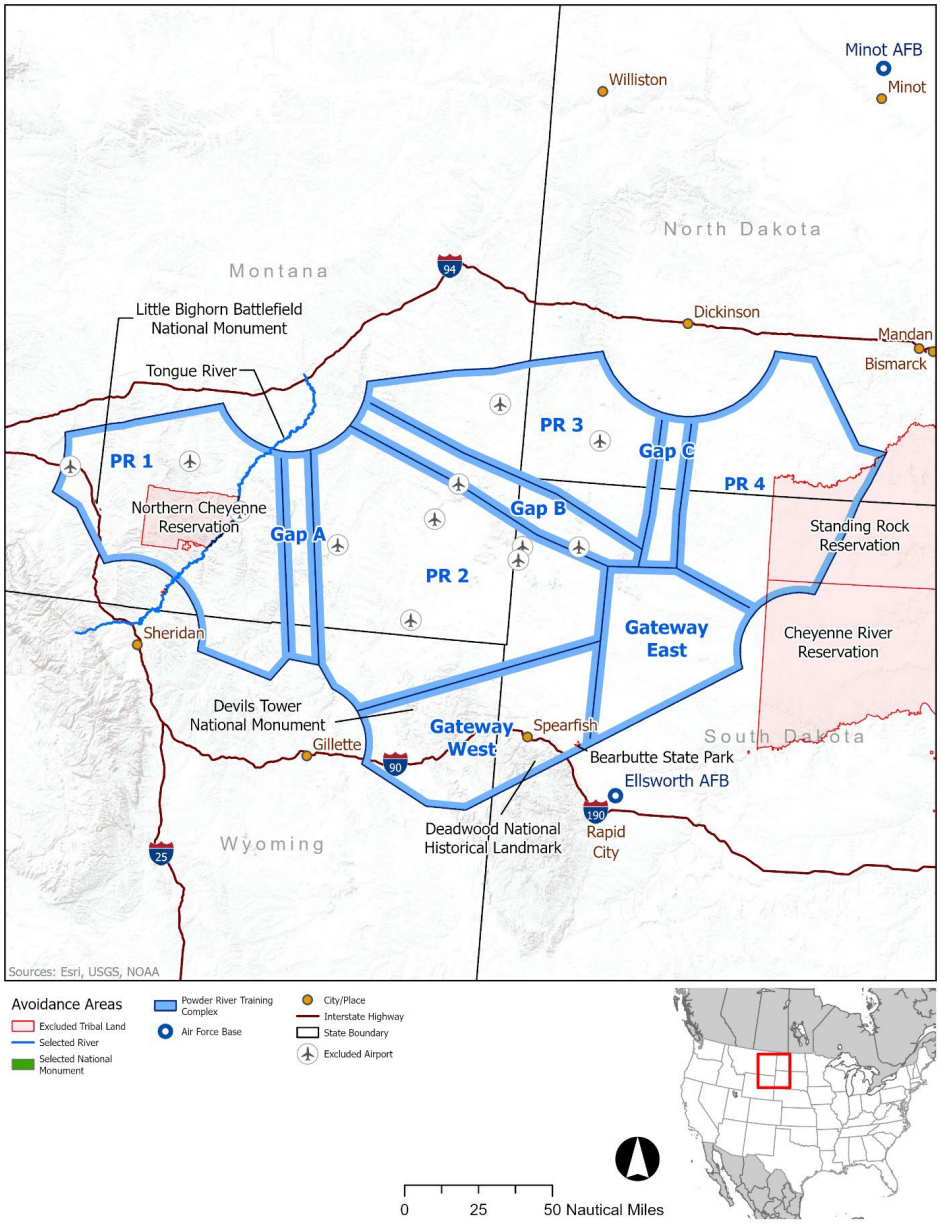
There are two types of airports, towered and non-towered, which are further subdivided into Civil Airports that are open to the public; Military/Federal Government Airports that are operated by the

military or other agencies of the Federal Government; and Private Airports that are designated for private or restricted use and not open to the public. Towered airports have an operating control tower in which ATC is responsible for providing the safe, orderly and expeditious flow of air traffic and all pilots are required to maintain two-way radio communication with ATC. Non-towered airports do not have operating control towers and, although advisable, two-way radio communications are not required. Airports within the region of influence (ROI) for the PRTC are listed in **Enclosure A**. Since the Proposed Action does not change the horizontal dimensions of PRTC, no new or additional airports would be within the ROI of the Proposed Action.

3.0 ANALYSIS

3.1 INTRODUCTION

This analysis evaluates two action alternatives addressed in the EIS: Alternative 1 and Alternative 2, described in the following sections. The No Action Alternative would not modify any of the existing airspace; thus, a detailed analysis on the impacts to civil airspace users is not necessary. The airspace under review is shown in **Figure 3.1-1** and proposed annual use of airspace by aircraft type is shown in **Table 3.1-1**.



Legend: PR = Powder River; PRTC = Powder River Training Complex; SAA = Special Activity Airspace

Figure 3.1-1 PRTC SAA Boundaries

Table 3.1-1 Annual Sorties in PRTC Airspace by Aircraft

Aircraft	Existing Sorties
B-1	1,945
B-2	8
B-52	1,086
Tanker	134
Transient Fighter	52
Transient Heavy	5
RQ/MQ	4
Total	***3,234***

Note: Transient fighter activity includes the most common fighters utilizing the airspace: F-15, F-16, and F-22.
Legend: MQ = multi-role remotely piloted aircraft system; PRTC = Powder River Training Complex; RQ = reconnaissance unmanned aircraft system
Source: DAF 2024

3.2 ALTERNATIVE 1

Alternative 1 proposes:

- Actions to improve training capability of LFEs:
  - Raise the available altitude to FL600
  - Increase the total days allowed annually from 10 days to 30 days
  - Increase duration allowed for individual LFEs from 3 days to 12 days
- Actions to improve day-to-day operations:
  - Raise the ceiling of the most used ATCAAs (PR 2 and Gateway West) from FL260 to FL600
  - Change times of use for PRTC to 07:00 to 00:30 (07:00 a.m. to 12:30 a.m.) Monday to Thursday, 07:00 to 18:00 (07:00 a.m. to 06:00 p.m.) Friday, and other times by NOTAM

Potential impacts to civil aviation are evaluated in detail. These assessments consider both IFR and VFR traffic, with routing assumptions based on conservative scenarios.

3.2.1 LFE Operations

Alternative 1 LFE area includes the entire PRTC complex as shown in **Figure 3.1-1**. The Proposed Action is to raise the available altitude to FL600, increase the total days allowed annually from 10 days to 30 days, and increase duration allowed for individual LFEs from 3 days to 12 days.

3.2.1.1 Airports

Table 3.2-1 provides information for each of the public and private airports located within 20 NM of PRTC that are potentially affected by the airspace initiative. **Enclosure A** provides details on each airport under and within 20 NM of the entire complex, regardless of assessed effects. Given that FAA Order JO 7400.2 dictates that SUA must avoid airport areas by 3 NM up to 1,500 feet AGL, and that many private airports within PRTC are also avoided by 1 NM up to 1,500 feet AGL, there is little anticipated impact to most airports in the area. Effects are generally associated with transiting to/from those airports.

Table 3.2-1 Airports in PRTC LFE ROI with Potential Impacts

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
Baker Municipal	BHK	PR 3	Coordinates: N46°20.80' / W104°15.49' Located 01 miles SE of Baker, Montana on 206 acres of land. Surveyed Elevation is 2,980 ft MSL. Public Airport Tower: No Publicly owned Owner: BAKER CITY AND FALLON CO BOX 846 BAKER, MT 59313 406-778-2883	RNAV RWY 13 Approach (Up to 6,000 ft MSL including missed approach via PR 3 Only).	RNAV RWY 31 Approach (Up to 5,400 ft MSL for approach and 6,000 ft MSL for missed approach via PR 3 Only).			Not reported	Approaches and Missed approaches require up to 6,000 ft MSL in PR 3 to accomplish. This may be affected by increased LFE days. Total impact would depend upon unknown weather variables and unavailable operations data.
Big Horn County	00U	PR 1	Coordinates: N45°44.66' / W107°39.63' Located 03 miles W of Hardin, Montana. Surveyed Elevation is 3,025 ft MSL. Public Airport Tower: No Publicly owned COUNTY OF BIG HORN PO BOX 908 HARDIN, MT 59034 406-665-9700	RNAV RWY 26 Approach (Up to 10,000 ft MSL for approach and 6,500 ft MSL for missed approach via PR 1A with a feeder route impacting PR 1C				Not reported	Single approach affects PR 1A and C at or below 10,000 ft MSL. This may be affected by increased LFE days. Total impact would depend upon unknown weather variables and unavailable operations data.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
Bowman Regional	BWW	PR 3	Coordinates: N46°9.93' / W103°18.04' Located 04 miles E of Bowman, North Dakota on 428 acres of land. Surveyed Elevation is 2,965 ft MSL. Public Airport Tower: No Publicly owned BOWMAN COUNTY ARPT AUTH PO BOX 331 BOWMAN, ND 58623 701-523-7484	RNAV RWY 13 Approach (Up to 5,800 ft MSL via PR 3 / 6,000 ft MSL on the Missed Approach via Gap C)	RNAV RWY 31 Approach (Up to 5,800 ft MSL via PR 3 / 6,000 ft MSL on the Missed Approach via Gap C)			Not reported	RNAV RWY 13 and 31 approaches both occur up to 5,800 feet MSL in PR 3 and 6,000 feet MSL on Missed Approach into Gap C. The missed approach is under Gap C, but the approaches occur within PR 3 airspace. These may be affected by increased LFE days. Total impact would depend upon unknown weather variables and unavailable operations data.
Colstrip	M46	PR 1	Coordinates: N45°51.17' / W106°42.56' Located 03 miles SW of Colstrip, Montana. Surveyed Elevation is 3,427 ft MSL. Public Airport. Tower: No Publicly owned COUNTY OF ROSEBUD PO BOX 47 FORSYTH, MT	GPS RWY 6 Approach (Up to 6,000 ft MSL via PR 1A and PR 1B)	GPS RWY 24 Approach (up to 5,500 ft MSL on approach and 6,000 ft MSL on missed approach in PR 1B with feeder from Gap A)	Departure RWY 6 - Standard Climb up to 9,000 ft MSL via PR 1B and Gap A with a heading towards PR 2 a few miles away.	Departure RWY 24	Not reported	Departure procedures from RWY 6 occur in PR 1B, GAP A and PR 2 at and below 9,000 ft MSL. This may be affected by increased LFE days and/or increased day-to-day times. Departure procedures from RWY 24 affect PR 1B at 6,000 ft MSL and below. GPS RWY 6 Approach occurs up to 6,000 ft MSL via PR 1A and PR 1B.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			59327 406-346-2251						GPS RWY 24 Approach occurs up to 6,000 ft MSL via PR 1B and Gap A. These may be affected by increased LFE days. Total impact would depend upon unknown weather variables and unavailable operations data.
Ekalaka Airport	97M	PR 2	Coordinates: N45°52.59' / W104°32.25' Located 02 miles SE of Ekalaka, Montana on 162 acres of land. Surveyed Elevation is 3,504 ft MSL. Public Airport Tower: No Publicly owned Owner: COUNTY OF CARTER COUNTY COURT HOUSE PO BOX 315 EKALAKA, MT 59324 406-775-8749	RNAV RWY 13 Approach (Up to 14,000 ft MSL via Gap, PR 2, and PR 3)	RNAV RWY 31 Approach (Up to 14,000 ft MSL via Gap, PR 2, and PR 3)			Not reported	Approach RNAV RWY 13 requires up to 14,000 ft MSL with one IAF in PR 2, one IAF in PR 3, one IAF in Gap B and FAF in Gap B. Can be flown as low as 7,000 depending on the direction. This may be affected by increased LFE days. RNAV RWY 31 requires up to 14,000 ft MSL with 1 x IAF in Gap B, and 2 x IAF in PR 2. FAF in PR 2. MA Point in Gap B at 7,000 feet MSL. Potential to be affected with increased LFE days and Day-to-Day times. Total impact would depend upon unknown weather variables and unavailable operations data.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
Hulett Municipal	W43	Gateway West	Coordinates: N44°39.77' / W104°34.07' Located 02 miles SE of Hulett, Wyoming on 330 acres of land. Surveyed Elevation is 4,263 ft MSL. Public Airport Tower: No Publicly owned TOWN OF HULETT P.O. BOX 278 HULETT, WY 82720 307-467-5771	RNAV RWY 13 Approach (Up to 7,000 feet MSL via PR 2 and GW-W and Missed Approach up to 7,600 ft MSL via GW-W) IMUNTE to FANRO (IFs) go via PR 2	RNAV (GPS)-A Approach (Up to 7,600 ft MSL. Missed Approach Up to 15,000 ft MSL via GW-W)	LLADN One Departure (Up to 8,100 ft MSL primarily under GW-W)		Not reported	RNAV-A Impacts up to 15,000 ft MSL under GW-W. Will not be affected as it is under airspace in question. LLADN One Up to 8,100 ft MSL under GW-W. Will not be affected as departure is under airspace in question. RNAV RWY 13 Impacts PR 2 at 7,000 ft MSL and below GW-W up to 7,600. Potential to be affected with increased LFE days and Day-to-Day times. Total impact unknown due to weather variables and unavailable operations data.

Legend: FAF = Final Approach Fix; ft = foot/feet; GPS = Global Positioning System; GW-W = Gateway West; IAF = Initial Approach Fix; LFE = Large Force Exercise; MA = Missed Approach; MOA = Military Operations Area; MSL = mean sea level; PR = Powder River; RNAV = Area Navigation; ROI = Region of Influence; RWY = Runway.

Source: SkyVector 2025.

Any potential impact would be procedural and conditional, occurring primarily when instrument approaches are required due to instrument meteorological conditions and may result in additional coordination to facilitate traffic during those periods. MOAs do not restrict VFR access to or from these airports, and impacts would be limited to increased radio coordination rather than denial of access.

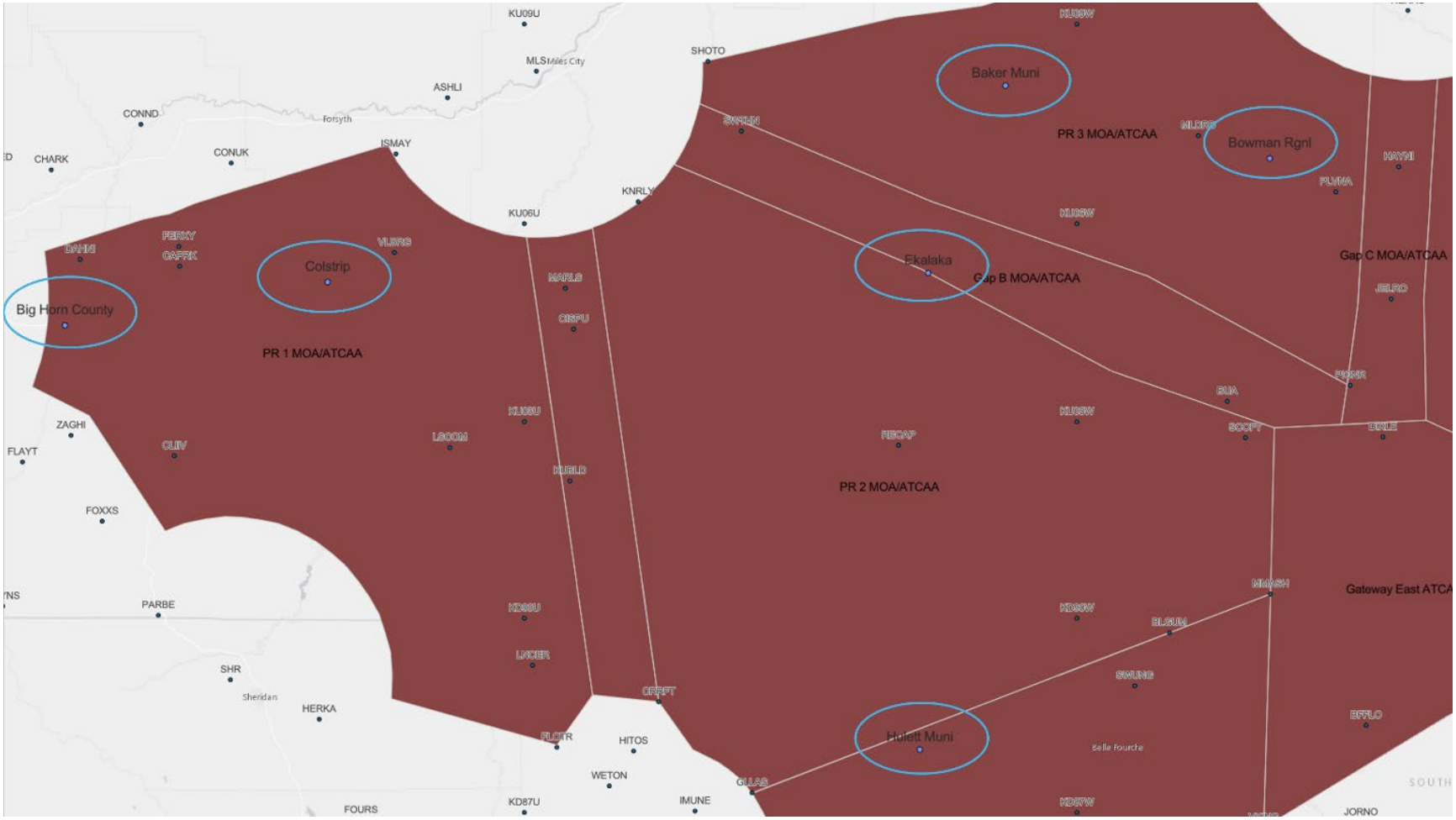
There are, however, six public airports within the PRTC ROI that have the potential for portions of their published instrument approach or departure procedures to be affected by the increase in LFE days. The additional LFE days do not represent entirely new days of airspace use, but rather an expansion of airspace utilization beyond routine day-to-day operating areas. As a result, only those portions of airspace used in excess of normal daily operations represent incremental effects attributable to the LFE increase. Review of PDARS data also indicates that traffic associated with these airports was observed within the affected airspace at a frequency of less than once per month to no occurrences at all, suggesting limited routine use and that many operations may be VFR or not conducted on a filed flight plan with transponder data available. Taken together, these factors indicate a minimal likelihood of significant operational impacts. Furthermore, during instrument meteorological conditions, the likelihood of dynamic LFE maneuvering at the affected altitudes is reduced, allowing potential impacts to be mitigated through coordination and, if necessary, the establishment of procedures for dynamic airspace floor updates via letters of agreement between the proponent and the FAA.

Figure 3.2-1 provides a visual depiction of the location of these airports. Detailed discussions of each airport follow the table. As shown in **Table 3.2-1**, operational statistics are not available or not reported to the FAA for any of these airports within the PRTC ROI.

Baker Municipal (BHK): Baker Municipal Airport is a public, non-towered field 1 mile southeast of Baker, Montana, at a surveyed elevation of approximately 2,981 MSL. It has a single grooved asphalt runway (13/31) about 5,900 × 75 feet with medium-intensity runway lights (MIRL), precision approach path indicators (PAPI) on both ends, and runway end identifier lights (REIL). The common traffic advisory frequency (CTAF) is 122.9, and Salt Lake City ARTCC provides approach/departure services.

Approaches and missed approaches require altitudes up to 6,000 feet MSL within PR 3 boundaries to accomplish.

Figure 3.2-2 and **Figure 3.2-3** are the applicable instrument procedures for the airport.



Legend: LFE = Large Force Exercise; PRTC = Powder River Training Complex; ROI = Region of Influence

Figure 3.2-1 Airports in PRTC LFE ROI with Potential Impacts

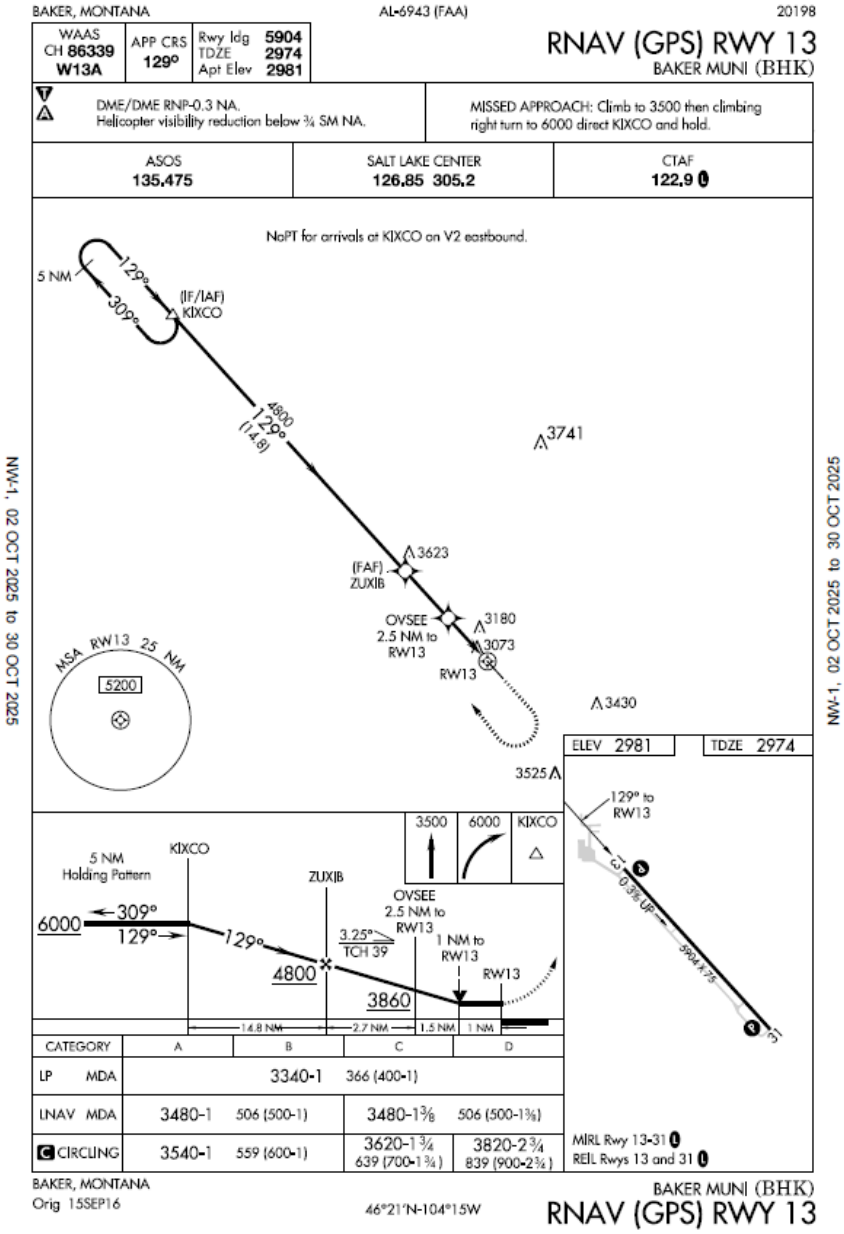


Figure 3.2-2 BHK RNAV (GPS) RWY 13

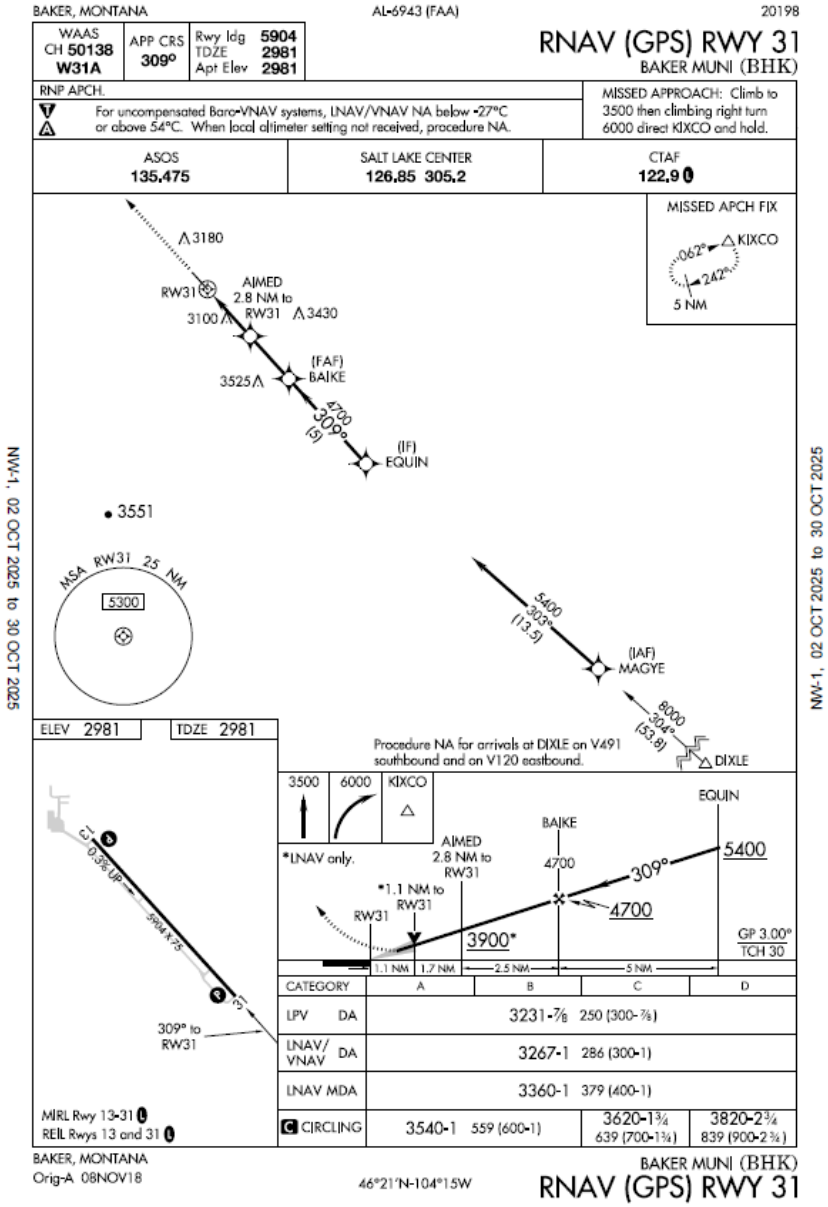


Figure 3.2-3 BHK RNAV (GPS) RWY 31

Big Horn County (00U): Big Horn County Airport is a public, unattended general-aviation field 3 miles west of Hardin, Montana, at an elevation of about 3,025 feet MSL. It has one asphalt runway (08/26) approximately 4,491 × 75 feet with MIRL and PAPI on both ends, CTAF/UNICOM 122.8, and an automated weather observing system (AWOS-3) on 118.325.

The RNAV (GPS) Runway (RWY) 26 approach has sections within PR 1A up to 10,000 feet MSL and 6,500 feet MSL on the missed approach, with a feeder route transiting a portion of PR 1C.

Figure 3.2-4 is the applicable instrument procedure for the airport.

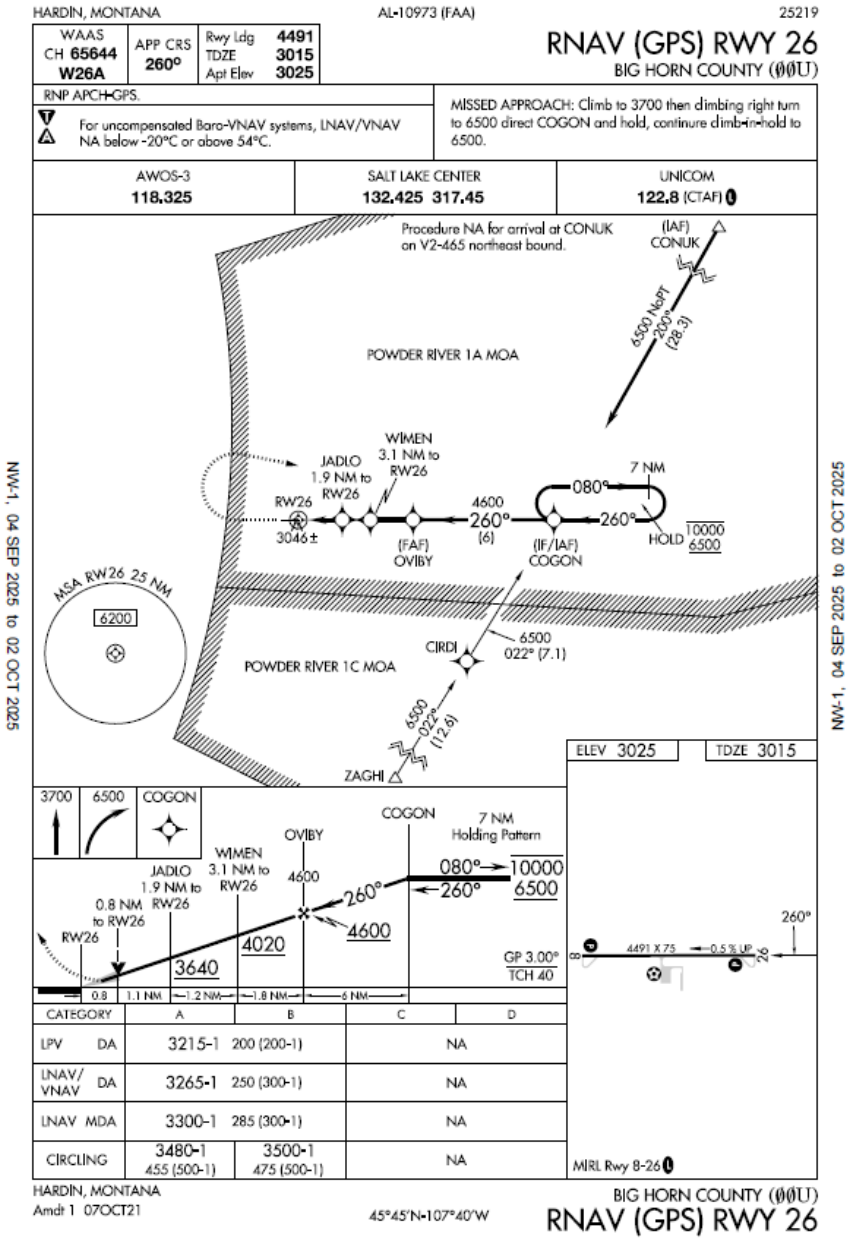


Figure 3.2-4 00U RNAV (GPS) RWY 26

Bowman Regional (BWW): Bowman Regional Airport is a public facility located 4 miles east of Bowman, North Dakota, at an elevation of about 2,965 feet MSL. It has a concrete, grooved runway (13/31) 5,701 × 75 feet with MIRL, PAPI, and REIL; CTAF/UNICOM is 122.8, and AWOS is 118.075.

RNAV RWY 13 and RNAV RWY 31 both have sections at 5,800 feet MSL within PR 3 and 6,000 feet MSL must be established on the missed approach into Gap C. The missed approach is under Gap C, but the approaches have effects within PR 3 airspace.

Figure 3.2-5 and **Figure 3.2-6** are the applicable instrument procedures for the airport.

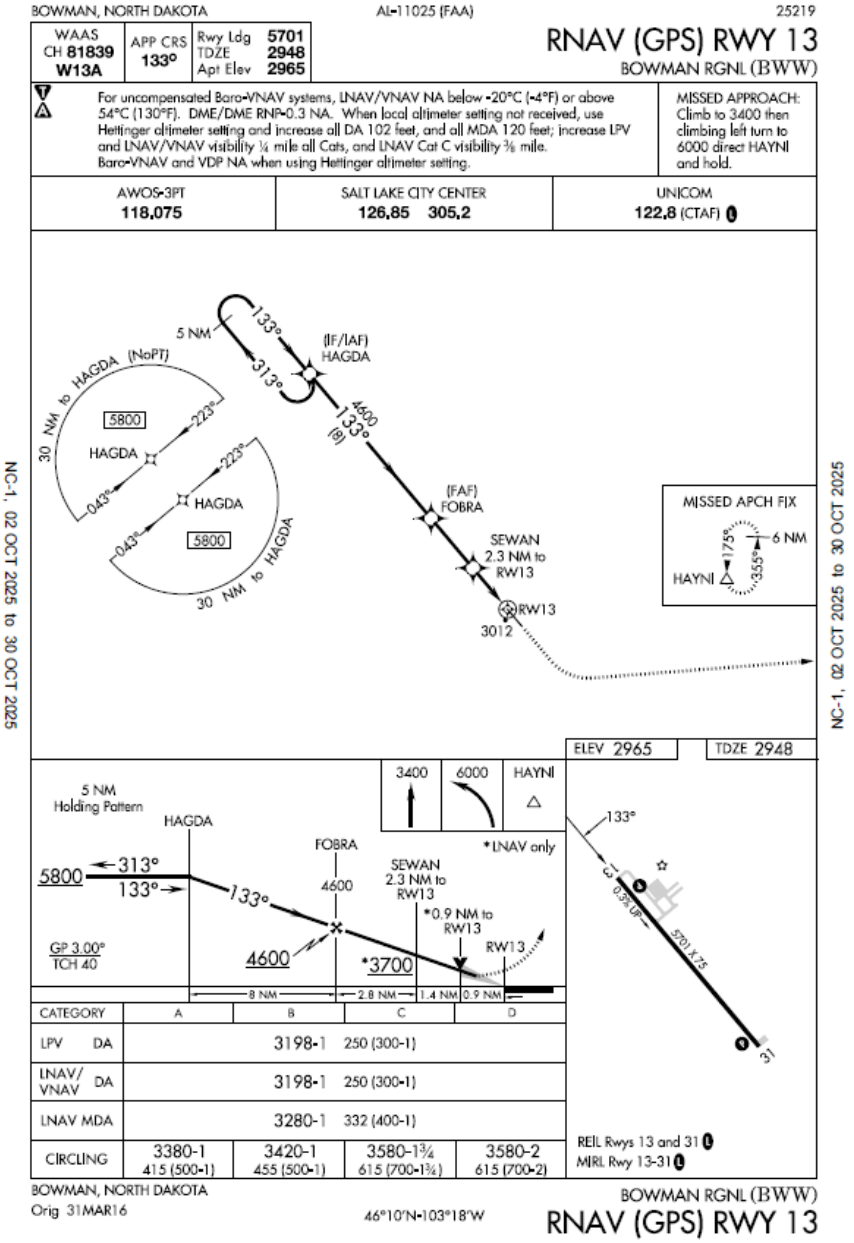


Figure 3.2-5 BWW RNAV (GPS) RWY 13

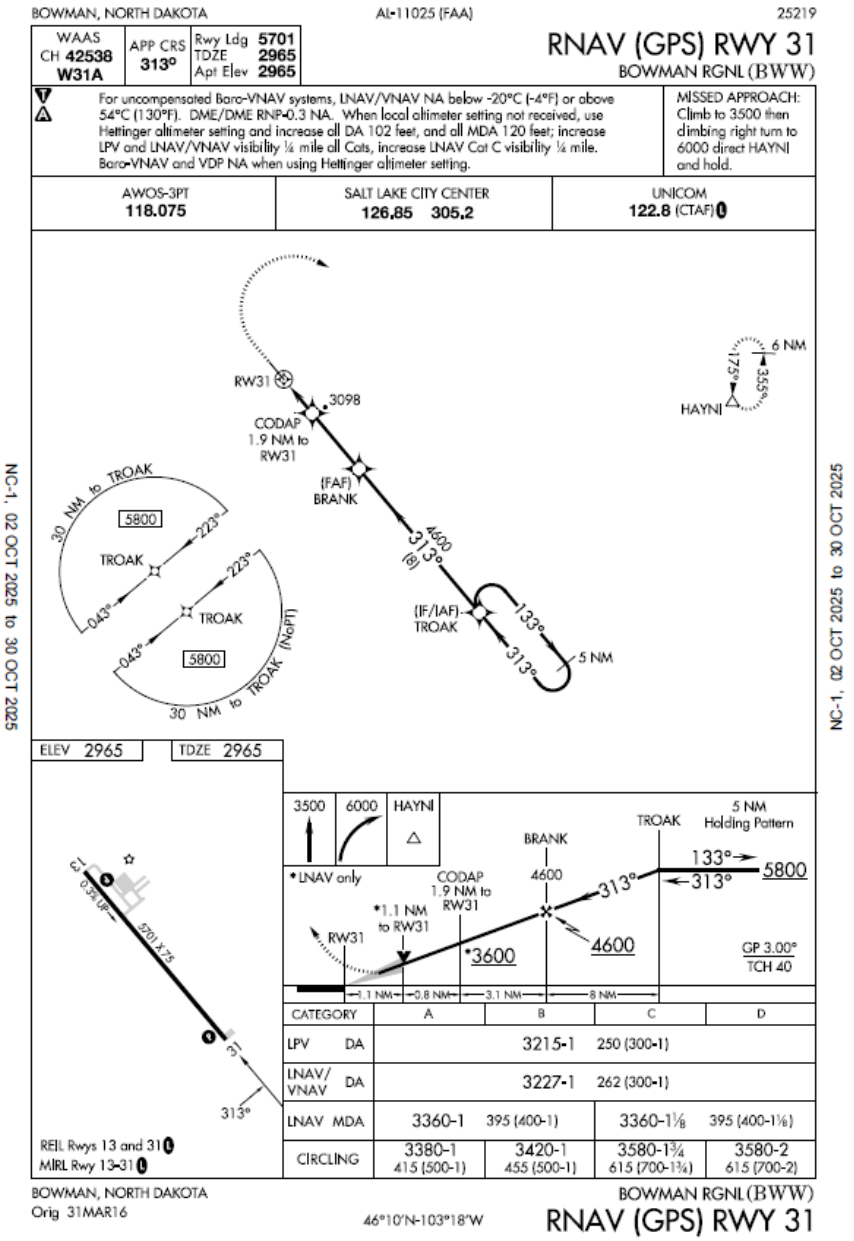


Figure 3.2-6 BWW RNAV (GPS) RWY 31

Colstrip (M46): Colstrip Airport is a public, on-call field 3 miles southwest of Colstrip, Montana, at an elevation of about 3,428 feet MSL. It has one asphalt runway (06/24) 5,100 × 75 feet with MIRL and PAPI both ends, CTAF/UNICOM 122.7, and AWOS on 118.525.

Departure procedures from RWY 6 have impacts in PR 1B, Gap A, and/or PR 2 below 9,000 feet MSL and may be affected by increased LFE days and/or increased day-to-day times. Departure procedures from RWY 24 have sections within PR 1B at 6,000 feet MSL and below. Approach GPS RWY 6 requires up to 6,000 feet MSL via PR 1A and PR 1B. Approach GPS RWY 24 requires up to 6,000 feet MSL via PR 1B and Gap A.

Figure 3.2-7 through Figure 3.2-10 are the applicable instrument procedures for the airport.

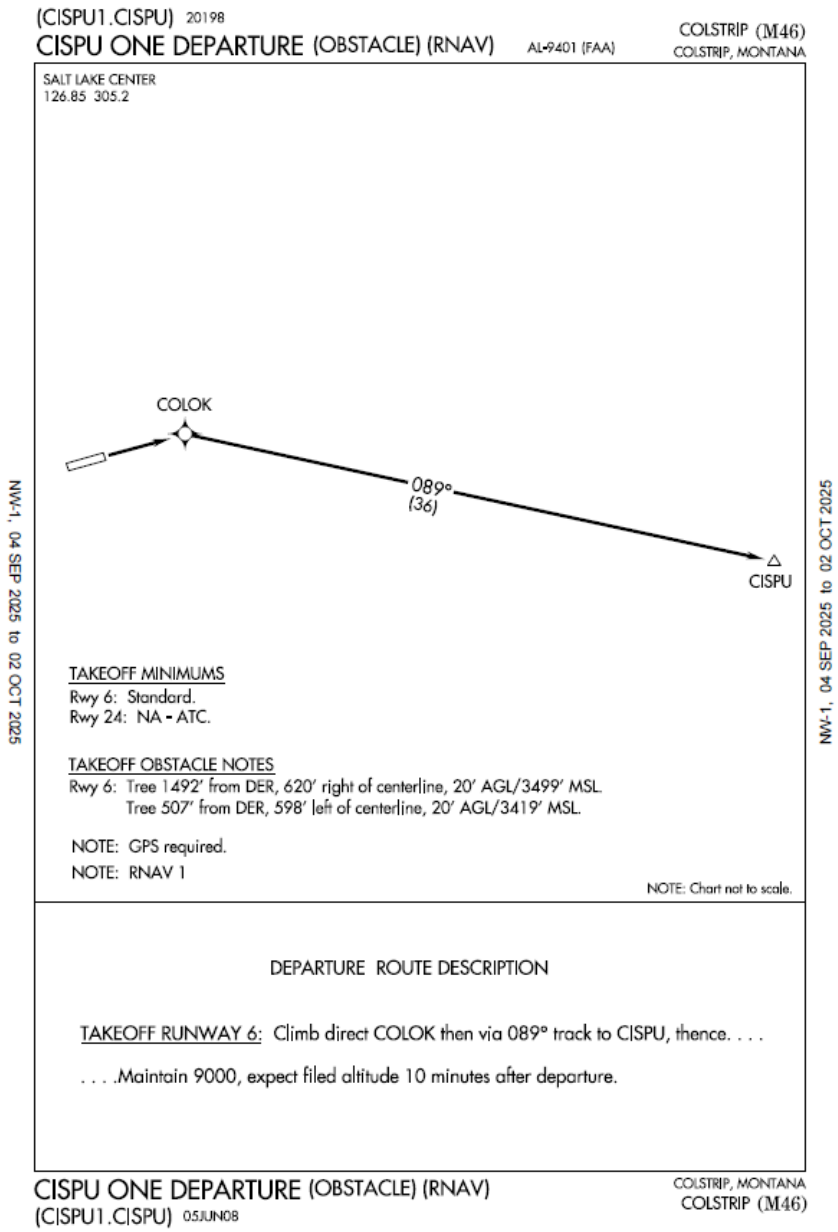


Figure 3.2-7 M46 CISPU ONE DEPARTURE

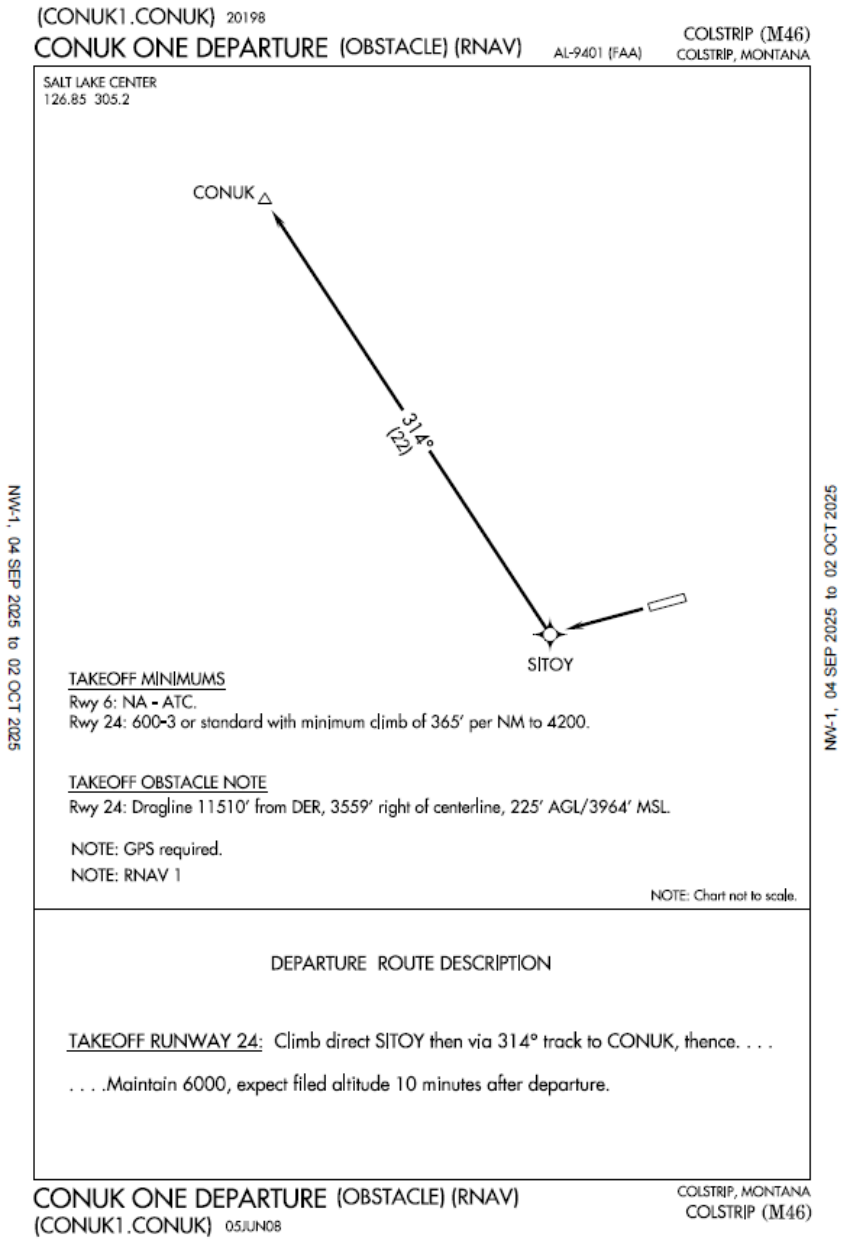


Figure 3.2-8 M46 CONUK ONE DEPARTURE

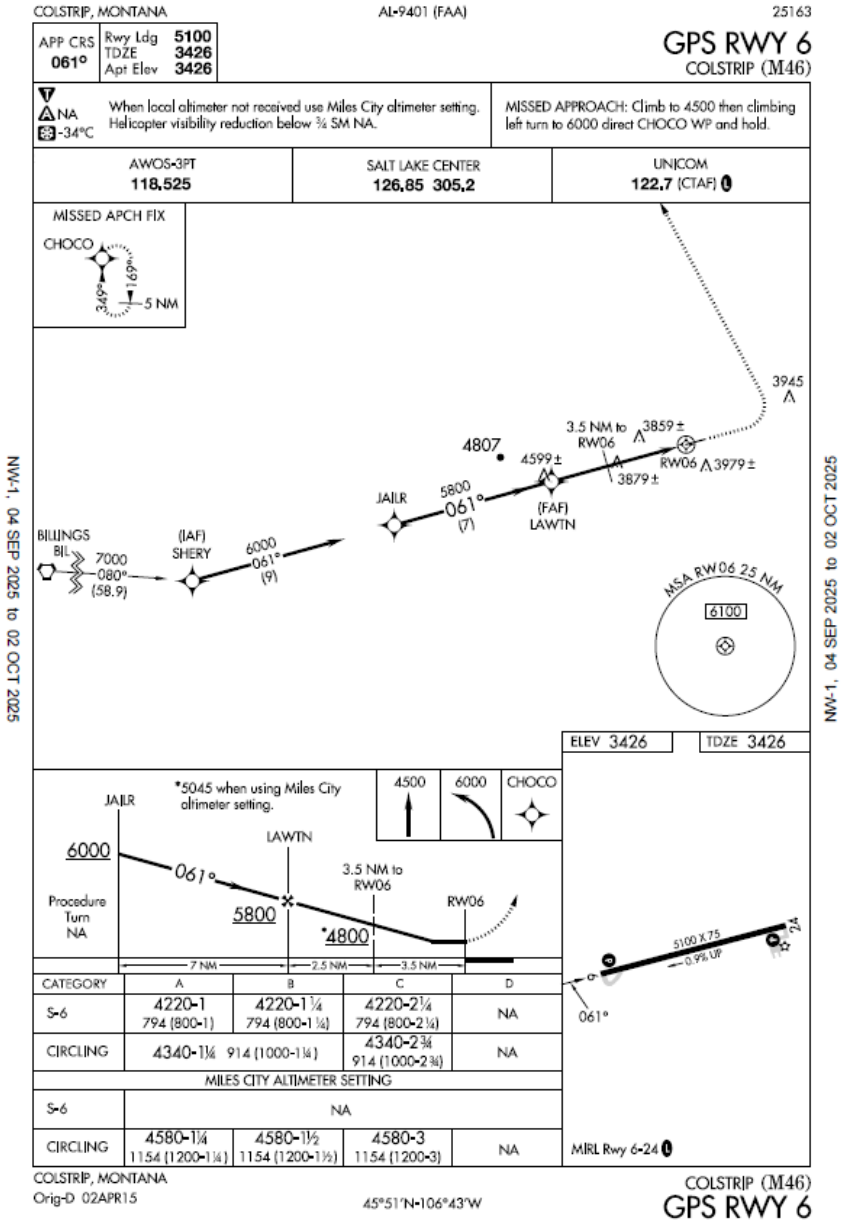


Figure 3.2-9 M46 GPS RWY 6

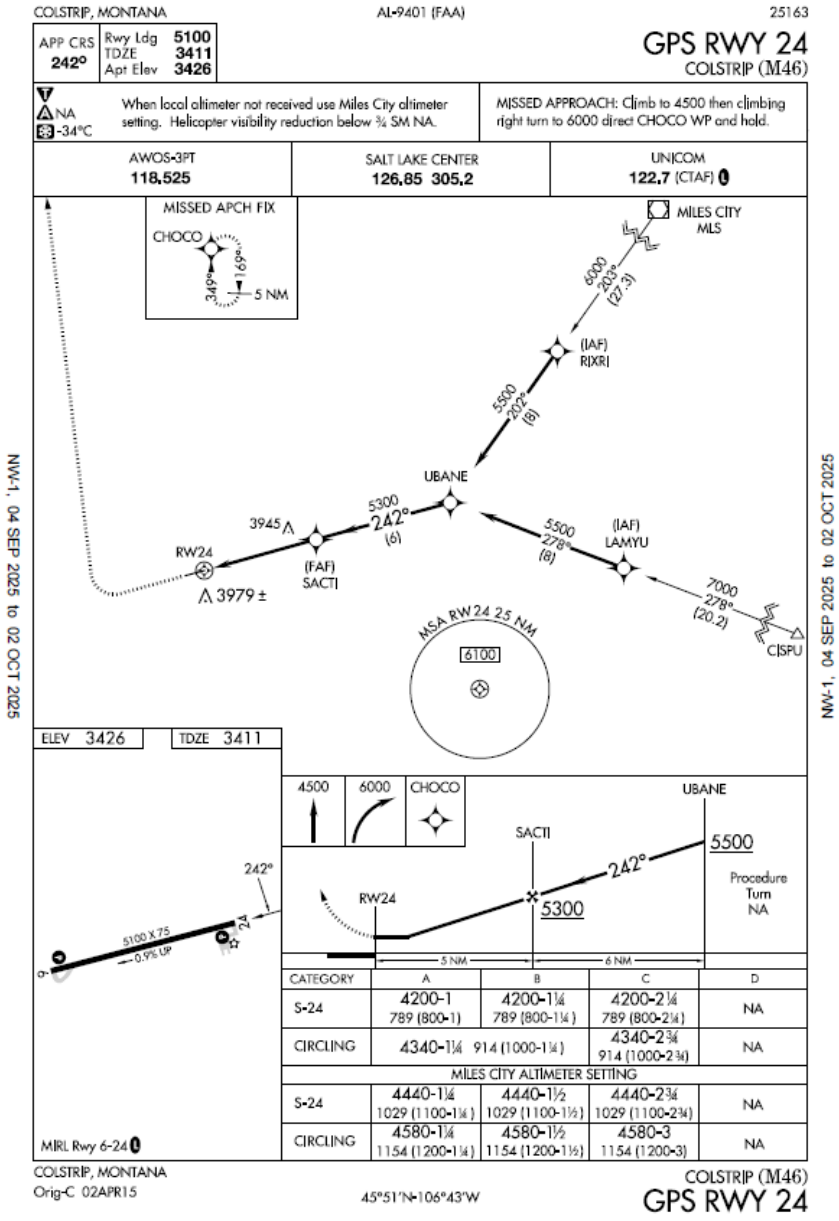


Figure 3.2-10 M46 GPS RWY 24

Ekalaka Airport (97M): Ekalaka Airport is a public, unattended field 2 miles southeast of Ekalaka, Montana, at an elevation of about 3,505 feet MSL. It has a single asphalt runway (13/31) approximately 3,798 × 75 feet with MIRL and PAPI; CTAF is 122.9.

RNAV RWY 13 requires up to 14,000 feet MSL with one initial approach fix (IAF) in PR 2, one IAF in PR 3, one IAF in Gap B, and the final approach fix (FAF) in Gap B. It can be flown as low as 7,000 feet depending on direction. RNAV RWY 31 requires up to 14,000 feet with one IAF in Gap B and two IAFs in PR 2, FAF in PR 2, and a missed approach point in Gap B at 7,000 feet.

Figure 3.2-11 and **Figure 3.2-12** are the applicable instrument procedures for the airport.

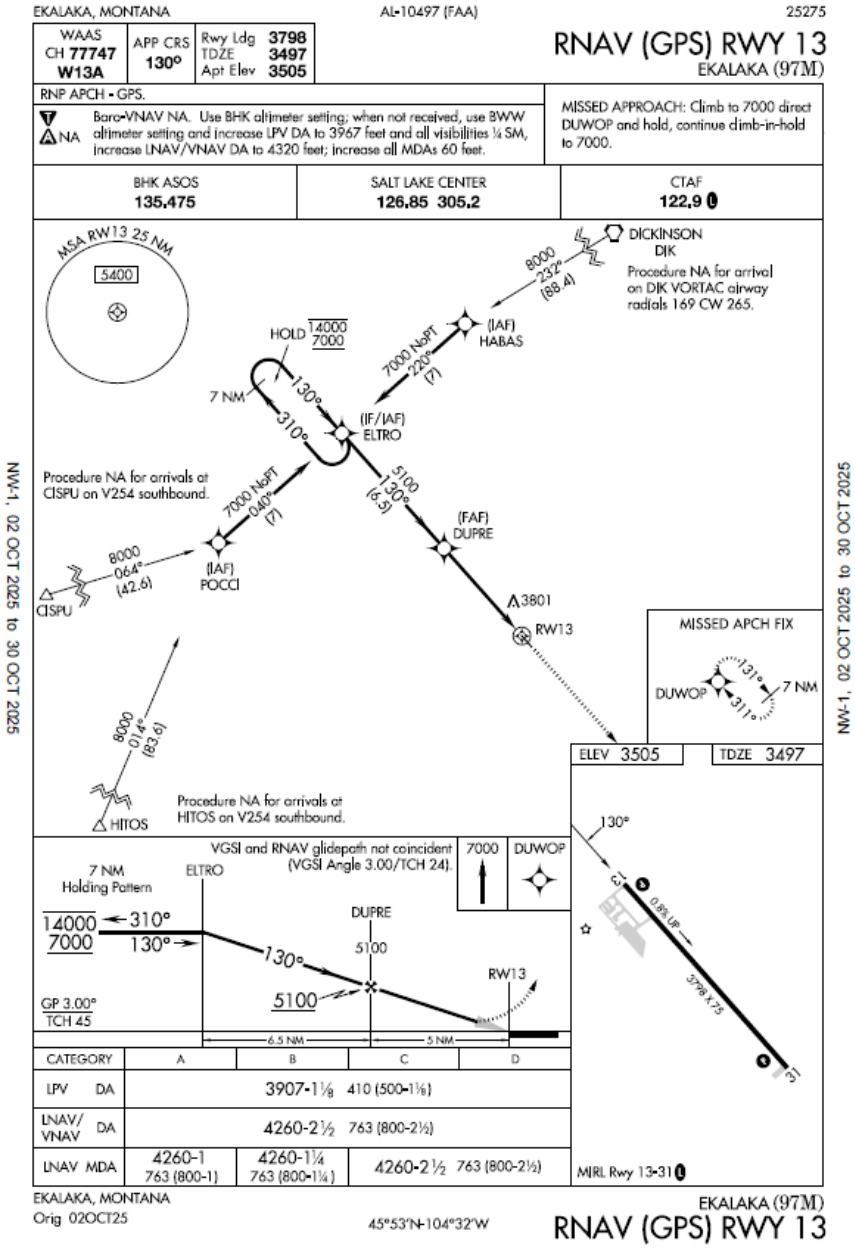


Figure 3.2-11 97M RNAV (GPS) RWY 13

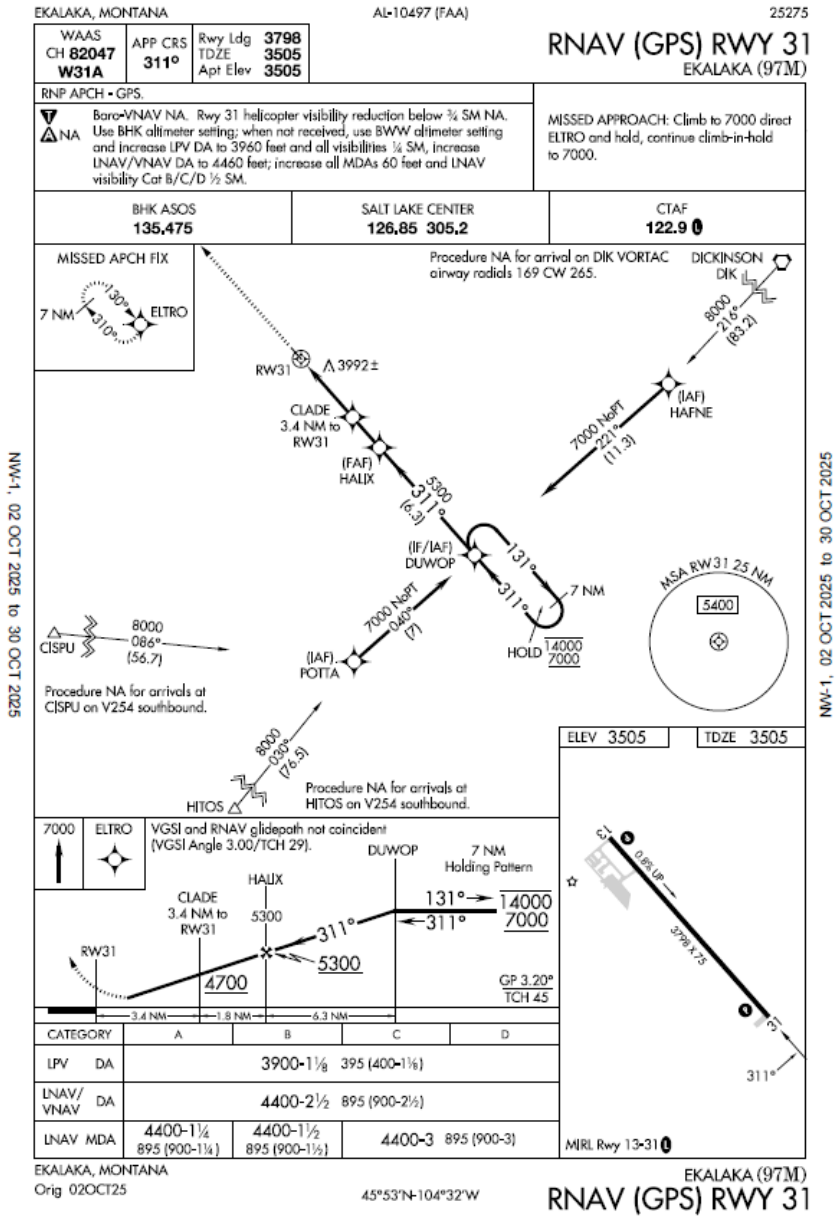


Figure 3.2-12 97M RNAV (GPS) RWY 31

Hulett Municipal (W43): Hulett Municipal Airport is a public, unattended airport 2 miles southeast of Hulett, Wyoming, at an elevation of about 4,264 feet MSL. It has a single asphalt runway (13/31) 5,500 × 75 feet with MIRL, PAPI, and REIL; CTAF/UNICOM is 122.8, and AWOS is 128.775.

RNAV-A requires up to 15,000 feet MSL under Gateway West with no anticipated effects as it is under the airspace in question. LLADN ONE departure up to 8,100 feet MSL is also under Gateway West with no anticipated impact. RNAV RWY 13 has sections within PR 2 at 7,000 feet MSL and below.

Figure 3.2-13 through Figure 3.2-15 are the applicable instrument procedures for the airport.

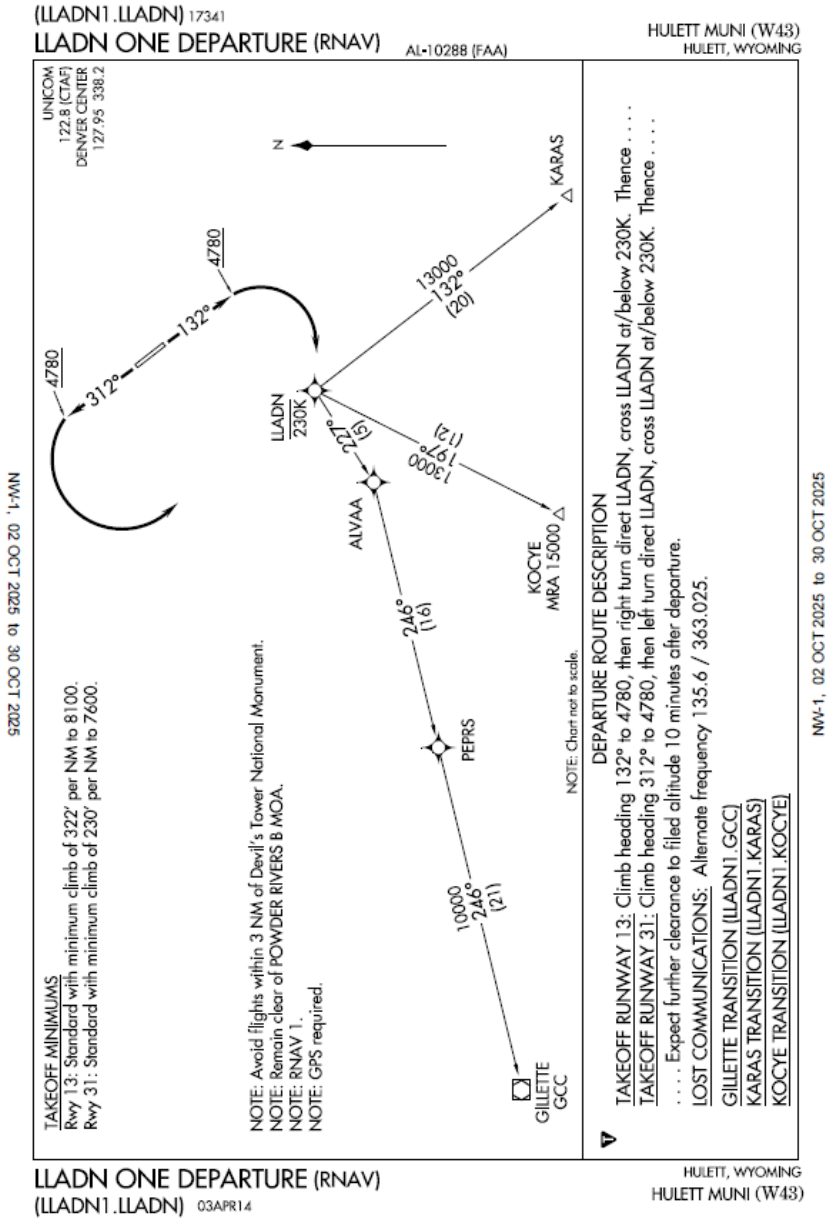


Figure 3.2-13 W43 LLADN ONE DEPARTURE

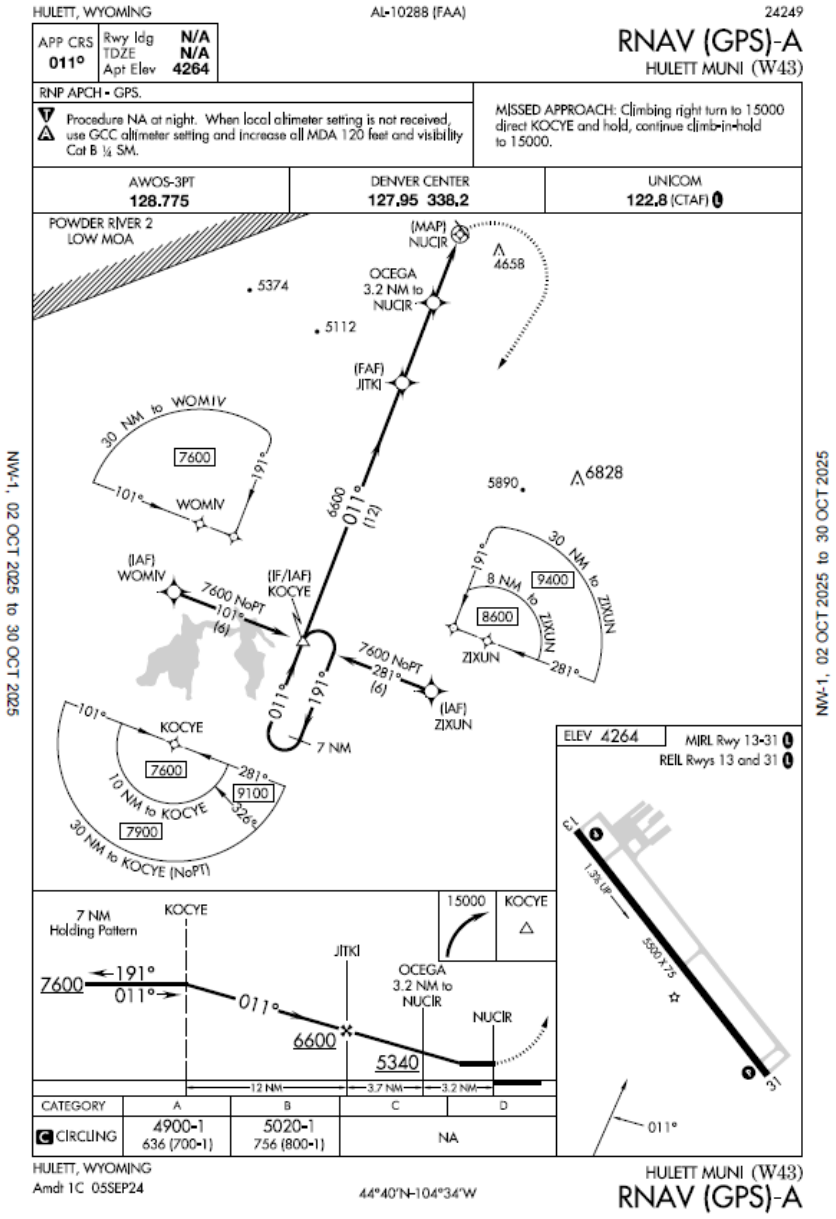


Figure 3.2-14 W43 RNAV (GPS) -A

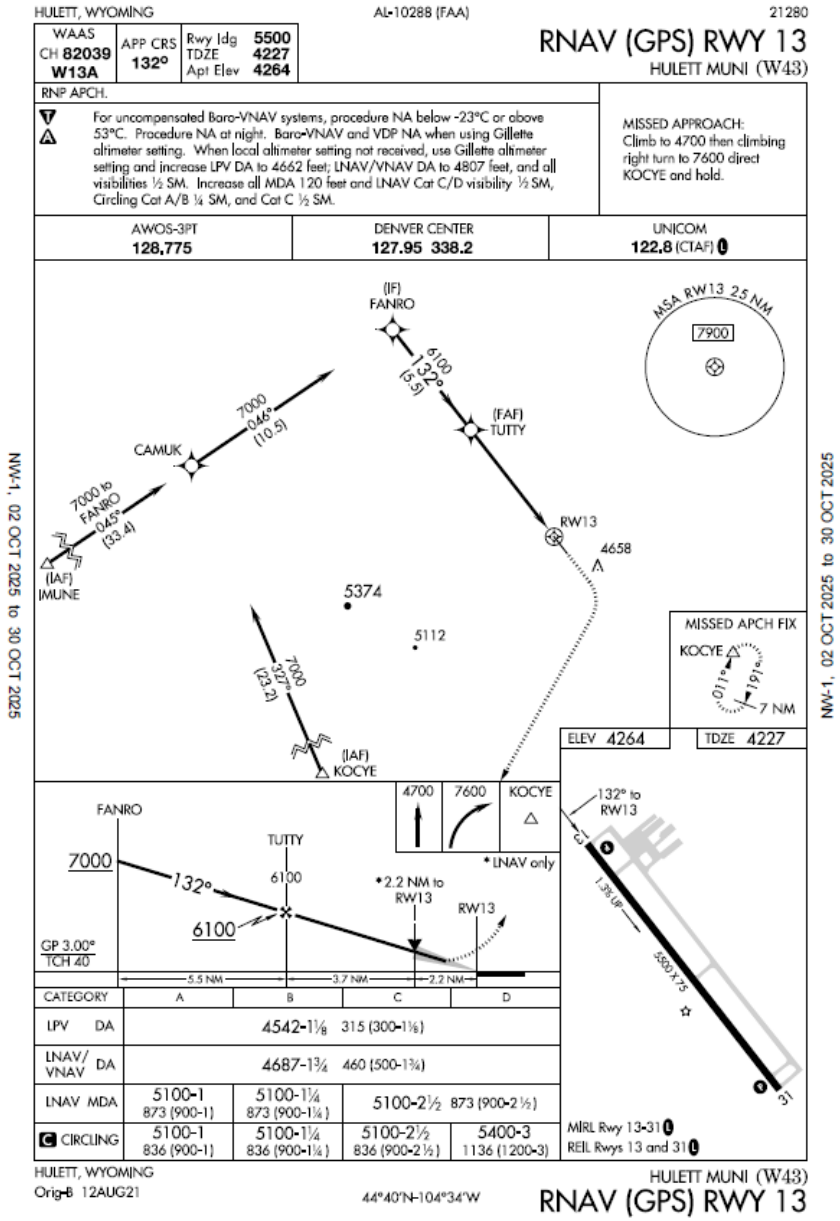


Figure 3.2-15 W43 RNAV (GPS) RWY 13

3.2.1.2 Flight Traffic

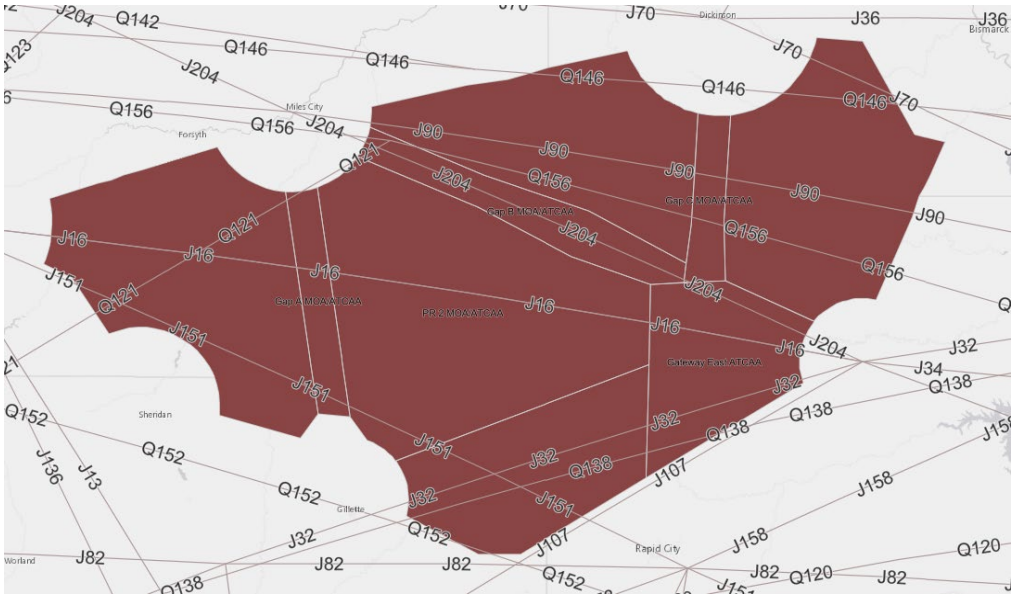
ATS Routes

There are 11 ATS routes which traverse the PRTC LFE lateral boundaries at altitudes from FL260–FL600. The route distances within the boundaries of each airspace within PRTC are listed in **Table 3.2-2** and a depiction of the routes can be seen in **Figure 3.2-16**.

Table 3.2-2 ATS Routes Intersecting LFE Area (Above FL260 to FL600) Sorted by Approximate Distance

Route Name	Type	PR 1 (NM)	PR 2 (NM)	PR 3 (NM)	PR 4 (NM)	Gap A (NM)	Gap B (NM)	Gap C (NM)	Gateway East (NM)	Gateway West (NM)	Total Distance (NM)
J16	Jet Route	89	117	0	0	12	0	0	55	0	273
J151	Jet Route	95	35	0	0	14	0	0	0	60	204
J90	Jet Route	0	0	116	67	0	0	11	0	0	194
Q156	Q-Route	0	0	100	61	0	18	12	0	0	191
J204	Jet Route	0	0	0	0	0	124	2	46	0	172
J32	Jet Route	0	0	0	0	0	0	0	59	92	151
Q138	Q-Route	0	0	0	0	0	0	0	28	90	118
Q121	Q-Route	80	2	0	0	6	12	0	0	0	100
Q146	Q-Route	0	0	41	41	0	0	0	0	0	82
J70	Jet Route	0	0	0	32	0	0	0	0	0	32
Q152	Q-Route	0	0	0	0	0	0	0	0	13	13

Legend: NM = Nautical Mile; PR = Powder River

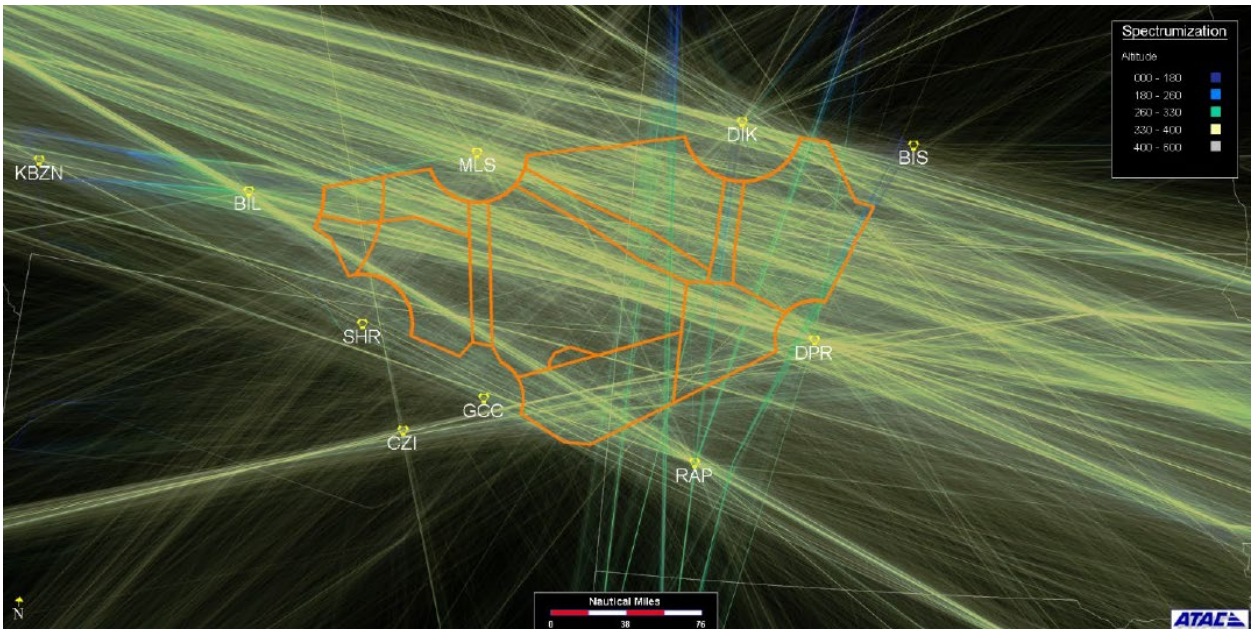


Legend: ATS = Air Traffic Service; FL = Flight Level; LFE = Large Force Exercise; PRTC = Powder River Training Complex

Figure 3.2-16 ATS Routes Traversing the PRTC LFE Area between FL260–FL600

Under Alternative 1, Aircraft that typically fly these routes through the area would require alternate routes or radar vectors to avoid the SAA only during the proposed times of activation. The impacts of rerouting traffic along these routes is a portion of traffic analysis included within the civil traffic section below.

Further, the heat map in **Figure 3.2-17** illustrates a strong east-to-west travel pattern across the analyzed airspace. This trend is likely largely attributable to the absence of major Jetways or Q-routes running predominantly north-south, which limits vertical connectivity at these altitudes and reinforces east-west movement. Among the available high-altitude routes, J-16, Q-156, J-15, and J-90 emerge as the most frequently utilized corridors although frequent off-route traffic is also evident.



Legend: LFE = Large Force Exercise; PRTC = Powder River Training Complex

Figure 3.2-17 Heat Map of Flights Traversing the PRTC LFE Area

Civil Traffic

There are 170,457 aircraft flights that annually traverse at least part of the area encompassing the proposed PRTC LFE Area above FL260 to FL600. The most common aircraft in this list are Boeing 737 and 777 series, Airbus A320/A321 families, and regional jets like the CRJ variants (**Table 3.2-3**). Listed below are the top 10 aircraft types, by percentage of flights per year. Assumptions for converting distance to time in this analysis were that aviation traffic at FL260–FL600 was traveling at 450 KTAS given most aircraft at these altitudes are domestic airliners and long-range business jets.

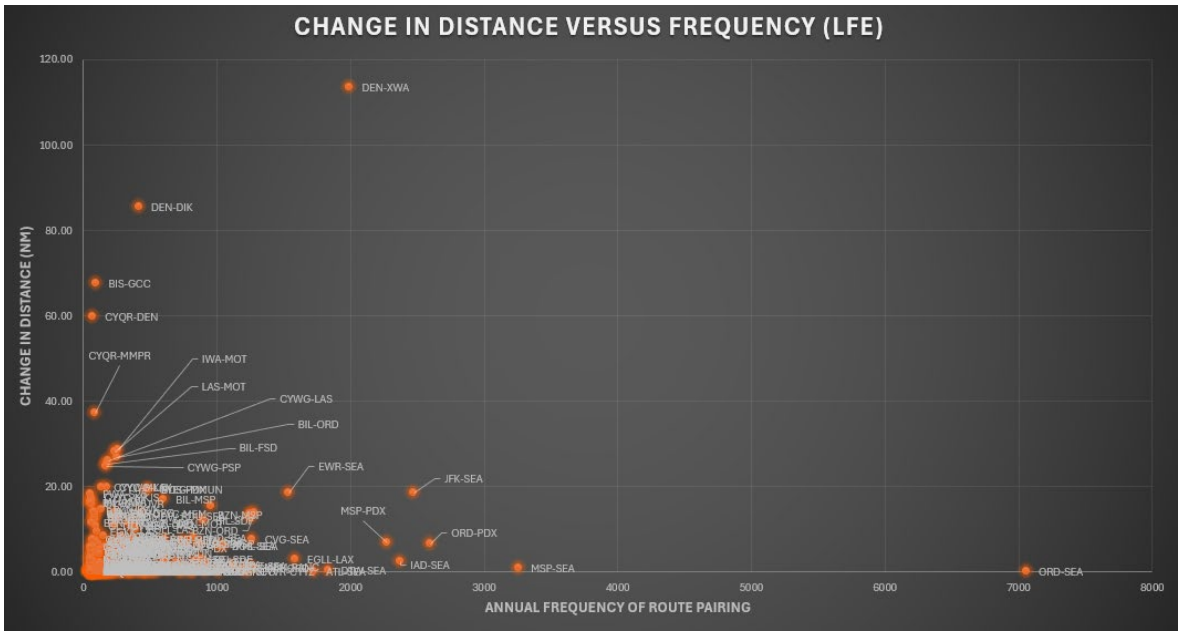
Table 3.2-3 Aircraft Types Intersecting PRTC LFE Area (Above FL260 to FL600)

Aircraft Type	Aircraft Name	Percent of Total
B739	Boeing 737-900	12%
B738	Boeing 737-800	9.8%
B39M	Boeing 737 MAX 9 (BBJ)	5.8%
B38M	Boeing 737 MAX 8 (BBJ)	5.0%
A321	Airbus A321	3.9%
A320	Airbus A320	3.8%
A21N	Airbus A321neo	3.7%
CRJ2	Bombardier CRJ-200	3.4%
B763	Boeing 767-300	3.1%
B77L	Boeing 777-200LR	2.3%

Legend: % = percent; FL = Flight Level; LFE = Large Force Exercise; PRTC = Powder River Training Complex

Of the 170,457 tracks that were found to have transited the LFE area during the year of data gathered, 1,472 (0.86 percent) being military carrier, and 120 (0.07 percent) being unknown carriers were removed from impact analysis. Further, the LFE proposal states that operations would not occur on weekends, thus avoiding impact to 47,300 (27.8 percent) of the potential flights impacted which occurred on Saturday or Sunday, which were also removed. Finally, 38 tracks were removed due to unknown origin and/or destination, and 34 were removed due to being local area flights (i.e., same origin/destination). The

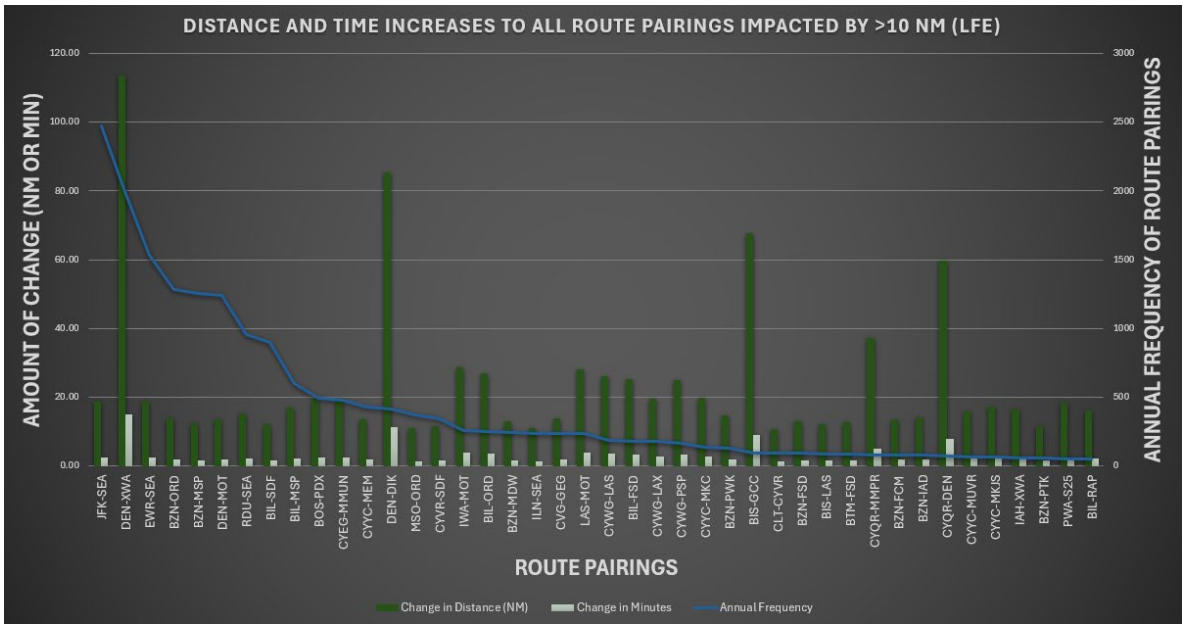
remaining 121,492 tracks were used to conduct a detailed analysis of the airspace establishment. Within this track set, it was determined that 5,706 Origin/Destination (route) pairings existed for all the tracks that passed through the airspace. Most of the route pairings occurred sparingly. Only 269 route pairings occurred at a frequency of once a week or greater (i.e., 52 times or more throughout the year). These 269 weekly or more frequent route pairings accounted for 121,492 tracks or 85.23 percent of total available data. The lower frequency tracks were removed from further analysis due to the already low impact the Proposed Action would have. The 269 route pairings were all plotted and assessed for impact pertaining to that of the direct great circle route vs. the route required to circumnavigate the proposed airspace. The list of all routes can be found in **Enclosure B**. **Figure 3.2-18** shows a graph of all 269 route pairings plotted with the change in distance required should the Proposed Action be implemented versus the annual frequency of that route pairing. As seen, most of the frequent routes have very low route effects, and most time-affected routes occur infrequently. Some route pairings, however, are outliers and have potential effects at higher frequencies such as DEN-XWA and DEN-DIK.



Legend: LFE = Large Force Exercise

Figure 3.2-18 LFE Change In Distance Versus Annual Frequency

Of the 269 route pairings, only 42 were affected by a course deviation of 10 NM or greater; 10 NM at 450 KTAS takes approximately 1 minute and 20 seconds, thus any routes affected to this degree or less are considered negligible. **Figure 3.2-19** and **Table 3.2-4** show all 42 routes that require greater than 10 NM deviation from the direct great circle route to circumnavigate the proposed area. In **Figure 3.2-19**, route pairings frequency are represented with the blue line. Effects to the great circle route by distance and time are represented by the green bars.



Legend: > = greater than; LFE = Large Force Exercise; NM = Nautical Mile

Figure 3.2-19 LFE Distance and Time Impacts to Route Pairings > 10 NM

Table 3.2-4 LFE Route Pairings Impacted by >10 NM Sorted by Frequency

Route Pairings	Annual Frequency	Baseline Great Circle Distance (NM)	Circumnavigation Distance (NM)	Change in Distance (NM)	Change as % of Baseline Route (%)	Change in Time (Min)
JFK-SEA	2476	2146.03	2164.68	18.65	0.9%	2.49
DEN-XWA	1994	505.78	619.27	113.48	22.4%	15.13
EWR-SEA	1536	2128.04	2146.69	18.65	0.9%	2.49
BZN-ORD	1281	1027.51	1041.35	13.84	1.3%	1.85
BZN-MSP	1254	757.07	769.53	12.45	1.6%	1.66
DEN-MOT	1244	524.81	538.32	13.51	2.6%	1.80
RDU-SEA	953	2041.39	2056.77	15.38	0.8%	2.05
BIL-SDF	898	1111.08	1123.12	12.04	1.1%	1.61
BIL-MSP	600	647.94	664.95	17.01	2.6%	2.27
BOS-PDX	492	2283.67	2302.91	19.24	0.8%	2.57
CYEG-MMUN	476	2292.32	2311.67	19.35	0.8%	2.58
CYYC-MEM	426	1417.37	1430.90	13.53	1.0%	1.80
DEN-DIK	415	424.49	509.92	85.43	20.1%	11.39
MSO-ORD	372	1154.84	1165.75	10.91	0.9%	1.46
CYVR-SDF	346	1733.66	1745.27	11.62	0.7%	1.55
IWA-MOT	261	1011.88	1040.62	28.75	2.8%	3.83
BIL-ORD	252	919.13	946.05	26.92	2.9%	3.59
BZN-MDW	243	1038.12	1051.04	12.93	1.2%	1.72
ILN-SEA	240	1727.42	1738.36	10.94	0.6%	1.46
CVG-GEG	239	1511.30	1525.17	13.87	0.9%	1.85
LAS-MOT	237	953.91	982.11	28.20	3.0%	3.76
CYWG-LAS	184	1137.99	1164.16	26.18	2.3%	3.49
BIL-FSD	179	520.58	545.95	25.37	4.9%	3.38
CYWG-LAX	176	1337.45	1357.17	19.71	1.5%	2.63
CYWG-PSP	166	1286.21	1311.07	24.85	1.9%	3.31

Route Pairings	Annual Frequency	Baseline Great Circle Distance (NM)	Circumnavigation Distance (NM)	Change in Distance (NM)	Change as % of Baseline Route (%)	Change in Time (Min)
CYYC-MKC	136	1087.52	1107.30	19.77	1.8%	2.64
BZN-PWK	133	1024.90	1039.61	14.71	1.4%	1.96
BIS-GCC	96	248.49	316.14	67.65	27.2%	9.02
CLT-CYVR	94	2024.55	2035.26	10.72	0.5%	1.43
BZN-FSD	91	628.15	641.25	13.10	2.1%	1.75
BIS-LAS	87	909.80	922.07	12.27	1.3%	1.64
BTM-FSD	86	685.33	698.14	12.81	1.9%	1.71
CYQR-MMPR	83	1786.55	1823.80	37.25	2.1%	4.97
BZN-FCM	83	747.76	761.33	13.57	1.8%	1.81
BZN-IAD	79	1537.27	1551.32	14.05	0.9%	1.87
CYQR-DEN	70	634.66	694.54	59.88	9.4%	7.98
CYYC-MUVR	66	2262.86	2278.67	15.82	0.7%	2.11
CYYC-MKJS	63	2598.27	2615.63	17.36	0.7%	2.31
IAH-XWA	61	1163.35	1179.79	16.43	1.4%	2.19
BZN-PTK	59	1201.48	1212.94	11.46	1.0%	1.53
PWA-S25	53	777.20	795.50	18.30	2.4%	2.44
BIL-RAP	52	256.03	272.22	16.19	6.3%	2.16

Legend: % = percent; BIL = Billings Logan International Airport (MT); BIS = Bismarck Municipal Airport (ND); BOS = Boston Logan International Airport (MA); BTM = Bert Mooney Airport (MT); BZN = Bozeman Yellowstone International Airport (MT); CLT = Charlotte Douglas International Airport (NC); CVG = Cincinnati/Northern Kentucky International Airport (KY); CYEG = Edmonton International Airport (AB); CYQR = Regina International Airport (SK); CYVR = Vancouver International Airport (BC); CYWG = Winnipeg James Armstrong Richardson International Airport (MB); CYYC = Calgary International Airport (AB); DEN = Denver International Airport (CO); DIK = Dickinson Theodore Roosevelt Regional Airport (ND); EWR = Newark Liberty International Airport (NJ); FCM = Flying Cloud Airport (MN); FSD = Sioux Falls Regional Airport (SD); GCC = Gillette-Campbell County Airport (WY); GEG = Spokane International Airport (WA); IAD = Washington Dulles International Airport (VA); IAH = George Bush Intercontinental Airport (TX); ILN = Wilmington Air Park (OH); IWA = Phoenix-Mesa Gateway Airport (AZ); JFK = John F. Kennedy International Airport (NY); LAS = Harry Reid International Airport (NV); LAX = Los Angeles International Airport (CA); MDW = Chicago Midway International Airport (IL); MEM = Memphis International Airport (TN); Min = Minutes; MMPR = Licenciado Gustavo Díaz Ordaz International Airport (Mexico); MMUN = Cancún International Airport (Mexico); MOT = Minot International Airport (ND); MSP = Minneapolis-St. Paul International Airport (MN); MSO = Missoula Montana Airport (MT); MUVR = Varadero Juan Gualberto Gómez Airport (Cuba); MKC = Charles B. Wheeler Downtown Airport (MO); MKJS = Sangster International Airport (Jamaica); NM = Nautical Mile; ORD = Chicago O'Hare International Airport (IL); PDX = Portland International Airport (OR); PSP = Palm Springs International Airport (CA); PTK = Oakland County International Airport (MI); PWA = Wiley Post Airport (OK); PWK = Chicago Executive Airport (IL); RAP = Rapid City Regional Airport (SD); RDU = Raleigh-Durham International Airport (NC); S25 = Wokal Field/Glasgow Airport (MT); SEA = Seattle-Tacoma International Airport (WA); SDF = Louisville Muhammad Ali International Airport (KY); XWA = Williston Basin International Airport (ND)

Table 3.2-5 highlights the six route-pairings that were impacted by a 3 percent change to the baseline route or greater, with BIS-GCC, DEN-XWA, and DEN-DIK being the most affected, each by over 20 percent.

Table 3.2-5 Route Pairings Affected by 3 Percent or More of Baseline Route by LFE Airspace

Route Pairings	Annual Frequency	Change in Distance (NM)	Change in Time (Min)	Change as a Percentage of Baseline Route (%)
BIS-GCC	96	67.65	9.02	27.2%
DEN-XWA	1994	113.48	15.13	22.4%
DEN-DIK	415	85.43	11.39	20.1%
CYQR-DEN	70	59.88	7.98	9.4%

Route Pairings	Annual Frequency	Change in Distance (NM)	Change in Time (Min)	Change as a Percentage of Baseline Route (%)
BIL-RAP	52	16.19	2.16	6.3%
BIL-FSD	179	25.37	3.38	4.9%

Legend: % = percent; BIL = Billings Logan International Airport (MT); BIS = Bismarck Municipal Airport (ND); CYQR = Regina International Airport (SK); DEN = Denver International Airport (CO); DIK = Dickinson Theodore Roosevelt Regional Airport (ND); FSD = Sioux Falls Regional Airport (SD); GCC = Gillette-Campbell County Airport (WY); LFE = Large Force Exercise; Min = Minutes; NM = Nautical Mile; RAP = Rapid City Regional Airport (SD); XWA = Williston Basin International Airport (ND)

Per Route Impact Analysis: Only five routes are affected by approximately 5 minutes or more per route at average speeds (450 KTAS) and at the altitudes in consideration. DEN-XWA has the greatest potential per flight effect of a 15-minute change. DEN-DIK has potential per flight effect of approximately 11 minutes. BIS-GCC has a potential effect of approximately 9 minutes although, some of this route's impact may be mitigated by transiting at different altitudes. CYQR-MMPR, an international flight route between Canada and Mexico, has potential per flight effect of approximately 5 minutes. Lastly, CYQR-DEN has potential effect of approximately 8 minutes per flight.

Days of Use Considerations: The proposal describes up to 30 total days per year for the LFE area, and a 10 of 12-day per exercise iteration (no flights on Saturday or Sunday). This results in 6 weeks of use out of the 52 weeks where data was collected, or 11.54 percent.

Impact Projection: Projecting a weighted impact metric was completed by using 11.54 percent (6 of 52 weeks) of the total annual flights and the per flight time deviations required to circumnavigate the area. This resulted in the total amount of projected effect to each route pairing throughout the year. Only four route pairings were projected to be affected by five flight hours or greater annually. DEN-XWA, JFK-SEA, DEN-DIK, and EWR-SEA have the greatest overall effect considering both frequency and duration. Flights between JFK or EWR and SEA have no distance impact if those flights are authorized through Canadian airspace. All 42 routes that were impacted by over 10 NM are shown below sorted by weighted impact metric in **Table 3.2-6**.

Table 3.2-6 Route Pairings Sorted by Weighted Impact Metric

Route Pairings	Annual Frequency	Change in Distance (NM)	Change as a Percentage of Baseline Route (%)	Change in Time per Flight (Min)	Weighted Impact Metric - 6 of 52 weeks x Change in Time (Hours)
DEN-XWA	1994	113.48	22.4%	15.13	58.03
JFK-SEA	2476	18.65	0.9%	2.49	11.84
DEN-DIK	415	85.43	20.1%	11.39	9.09
EWR-SEA	1536	18.65	0.9%	2.49	7.35
BZN-ORD	1281	13.84	1.3%	1.85	4.55
DEN-MOT	1244	13.51	2.6%	1.80	4.31
BZN-MSP	1254	12.45	1.6%	1.66	4.00
RDU-SEA	953	15.38	0.8%	2.05	3.76
BIL-SDF	898	12.04	1.1%	1.61	2.77
BIL-MSP	600	17.01	2.6%	2.27	2.62
BOS-PDX	492	19.24	0.8%	2.57	2.43
CYEG-MMUN	476	19.35	0.8%	2.58	2.36
IWA-MOT	261	28.75	2.8%	3.83	1.92
BIL-ORD	252	26.92	2.9%	3.59	1.74
LAS-MOT	237	28.20	3.0%	3.76	1.71
BIS-GCC	96	67.65	27.2%	9.02	1.67

Route Pairings	Annual Frequency	Change in Distance (NM)	Change as a Percentage of Baseline Route (%)	Change in Time per Flight (Min)	Weighted Impact Metric - 6 of 52 weeks x Change in Time (Hours)
CYYC-MEM	426	13.53	1.0%	1.80	1.48
CYWG-LAS	184	26.18	2.3%	3.49	1.24
BIL-FSD	179	25.37	4.9%	3.38	1.16
CYQR-DEN	70	59.88	9.4%	7.98	1.07
CYWG-PSP	166	24.85	1.9%	3.31	1.06
MSO-ORD	372	10.91	0.9%	1.46	1.04
CYVR-SDF	346	11.62	0.7%	1.55	1.03
CYWG-LAX	176	19.71	1.5%	2.63	0.89
CVG-GEG	239	13.87	0.9%	1.85	0.85
BZN-MDW	243	12.93	1.2%	1.72	0.81
CYQR-MMPR	83	37.25	2.1%	4.97	0.79
CYYC-MKC	136	19.77	1.8%	2.64	0.69
ILN-SEA	240	10.94	0.6%	1.46	0.67
BZN-PWK	133	14.71	1.4%	1.96	0.50
BZN-FSD	91	13.10	2.1%	1.75	0.31
BZN-FCM	83	13.57	1.8%	1.81	0.29
BZN-IAD	79	14.05	0.9%	1.87	0.28
BTM-FSD	86	12.81	1.9%	1.71	0.28
CYYC-MKJS	63	17.36	0.7%	2.31	0.28
BIS-LAS	87	12.27	1.3%	1.64	0.27
CYYC-MUVR	66	15.82	0.7%	2.11	0.27
CLT-CYVR	94	10.72	0.5%	1.43	0.26
IAH-XWA	61	16.43	1.4%	2.19	0.26
PWA-S25	53	18.30	2.4%	2.44	0.25
BIL-RAP	52	16.19	6.3%	2.16	0.22
BZN-PTK	59	11.46	1.0%	1.53	0.17

Legend: % = percent; BIL = Billings Logan International Airport (MT); BIS = Bismarck Municipal Airport (ND); BOS = Boston Logan International Airport (MA); BTM = Bert Mooney Airport (MT); BZN = Bozeman Yellowstone International Airport (MT); CLT = Charlotte Douglas International Airport (NC); CVG = Cincinnati/Northern Kentucky International Airport (KY); CYEG = Edmonton International Airport (AB); CYQR = Regina International Airport (SK); CYVR = Vancouver International Airport (BC); CYWG = Winnipeg James Armstrong Richardson International Airport (MB); CYYC = Calgary International Airport (AB); DEN = Denver International Airport (CO); DIK = Dickinson Theodore Roosevelt Regional Airport (ND); EWR = Newark Liberty International Airport (NJ); FCM = Flying Cloud Airport (MN); FSD = Sioux Falls Regional Airport (SD); GCC = Gillette-Campbell County Airport (WY); GEG = Spokane International Airport (WA); IAD = Washington Dulles International Airport (VA); IAH = George Bush Intercontinental Airport (TX); ILN = Wilmington Air Park (OH); IWA = Phoenix-Mesa Gateway Airport (AZ); JFK = John F. Kennedy International Airport (NY); LAS = Harry Reid International Airport (NV); LAX = Los Angeles International Airport (CA); MDW = Chicago Midway International Airport (IL); MEM = Memphis International Airport (TN); Min = Minutes; MMPR = Licenciado Gustavo Díaz Ordaz International Airport (Mexico); MMUN = Cancún International Airport (Mexico); MOT = Minot International Airport (ND); MSP = Minneapolis-St. Paul International Airport (MN); MSO = Missoula Montana Airport (MT); MUVR = Varadero Juan Gualberto Gómez Airport (Cuba); MKC = Charles B. Wheeler Downtown Airport (MO); MKJS = Sangster International Airport (Jamaica); NM = Nautical Mile; ORD = Chicago O'Hare International Airport (IL); PDX = Portland International Airport (OR); PSP = Palm Springs International Airport (CA); PTK = Oakland County International Airport (MI); PWA = Wiley Post Airport (OK); PWK = Chicago Executive Airport (IL); RAP = Rapid City Regional Airport (SD); RDU = Raleigh-Durham International Airport (NC); S25 = Wokal Field/Glasgow Airport (MT); SEA = Seattle-Tacoma International Airport (WA); SDF = Louisville Muhammad Ali International Airport (KY); XWA = Williston Basin International Airport (ND)

3.2.1.3 Use of GAP A/B/C MOAs Below FL260

In addition to impacts within the PRTC at or above FL260, there is potential for the Proposed Action to affect civil aviation below FL260 in the GAP A/B/C MOAs given the increased LFE days. Under current conditions, LFEs occur about 10 days per year; the Proposed Action could increase this to as many as 30 days annually. This means up to 20 additional days per year when the GAP A/B/C MOAs could be activated below FL260, adding to existing flight restrictions for civil aircraft (General Aviation, Air Taxi, and Air Carrier) in these corridors.

To assess potential impacts, the PDARS dataset was filtered for flights operating in the GAP MOAs below FL260. This analysis was independent of previously discussed activity at or above FL260.

GAP A MOA: Annual use of the GAP A MOA below FL260 was recorded 95 times (roughly twice per week). Of these, 46 flights had unknown origins/destinations, and 38 were of unknown aircraft type. Operations may include use of the V-254 ATS Route, IFR direct routing between MLS and GCC, or VFR flights between PR 1 and PR 2 MOAs (below 18,000 feet MSL). Most unknown aircraft were below 12,000 feet MSL, suggesting short-distance flights or light aircraft without supplemental oxygen. Among flights with known origins/destinations, only a few occurred more than once annually. The conclusion is that GAP A MOA is rarely used as a transit path through the PRTC complex below FL260.

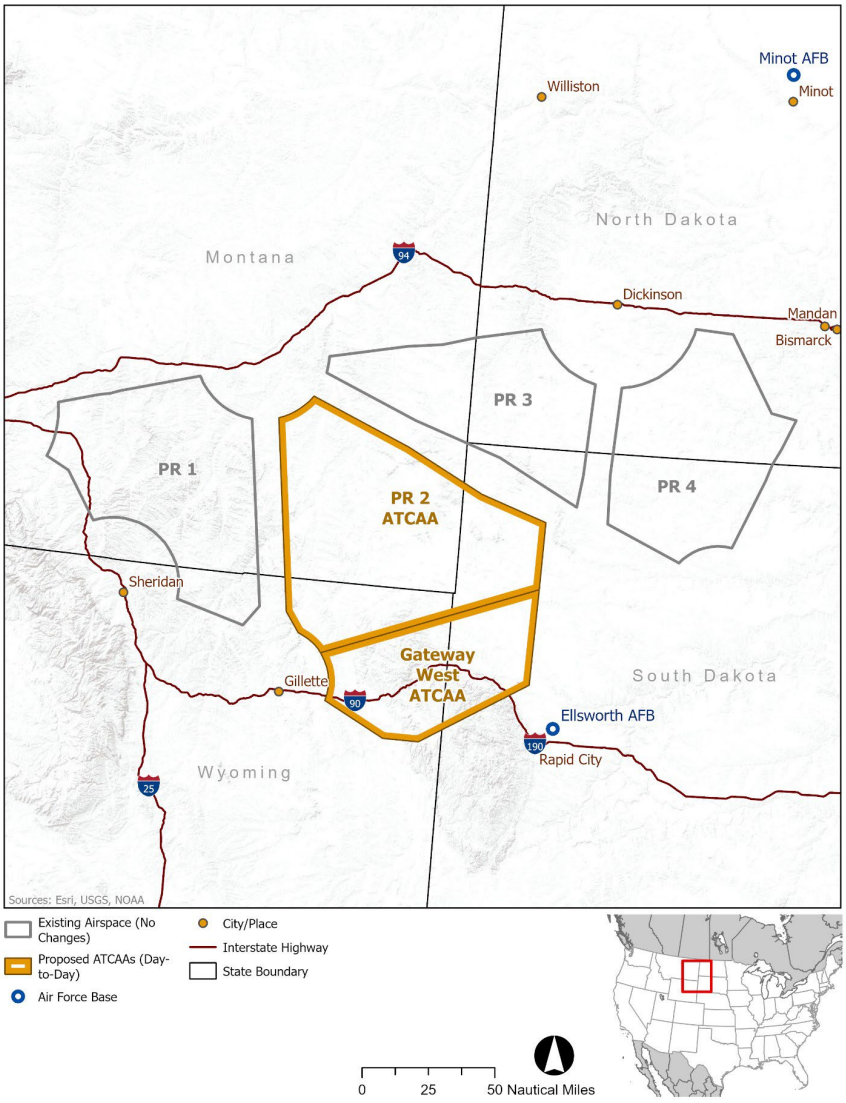
GAP B MOA: Although GAP B MOA sees more traffic at higher altitudes, its use below FL260 is even lighter than GAP A. Data shows 83 uses annually (less than twice per week). Of these, 17 were unknown aircraft; identified flights were mostly light General Aviation (GA) aircraft (Pilatus, Cirrus, Beech, Cessna). GAP B MOA aligns with V-120 ATS Route at low altitudes and J-204 at higher altitudes. Most flights (50 of 83) appear to follow V-120, while 33 align with J-204 (FL180–FL260).

GAP C MOA: Below FL260, GAP C MOA is used less than once per week (36 annual uses). It contains V-491 and overlaying T286 ATS routes, both lightly used below FL260. There is no J or Q route through GAP C, though there is a fix JELRO at its southern end (defined off Dickinson VHF Omnidirectional Range/Tactical Air Navigation [VORTAC]) that could support direct routing above FL180. This appears rarely used.

Summary: Combined, GAP A/B/C MOAs are used about four times per week below FL260 (214 annual uses total). Under the Proposed Action, these operations could be affected during up to four additional weeks per year (due to increased LFE training). Assuming full-day activation for an LFE (a conservative assumption), potential impact equates to roughly 16 flights annually (4/52 × 214) whose historical routing would need adjustment.

3.2.2 Day-To-Day Operations

Under Alternative 1, the actions to improve day-to-day operations include raising the ceiling of the most used ATCAAs, PR 2 and Gateway West from FL260 to FL600. Additionally, times of use for PRTC is proposed to change to 07:00 to 00:30 (07:00 a.m. to 12:30 a.m.) Monday to Thursday, 07:00 to 18:00 (07:00 a.m. to 06:00 p.m.) Friday, and other times by NOTAM (**Figure 3.2-20**).



Legend: ATCAA = Air Traffic Control Assigned Airspace; PR = Powder River

Figure 3.2-20 Alternative 1 Day-To-Day Area

3.2.2.1 Airports

Impacts to airports during day-to-day operations would be the same as those described for the LFE scenario and published instrument approach and departure procedure impacts would involve the same airports identified in **Table 3.2-1**. As with LFE operations, any potential impacts would be procedural and conditional, occurring primarily when instrument approaches are required due to instrument meteorological conditions and when portions of those procedures transit affected airspace. MOAs would not restrict VFR access to or from these airports, and any effects would be limited to increased radio coordination rather than denial of access. Unlike LFE operations, however, any potential impacts associated with day-to-day use would only occur during the proposed scheduled hours of airspace activation.

No additional airports, procedures, or altitudes would be affected beyond those identified in the LFE analysis.

3.2.2.2 Flight Traffic

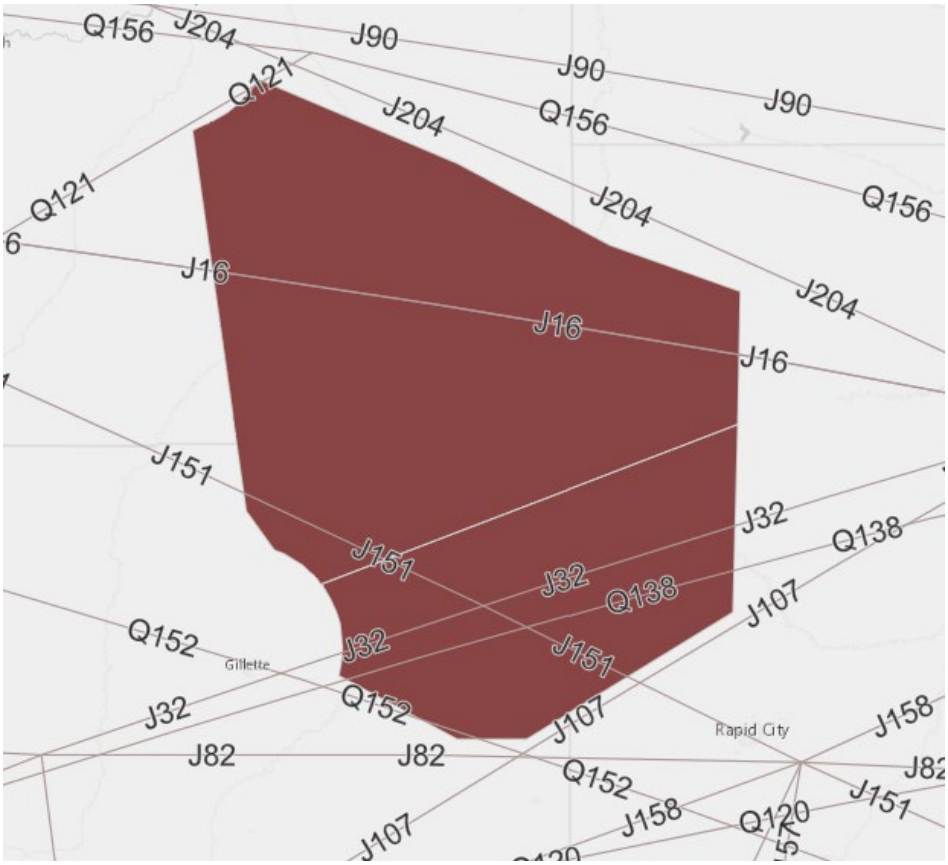
ATS Routes

There are six ATS routes which traverse the PRTC Alternative 1 Day-to-Day Proposed Changes from FL260–FL600. The route distances affected are listed below in **Table 3.2-7** and a depiction of the routes can be seen in **Figure 3.2-21**.

Table 3.2-7 PRTC Alternative 1 Day-to-Day ATS Routes

Route Name	Type	PR 2 (NM)	Gateway West (NM)	Total Distance (NM)
J16	Jet Route	117	0	117
J151	Jet Route	35	60	95
J32	Jet Route	0	92	92
Q138	Q-Route	0	90	90
Q152	Q-Route	0	13	13
Q121	Q-Route	2	0	2

Legend: NM = Nautical Mile; PR = Powder River



Legend: ATS = Air Traffic Service; ATCAA = Air Traffic Control Assigned Airspace; PR = Powder River

Figure 3.2-21 ATS Routes Traversing the PRTC Day-To-Day Area (PR 2 and Gateway West ATCAAs)

As a result of establishment of airspace in this area, the aircraft that typically fly these routes through the area would require alternate routing or radar vectors to avoid the SAA only at times when it is active. The

impact of rerouting traffic along these routes is a portion of traffic analysis included within the civil traffic section below.

Further, the heat maps in **Figure 3.2-22 and Figure 3.2-23** illustrate a strong east-to-west travel pattern across the analyzed airspace. This trend is likely largely attributable to the absence of major Jetways or Q-routes running predominantly north-south, which limits vertical connectivity at these altitudes and reinforces east-west movement. The heat maps indicate that routing through the various airspace occurs regularly both on established Jetway/Q-Routes as well as off of established routes, particularly in the PR 2 area.

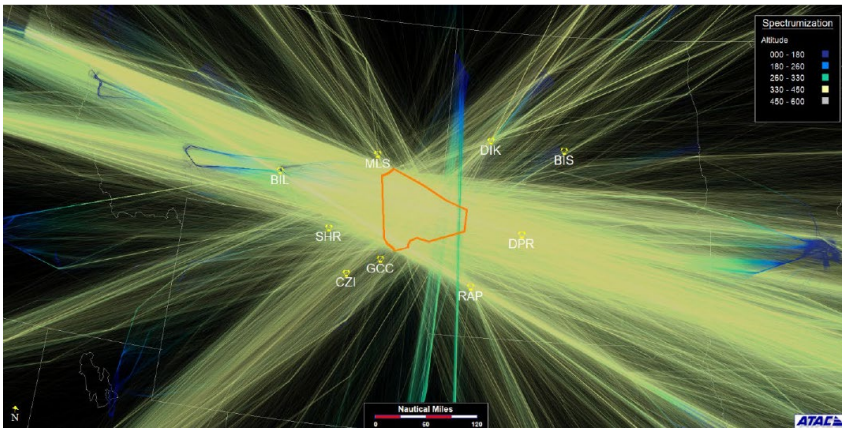


Figure 3.2-22 PR 2 Heat Map

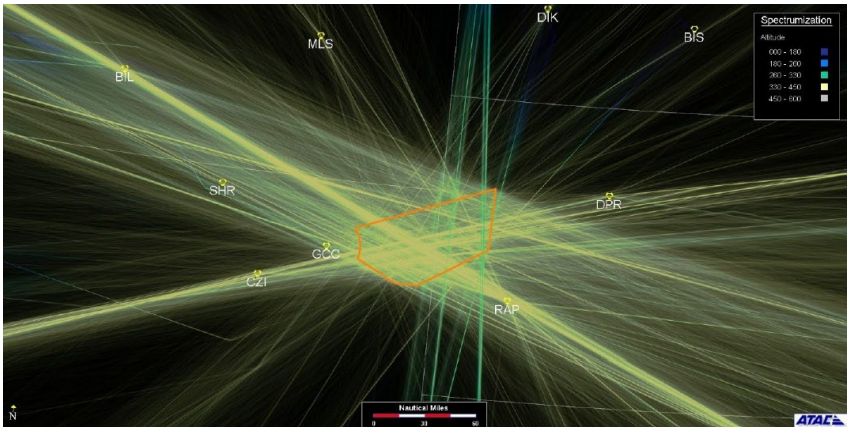


Figure 3.2-23 Gateway West Heat Map

Civil Traffic

During the year of data collection, 97,571 aircraft flights traversed at least part of the area encompassing the proposed PRTC Alternative 1 Day-to-Day area above FL260 to FL600. The most common aircraft in this list are Boeing 737 and 777 series, Airbus A320/A321 families, and regional jets like the CRJ variants. Listed in **Table 3.2-8** are the top 10 aircraft types, by number of flights per year. Assumptions for converting distance to time were that aviation traffic at FL260–FL600 was traveling at 450 KTAS given most aircraft at these altitudes are domestic airliners and long-range business jets.

Table 3.2-8 Aircraft Types Intersecting PRTC Alternative 1 Day-to-Day Area (Above FL260 to FL600)

Aircraft Type	Aircraft Name	Percent of Total
B739	Boeing 737-900	12.7%
B738	Boeing 737-800	10.3%
B39M	Boeing 737 MAX 9 (BBJ)	5.9%
B38M	Boeing 737 MAX 8 (BBJ)	4.7%
A320	Airbus A320	4.2%
A321	Airbus A321	4.1%
A21N	Airbus A321neo	3.8%
B763	Boeing 767-300	3.6%
CRJ2	Bombardier CRJ-200	2.7%
B752	Boeing 757-200	2.1%

Legend: % = percent; FL = Flight Level; PRTC = Powder River Training Complex

Of the 97,571 tracks that were found to have transited the Alternative 1 Day-to-Day area during the year of data gathered, 885 (0.91 percent) being military carrier, and 78 (0.08 percent) being unknown carriers were removed from impact analysis. Further, the Alternative 1 Day-to-Day proposal states that operations will generally not occur on weekends, thus avoiding impact to 26,993 (27.66 percent) of the potential flights impacted which occurred on Saturday or Sunday, which were also removed. Additionally, the Alternative 1 Day-to-Day proposal state that the airspace schedule is proposed to change to 07:00 to 00:30 (07:00 a.m. to 12:30 a.m.) Monday to Thursday, 07:00 to 18:00 (07:00 a.m. to 06:00 p.m.) Friday. Focusing the analysis on the proposed schedule eliminated 11,001 (11.27 percent) additional tracks. Finally, 21 tracks were removed due to unknown origin and/or destination, and 16 were removed due to being local area flights (i.e., same origin/destination). The remaining 58,557 tracks were used to conduct a detailed analysis of the airspace establishment effects. Within this track set, it was determined that 4,089 Origin/Destination (route) pairings existed for all the tracks that passed through the airspace. Most of the route pairings occurred sparingly. Only 170 route pairings occurred at a frequency of once a week or greater (i.e., 52 times or more throughout the year). These 170 weekly or more frequent route pairings accounted for 45,547 tracks or 77.78 percent of the remaining data set. The lower frequency tracks were removed from further analysis due to the low impact the establishment of airspace would have on those route pairings. The 170 route pairings were all plotted and assessed for effects pertaining to that of the direct great circle route vs. the route required to circumnavigate the proposed airspace. The list of all route pairings can be found in **Enclosure C**. **Figure 3.2-24** shows a graph of all 170 route pairings plotted with the change in distance required in the event the airspace was established versus the annual frequency of that route pairing. As seen, most of the frequent routes have very low route effects, and most time-effected routes occur infrequently. Some route pairings, however, are outliers and have potential effects at higher frequencies such as DEN-XWA and BIS-GCC.

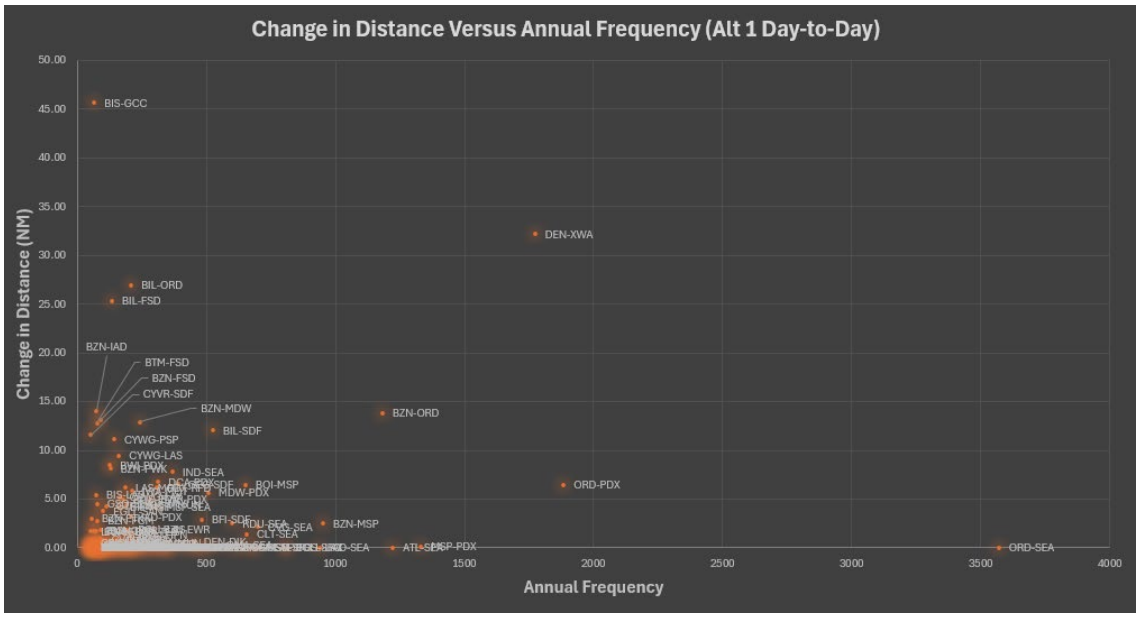
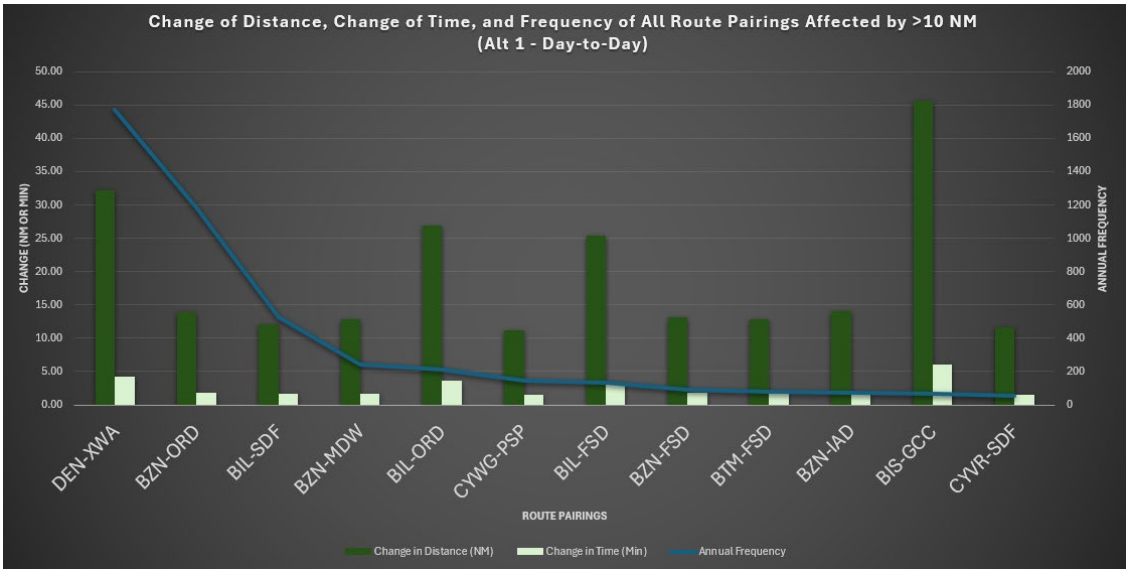


Figure 3.2-24 Alternative 1 Day-to-Day Change In Distance Versus Annual Frequency

Of the 170 route pairings, 52 percent of great circle routes did not pass through the proposed airspace and are likely not impacted and only 12 route pairings were impacted by a course deviation of 10 NM or greater; 10 NM at 450 KTAS takes approximately 1 minute and 20 seconds, thus any routes impacted to this degree or less are considered negligible. **Figure 3.2-25** and **Table 3.2-9** show all 12 routes that require greater than 10 NM deviation from the direct great circle route to circumnavigate the proposed area. In **Figure 3.2-25**, route pairings frequency are represented with the blue line. Effects to the great circle route by distance and time are represented by the green bars. **Table 3.2-10** highlights the 3 routes with greater than 3% change.



Legend: > = greater than; NM = Nautical Mile

Figure 3.2-25 Alternative 1 Day-to-Day Distance and Time Impacts to Route Pairings > 10 NM

Table 3.2-9 Alternative 1 Day-to-Day Route Pairings Impacted by >10 NM Sorted by Frequency

Route Pairings	Annual Frequency	Sum of Baseline Distance (NM)	Sum of Circumnavigation Distance (NM)	Change in Distance (NM)	Change as a Percentage of Baseline (%)	Change in Time (Min)
DEN-XWA	1773	505.78	537.99	32.21	6%	4.29
BZN-ORD	1183	1027.51	1041.35	13.84	1%	1.85
BIL-SDF	526	1111.08	1123.12	12.04	1%	1.61
BZN-MDW	242	1038.12	1051.04	12.93	1%	1.72
BIL-ORD	209	919.13	946.05	26.92	3%	3.59
CYWG-PSP	143	1286.21	1297.36	11.15	1%	1.49
BIL-FSD	135	520.58	545.95	25.37	5%	3.38
BZN-FSD	89	628.15	641.25	13.10	2%	1.75
BTM-FSD	77	685.33	698.14	12.81	2%	1.71
BZN-IAD	74	1537.27	1551.32	14.05	1%	1.87
BIS-GCC	66	248.49	294.15	45.66	18%	6.09
CYVR-SDF	54	1733.66	1745.27	11.62	1%	1.55

Legend: % = percent; BIL = Billings Logan International Airport (MT); BIS = Bismarck Municipal Airport (ND); BZN = Bozeman Yellowstone International Airport (MT); BTM = Bert Mooney Airport (MT); CYVR = Vancouver International Airport (BC); CYWG = Winnipeg James Armstrong Richardson International Airport (MB); DEN = Denver International Airport (CO); FSD = Sioux Falls Regional Airport (SD); GCC = Gillette-Campbell County Airport (WY); IAD = Washington Dulles International Airport (VA); MDW = Chicago Midway International Airport (IL); Min = Minutes; NM = Nautical Mile; ORD = Chicago O'Hare International Airport (IL); PSP = Palm Springs International Airport (CA); SDF = Louisville Muhammad Ali International Airport (KY); XWA = Williston Basin International Airport (ND).

Table 3.2-10 Alternative 1 Day-to-Day Route Pairings Affected by 3 Percent Change from Baseline Route or Greater

Route Pairings	Annual Frequency	Baseline Distance (NM)	Circumnavigation Distance (NM)	Change in Distance (NM)	Change as a Percentage of Baseline (%)	Change in Time (Min)
BIS-GCC	66	248.49	294.15	45.66	6.09	18%
DEN-XWA	1773	505.78	537.99	32.21	4.29	6%
BIL-FSD	135	520.58	545.95	25.37	3.38	5%

Legend: % = percent; BIL = Billings Logan International Airport (MT); BIS = Bismarck Municipal Airport (ND); DEN = Denver International Airport (CO); FSD = Sioux Falls Regional Airport (SD); GCC = Gillette-Campbell County Airport (WY); NM = Nautical Mile; XWA = Williston Basin International Airport (ND).

Per Route Impact Analysis: Only two routes are affected by approximately 5 minutes or more per route at average speeds (450 KTAS) and at the altitudes in consideration. BIS-GCC has the greatest potential to be affected on a per flight basis with a 6-minute change, though some of this may be mitigated through altitude choices. DEN-XWA has potential to be affected per flight by approximately 4 minutes.

Impact Projection: Projecting a weighted impact metric was completed by using the total annual flights and the per flight time deviations required to circumnavigate the area. This resulted in the total amount of potential effect to each route pairing throughout the year. Only seven route pairings were projected to have an effect of five flight hours or greater annually despite the daily operations projected for the airspace. DEN-XWA is affected the greatest at 126 annual hours. BZN-ORD is the second most affected at 36 hours annually. BIL-SDF, BIL-ORD, BIL-FSD, BZN-MDW, and BIS-GCC are the next most affected considering both frequency and duration at times between 6 and 14 hours annually. All 12 routes that were affected by over 10 NM by Alternative 1 Day-to-Day airspace are shown below sorted by weighted impact metric in **Table 3.2-11**.

Table 3.2-11 Route Pairings Sorted by Weighted Impact Metric (Alt 1 Day-to-Day)

Route Pairings	Annual Frequency	Sum of Baseline Distance (NM)	Sum of Circumnavigation Distance (NM)	Change in Distance (NM)	Change as a Percentage of Baseline (%)	Change in Time (Min)	Weighted Impact Metric (Change in Time x Frequency) (Hours)
DEN-XWA	1773	505.78	537.99	32.21	6%	4.29	126.90
BZN-ORD	1183	1027.51	1041.35	13.84	1%	1.85	36.40
BIL-SDF	526	1111.08	1123.12	12.04	1%	1.61	14.07
BIL-ORD	209	919.13	946.05	26.92	3%	3.59	12.50
BIL-FSD	135	520.58	545.95	25.37	5%	3.38	7.61
BZN-MDW	242	1038.12	1051.04	12.93	1%	1.72	6.95
BIS-GCC	66	248.49	294.15	45.66	18%	6.09	6.70
CYWG-PSP	143	1286.21	1297.36	11.15	1%	1.49	3.54
BZN-FSD	89	628.15	641.25	13.10	2%	1.75	2.59
BZN-IAD	74	1537.27	1551.32	14.05	1%	1.87	2.31
BTM-FSD	77	685.33	698.14	12.81	2%	1.71	2.19
CYVR-SDF	54	1733.66	1745.27	11.62	1%	1.55	1.39

Legend: % = percent; BIL = Billings Logan International Airport (MT); BIS = Bismarck Municipal Airport (ND); BTM = Bert Mooney Airport (MT); BZN = Bozeman Yellowstone International Airport (MT); CYVR = Vancouver International Airport (BC); CYWG = Winnipeg James Armstrong Richardson International Airport (MB); DEN = Denver International Airport (CO); FSD = Sioux Falls Regional Airport (SD); GCC = Gillette-Campbell County Airport (WY); IAD = Washington Dulles International Airport (VA); MDW = Chicago Midway International Airport (IL); Min = Minutes; NM = Nautical Mile; ORD = Chicago O'Hare International Airport (IL); PSP = Palm Springs International Airport (CA); SDF = Louisville Muhammad Ali International Airport (KY); XWA = Williston Basin International Airport (ND).

3.3 ALTERNATIVE 2

Alternative 2 includes changes to improve day-to-day operations and training capability of LFEs. These actions are described in more detail in the following sections.

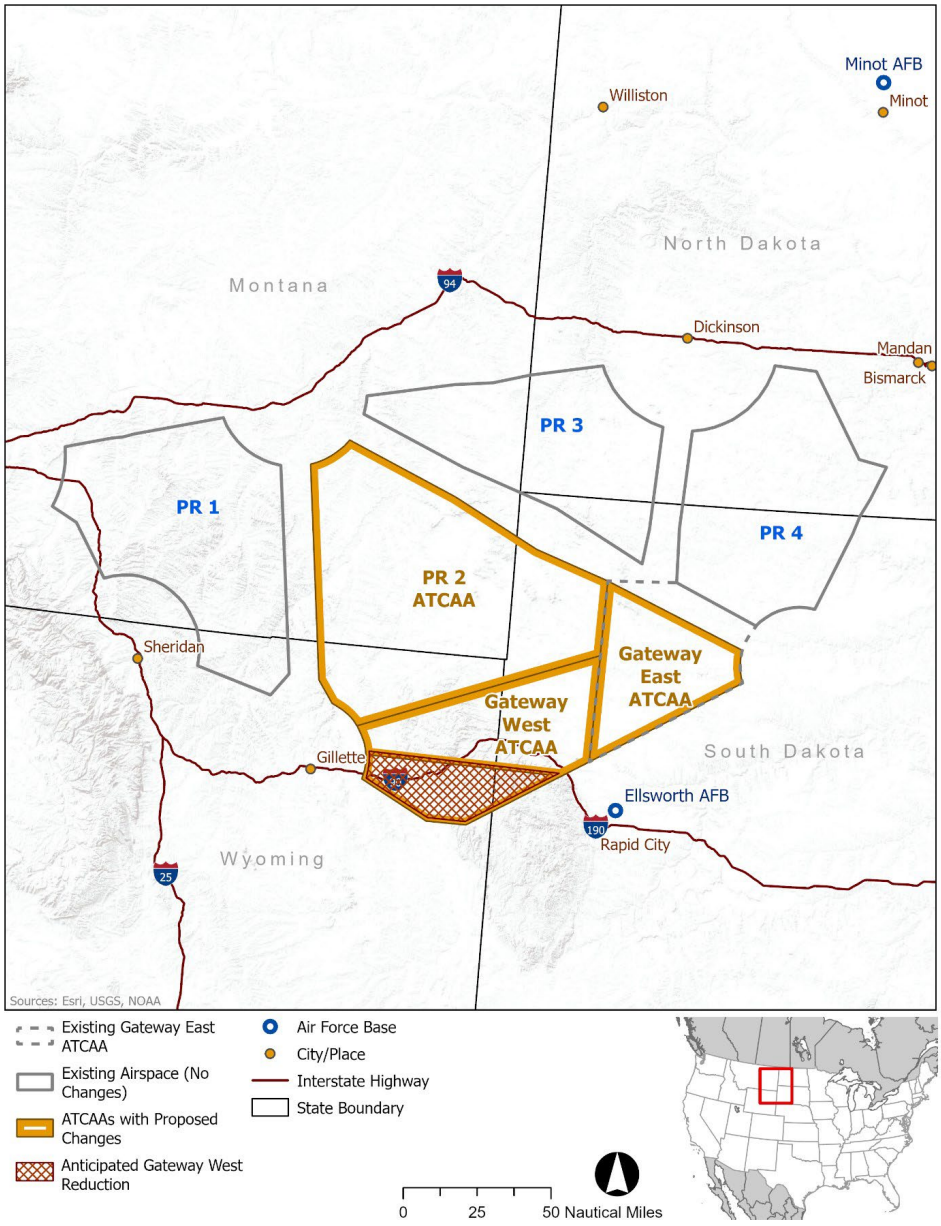
3.3.1 Large Force Exercises

Alternative 2 includes the same changes to LFEs as Alternative 1, but it incorporates modifications to Gateway East and West ATCAAs. The northern border of the Gateway East ATCAA would be shifted south to align with the PR 2 ATCAA northern border. A new Gap D ATCAA would be established in place of the northern portion of Gateway East ATCAA. The southern corner of Gateway West ATCAA would be moved to the north to facilitate civilian traffic, though the exact location of the new southern boundary would be coordinated with FAA. All other proposed changes would be the same as described in Alternative 1: authorizing operations up to FL600 and increasing the annual total from 10 days to 30. The impacts to airports and civil traffic would be the same as Alternative 1 described in **Section 3.2.1**.

3.3.2 Day-To-Day Operations

Under Alternative 2, the northern border of the Gateway East ATCAA would be shifted south to align with the PR 2 ATCAA northern border (**Figure 3.3-1**). This modified Gateway East ATCAA would be available for day-to-day operations (currently use of Gateway East ATCAA is limited to LFEs only). The southern corner of Gateway West ATCAA would be moved to the north to facilitate civilian traffic, though the exact location of the new southern boundary would be coordinated with FAA during a revision to the Letter of Agreement for this ATCAA. Since a new boundary would not be known until much later

in the aeronautical review process, the airspace analysis was conducted on the full Gateway West ATCAA to represent the greatest area of potential effect. The ceiling of the PR2 ATCAA and the modified Gateway East/West ATCAAs would be raised to FL600. The published times of use for PRTC day-to-day operations would be changed to 0700 to 0030 (7:00 am to 12:30 am) Monday to Thursday, 0700 to 1800 (7:00 am to 6:00 pm) Friday, and other times by NOTAM (same as Alternative 1).

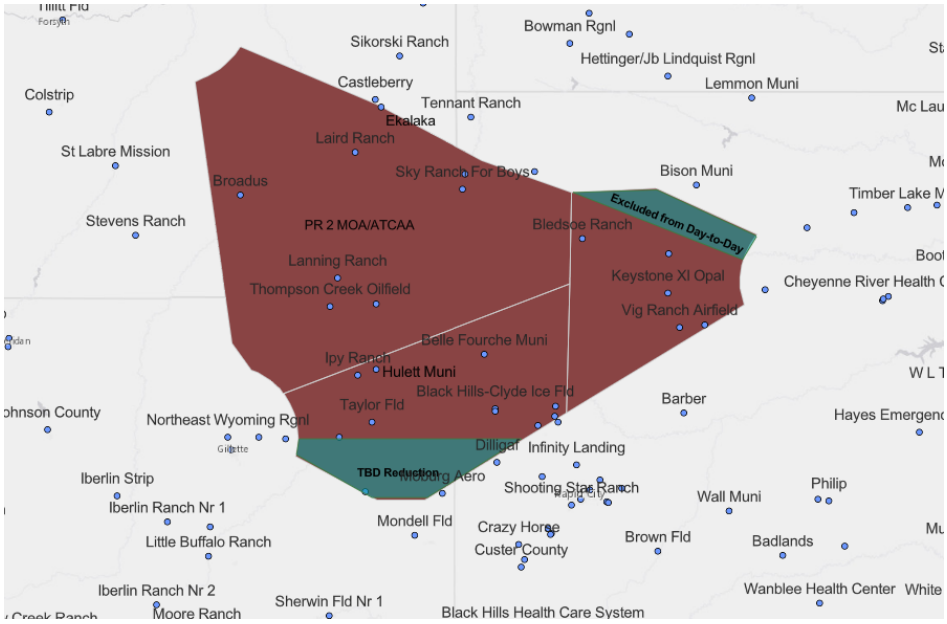


Legend: ATCAA = Air Traffic Control Assigned Airspace; PR = Powder River

Figure 3.3-1 Alternative 2 Day-To-Day Area

3.3.2.1 Airports

Under Alternative 2, the measured effects to airports on a day-to-day basis remain the same as that under PRTC Alternative 1 Day-To-Day. Detailed information on those affects can be found in **Section 3.2.2.1**. Airport positions as they pertain to the Alternative 2 proposal can be seen below in **Figure 3.3-2**.



Note: Exclusion and reduction areas are estimated for visual indicators only and not to scale.

Figure 3.3-2 Airports Near Alternative 2 Day-to-Day Area

3.3.2.2 Flight Traffic

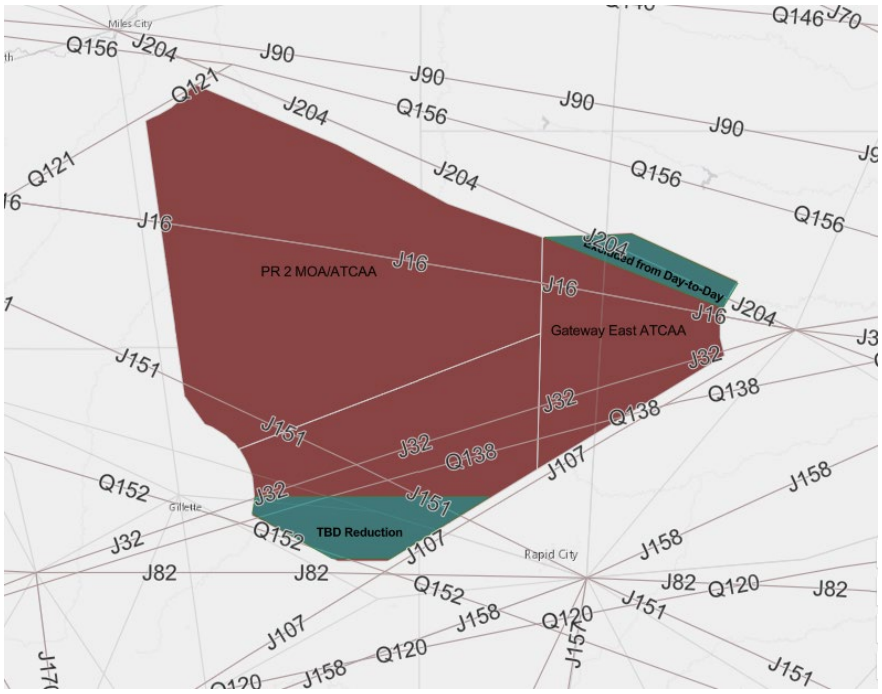
ATS Routes

There is only minor differences in the ATS Routes affected under Alternative 2. The same six ATS routes which traverse the PRTC Alternative 2 Day-to-Day lateral boundaries at altitudes from FL260-FL600 are the same as those affected by Alternative 1 Day-to-Day in **Section 3.2.2**. The route distances affected under Alternative 2 change slightly and are listed below in **Table 3.3-1** and a depiction of the routes can be seen in **Figure 3.3-3**.

Table 3.3-1 PRTC Alternative 2 Day-to-Day ATS Routes

Route Name	Type	PR 2 (NM)	Gateway East (NM)	Gateway West (NM)	Total Distance (NM)
J16	Jet Route	117	55	0	172
J151	Jet Route	35	0	60	95
J32	Jet Route	0	59	92	151
Q138	Q-Route	0	28	90	118
Q152	Q-Route	0	0	13	13
Q121	Q-Route	2	0	0	2

Legend: ATS = Air Traffic Service; NM = Nautical Mile; PR = Powder River; PRTC = Powder River Training Complex



Note: Exclusion and reduction areas are estimated for visual indicators only and not to scale.

Figure 3.3-3 ATS Routes Traversing the PRTC Alternative 2 Day-To-Day Area (PR 2, Gateway East, and Gateway West ATCAAs)

Aircraft that typically fly these routes through the area would require alternate routing or radar vectors to avoid the SAA only at times when it is active. The impact of rerouting traffic along these routes is a portion of traffic analysis included within the civil traffic section below.

Civil Traffic

During the year of data collection, 99,212 aircraft flights traversed at least part of the area encompassing the proposed PRTC Alternative 2 Day-to-Day area above FL260 to FL600. The most common aircraft in this list are Boeing 737 and 777 series, Airbus A320/A321 families, and regional jets like the CRJ variants. Listed below are the top 10 aircraft types, by percentage of flights per year (**Table 3.3-2**). Assumptions for converting distance to time were that aviation traffic at FL260–FL600 was traveling at 450 KTAS given most aircraft at these altitudes are domestic airliners and long-range business jets.

Table 3.3-2 Aircraft Types Intersecting PRTC Alternative 2 Day-to-Day Area (Above FL260 to FL600)

Aircraft Type	Aircraft Name	Percent of Total
B739	Boeing 737-900	12.4%
B738	Boeing 737-800	10.1%
B39M	Boeing 737 MAX 9 (BBJ)	5.8%
B38M	Boeing 737 MAX 8 (BBJ)	4.7%
A320	Airbus A320	4.1%
A321	Airbus A321	4.0%
A21N	Airbus A321neo	3.7%
B763	Boeing 767-300	3.5%
CRJ2	Bombardier CRJ-200	3.4%
B752	Boeing 757-200	2.1%

Legend: % = percent; FL = Flight Level; PRTC = Powder River Training Complex

Of the 99,212 tracks that were found to have transited the Alternative 2 Day-to-Day area during the year of data gathered, 908 (0.92 percent) being military carrier, and 78 (0.08 percent) being unknown carriers were removed from impact analysis. Further, the Alternative 2 Day-to-Day proposal states that operations will generally not occur on weekends, thus avoiding impact to 27,448 (27.67 percent) of the potential flights which occurred on Saturday or Sunday, which were also removed. Additionally, the Alternative 2 Day-to-Day proposal state that the airspace schedule is proposed to change to 07:00 to 00:30 Monday to Thursday, 07:00 to 18:00 Friday. Focusing the analysis on the proposed schedule eliminated 11,114 (11.2 percent) additional tracks. Finally, 22 tracks were removed due to unknown origin and/or destination, and 16 were removed due to being local area flights (i.e., same origin/destination). The remaining 59,626 tracks were used to conduct a detailed analysis of the airspace establishment effects. Within this track set, it was determined that 4,183 Origin/Destination (route) pairings existed for all the tracks that passed through the airspace. Most of the route pairings occurred sparingly. Only 171 route pairings occurred at a frequency of once a week or more (i.e., 52 times or more throughout the year). These 171 weekly or more frequent route pairings accounted for 46,227 tracks or 77.53 percent of the remaining data set. The lower frequency tracks were removed from further analysis due to the low impact the establishment of airspace would have on those route pairings. The 171 route pairings were all plotted and assessed for impact pertaining to that of the direct great circle route vs. the route required to circumnavigate the proposed airspace. The list of all route pairings can be found in **Enclosure D**. **Figure 3.3-4** shows a graph of all 171 route pairings plotted with the change in distance required in the event the airspace was established versus the annual frequency of that route pairing. As seen, most of the frequent routes have very low route impacts, and most time impacted routes occur infrequently. Some route pairings, however, are outliers and have potential impacts at higher frequencies such as DEN-XWA, BZN-ORD, DEN-DIK and BIS-GCC.

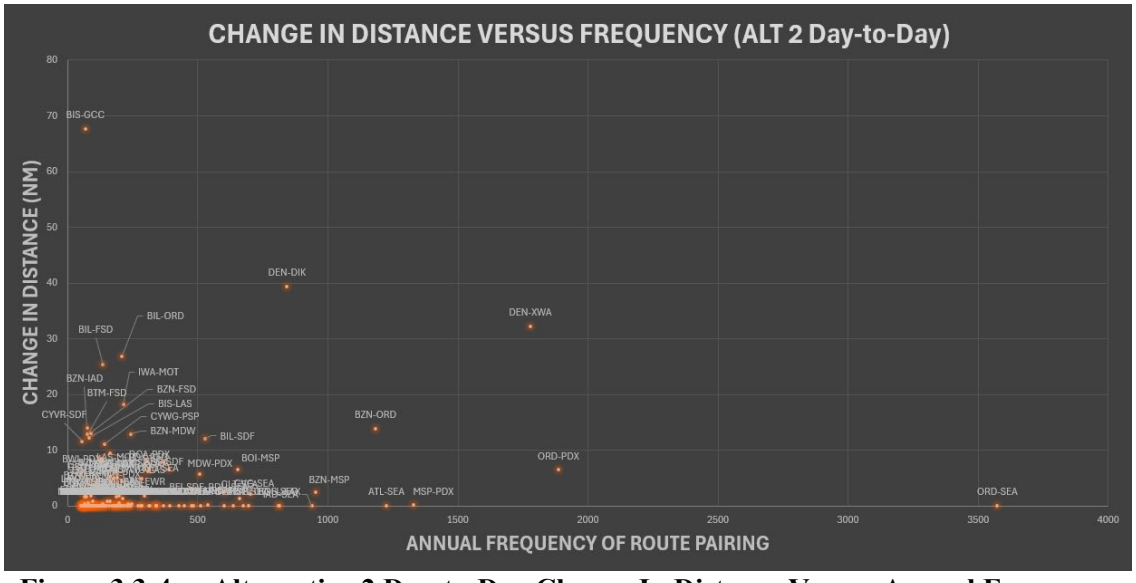
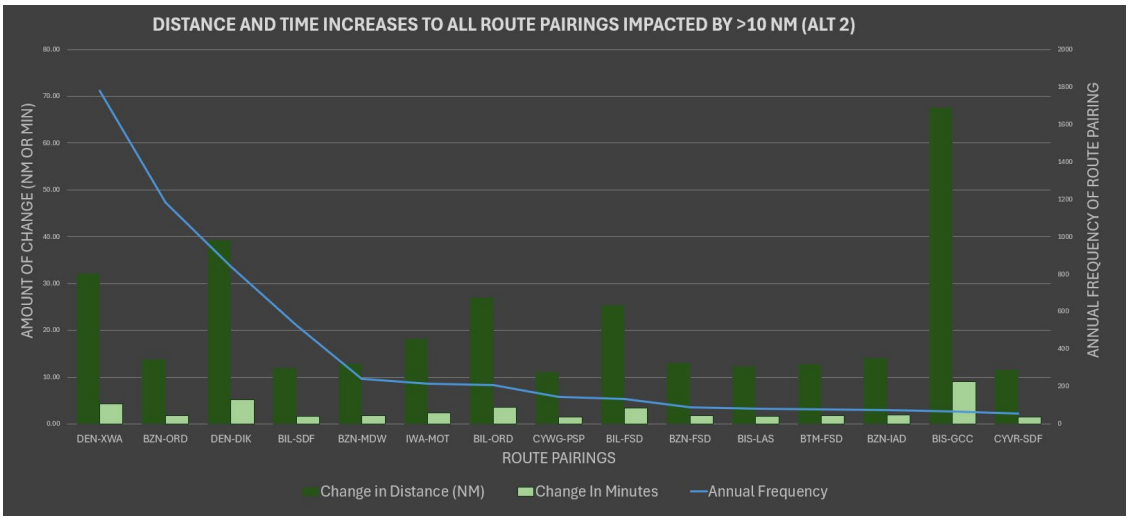


Figure 3.3-4 Alternative 2 Day-to-Day Change In Distance Versus Annual Frequency

Of the 171 route pairings, 51 percent of great circle routes did not pass through the proposed airspace and are likely not impacted, and only 15 route pairings were impacted by a course deviation of 10 NM or greater; 10 NM at 450 KTAS takes approximately 1 minute and 20 seconds, thus any routes impacted to this degree or less are considered negligible. **Figure 3.3-5** and **Table 3.3-3** show all 15 routes that require greater than 10 NM deviation from the direct great circle route to circumnavigate the proposed area. In

Figure 3.3-5, route pairings frequency are represented with the blue line. Impacts to the great circle route by distance and time are represented by the green bars.



Legend: > = greater than; NM = Nautical Mile

Figure 3.3-5 Alternative 2 Day-to-Day Distance and Time Impacts to Route Pairings > 10 NM

Table 3.3-3 Alternative 2 Day-to-Day Route Pairings Impacted by >10 NM Sorted by Frequency

Route Parings	Annual Frequency	Baseline Distance (NM)	Circumnavigation Distance (NM)	Change in Distance (NM)	Change to Baseline Route (%)	Change in Time (Min)
DEN-XWA	1778	505.78	537.99	32.21	6.4%	4.29
BZN-ORD	1183	1027.51	1041.35	13.84	1.3%	1.85
DEN-DIK	843	424.49	463.83	39.34	9.3%	5.24
BIL-SDF	527	1111.08	1123.12	12.04	1.1%	1.61
BZN-MDW	242	1038.12	1051.04	12.93	1.2%	1.72
IWA-MOT	214	1011.88	1030.07	18.19	1.8%	2.43
BIL-ORD	209	919.13	946.05	26.92	2.9%	3.59
CYWG-PSP	143	1286.21	1297.36	11.15	0.9%	1.49
BIL-FSD	135	520.58	545.95	25.37	4.9%	3.38
BZN-FSD	89	628.15	641.25	13.10	2.1%	1.75
BIS-LAS	83	909.80	922.07	12.27	1.3%	1.64
BTM-FSD	77	685.33	698.14	12.81	1.9%	1.71
BZN-IAD	74	1537.27	1551.32	14.05	0.9%	1.87
BIS-GCC	68	248.49	316.14	67.65	27.2%	9.02
CYVR-SDF	56	1733.66	1745.27	11.62	0.7%	1.55

Legend: % = percent; BIL = Billings Logan International Airport (MT); BIS = Bismarck Municipal Airport (ND); BTM = Bert Mooney Airport (MT); BZN = Bozeman Yellowstone International Airport (MT); CYVR = Vancouver International Airport (BC); CYWG = Winnipeg James Armstrong Richardson International Airport (MB); DEN = Denver International Airport (CO); DIK = Dickinson Theodore Roosevelt Regional Airport (ND); FSD = Sioux Falls Regional Airport (SD); GCC = Gillette-Campbell County Airport (WY); IAD = Washington Dulles International Airport (VA); IWA = Phoenix–Mesa Gateway Airport (AZ); LAS = Harry Reid International Airport (NV); MDW = Chicago Midway International Airport (IL); Min = Minutes; MOT = Minot International Airport (ND); NM = Nautical Mile; ORD = Chicago O'Hare International Airport (IL); PSP = Palm Springs International Airport (CA); SDF = Louisville Muhammad Ali International Airport (KY); XWA = Williston Basin International Airport (ND).

Per Route Impact Analysis: Only three routes are impacted by approximately 5 minutes or more per route at average speeds (450 KTAS) and at the altitudes in consideration. BIS-GCC has the greatest potential to be affected on a per flight basis with a 9-minute change, though some of this may be

mitigated through altitude choice. DEN-DIK is potentially impacted by 5 minutes per route, and DEN-XWA has potential to be affected per flight by approximately 4 minutes.

Impact Projection: Projecting a weighted impact metric was completed by using the total annual flights and the per flight time deviations required to circumnavigate the area. This resulted in the total amount of potential effect to each route pairing throughout the year. Only nine route pairings were projected to have an effect of five flight hours or greater annually despite the daily operations projected for the airspace. DEN-XWA is affected the greatest at 127 annual hours. The DEN–DIK route is the second most affected, with approximately 74 hours of annual effect. It represents the greatest difference between Alternative 1 and Alternative 2 Day-to-Day proposals, with increased activation of the Gateway East ATCAA, which requires a more pronounced easterly diversion for flights between these two airports. BZN-ORD is affected by 36 hours of flight time annually. BIL-SDF, BIL-ORD, BIS-GCC, IWA-MOT, BIL-FSD, and BZN-MDW are the next most affected considering both frequency and duration at times between 7 and 14 hours annually. All 15 routes that were affected by over 10 NM by Alternative 2 Day-to-Day airspace are shown below sorted by weighted impact metric in **Table 3.3-4**. BZN-ORD is the second most affected at 36 hours annually. BIL-SDF, BIL-ORD, BIL-FSD, BZN-MDW, and BIS-GCC

Table 3.3-4 Route Pairings Sorted by Weighted Impact Metric (Alt 2 Day-to-Day)

Route Parings	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change to Baseline Route (Percentage)	Change in Time (Min)	Weighted Impact Metric (Frequency x Per Route Affect) (Hours)
DEN-XWA	1778	505.78	537.99	32.21	6.4%	4.29	127.26
DEN-DIK	843	424.49	463.83	39.34	9.3%	5.24	73.69
BZN-ORD	1183	1027.51	1041.35	13.84	1.3%	1.85	36.40
BIL-SDF	527	1111.08	1123.12	12.04	1.1%	1.61	14.10
BIL-ORD	209	919.13	946.05	26.92	2.9%	3.59	12.50
BIS-GCC	68	248.49	316.14	67.65	27.2%	9.02	10.22
IWA-MOT	214	1011.88	1030.07	18.19	1.8%	2.43	8.65
BIL-FSD	135	520.58	545.95	25.37	4.9%	3.38	7.61
BZN-MDW	242	1038.12	1051.04	12.93	1.2%	1.72	6.95
CYWG-PSP	143	1286.21	1297.36	11.15	0.9%	1.49	3.54
BZN-FSD	89	628.15	641.25	13.10	2.1%	1.75	2.59
BZN-IAD	74	1537.27	1551.32	14.05	0.9%	1.87	2.31
BIS-LAS	83	909.80	922.07	12.27	1.3%	1.64	2.26
BTM-FSD	77	685.33	698.14	12.81	1.9%	1.71	2.19
CYVR-SDF	56	1733.66	1745.27	11.62	0.7%	1.55	1.45

Legend: % = percent; BIL = Billings Logan International Airport (MT); BIS = Bismarck Municipal Airport (ND); BTM = Bert Mooney Airport (MT); BZN = Bozeman Yellowstone International Airport (MT); CYVR = Vancouver International Airport (BC); CYWG = Winnipeg James Armstrong Richardson International Airport (MB); DEN = Denver International Airport (CO); DIK = Dickinson Theodore Roosevelt Regional Airport (ND); FSD = Sioux Falls Regional Airport (SD); GCC = Gillette-Campbell County Airport (WY); IAD = Washington Dulles International Airport (VA); IWA = Phoenix–Mesa Gateway Airport (AZ); LAS = Harry Reid International Airport (NV); MDW = Chicago Midway International Airport (IL); Min = Minutes; MOT = Minot International Airport (ND); NM = Nautical Mile; ORD = Chicago O'Hare International Airport (IL); PSP = Palm Springs International Airport (CA); SDF = Louisville Muhammad Ali International Airport (KY); XWA = Williston Basin International Airport (ND).

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ENCLOSURE A
AIRPORTS WITHIN PRTC ROI

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Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
Baker Municipal	BHK	PR 3	Coordinates: N46°20.80' / W104°15.49' Located 01 miles SE of Baker, Montana on 206 acres of land. Surveyed Elevation is 2,980 ft MSL. Public Airport Tower: No Publicly Owned Owner: BAKER CITY AND FALLON CO BOX 846 BAKER, MT 59313 406-778-2883	RNAV RWY 13 Approach (Up to 6,000 ft MSL including missed approach via PR 3 Only).	RNAV RWY 31 Approach (Up to 5,400 ft MSL for approach and 6,000 ft MSL for missed approach via PR 3 Only).			Not reported	Approaches and Missed approaches require up to 6,000 ft MSL in PR 3 to accomplish and may be affected by increased LFE days. Total impact would depend upon unknown weather variables and unavailable operations data.
Barbar	SD98	Gateway East	Coordinates: N44°27.75' / W102°33.11' Located 07 miles S of Enning, South Dakota. Estimated Elevation is 2,655 ft MSL. Private Airfield Tower: No Privately Owned MARVIN BARBER 20250 ELM SPRINGS RD ENNING, SD 57737 605-985-5515					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
Bell Fourche Municipal	KEFC	Gateway West	Coordinates: N44°44.07' / W103°51.71' Located 04 miles N of Belle Fourche, South Dakota on 279 acres of land. Surveyed Elevation is 3,190 ft MSL. Public Airport Tower: No Publicly owned CITY OF BELLE FOURCHE 511 6TH AVE. BELLE FOURCHE, SD 57717 605-892-2494	RNAV RWY 32 (Up to 10,000 max and 7,600 minimum for standard approach, missed approach up to 7,600 all via GW-W)				Not reported	Single approach needs 10,000 feet MSL below GW-W. This is below airspace in question and does not indicate any conflict.
Big Horn County	00U	Powder River 1	Coordinates: N45°44.66' / W107°39.63' Located 03 miles W of Hardin, Montana. Surveyed Elevation is 3,025 ft MSL. Public Airport Tower: No Publicly owned COUNTY OF BIG HORN PO BOX 908 HARDIN, MT 59034 406-665-9700	RNAV RWY 26 Approach (Up to 10,000 ft MSL for approach and 6,500 ft MSL for missed approach via PR 1A with a feeder route impacting PR 1C				Not reported	Single approach impacts at or below 10,000 ft MSL in PR 1A and C may be affected by increased LFE days. Total impact would depend upon unknown weather variables and unavailable operations data.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
Bison Municipal	6V5	PR 4	Coordinates: N45°31.10' / W102°28.07' Located 00 miles SW of Bison, South Dakota on 95 acres of land. Surveyed Elevation is 2,791 ft MSL. Public Airport Tower: No Publicly owned BISON CITY PO BOX 910, 309 1ST AVE W BISON, SD 57620 605-244-5677					Not reported	No approach/ departure procedures to impact airspace.
Black Hills - Clyde Ice Field	SPF	Gateway West	Coordinates: N44°28.86' / W103°47.16' Located 03 miles E of Spearfish, South Dakota on 485 acres of land. Surveyed Elevation is 3,933 ft MSL. Public Airport Tower: No Publicly owned CITY OF SPEARFISH 625 NORTH FIFTH STREET SPEARFISH, SD	RNAV RWY 13 Approach (7,000–14,000 ft MSL needed for approach, 4,600 ft MSL for missed approach all via GW-W)	RNAV RWY 31 Approach (8,200 ft MSL needed for approach, 7,000 ft MSL for missed approach all via GW-W)	SWUNG TWO Departure (Up to 4,800 ft MSL all via GW-W)		Not reported	Procedures are well below airspace floor.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			57783 605-642-1333						
Bledsoe Ranch	0SD3	Gateway East	Coordinates: N45°16.17' / W103°13.03' Located 10 miles NE of Hoover, South Dakota. Estimated Elevation is 2,872 ft MSL. Private Airstrip Tower: No Privately Owned ROBERT E. BLEDSOE BOX 406 WRAY, CO 80758 (970) 332-4955					Not reported	No approach/ departure procedures to impact airspace.
Blomberg 42 Ranch (Pvt)	SD48	Gateway East	Coordinates: N45°12.00' / W102°39.03' Located 28 miles NW of Faith, South Dakota. Estimated Elevation is 2,610 ft MSL. Private Airfield Tower: No Privately Owned LESTER BLOMBERG 42 RANCH FAITH, SD 56726 605-866-4632					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
Bowman Regional	BWW	PR 3	Coordinates: N46°9.93' / W103°18.04' Located 04 miles E of Bowman, North Dakota on 428 acres of land. Surveyed Elevation is 2,965 ft MSL. Public Airport Tower: No Publicly owned BOWMAN COUNTY ARPT AUTH PO BOX 331 BOWMAN, ND 58623 701-523-7484	RNAV RWY 13 Approach (Up to 5,800 feet MSL via PR 3 / 6,000 ft MSL on the Missed Approach via Gap C)	RNAV RWY 31 Approach (Up to 5,800 feet MSL via PR 3 / 6,000 ft MSL on the Missed Approach via Gap C)			Not reported	RNAV RWY 13 and 31 both affect airspace up to 5,800 feet in PR 3 and 6,000 on Missed Approach into Gap C. The missed approach is under Gap C, but the approaches conflict with PR 3 airspace and therefore have potential affect with increased LFE days. Total impact would depend upon unknown weather variables and unavailable operations data.
Boyd's Turf	0NA9	PR 3	Coordinates: N46°45.00' / W103°48.06' Located 09 miles NE of Golva, North Dakota on 2 acres of land. Estimated Elevation is 2,750 ft MSL. Private Airstrip Tower: No					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			Privately Owned Owner: BOYD H. TRESTER 180 ELLIOT ST SENTINEL BUTTE, ND 58654 701-260-1053						
Brands	ND62	PR 4	Coordinates: N46°50.90' / W102°27.48' Located 03 miles SW of Taylor, North Dakota on 400 acres of land. Estimated Elevation is 2,423 ft MSL. Private Airstrip Tower: No Privately Owned LELAND BRAND 9511 39TH ST., S.W. TAYLOR, ND 58656-6624 701-974-3578					Not reported	No approach/ departure procedures to impact airspace.
Broadus	00F	PR 2	Coordinates: N45°28.23' / W105°27.43' Located 03 miles NW of Broadus, Montana on 160 acres of land. Estimated Elevation is 3,282 ft MSL. Public Airport Tower: No					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			Publicly owned POWDER RIVER CO PO BOX 200 BROADUS, MT 59317 406-436-2361						
Bruch Airfield	SD35	Gateway West	Coordinates: N44°29.65' / W103°23.67' Located 08 miles NE of Sturgis, South Dakota. Elevation is 2,980 ft MSL. Private Airstrip Tower: No Privately Owned JOHN H BRUCH 20073 COLONY PLACE STURGIS, SD 57785 605-347-5269					Not reported	No approach/ departure procedures to impact airspace.
Camp Crook Municipal	80A5	PR 2	Coordinates: N45°34.00' / W103°59.03' Located 00 miles NW of Camp Crook, South Dakota. Surveyed Elevation is 3,140 ft MSL. Private Helipad Tower: No					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
Castleberry	MT45	Gap B	Coordinates: N45°54.53' / W104°34.56' Located 02 miles NW of Ekalaka, Montana on 14 acres of land. Estimated Elevation is 3,373 ft MSL. Private Airstrip Tower: No Privately Owned CASTLEBERRY INC BOX 281 EKALAKA, MT 59324 406-775-6526					Not reported	No approach/ departure procedures to impact airspace.
Chase Airstrip	6NA5	Powder River 4	Coordinates: N46°54.77' / W102°0.54' Located 02 miles ESE of Hebron, North Dakota on 9 acres of land. Estimated Elevation is 2,140 ft MSL. Private Airstrip Tower: No Privately Owned KEITH & CHERYL CHASE PO BOX 48 HEBRON, ND 58638 701-878-4735					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
Colstrip	M46	PR 1	Coordinates: N45°51.17' / W106°42.56' Located 03 miles SW of Colstrip, Montana. Surveyed Elevation is 3,427 ft MSL. Public Airport. Tower: No Publicly owned COUNTY OF ROSEBUD PO BOX 47 FORSYTH, MT 59327 406-346-2251	GPS RWY 6 Approach (Up to 6,000 ft MSL via PR 1A and PR 1B	GPS RWY 24 Approach (up to 5,500 ft MSL on approach and 6,000 ft MSL on missed approach in PR 1B with feeder from Gap A)	Departure RWY 6 - Standard Climb up to 9,000 ft MSL via PR 1B and Gap A with a heading towards PR 2 a few miles away.	Departure RWY 24	Not reported	Departure procedures from RWY 6 have effect on PR 1B, GAP A or PR 2 below 9,000 ft MSL. This may be impacted by increased LFE days and/or increased day-to-day times. Departure procedures from RWY 24 affects PR 1B at 6,000 ft MSL and below. Approach GPS RWY 6 up to 6,000 ft MSL via PR 1A and PR 1B. Approach GPS RWY 24 up to 6,000 ft MSL via PR 1B and Gap A. These approaches have potential impacts with increased LFE days. Total impact would depend upon unknown weather variables and

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
									unavailable operations data.
Dilligaf	Unknown	Gateway West	No information available					Not reported	No information available.
Dilse Airstrip	NA98	PR 3	Coordinates: N46°18.15' / W103°10.21' Located 10 miles N of Scranton, North Dakota on 2 acres of land. Estimated Elevation is 2,878 ft MSL. Private Airstrip Tower: No Privately Owned Owner: TED D. DILSE 7603 135TH AVE SW SCRANTON, ND 58653 701-275-8256					Not reported	No approach/ departure procedures to impact airspace.
Dorsey Ranch	1SD0	PR 4	Coordinates: N45°19.38' / W101°44.53' Located 05 miles SE of Glad Valley, South Dakota. Estimated Elevation is 2,350 ft MSL. Private Airfield Tower: No Privately Owned					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			KEITH W. DORSEY BOX 54 ISABEL, SD 57633 605-466-2427						
Eden Valley	SD24	Gateway West	Coordinates: N44°26.83' / W103°23.72' Located 05 miles NE of Sturgis, South Dakota. Estimated Elevation is 3,070 ft MSL. Private Airstrip Tower: No Privately Owned EDEN VALLEY LLC 20400 GRAVEL RD STURGIS, SD 57785 605-347-1385					Not reported	No approach/ departure procedures to impact airspace.
Ekalaka Airport	97M	PR 2	Coordinates: N45°52.59' / W104°32.25' Located 02 miles SE of Ekalaka, Montana on 162 acres of land. Surveyed Elevation is 3,504 ft MSL. Public Airport Tower: No Publicly owned Owner: COUNTY OF CARTER COUNTY COURT	RNAV RWY 13 Approach (Up to 14k via Gap, PR 2, and PR 3)	RNAV RWY 31 Approach (Up to 14k via Gap, PR 2, and PR 3)			Not reported	Approach RNAV RWY 13 requires up to 14,000 ft MSL with one IAF in PR 2, one IAF in PR 3, one IAF in Gap B and FAF in Gap B. It can be flown as low as 7,000 ft MSL depending on the direction. RNAV RWY 31 requires up to

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			HOUSE PO BOX 315 EKALAKA, MT 59324 406-775-8749						14,000 feet MSL with 1 x IAF in Gap B, and 2 x IAF in PR 2. FAF in PR 2. MA Point in Gap B at 7,000 ft MSL. These approaches have potential effects with increased day-to-day times and LFE days. Total impact would depend upon unknown weather variables and unavailable operations data.
Elgin Municipal	Y71	PR 4	Coordinates: N46°22.97' / W101°50.69' Located 01 miles S of Elgin, North Dakota on 10 acres of land. Surveyed Elevation is 2,355 ft MSL. Public Airstrip Tower: No Publicly owned ELGIN ARPT AUTHORITY 7125 67TH AVE SW					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			ELGIN, ND 58533 701-220-3442						
Faith Municipal	D07	Gateway East	Coordinates: N45°2.11' / W102°1.24' Located 01 miles E of Faith, South Dakota on 78 acres of land. Surveyed Elevation is 2,584 ft MSL. Public Airfield Tower: No Publicly owned CITY OF FAITH PO BOX 368 FAITH, SD 57626 605-967-2261					Not reported	No approach/ departure procedures to impact airspace.
Fort Smith Landing Strip	5U7	PR 1	Coordinates: N45°19.25' / W107°55.87' Located 01 miles N of Fort Smith, Montana on 60 acres of land. Surveyed Elevation is 3,242 ft MSL. Public Airport Tower: No Publicly owned NATIONAL PARK SERVICE BIG HORN CANYON PO , PO					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			BOX 7458 HARDIN, MT 59035 406-666-2412						
Glen Ulin Regional	D57	PR 4	Coordinates: N46°48.86' / W101°51.91' Located 02 miles W of Glen Ullin, North Dakota on 240 acres of land. Surveyed Elevation is 2,091 ft MSL. Public Airport Tower: No Publicly owned GLEN ULLIN ARPT AUTHORITY BOX 70 GLEN ULLIN, ND 58631-0070 701-348-3649	RNAV RWY 29 (No higher than 6,000 ft MSL with Missed Approach no higher than 4,600				Not reported	The one approach can be flown clear of the lateral boundaries and below of PR 4. No impact on airport operations anticipated.
Hagen	14ND	Gap C	Coordinates: N46°12.47' / W102°54.51' Located 07 miles NE of Reeder, North Dakota. Estimated Elevation is 2,810 ft MSL. Private Airstrip Tower: No Privately Owned BRUCE HAGEN 1406 15TH AVE NW					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			REEDER, ND 58649 701-853-2881						
Harding County	9D2	Gap B	Coordinates: N45°34.77' / W103°31.73' Located 01 miles SE of Buffalo, South Dakota on 120 acres of land. Estimated Elevation is 2,891 ft MSL. Public Airport Tower: No Publicly owned HARDING COUNTY P O BOX 26 BUFFALO, SD 57720 605-375-3130					Not reported	No approach/ departure procedures to impact airspace.
Hettinger/JB Lindquist Regional	HEI	PR 4	Coordinates: N46°0.89' / W102°39.36' Located 01 miles NW of Hettinger, North Dakota on 271 acres of land. Surveyed Elevation is 2,705 ft MSL. Public Airport Tower: No Publicly owned ADAMS CO ARPT AUTH	RNAV RWY 12 (Up to 5,000 feet for approach required via / Up to 9,000 feet for the Missed Approach via PR 4 and Gap C	RNAV RWY 30 (Up to 5000 ft MSL via PR 4 and up to 6,000 ft MSL for missed approach via PR 4 and GAP C.			Not reported	Approaches can be flown below both PR 4 and Gap C airspace

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			BOX 429 HETTINGER, ND 58639 701-567-2069						
Hulett Municipal	W43	Gateway West	Coordinates: N44°39.77' / W104°34.07' Located 02 miles SE of Hulett, Wyoming on 330 acres of land. Surveyed Elevation is 4,263 ft MSL. Public Airport Tower: No Publicly owned TOWN OF HULETT P.O. BOX 278 HULETT, WY 82720 307-467-5771	RNAV RWY 13 Approach (Up to 7,000 feet MSL via PR 2 and GW-W and Missed Approach up to 7,600 via GW-W) IMUNTE to FANRO (IFs) go via PR 2	RNAV (GPS)-A Approach (Up to 7,600 feet MSL. Missed Approach Up to 15,000 via GW-W)	LLADN One Departure (Up to 8,100 feet MSL primarily under GW-W)		Not reported	RNAV-A has effect up to 15,000 ft MSL under GW-W. No anticipated impact as it is under airspace in question. LLADN One Up to 8,100 ft MSL under GW-W. No anticipated impact as departure is under airspace in question. RNAV RWY 13 has effects on airspace in PR 2 at 7,000 ft MSL and below GW-W up to 7,600. Potential to affect PR 2 airspace exists with increased LFE days and day-to-day times. Total impact unknown due to weather

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
									variables and unavailable operations data.
Hysham	6U7	PR 1	Coordinates: N46°17.61' / W107°11.60' Located 02 miles E of Hysham, Montana on 40 acres of land. Estimated Elevation is 2,624 ft MSL. Tower: No Public Airport Publicly owned TREASURE COUNTY COUNTY COURTHOUSE, 200 SPURLING ST HYSHAM, MT 59038 406-342-5547					Not reported	No approach/ departure procedures to impact airspace.
Infinity Landing	SD25	Gateway West	Coordinates: N44°13.10' / W103°15.18' Located 06 miles E of Piedmont, South Dakota. Estimated Elevation is 3,159 ft MSL. Private Airfield Tower: No Privately Owned INFINITY					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			PROPERTIES LLC 7190 INFINITY DR SUMMERSET, SD 57718 605-787-2180						
Ipy Ranch	WY14	Gateway West	Coordinates: N44°38.25' / W104°41.31' Located 04 miles SW of Hulett, Wyoming. Estimated Elevation is 3,960 ft MSL. Private Airfield Tower: No Privately Owned IPY RANCH, LTD P.O. BOX 50 DEVILS TOWER, WY 82714 307-467-5540					Not reported	No approach/ departure procedures to impact airspace.
Isabel Municipal	3Y7	PR 4	Coordinates: N45°23.38' / W101°26.25' Located 00 miles SW of Isabel, South Dakota on 139 acres of land. Estimated Elevation is 2,398 ft MSL. Public Airfield Tower: No Publicly owned CITY OF ISABEL PO BOX 268					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			ISABEL, SD 57633 605-466-2177						
Johnny Creek	79MT	PR 3	Coordinates: N46°25.82' / W104°14.65' Located 04 miles NNE of Baker, Montana. Estimated Elevation is 3,076 ft MSL. Private Airstrip Tower: No Privately Owned ROGER MEGGERS PO BOX 979, 79 JOHNY CREEK TRAIL BAKER, MT 59313 406-852-0771					Not reported	No approach/ departure procedures to impact airspace.
Keyhole	01WY	Gateway West	Coordinates: N44°20.83' / W104°48.65' Located 08 miles NE of Moorcroft, Wyoming. Estimated Elevation is 4,250 ft MSL. Private Airstrip Tower: No Privately Owned GEORGE B. WATERS KEYHOLE RANCH INC, 647 MCKEAN					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			RD MOORCROFT, WY 82721-9778 307-756-3279						
Keystone XI Opal	SD04	Gateway East	Coordinates: N45°1.20' / W102°39.53' Located 12 miles NW of Opal, South Dakota. Estimated Elevation is 3,001 ft MSL. Private Helipad Tower: No Privately Owned TRANSCANADA KEYSTONE XL PIPELINE 13710 FNB PARKWAY, SUITE 300 OMAHA, NE 68154 402-492-7594					Not reported	No approach/ departure procedures to impact airspace.
Kissack/Reynolds	22WY	Gateway West	Coordinates: N44°20.28' / W105°9.73' Located 04 miles NE of Rozet, Wyoming on 80 acres of land. Estimated Elevation is 4,380 ft MSL. Private Airstrip Tower: No Privately Owned					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			DOUG KISSACK P. O. BOX 9, 231 S. HEPTNER RD ROZET, WY 82727 307-682-9026						
Laird Ranch Airport	MT05	PR 2	Coordinates: N45°40.08' / W104°42.20' Located 15 miles SW of Ekalaka, Montana. Surveyed Elevation is 3,462 ft MSL. Private Airport Tower: No Privately Owned Owner: ERLEND LAIRD 1824 CHALK BUTTES RD EKALAKA, MT 59324 406-775-6458					Not reported	No approach/ departure procedures to impact airspace.
Lanning Ranch	MT50	PR 2	Coordinates: N45°5.27' / W104°49.16' Located 18 miles NW of Alzada, Montana. Estimated Elevation is 3,995 ft MSL. Private Airstrip Tower: No Privately Owned DANNY LANNING 200 LANNING					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			TRAIL ALZADA, MT 59311 406-828-4522						
Lemmon Municipal	LEM	PR 4	Coordinates: N45°55.10' / W102°6.33' Located 03 miles SE of Lemmon, South Dakota on 640 acres of land. Surveyed Elevation is 2,572 ft MSL. Public Airport Tower: No Publicly owned CITY OF LEMMON 303 1ST AVE WEST LEMMON, SD 57638 605-374-5681	RNAV RWY 30 (Up to 6,000 ft MSL for approach and 4,500 ft MSL for the missed approach all within PR 4)				Not reported	Approach can be flown below PR 4 airspace.
Madsen	WY65	Gateway West	N44°20.93' / W105°20.25' Located 10 miles NE of Gillette, Wyoming on 40 acres of land. Estimated Elevation is 4,500 ft MSL. Private Airstrip Tower: No Privately Owned B. MADSEN & C. OVERBY 71 MADSEN ROAD					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			GILLETTE, WY 82716 307-682-4390						
Mitchells Strip	SD90	Gateway West	N44°28.03' / W103°47.23' Located 05 miles E of Spearfish, South Dakota. Estimated Elevation is 3,920 ft MSL. Private Airstrip Tower: No Privately Owned LAWRENCE L MITHHELL 1020 MAITLAND RD SPEARFISH, SD 605-642-3181					Not reported	No approach/ departure procedures to impact airspace.
Moburg Aero	WY53	Gateway West	Coordinates: N44°4.98' / W104°7.92' Located 01 miles ENE of Four Corners, Wyoming. Estimated Elevation is 5,968 ft MSL. Private Airstrip Tower: No Privately Owned JAMES HAYES 29 MALLO RD FOUR CORNERS,					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			WY 82715 612-743-9266						
Mondell Field	ECS	Gateway West	Coordinates: N43°53.06' / W104°18.87' Located 05 miles NW of Newcastle, Wyoming on 241 acres of land. Surveyed Elevation is 4,177 ft MSL. Public Airport Tower: No Publicly owned CITY OF NEWCASTLE/WESTON CO COUNTY COURT HOUSE/1 W MAIN NEWCASTLE, WY 82701 307-746-4744	RNAV RWY 14 Approach (Up to 8,000 ft MSL for approach and 9,400 ft MSL for missed approach all via GW-W)	RNAV RWY 14 Approach (Up to 8,000 ft MSL for approach and 9,500 ft MSL for missed approach all via GW-W)	VOR RWY 32 Approach (up to 6,800 ft MSL for approach and 7,500 ft MSL for missed approach all via GW-W		Not reported	No impacts as procedures are well below the Gateway West.
Mott Municipal	3P3	PR 4	Coordinates: N46°21.55' / W102°19.69' Located 01 miles S of Mott, North Dakota on 115 acres of land. Surveyed Elevation is 2,413 ft MSL. Public Airport Tower: No Publicly owned MOTT AIRPORT					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			AUTHORITY OWEN BLICKENSDERFER CHRMN APT AUTH 701-567-3861. 406 MEADOW LANE MOTT, ND 58646 701-260-3525						
Pale Morning Dun Ranch Airport	9MT0	PR 1	Coordinates: N45°24.18' / W107°46.45' Located 10 miles SW of Fort Smith, Montana on 200 acres of land. Estimated Elevation is 3,220 ft MSL. Private Airport Tower: No Privately Owned MIKE PARNELL PO BOX 1390 EASTBOUND, WA 98245 360-317-4026					Not reported	No approach/ departure procedures to impact airspace.
Paradise Valley	2SD0	Gateway West	Coordinates: N44°9.82' / W103°28.73' Located 03 miles SE of Nemo, South Dakota on 32 acres of land. Estimated Elevation is 4,500 ft MSL.					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			Private Airstrip Tower: No Privately Owned L.A. KRAEMER 12856 NEMO RD DEADWOOD, SD 57732 605-342-2339						
Pierce Ranch	WY56	PR 2	Coordinates: N44°58.21' / W104°34.11' Located 17 miles N of Hulett, Wyoming. Estimated Elevation is 3,550 ft MSL. Private Airstrip Tower: No Privately Owned JOHN PIERCE 3071 LITTLE MISSOURI RD HULETT, WY 82720-9627 605-381-2033					Not reported	No approach/ departure procedures to impact airspace.
Richardton	4E8	PR 4	Coordinates: N46°53.75' / W102°21.40' Located 02 miles NW of Richardton, North Dakota on 20 acres of land. Estimated Elevation is 2,498 ft MSL.					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			Public Airport Tower: No Publicly owned RICHARDTON APT AUTHORITY 11 SOUTH AVENUE W RICHARDTON, ND 58652 701-290-4335						
Sikorski Ranch	MT74	PR 3	Coordinates: N46°6.42' / W104°24.91' Located 17 miles NE of Ekalaka, Montana on 20 acres of land. Estimated Elevation is 3,330 ft MSL. Private Airstrip Tower: No Privately Owned SIKORSKI & SONS 24 WICKLOW LN BAKER, MT 59313 406-775-6535					Not reported	No approach/ departure procedures to impact airspace.
Sky Ranch For Boys	SD33	PR 2	Coordinates: N45°30.00' / W104°0.03' Located 03 miles S of Camp Crook, South Dakota. Estimated Elevation is 3,200 ft MSL. Private Airport					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			Tower: No Privately Owned ALVIN CORDELL 13125 LITTLE MISSOURI RIVER RD CAMP CROOK, SD 57724 605-797-4539						
St Labre Mission	3U4	PR 1	Coordinates: N45°36.39' / W106°16.45' Located 01 miles NW of Ashland, Montana Estimated Elevation is 2,909 ft MSL. Privately owned airport, open to the public. Tower: No Privately Owned ST LABRE MISSION PO BOX 77, 112 CAMPUS ROAD ASHLAND, MT 59003 406-784-4500					Not reported	No approach/ departure procedures to impact airspace.
Stevens Ranch	1M6	PR 1	Coordinates: N45°17.28' / W106°8.72' Located 19 miles SE of Ashland, Montana. Estimated Elevation is 3,300 ft MSL.					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			Privately owned, open to the public. Privately Owned WILLIAM C. STEVENS 5 FORT ROAD ASHLAND, MT 59003 406 784 2469						
Sturgis Heliport	2SD5	Gateway West	Coordinates: N44°24.17' / W103°30.53' Located 01 miles S of Sturgis, South Dakota. Estimated Elevation is 3,510 ft MSL. Private Helipad Tower: No Privately Owned MICHAEL JACOB RAPID HELICOPTERS INC, 620 WEST BLVD RAPID CITY, SD 67701 605-343-5058					Not reported	No approach/ departure procedures to impact airspace.
Sturgis Municipal	49B	Gateway West	Coordinates: N44°25.12' / W103°22.66' Located 04 miles E of Sturgis, South Dakota on 275 acres	RNAV RWY 11 Approach (Up to 6,600 ft MSL for approach and 7,000 ft MSL	RNAV RWY 11 Approach (Up to 7,00 ft MSL for approach and			Not reported	Procedures are well below airspace floor.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			of land. Estimated Elevation is 3,254 feet MSL. Public Airport Tower: No Publicly owned CITY OF STURGIS 1040 SECOND ST STE. 103 STURGIS, SD 57785 605-347-4422	for missed approach all under GW-W	missed approach all under GW-W				
Taylor Field	WY55	Gateway West	Coordinates: N44°25.16' / W104°35.74' Located 09 miles W of Sundance, Wyoming. Estimated Elevation is 4,950 ft MSL. Private Airstrip Tower: No Privately Owned GUY DAVID TAYLOR P.O. BOX 370 SUNDANCE, WY 82779 307-290-1097					Not reported	No approach/ |departure procedures to impact airspace.
Tennant Ranch	SD76	Gap B	Coordinates: N45°49.77' / W103°56.73' Located 17 miles N of Camp Crook, South Dakota.					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			Estimated Elevation is 3,090 ft MSL. Private Airstrip Tower: No Privately Owned GARY TENNANT 10995 N CAMP CROOK RD CAMP CROOK, SD 57724 605-797-4470						
Thompson Creek Oilfield	11WY	Powder River 2	Coordinates: N44°57.52' / W104°52.12' Located 24 miles SE of Hulett, Wyoming on 15 acres of land. Estimated Elevation is 3,814 ft MSL. Private Airstrip Tower: No Privately Owned SIGNAL HILL REALTY COMPANY, LLC P.O. BOX 3220 CODY, WY 82414 307-250-7930					Not reported	No approach/ departure procedures to impact airspace.
Tillitt Field	1S3	Powder River 1	Coordinates: N46°16.27' / W106°37.43' Located 03 miles E of Forsyth, Montana on 266 acres of land.	RNAV RWY 27 Approach				Not reported	No impacts within PRTC boundaries from approach.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			Surveyed Elevation is 2,729 ft MSL. Public Airport Tower: No Publicly owned COUNTY OF ROSEBUD P.O. BOX 47 FORSYTH, MT 59327 (406) 346-2251						
Upton Municipal	83V	Gateway West	Coordinates: N44°5.43' / W104°38.45' Located 01 miles SW of Upton, Wyoming on 140 acres of land. Estimated Elevation is 4,290 ft MSL. Public Airstrip Tower: No Publicly owned TOWN OF UPTON & WESTON CO PO BOX 203 UPTON, WY 82730 307-468-2441					Not reported	No approach/ departure procedures to impact airspace.
Vig Limousine	1SD4	Gateway East	Coordinates: N44°52.20' / W102°24.84' Located 22 miles SW of Faith, South Dakota. Estimated Elevation					Not reported	No approach/ departure procedures to impact airspace.

Airfields	ICAO	Airspace	About	Approach/ Departure	Approach/ Departure2	Approach/ Departure3	Approach/ Departure4	Ops Data	Notes and Assessment:
			is 2,558 ft MSL. Private Airfield Tower: No Privately Owned CHERYL J. VIG 18201 OPAL RD OPAL, SD 57758 605-748-2249						
Vig Ranch Airfield	SD72	Gateway East	Coordinates: N44°51.57' / W102°34.60' Located 04 miles SW of Opal, South Dakota. Estimated Elevation is 2,626 ft MSL. Private Airfield Tower: No Privately Owned CECIL VIG MUD BUTTE, SD 57758 605-967-2357					Not reported	No approach/ departure procedures to impact airspace.

Legend: FAF = Final Approach Fix; ft = foot/feet; GPS = Global Positioning System; IAF = Initial Approach Fix; LFE = Large Force Exercise; MSL = mean sea level; PR = Powder River; PRTC = Powder River Training Complex; RNAV = Area Navigation; RWY = Runway

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ENCLOSURE B
ALL LFE ROUTE PAIRINGS AT WEEKLY OR GREATER ANNUAL FREQUENCY

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Route Pairing	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change as a Percentage of Baseline Route (%)	Change in Time (Min)
ORD-SEA	7058	1491	1491	0	0.0%	0.00
MSP-SEA	3259	1212	1213	1	0.1%	0.11
ORD-PDX	2595	1507	1514	6	0.4%	0.86
JFK-SEA	2476	2146	2165	19	0.9%	2.49
IAD-SEA	2370	1999	2001	3	0.1%	0.34
MSP-PDX	2270	1236	1243	7	0.6%	0.92
DEN-XWA	1994	506	619	113	22.4%	15.13
DTW-SEA	1837	1670	1671	0	0.0%	0.05
ATL-SEA	1727	1893	1893	0	0.0%	0.00
EGLL-LAX	1584	4730	4733	3	0.1%	0.40
EWR-SEA	1536	2128	2147	19	0.9%	2.49
BZN-ORD	1281	1028	1041	14	1.3%	1.85
CVG-SEA	1267	1703	1711	8	0.4%	1.01
MEM-PANC	1263	2735	2736	1	0.0%	0.15
BZN-MSP	1254	757	770	12	1.6%	1.66
DEN-MOT	1244	525	538	14	2.6%	1.80
CYVR-CYYZ	1227	1807	1807	0	0.0%	0.00
CYVR-ORD	1208	1529	1530	1	0.0%	0.10
CLT-SEA	1123	1976	1978	1	0.1%	0.18
PHL-SEA	1050	2087	2093	6	0.3%	0.82
BOS-SEA	1021	2268	2274	6	0.3%	0.82
BOS-SFO	1016	2344	2344	0	0.0%	0.00
RDU-SEA	953	2041	2057	15	0.8%	2.05
JFK-PDX	922	2127	2128	1	0.1%	0.18
MIA-PANC	914	3475	3475	0	0.0%	0.00
DCA-SEA	911	2019	2020	2	0.1%	0.22
BIL-SDF	898	1111	1123	12	1.1%	1.61
BFI-SDF	886	1686	1689	3	0.2%	0.39
GEG-MSP	880	1018	1019	1	0.1%	0.11
BOI-MSP	871	989	996	6	0.7%	0.86
LAX-LFPG	832	4915	4917	2	0.0%	0.32
IND-SEA	826	1618	1625	8	0.5%	1.04
JFK-SFO	823	2242	2242	0	0.0%	0.00
BNA-SEA	813	1715	1715	0	0.0%	0.00
MSP-SFO	782	1378	1378	0	0.0%	0.00
GEG-SDF	767	1496	1503	7	0.4%	0.87
MDW-SEA	739	1502	1510	7	0.5%	0.99
SEA-STL	735	1482	1482	0	0.0%	0.00
EWR-PDX	731	2109	2111	2	0.1%	0.20
CYYC-ORD	723	1201	1201	0	0.0%	0.00
ATL-CYYC	698	1661	1663	2	0.1%	0.28
BWI-SEA	680	2024	2025	1	0.0%	0.12
CYYC-IAH	644	1519	1519	0	0.0%	0.06
MDW-PDX	613	1518	1523	6	0.4%	0.75
MSO-MSP	609	878	881	3	0.3%	0.41
BFI-RFD	609	1437	1445	8	0.5%	1.03
MKE-SEA	604	1468	1471	2	0.1%	0.29
BIL-MSP	600	648	665	17	2.6%	2.27
OMA-SEA	588	1186	1186	0	0.0%	0.03
CYYZ-SEA	548	1786	1786	0	0.0%	0.00
CMH-SEA	534	1748	1754	6	0.3%	0.81

Route Pairing	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change as a Percentage of Baseline Route (%)	Change in Time (Min)
ATL-RKSI	532	6203	6203	0	0.0%	0.00
PDX-SDF	522	1691	1691	0	0.0%	0.00
MCO-SEA	507	2216	2216	0	0.0%	0.00
BOS-PDX	492	2284	2303	19	0.8%	2.57
ORD-PANC	490	2467	2467	0	0.0%	0.00
CLE-SEA	486	1751	1752	1	0.0%	0.10
CYEG-MMUN	476	2292	2312	19	0.8%	2.58
EGLL-SFO	469	4652	4652	0	0.0%	0.00
CYYZ-SFO	467	1959	1959	0	0.0%	0.00
CYVR-MSP	465	1244	1244	0	0.0%	0.00
GPI-MSP	463	889	889	0	0.0%	0.00
PDX-RFD	456	1453	1459	6	0.4%	0.82
CVG-PDX	452	1712	1712	0	0.0%	0.05
PIT-SEA	448	1842	1843	1	0.1%	0.16
JFK-RJTT	448	5872	5872	0	0.0%	0.00
MSP-PSC	443	1087	1091	5	0.4%	0.62
CYYC-FSD	427	833	834	2	0.2%	0.23
CYYC-MEM	426	1417	1431	14	1.0%	1.80
ORD-RJTT	424	5466	5466	0	0.0%	0.00
BIS-DEN	416	449	449	0	0.0%	0.02
DEN-DIK	415	424	510	85	20.1%	11.39
EWR-SFO	410	2224	2224	0	0.0%	0.00
CYYC-DFW	402	1324	1325	1	0.1%	0.11
CYYC-MMUN	400	2209	2213	4	0.2%	0.58
EGLL-LAS	390	4533	4543	10	0.2%	1.33
DCA-PDX	379	2037	2044	7	0.3%	0.90
BZN-EWR	378	1631	1639	8	0.5%	1.02
GPI-ORD	376	1172	1174	2	0.1%	0.23
MSO-ORD	372	1155	1166	11	0.9%	1.46
ORD-RJAA	371	5439	5439	0	0.0%	0.00
PANC-SDF	369	2707	2707	0	0.0%	0.00
GTF-MEM	366	1214	1218	4	0.4%	0.57
ATL-GEG	355	1708	1708	0	0.0%	0.00
CYEG-DEN	350	886	886	0	0.0%	0.00
LAX-LTFM	349	5941	5941	0	0.0%	0.00
CYVR-SDF	346	1734	1745	12	0.7%	1.55
CVG-CYYC	344	1426	1426	0	0.0%	0.00
EDDF-LAX	340	5033	5034	0	0.0%	0.01
DTW-PDX	339	1693	1699	6	0.4%	0.86
CYYC-MCO	318	2004	2009	5	0.3%	0.67
CYVR-EWR	317	2165	2166	0	0.0%	0.06
EHAM-LAX	311	4836	4836	0	0.0%	0.02
CYUL-SFO	300	2201	2201	0	0.0%	0.00
ATL-CYVR	297	1950	1951	0	0.0%	0.04
IAD-PDX	290	2017	2024	7	0.3%	0.87
RFD-SEA	288	1438	1446	8	0.6%	1.09
GTF-MSP	286	769	769	1	0.1%	0.11
ATL-PDX	281	1884	1884	0	0.0%	0.00
MCI-SEA	280	1291	1291	0	0.0%	0.00
BNA-CYYC	274	1476	1478	1	0.1%	0.19
DFW-PANC	272	2640	2640	0	0.0%	0.00

Route Pairing	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change as a Percentage of Baseline Route (%)	Change in Time (Min)
CVG-CYVR	266	1746	1751	5	0.3%	0.62
IWA-MOT	261	1012	1041	29	2.8%	3.83
GEG-ORD	259	1298	1304	6	0.5%	0.79
BIL-ORD	252	919	946	27	2.9%	3.59
BZN-MDW	243	1038	1051	13	1.2%	1.72
ATL-PANC	243	2964	2964	0	0.0%	0.00
ILN-SEA	240	1727	1738	11	0.6%	1.46
CVG-GEG	239	1511	1525	14	0.9%	1.85
LAS-MOT	237	954	982	28	3.0%	3.76
ORD-RCTP	234	6468	6468	0	0.0%	0.00
CYEG-MEM	232	1482	1482	1	0.1%	0.12
CYYJ-CYYZ	232	1820	1820	0	0.0%	0.00
IND-PDX	230	1627	1627	1	0.0%	0.07
CHS-SEA	221	2095	2095	0	0.0%	0.00
BIS-IWA	221	949	954	5	0.5%	0.67
BZN-HPN	219	1642	1648	6	0.4%	0.81
BZN-TEB	218	1632	1639	7	0.4%	0.94
SEA-TPA	217	2187	2187	0	0.0%	0.00
ORD-RKSI	211	5680	5680	0	0.0%	0.00
LPPT-SFO	211	4925	4925	0	0.0%	0.00
MIA-SEA	209	2365	2365	0	0.0%	0.00
EDDF-SFO	208	4940	4940	0	0.0%	0.00
EIDW-LAX	207	4491	4494	3	0.1%	0.37
EHAM-SLC	203	4324	4327	2	0.1%	0.32
CLT-PDX	202	1978	1978	0	0.0%	0.00
EGLL-SAN	200	4755	4761	6	0.1%	0.85
ORD-SFO	196	1600	1600	0	0.0%	0.00
EDDF-LAS	196	4840	4844	4	0.1%	0.53
IAD-RJTT	195	5881	5881	0	0.0%	0.00
BOI-ORD	186	1246	1246	0	0.0%	0.00
EPWA-LAX	186	5215	5215	0	0.0%	0.00
BFI-IAD	185	1998	2000	2	0.1%	0.22
CYWG-LAS	184	1138	1164	26	2.3%	3.49
ATL-RJTT	180	5968	5968	0	0.0%	0.00
BIL-FSD	179	521	546	25	4.9%	3.38
LFPG-SFO	179	4839	4839	0	0.0%	0.00
FLL-SEA	176	2359	2359	0	0.0%	0.00
CYWG-LAX	176	1337	1357	20	1.5%	2.63
BNA-BZN	169	1245	1245	0	0.0%	0.00
CYWG-PSP	166	1286	1311	25	1.9%	3.31
ATL-CYEG	166	1713	1713	0	0.0%	0.00
EKCH-LAX	164	4875	4875	0	0.0%	0.00
LAX-OTHH	162	7207	7207	0	0.0%	0.00
JFK-PHNL	161	4323	4323	0	0.0%	0.00
MSP-RKSI	161	5417	5417	0	0.0%	0.00
LFPG-SLC	160	4402	4408	6	0.1%	0.76
CYVR-IAD	159	2032	2032	0	0.0%	0.00
CVG-RJGG	155	5808	5808	0	0.0%	0.00
EDDM-LAX	152	5192	5192	0	0.0%	0.00
BWI-PDX	150	2044	2053	8	0.4%	1.13
DFW-RJTT	150	5603	5603	0	0.0%	0.00

Route Pairing	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change as a Percentage of Baseline Route (%)	Change in Time (Min)
LAX-LLBG	145	6570	6570	0	0.0%	0.00
JFK-VHHH	145	7003	7003	0	0.0%	0.00
BOS-BZN	144	1725	1727	2	0.1%	0.23
MSP-PHNL	143	3447	3447	0	0.0%	0.00
MSP-RJTT	142	5185	5185	0	0.0%	0.00
ATL-BZN	142	1423	1423	0	0.0%	0.00
ORD-VHHH	139	6762	6762	0	0.0%	0.00
CYYC-MKC	136	1088	1107	20	1.8%	2.64
BFI-TEB	134	2081	2081	0	0.0%	0.00
BZN-PWK	133	1025	1040	15	1.4%	1.96
CYVR-JFK	132	2122	2122	0	0.0%	0.00
DTW-SFO	131	1802	1802	0	0.0%	0.00
LAX-LIRF	127	5509	5511	2	0.0%	0.28
CVG-RKSI	126	5903	5903	0	0.0%	0.00
LAX-LSZH	126	5148	5149	1	0.0%	0.09
EGLL-SLC	121	4217	4222	5	0.1%	0.69
EHAM-LAS	120	4642	4646	4	0.1%	0.56
EGLL-PHX	120	4569	4569	0	0.0%	0.00
EDDM-SAN	118	5223	5227	4	0.1%	0.57
DEN-EDDM	117	4528	4528	0	0.0%	0.00
JFK-WSSS	115	8283	8283	0	0.0%	0.00
CYYC-FLL	111	2154	2161	7	0.3%	0.88
JAC-ORD	110	1007	1007	0	0.0%	0.00
BED-BZN	109	1711	1713	2	0.1%	0.23
BNA-CYVR	109	1770	1772	2	0.1%	0.23
MSP-SMF	108	1316	1316	0	0.0%	0.00
EDDM-SFO	107	5096	5096	0	0.0%	0.00
CYYC-MSP	107	911	911	0	0.0%	0.00
EGKK-LAS	107	4553	4563	9	0.2%	1.25
IND-RJBB	105	5795	5795	0	0.0%	0.00
CYYC-MDPC	105	2906	2906	0	0.0%	0.02
DEN-EGLL	105	4048	4048	0	0.0%	0.00
EWR-JAC	104	1624	1624	0	0.0%	0.01
LSZH-SFO	102	5063	5063	0	0.0%	0.00
DEN-EDDF	101	4368	4368	0	0.0%	0.00
EHAM-SFO	101	4744	4744	0	0.0%	0.00
CYVR-MEM	101	1686	1686	0	0.0%	0.00
BOS-PHNL	100	4420	4420	0	0.0%	0.00
CVG-VHHH	99	6978	6978	0	0.0%	0.00
BZN-JFK	99	1649	1656	7	0.4%	0.98
DTW-RJTT	99	5572	5572	0	0.0%	0.00
BIS-GCC	96	248	316	68	27.2%	9.02
CLT-CYVR	94	2025	2035	11	0.5%	1.43
BZN-FSD	91	628	641	13	2.1%	1.75
IAD-SFO	89	2097	2097	0	0.0%	0.00
GSO-SEA	89	1987	1992	5	0.2%	0.60
CYYC-MRLB	89	2806	2806	0	0.0%	0.03
DTW-ZSPD	87	6189	6189	0	0.0%	0.00
LTFM-SFO	87	5813	5813	0	0.0%	0.00
BFI-MDW	87	1502	1509	7	0.5%	0.93
BIS-LAS	87	910	922	12	1.3%	1.64

Route Pairing	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change as a Percentage of Baseline Route (%)	Change in Time (Min)
PDX-PHL	86	2086	2090	4	0.2%	0.60
BTM-FSD	86	685	698	13	1.9%	1.71
MEM-RJBB	85	5925	5926	1	0.0%	0.16
DFW-RKSI	84	5933	5933	0	0.0%	0.00
CYQR-MMPR	83	1787	1824	37	2.1%	4.97
BZN-FCM	83	748	761	14	1.8%	1.81
FAR-LAS	82	1046	1046	0	0.0%	0.00
EDDP-LAX	82	5061	5061	0	0.0%	0.00
CYVR-MIA	82	2432	2432	0	0.0%	0.00
LAX-LEBL	80	5224	5226	2	0.0%	0.32
BZN-IAD	79	1537	1551	14	0.9%	1.87
BOS-RJAA	77	5810	5810	0	0.0%	0.00
CYYC-CYYZ	75	1452	1452	0	0.0%	0.00
BIS-EAN	75	335	341	6	1.7%	0.78
CVG-RJAA	75	5669	5669	0	0.0%	0.00
IAH-RJAA	73	5761	5761	0	0.0%	0.00
DTW-PHNL	73	3883	3883	0	0.0%	0.00
LAX-LOWW	72	5321	5321	0	0.0%	0.00
CYXE-MMPR	72	1892	1900	8	0.4%	1.01
LIRF-SFO	72	5431	5431	0	0.0%	0.00
ORD-RJBB	72	5642	5642	0	0.0%	0.00
EGKK-LAX	71	4750	4752	2	0.0%	0.26
JFK-RKSI	71	5988	5988	0	0.0%	0.00
LAX-OMDB	70	7235	7235	0	0.0%	0.00
DTW-RKSI	70	5754	5754	0	0.0%	0.00
CYQR-DEN	70	635	695	60	9.4%	7.98
MSP-SJC	70	1366	1366	0	0.0%	0.00
GEG-MEM	68	1442	1442	0	0.0%	0.00
ORD-RJGG	68	5580	5580	0	0.0%	0.00
BNA-PDX	68	1711	1711	0	0.0%	0.00
IAD-RKSI	67	6033	6033	0	0.0%	0.00
LEBL-SFO	67	5176	5176	0	0.0%	0.00
BOS-SLC	67	1825	1825	0	0.0%	0.00
DEN-LTFM	67	5313	5313	0	0.0%	0.00
CYYC-MUVR	66	2263	2279	16	0.7%	2.11
MEM-RJAA	66	5707	5712	4	0.1%	0.55
CLT-GEG	64	1787	1791	5	0.3%	0.65
BIKF-DEN	64	3092	3092	0	0.0%	0.00
CYYC-MKJS	63	2598	2616	17	0.7%	2.31
CYLW-CYYZ	63	1655	1655	0	0.0%	0.00
MEM-ZSPD	63	6447	6447	0	0.0%	0.00
MSP-RNO	63	1218	1218	0	0.0%	0.00
IAH-XWA	61	1163	1180	16	1.4%	2.19
CYYC-EWR	61	1753	1753	0	0.0%	0.00
ELLX-LAX	59	4990	4990	1	0.0%	0.09
BZN-PTK	59	1201	1213	11	1.0%	1.53
ATW-PDX	58	1440	1443	3	0.2%	0.44
CYVR-DTW	58	1701	1701	0	0.0%	0.00
CYYZ-PDX	58	1817	1817	0	0.0%	0.00
BIL-FAR	56	490	492	2	0.4%	0.26
BFI-MSP	56	1212	1212	1	0.1%	0.10

Route Pairing	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change as a Percentage of Baseline Route (%)	Change in Time (Min)
GFK-LAS	56	1068	1074	6	0.5%	0.78
ORD-SMF	56	1544	1544	0	0.0%	0.00
CYYZ-VHHH	55	6776	6776	0	0.0%	0.00
JFK-RCTP	55	6773	6773	0	0.0%	0.00
CYQR-MMUN	55	1955	1955	0	0.0%	0.00
LFPO-SFO	54	4848	4848	0	0.0%	0.00
CYQR-LAS	54	974	974	0	0.0%	0.00
LAX-LFPO	54	4922	4925	3	0.1%	0.41
EIDW-SFO	53	4418	4418	0	0.0%	0.00
BZN-PBI	53	1871	1871	0	0.0%	0.00
PWA-S25	53	777	795	18	2.4%	2.44
BFI-OMA	53	1186	1186	0	0.0%	0.00
BIL-RAP	52	256	272	16	6.3%	2.16
PHL-SFO	52	2186	2186	0	0.0%	0.00

ENCLOSURE C
ALL ALTERNATIVE 1 DAY-TO-DAY ROUTE PAIRINGS AT WEEKLY OR GREATER ANNUAL FREQUENCY

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Route Pairings	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change as a Percentage of Baseline (%)	Change in Time (Min)
ORD-SEA	3569	1491	1491	0	0%	0.00
ORD-PDX	1884	1507	1514	6	0%	0.86
DEN-XWA	1773	506	538	32	6%	4.29
MSP-PDX	1331	1236	1236	0	0%	0.02
ATL-SEA	1223	1893	1893	0	0%	0.00
BZN-ORD	1183	1028	1041	14	1%	1.85
BZN-MSP	952	757	760	2	0%	0.33
IAD-SEA	938	1999	1999	0	0%	0.00
BOS-SFO	809	2344	2344	0	0%	0.00
EGLL-LAX	808	4730	4730	0	0%	0.00
CVG-SEA	699	1703	1705	2	0%	0.29
MSP-SFO	695	1378	1378	0	0%	0.00
JFK-SFO	675	2242	2242	0	0%	0.00
CLT-SEA	656	1976	1978	1	0%	0.18
BOI-MSP	652	989	996	6	1%	0.86
SEA-STL	638	1482	1482	0	0%	0.00
BNA-SEA	601	1715	1715	0	0%	0.00
RDU-SEA	601	2041	2044	2	0%	0.33
OMA-SEA	538	1186	1186	0	0%	0.03
BIL-SDF	526	1111	1123	12	1%	1.61
MDW-PDX	509	1518	1523	6	0%	0.75
LAX-LFPG	508	4915	4915	0	0%	0.00
DCA-SEA	482	2019	2019	0	0%	0.00
BFI-SDF	482	1686	1689	3	0%	0.39
JFK-SEA	475	2146	2146	0	0%	0.00
DEN-DIK	451	424	425	1	0%	0.08
CYYC-IAH	449	1519	1519	0	0%	0.00
MDW-SEA	426	1502	1502	0	0%	0.01
JFK-PDX	393	2127	2127	0	0%	0.00
GEG-SDF	390	1496	1503	7	0%	0.87
IND-SEA	369	1618	1625	8	0%	1.04
CYYZ-SFO	367	1959	1959	0	0%	0.00
EWR-SEA	342	2082	2082	0	0%	0.00
MCO-SEA	340	2216	2216	0	0%	0.00
CYVR-ORD	340	1529	1529	0	0%	0.00
DTW-SEA	339	1670	1670	0	0%	0.00
EWR-SFO	317	2224	2224	0	0%	0.00
PDX-SDF	314	1691	1691	0	0%	0.00
DCA-PDX	314	2037	2044	7	0%	0.90
PDX-RFD	309	1453	1459	6	0%	0.82
MSP-SEA	306	1283	1287	4	0%	0.56
BZN-EWR	294	1631	1633	2	0%	0.25
BWI-SEA	286	2024	2024	0	0%	0.00
EWR-PDX	283	2144	2149	5	0%	0.66
CYYC-DFW	281	1324	1324	0	0%	0.00
BFI-RFD	280	1437	1437	0	0%	0.00
EGLL-SFO	269	4652	4652	0	0%	0.00
CVG-PDX	247	1712	1712	0	0%	0.05
ATL-GEG	243	1708	1708	0	0%	0.00
BZN-MDW	242	1038	1051	13	1%	1.72

Route Pairings	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change as a Percentage of Baseline (%)	Change in Time (Min)
MSP-PSC	239	1087	1087	0	0%	0.00
BOS-SEA	232	2163	2163	0	0%	0.00
MSO-ORD	231	1155	1155	0	0%	0.05
ATL-PDX	228	1884	1884	0	0%	0.00
CYUL-SFO	228	2201	2201	0	0%	0.00
MSO-MSP	217	878	878	0	0%	0.00
PHL-SEA	213	2061	2061	0	0%	0.00
IWA-MOT	213	1012	1018	6	1%	0.78
BZN-HPN	210	1642	1643	1	0%	0.18
BIL-ORD	209	919	946	27	3%	3.59
IAD-PDX	208	2017	2020	3	0%	0.42
ATL-RKSI	202	6203	6203	0	0%	0.00
MEM-PANC	202	2735	2735	0	0%	0.00
MIA-PANC	198	3475	3475	0	0%	0.00
EGLL-LAS	197	4533	4535	2	0%	0.25
CYYC-MMUN	195	2209	2209	0	0%	0.07
MCI-SEA	194	1291	1291	0	0%	0.00
CYEG-MMUN	193	2292	2297	4	0%	0.59
EHAM-LAX	191	4836	4836	0	0%	0.00
LAX-LTFM	190	5941	5941	0	0%	0.00
BZN-TEB	187	1632	1634	2	0%	0.22
LAS-MOT	187	954	960	6	1%	0.83
LPPT-SFO	183	4925	4925	0	0%	0.00
EDDF-LAX	181	5033	5033	0	0%	0.00
BOI-ORD	180	1246	1246	0	0%	0.00
BOS-PDX	178	2284	2289	5	0%	0.66
SEA-TPA	177	2187	2187	0	0%	0.00
CMH-SEA	174	1748	1748	0	0%	0.00
ORD-SFO	171	1600	1600	0	0%	0.00
BIL-MSP	166	648	652	4	1%	0.56
CYWG-LAX	163	1337	1343	5	0%	0.69
ILN-SEA	163	1727	1728	1	0%	0.11
CYWG-LAS	162	1138	1147	9	1%	1.26
BNA-BZN	160	1245	1245	0	0%	0.00
BIS-IWA	156	949	949	0	0%	0.00
DTW-PDX	153	1693	1693	1	0%	0.10
CLT-PDX	150	1773	1773	0	0%	0.00
CHS-SEA	145	2095	2095	0	0%	0.00
CYWG-PSP	143	1286	1297	11	1%	1.49
EDDF-LAS	143	4840	4840	0	0%	0.01
ATL-BZN	140	1423	1423	0	0%	0.00
FLL-SEA	135	2359	2359	0	0%	0.00
BIL-FSD	135	521	546	25	5%	3.38
ATL-CYVR	134	1950	1951	0	0%	0.04
MIA-SEA	132	2365	2365	0	0%	0.00
DFW-RJTT	131	5603	5603	0	0%	0.00
BZN-PWK	129	1025	1033	8	1%	1.09
BWI-PDX	127	2044	2053	8	0%	1.13
DFW-PANC	120	2640	2640	0	0%	0.00
BOS-BZN	120	1725	1725	0	0%	0.00

Route Pairings	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change as a Percentage of Baseline (%)	Change in Time (Min)
CVG-CYVR	118	1746	1746	0	0%	0.00
CYVR-CYYZ	116	1807	1807	0	0%	0.00
EDDF-SFO	114	4940	4940	0	0%	0.00
GTF-MEM	112	1214	1218	4	0%	0.57
JAC-ORD	108	1007	1007	0	0%	0.00
EHAM-SLC	107	4324	4324	0	0%	0.00
EIDW-LAX	107	4491	4491	0	0%	0.00
LFPG-SFO	103	4839	4839	0	0%	0.00
DTW-SFO	102	1802	1802	0	0%	0.00
EGLL-SAN	101	4755	4759	4	0%	0.50
EKCH-LAX	98	4875	4875	0	0%	0.00
LFPG-SLC	96	4402	4402	0	0%	0.00
CLE-SEA	95	1751	1751	0	0%	0.00
ATL-RJTT	95	5968	5968	0	0%	0.00
EWR-JAC	94	1624	1624	0	0%	0.01
CVG-GEG	93	1511	1512	1	0%	0.11
PIT-SEA	92	1842	1842	0	0%	0.00
MKE-SEA	92	1468	1468	0	0%	0.00
GPI-ORD	92	1172	1172	0	0%	0.00
BZN-JFK	89	1649	1650	2	0%	0.24
BZN-FSD	89	628	641	13	2%	1.75
MSP-SMF	88	1316	1316	0	0%	0.00
LAX-OTHH	82	7207	7207	0	0%	0.00
EDDM-LAX	80	5192	5192	0	0%	0.00
IND-PDX	80	1627	1627	1	0%	0.07
LAX-LIRF	80	5509	5509	0	0%	0.00
GEG-MSP	79	1018	1018	0	0%	0.00
BZN-FCM	79	748	751	3	0%	0.37
IND-RJBB	78	5795	5795	0	0%	0.00
GSO-SEA	77	1987	1992	5	0%	0.60
BTM-FSD	77	685	698	13	2%	1.71
IAD-SFO	77	2097	2097	0	0%	0.00
RFD-SEA	75	1438	1438	0	0%	0.01
CYYZ-SEA	74	1786	1786	0	0%	0.00
BIS-LAS	74	910	915	5	1%	0.73
BZN-IAD	74	1537	1551	14	1%	1.87
BNA-CYVR	73	1770	1772	2	0%	0.23
FAR-LAS	70	1046	1046	0	0%	0.00
EHAM-LAS	68	4642	4642	0	0%	0.00
GEG-ORD	68	1298	1298	0	0%	0.00
PANC-SDF	67	2707	2707	0	0%	0.00
JFK-PHNL	67	4323	4323	0	0%	0.00
BIS-GCC	66	248	294	46	18%	6.09
BED-BZN	65	1711	1712	0	0%	0.01
EGKK-LAS	65	4553	4555	2	0%	0.23
EDDM-SAN	64	5223	5223	0	0%	0.04
MSP-SJC	63	1366	1366	0	0%	0.00
BOS-PHNL	63	4420	4420	0	0%	0.00
CYYC-MCO	63	2004	2004	0	0%	0.00
LTFM-SFO	62	5813	5813	0	0%	0.00

Route Pairings	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change as a Percentage of Baseline (%)	Change in Time (Min)
EGLL-SLC	62	4217	4217	0	0%	0.00
LAX-LLBG	62	6570	6570	0	0%	0.00
LSZH-SFO	61	5063	5063	0	0%	0.00
CYVR-MIA	59	2432	2432	0	0%	0.00
BNA-PDX	59	1711	1711	0	0%	0.00
EHAM-SFO	58	4744	4744	0	0%	0.00
ATL-CYYC	57	1661	1661	0	0%	0.00
EGLL-PHX	57	4569	4569	0	0%	0.00
BOS-SLC	57	1825	1825	0	0%	0.00
BZN-PTK	56	1201	1204	3	0%	0.40
IAH-RJAA	55	5761	5761	0	0%	0.00
ATW-PDX	55	1440	1440	0	0%	0.00
LAX-LSZH	54	5148	5148	0	0%	0.00
EGKK-LAX	54	4750	4750	0	0%	0.00
CYVR-SDF	54	1734	1745	12	1%	1.55
MSP-RNO	54	1218	1218	0	0%	0.00
LAX-LEBL	53	5224	5225	2	0%	0.23
GFK-LAS	52	1068	1068	0	0%	0.06
MSP-PHNL	52	3447	3447	0	0%	0.00
EDDP-LAX	52	5061	5061	0	0%	0.00

ENCLOSURE D
ALL ALTERNATIVE 2 DAY-TO-DAY ROUTE PAIRINGS AT WEEKLY OR GREATER ANNUAL FREQUENCY

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Route Pairings	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change to Baseline Route (Percentage)	Change in Time (Min)
ORD-SEA	3573	1491	1491	0	0%	0.00
ORD-PDX	1886	1507	1514	6	0%	0.86
DEN-XWA	1778	506	538	32	6%	4.29
MSP-PDX	1331	1236	1236	0	0%	0.02
ATL-SEA	1225	1893	1893	0	0%	0.00
BZN-ORD	1183	1028	1041	14	1%	1.85
BZN-MSP	954	757	760	2	0%	0.33
IAD-SEA	938	1999	1999	0	0%	0.00
DEN-DIK	843	424	464	39	9%	5.24
EGLL-LAX	814	4730	4730	0	0%	0.00
BOS-SFO	809	2344	2344	0	0%	0.00
CVG-SEA	702	1703	1705	2	0%	0.29
MSP-SFO	695	1378	1378	0	0%	0.00
JFK-SFO	675	2242	2242	0	0%	0.00
CLT-SEA	660	1976	1978	1	0%	0.18
BOI-MSP	653	989	996	6	1%	0.86
SEA-STL	638	1482	1482	0	0%	0.00
RDU-SEA	602	2041	2044	2	0%	0.33
BNA-SEA	602	1715	1715	0	0%	0.00
OMA-SEA	538	1186	1186	0	0%	0.03
BIL-SDF	527	1111	1123	12	1%	1.61
LAX-LFPG	510	4915	4915	0	0%	0.00
MDW-PDX	509	1518	1523	6	0%	0.75
BFI-SDF	484	1686	1689	3	0%	0.39
DCA-SEA	482	2019	2019	0	0%	0.00
JFK-SEA	476	2146	2146	0	0%	0.00
CYYC-IAH	449	1519	1519	0	0%	0.00
MDW-SEA	426	1502	1502	0	0%	0.01
JFK-PDX	393	2127	2127	0	0%	0.00
GEG-SDF	390	1496	1503	7	0%	0.87
IND-SEA	369	1618	1625	8	0%	1.04
CYYZ-SFO	367	1959	1959	0	0%	0.00
CYVR-ORD	342	1529	1529	0	0%	0.00
EWR-SEA	342	2082	2082	0	0%	0.00
MCO-SEA	341	2216	2216	0	0%	0.00
DTW-SEA	340	1670	1670	0	0%	0.00
EWR-SFO	317	2224	2224	0	0%	0.00
PDX-SDF	314	1691	1691	0	0%	0.00
DCA-PDX	314	2037	2044	7	0%	0.90
PDX-RFD	309	1453	1459	6	0%	0.82
MSP-SEA	307	1283	1291	8	1%	1.07
BZN-EWR	294	1631	1633	2	0%	0.25
CYYC-DFW	286	1324	1324	0	0%	0.00
BWI-SEA	286	2024	2024	0	0%	0.00
EWR-PDX	283	2144	2149	5	0%	0.66
BFI-RFD	280	1437	1437	0	0%	0.00
EGLL-SFO	269	4652	4652	0	0%	0.00
CVG-PDX	247	1712	1712	0	0%	0.05
ATL-GEG	243	1708	1708	0	0%	0.00
BZN-MDW	242	1038	1051	13	1%	1.72
MSP-PSC	239	1087	1087	0	0%	0.00

Route Pairings	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change to Baseline Route (Percentage)	Change in Time (Min)
BOS-SEA	233	2163	2163	0	0%	0.00
MSO-ORD	231	1155	1155	0	0%	0.05
CYUL-SFO	228	2201	2201	0	0%	0.00
ATL-PDX	228	1884	1884	0	0%	0.00
MSO-MSP	220	878	878	0	0%	0.00
IWA-MOT	214	1012	1030	18	2%	2.43
PHL-SEA	213	2061	2061	0	0%	0.00
BZN-HPN	210	1642	1643	1	0%	0.18
CYEG-MMUN	209	2292	2297	4	0%	0.59
BIL-ORD	209	919	946	27	3%	3.59
IAD-PDX	209	2017	2020	3	0%	0.42
MEM-PANC	206	2735	2735	0	0%	0.00
MIA-PANC	205	3475	3475	0	0%	0.00
ATL-RKSI	203	6203	6203	0	0%	0.00
EGLL-LAS	198	4533	4535	2	0%	0.25
CYYC-MMUN	198	2209	2209	0	0%	0.07
MCI-SEA	194	1291	1291	0	0%	0.00
EHAM-LAX	191	4836	4836	0	0%	0.00
LAX-LTFM	191	5941	5941	0	0%	0.00
BIS-IWA	191	949	954	5	1%	0.67
BZN-TEB	187	1632	1634	2	0%	0.22
LAS-MOT	187	954	960	6	1%	0.83
LPPT-SFO	183	4925	4925	0	0%	0.00
EDDF-LAX	181	5033	5033	0	0%	0.00
BOI-ORD	180	1246	1246	0	0%	0.00
BOS-PDX	178	2284	2289	5	0%	0.66
SEA-TPA	177	2187	2187	0	0%	0.00
CMH-SEA	174	1748	1748	0	0%	0.00
ORD-SFO	171	1600	1600	0	0%	0.00
BIL-MSP	166	648	652	4	1%	0.56
CYWG-LAX	163	1337	1343	5	0%	0.69
ILN-SEA	163	1727	1728	1	0%	0.11
CYWG-LAS	162	1138	1147	9	1%	1.26
BNA-BZN	160	1245	1245	0	0%	0.00
DTW-PDX	153	1693	1693	1	0%	0.10
CLT-PDX	150	1978	1978	0	0%	0.00
CHS-SEA	145	2095	2095	0	0%	0.00
CYWG-PSP	143	1286	1297	11	1%	1.49
EDDF-LAS	143	4840	4840	0	0%	0.01
ATL-BZN	140	1423	1423	0	0%	0.00
BIL-FSD	135	521	546	25	5%	3.38
FLL-SEA	135	2359	2359	0	0%	0.00
ATL-CYVR	134	1950	1951	0	0%	0.04
MIA-SEA	133	2365	2365	0	0%	0.00
DFW-RJTT	132	5603	5603	0	0%	0.00
BZN-PWK	129	1025	1033	8	1%	1.09
BWI-PDX	127	2044	2053	8	0%	1.13
DFW-PANC	124	2640	2640	0	0%	0.00
BOS-BZN	120	1725	1725	0	0%	0.00
CVG-CYVR	118	1746	1746	0	0%	0.00
CYVR-CYYZ	118	1807	1807	0	0%	0.00

Route Pairings	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change to Baseline Route (Percentage)	Change in Time (Min)
DEN-MOT	115	525	528	3	1%	0.46
EDDF-SFO	114	4940	4940	0	0%	0.00
GTF-MEM	112	1214	1218	4	0%	0.57
JAC-ORD	109	1007	1007	0	0%	0.00
EHAM-SLC	107	4324	4324	0	0%	0.00
EIDW-LAX	107	4491	4491	0	0%	0.00
DTW-SFO	103	1802	1802	0	0%	0.00
LFPG-SFO	103	4839	4839	0	0%	0.00
EGLL-SAN	100	4755	4759	4	0%	0.50
EKCH-LAX	99	4875	4875	0	0%	0.00
GPI-ORD	96	1172	1172	0	0%	0.00
CVG-GEG	96	1511	1512	1	0%	0.11
LFPG-SLC	96	4402	4402	0	0%	0.00
CLE-SEA	95	1751	1751	0	0%	0.00
ATL-RJTT	95	5968	5968	0	0%	0.00
EWR-JAC	94	1624	1624	0	0%	0.01
PIT-SEA	92	1842	1842	0	0%	0.00
MKE-SEA	92	1468	1468	0	0%	0.00
BZN-FSD	89	628	641	13	2%	1.75
BZN-JFK	89	1649	1650	2	0%	0.24
MSP-SMF	88	1316	1316	0	0%	0.00
BIS-LAS	83	910	922	12	1%	1.64
LAX-OTHH	82	7207	7207	0	0%	0.00
GEG-MSP	80	1018	1018	0	0%	0.00
EDDM-LAX	80	5192	5192	0	0%	0.00
LAX-LIRF	80	5509	5509	0	0%	0.00
IND-PDX	80	1627	1627	1	0%	0.07
BZN-FCM	79	748	751	3	0%	0.37
IND-RJBB	78	5795	5795	0	0%	0.00
GSO-SEA	77	1987	1992	5	0%	0.60
BTM-FSD	77	685	698	13	2%	1.71
IAD-SFO	77	2097	2097	0	0%	0.00
CYYZ-SEA	75	1786	1786	0	0%	0.00
RFD-SEA	75	1438	1438	0	0%	0.01
BZN-IAD	74	1537	1551	14	1%	1.87
BNA-CYVR	73	1770	1772	2	0%	0.23
FAR-LAS	70	1046	1046	0	0%	0.00
GEG-ORD	69	1298	1298	0	0%	0.00
CYYC-MCO	68	2004	2004	0	0%	0.00
EHAM-LAS	68	4642	4642	0	0%	0.00
BIS-GCC	68	248	316	68	27%	9.02
PANC-SDF	67	2707	2707	0	0%	0.00
JFK-PHNL	67	4323	4323	0	0%	0.00
EGKK-LAS	66	4553	4555	2	0%	0.23
BED-BZN	65	1711	1712	0	0%	0.01
EDDM-SAN	64	5223	5223	0	0%	0.04
MSP-SJC	63	1366	1366	0	0%	0.00
BOS-PHNL	63	4420	4420	0	0%	0.00
LAX-LLBG	63	6570	6570	0	0%	0.00
ATL-CYYC	63	1661	1661	0	0%	0.00
LTFM-SFO	62	5813	5813	0	0%	0.00

Route Pairings	Annual Frequency	Baseline Distance D1 (NM)	Circumnavigation Distance D2 (NM)	Change in Distance (NM)	Change to Baseline Route (Percentage)	Change in Time (Min)
EGLL-SLC	62	4217	4217	0	0%	0.00
LSZH-SFO	61	5063	5063	0	0%	0.00
EGLL-PHX	60	4569	4569	0	0%	0.00
BNA-PDX	59	1711	1711	0	0%	0.00
EHAM-SFO	59	4744	4744	0	0%	0.00
CYVR-MIA	59	2432	2432	0	0%	0.00
BOS-SLC	57	1825	1825	0	0%	0.00
IAH-RJAA	56	5761	5761	0	0%	0.00
BZN-PTK	56	1201	1204	3	0%	0.40
CYVR-SDF	56	1734	1745	12	1%	1.55
ATW-PDX	55	1440	1440	0	0%	0.00
LAX-LSZH	55	5148	5148	0	0%	0.00
MSP-RNO	54	1218	1218	0	0%	0.00
EGKK-LAX	54	4750	4750	0	0%	0.00
LAX-LEBL	53	5224	5226	2	0%	0.32
MSP-PHNL	52	3447	3447	0	0%	0.00
GFK-LAS	52	1068	1074	6	1%	0.78
EDDP-LAX	52	5061	5061	0	0%	0.00

APPENDIX D
NOISE STUDY

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NOISE STUDY

TO SUPPORT THE

ENVIRONMENTAL IMPACT STATEMENT FOR OPTIMIZATION OF POWDER RIVER TRAINING COMPLEX

ELLSWORTH AIR FORCE BASE SOUTH DAKOTA

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ACRONYMS AND ABBREVIATIONS

%	percent
5 BW	5th Bomb Wing
28 BW	28th Bomb Wing
AAD	Average Annual Day
AAM	Advanced Acoustic Model
AFB	Air Force Base
AGL	above ground level
ANSI	American National Standards Institute
ATCAA	Air Traffic Control Assigned Airspace
CDNL	C-weighted Day-Night Average Sound Level
DAF	Department of the Air Force
dB	Decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
DNL	Day-Night Average Sound Level
DNWG	Department of Defense Noise Working Group
DoD	Department of Defense
EPA	United States Environmental Protection Agency
FAA	Federal Aviation Administration
FICON	Federal Interagency Committee on Noise
FL	Flight Level
Hz	Hertz
kPa-s/m^2	kilopascal-seconds per square meter
L_{dnmr}	Onset-Rate Adjusted Day-Night Average Sound Level
L_{eq}	Equivalent Sound Level
L_{max}	Maximum Sound Level
LFE	Large Force Exercise
MOA	Military Operations Area
MSL	mean sea level
NED	National Elevation Dataset
NEPA	National Environmental Policy Act
NOTAM	Notice to Airmen
PF	Pre-Flight
PHL	Potential for Hearing Loss
POI	Point of Interest
PR	Powder River
PRTC	Powder River Training Complex
psf	pounds per square foot
SEL	Sound Exposure Level
U.S.	United States
USGS	United States Geological Survey

1.0 INTRODUCTION

1.1 BACKGROUND

The Department of the Air Force (DAF) is proposing to address shortfalls in aircrew readiness by improving day-to-day training and increasing Large Force Exercise (LFE) capability hosted at Powder River Training Complex (PRTC) to meet emerging threats to National Security. Currently, PRTC is the day-to-day (primarily Monday through Friday) training complex for bomber aircraft from the 28th Bomb Wing (28 BW) at Ellsworth Air Force Base (AFB) and the 5th Bomb Wing (5 BW) at Minot AFB. In addition to day-to-day operations, Ellsworth AFB hosts aircraft participating in LFEs within PRTC for joint forces to participate in realistic combat training scenarios.

The PRTC is managed by the 28 BW and is the largest training airspace in the Continental U.S. It is comprised of several Military Operations Areas (MOAs) and Air Traffic Control Assigned Airspaces (ATCAAs) which overlay portions of South Dakota, North Dakota, Wyoming, and Montana (**Figure 1.1-1**). The primary day-to-day MOAs include Powder River (PR) 1, 2, 3, and 4 along with their associated ATCAAs and Gateway West ATCAA. The Gap MOAs and associated ATCAAs are designed (and only activated) to join the PR MOAs/ATCAAs for LFEs. The Gateway East ATCAA is currently only used for LFEs.

The Proposed Action includes:

- Actions to improve day-to-day operations:
  - Raise the ceiling of the most used ATCAAs from Flight Level (FL) 260 to FL600
  - Change times of use for PRTC to 07:00 to 00:30 (07:30 a.m. to 12:30 a.m.) Monday to Thursday, 07:00 to 18:00 (07:00 a.m. to 06:00 p.m.) Friday, and other times by Notice to Airmen (NOTAM)
- Actions to improve training capability of LFEs:
  - Raise the available altitude to FL600
  - Increase the total days allowed annually from 10 days to 30 days
  - Increase duration allowed for individual LFEs from 3 days to 12 days

This Noise Study is in support of the *Environmental Impact Statement for the Optimization of the Powder River Training Complex, South Dakota*. Aircraft noise modeling was accomplished using the Department of Defense's (DoD's) Noisemap, MRNMAP, BooMap, and PCBoom softwares. The input data (numbers and types of aircraft, time of day, runway assignments, type of operation, airspace usage, number of supersonic operations) were developed with data obtained from recent noise studies and coordination with representatives from the Ellsworth AFB flying squadrons and PRTC air traffic controllers.

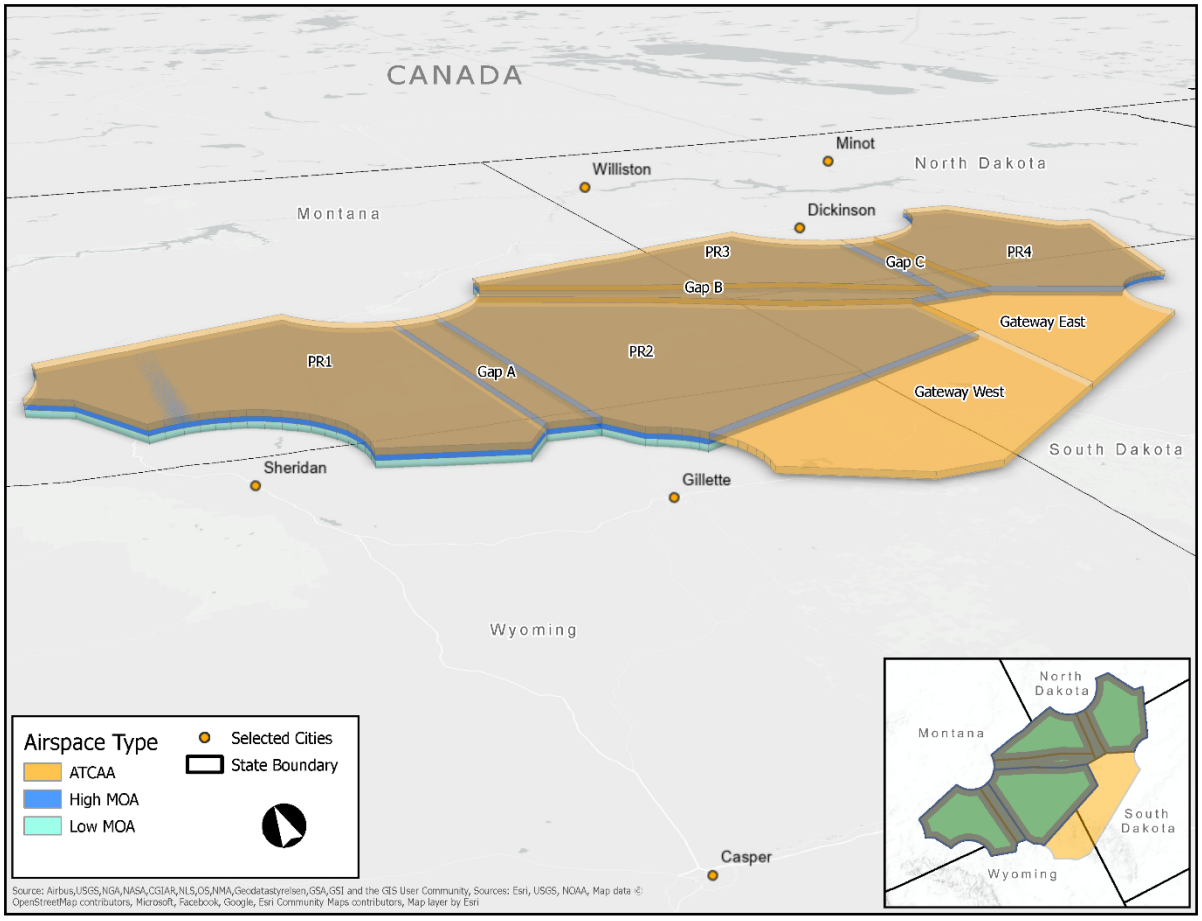


Figure 1.1-1 Powder River Training Complex Overview

1.2 DOCUMENT STRUCTURE

Section 1.0 introduced this study and Section 2.0 describes the methodology used in the analysis. Section 3.0 provides the modeling data used and the noise exposure for the existing conditions. Section 4.0 provides the noise exposure for Alternative 1 and Section 5.0 provides the noise exposure for Alternative 2. Section 6.0 presents the discussion on the No Action Alternative. Section 7.0 presents a summary and Section 8.0 contains the references. **Enclosure A** displays flight tracks used in the creation of the noise contours for the airfield.

2.0 METHODOLOGY

Assessment of noise associated with a proposed action requires prediction of future conditions that cannot be measured until after implementation. The solution to this includes the use of computer software to simulate future conditions, as detailed in the following sections. A congressionally mandated study compared the accuracy of noise modeling methods described in this section to real-world field measurements. The report found that DoD-approved noise models operate as intended providing accurate prediction of noise exposure levels from aircraft operations for use in impact assessments and long-term land use planning (Department of the Navy 2021). The study also determined that the largest variable in any aircraft noise-modeling effort is the expected operational flight parameter data, such as runway and

flight track utilization, altitudes at various points in the flight track, engine power settings, and other parameters.

The DoD and the Federal Interagency Committee on Noise (FICON) (1978) outline the types of metrics to describe noise exposure for environmental impact assessment, while the Defense Noise Working Group (DNWG) provides guidance on military noise modeling methodology. The following subsections describe the noise model parameters, primary and supplemental noise metrics, and impact thresholds.

2.1 NOISE MODEL PARAMETERS

The DoD prescribes use of the Noisemap suite of computer programs (Wyle 1998; Wasmer Consulting 2006) containing the core computational programs called "NMAP," version 7.3. For this Noise Study, the Noisemap suite of programs refers to BASEOPS as the input module, Noisemap as the noise model for predicting noise exposure in the airfield environment and MRNMAP as the noise model used to predict noise exposure in the airspace environment from subsonic aircraft operations. Additionally, BooMap version 96 (Plotkin 1989) and PCBoom version 4 (Wyle 2002) are used to predict noise levels associated from supersonic aircraft operations in the airspace. **Table 2.1-1** presents noise modeling parameters used in this analysis.

Noisemap's ability to account for the effects of sound propagation includes consideration of varying terrain elevation, taken from the United States (U.S.) Geological Survey (USGS) National Elevation Dataset (NED), and ground impedance conditions, taken from USGS Hydrography data. In this case, "soft ground" (e.g., grass-covered ground) is modeled with a flow resistivity of 225 kilopascal-seconds per square meter (kPa-s/m^2) and "hard ground" (in this case, water) is modeled with a flow resistivity of 100,000 kPa-s/m^2. For ambient temperature, humidity, and pressure, each month was assigned a temperature, relative humidity, and barometric pressure from data available for that month for 2025. Noisemap then determined and used the month with the weather values that produced the median results in terms of noise propagation effect, which in this case was the month of March (with the values noted in **Table 2.1-1**).

Table 2.1-1 Noise Modeling Parameters

Software	***Analysis***	***Version***
NMAP	Airfield noise – military aircraft	7.3
MRNMAP	Airspace noise - subsonic	3.0
BooMap	Airspace noise - supersonic	96
PCBoom	Airspace noise - supersonic	4
Parameter	***Description***	
Receiver Grid Spacing	500 ft in x and y (airfield) 2,000 ft in x and y (airspace)	
Metrics	DNL, L_{dnmr}, CDNL (primary) SEL, L_{max}, L_{eq}, NA, psf	
Basis	AAD Operations	
Airfield Topography		
Elevation Data Source	USGS 30m NED	
Elevation Grid Spacing	500 ft in x and y	
Impedance Data Source	USGS Hydrography DLG	
Impedance Grid spacing	500 ft in x and y	
Flow Resistivity of Ground (soft/hard)	225 kPa-s/m^2 / 100,000 kPa-s/m^2	

Military Modeled Weather (Monthly Averages 2025)	
Temperature	63°F
Relative Humidity	47%
Barometric Pressure	25.99in Hg

Legend: °F = degrees Fahrenheit; % = percent; AAD = Average Annual Day; CDNL = C-weighted Day-Night Average Sound Level; DLG = Digital Line Graph; DNL = Day-Night Average Sound Level; ft = feet; in Hg = inches Mercury; kPa-s/m^2 = kilopascal-seconds per square meter; L_{dnmr} = onset rate adjusted DNL; L_{max} = maximum sound level; m = meters; NED = National Elevation Dataset; psf = pounds per square foot; SEL = Sound Exposure Level; USGS = United States Geological Survey.

Ellsworth AFB is comprised of one runway, Runway 13/31 oriented in a northwest and southeast direction. All fixed-wing aircraft operations occur along Runway 13/31 which is 13,495 feet in length and 300 feet in width. **Table 2.1-2** describes airfield details utilized in this Noise Study. This information was developed iteratively with DAF representatives from the installation's flying squadrons and air traffic controllers (Ellsworth AFB 2025). These data have been combined with the numbers of each type of operation by aircraft/track/profile, local climate, terrain surrounding the airfield, and similar data related to aircraft engine runs that occur at specific locations on the ground (e.g., pre- and post-flight and maintenance activities). Because Advanced Acoustic Model (AAM) sound hemispheres are not available for the existing aircraft, all military aircraft are modeled with NMAP to provide a consistent manner of analysis across alternatives in accordance with DoD standards (DoD 2022).

Table 2.1-2 Ellsworth AFB Airfield Details for Noise Modeling

Runway	*Start*	*End*	*Length*	*Width*	*Elevation*	*Displaced Threshold*	*Traffic Pattern*	*Instrument Approach*
13	44-09.531802N 103-07.244683W	44-07.879450N 103-05.183420W	13,495 ft	300 ft	3,276 ft	N/A	Left	ILS
31	44-07.879450N 103-05.183420W	44-09.531802N 103-07.244683W	13,495 ft	300 ft	3,276 ft	N/A	Left	ILS

Legend: AFB = Air Force Base; Start and End in Degrees Minutes Latitude and Longitude; ft = feet; N/A=non-applicable; ILS=Instrument Lighting System
Source: AIRNAV 2025.

2.2 NOISE METRICS

The word "metric" describes a standard of measurement. Researchers have developed many different types of noise metrics in an attempt to represent the effects of environmental noise. Each metric used in environmental noise analysis has a different physical meaning or interpretation.

Human hearing sensitivity to differing sound pitch, measured in cycles per second or hertz (Hz), varies by frequency. To account for this effect, sound measured for environmental analysis utilizes A-weighting, which emphasizes sound roughly within the range of typical speech and de-emphasizes very low and very high frequency sounds. All decibels (dB) presented in this study utilize A-weighted (dBA or dB[A]) but are presented as dB for brevity, unless otherwise noted.

2.2.1 Day-Night Average Sound Level (DNL) and Onset-Rate Adjusted Day-Night Sound Level (L_{dnmr})

The Day-Night Average Sound Level (DNL) is an A-weighted cumulative noise metric that measures noise based on annual average daily aircraft operations. DNL is the U.S. Government standard for modeling the cumulative noise exposure and assessing community noise impacts. DNL uses two time periods: daytime

(acoustic day) and nighttime (acoustic night). Acoustic daytime hours are from 7:00 a.m. to 10:00 p.m., and acoustic nighttime hours are from 10:00 p.m. to 7:00 a.m. local time. DNL weights operations occurring during acoustic nighttime by adding 10 dB to their single event sound level.

DoD Noise Program Policy (DoD Instruction 4715.13, 28 January 2020) requires the use of the DNL noise metric to describe aircraft noise exposure levels at airfields based on average annual day (AAD) averaged over 365 days for purpose of compatible land use planning. Consistent with that standard, this study analyzed military operations at the airfield on an average annual basis.

Training within airspace is often concentrated during large exercises that only occur a few times per year. In cases like this, aircraft noise exposure can be described using "busy month" operational data. The month with the highest number of operations is used for noise modeling instead of average annual day operations. This results in modeled noise levels that better describe these large exercises and their acoustic effect.

When DNL is adjusted for the onset rate of the noise to account for the "surprise factor," the metric is L_{dnmr}. The onset rate adjustment was included in the model calculations; however, in some cases it was small enough to not make a difference in the DNL calculation. The DoD uses L_{dnmr} as the standard metric for assessing aircraft noise in training airspace. The Federal Aviation Administration (FAA) standard for assessing aircraft noise in airspace is DNL. Because this Environmental Impact Statement has been developed to meet the National Environmental Policy Act (NEPA) requirements of both agencies, both of these were calculated and are presented in the results.

2.2.2 C-weighted Day-Night Average Sound Level (CDNL)

C-weighted Day-Night Average Sound Level (CDNL) is used to measure the effects of sonic booms that occur from aircraft flying at supersonic speeds. CDNL is similar to DNL, in that it is a cumulative metric that averages all of the sound energy produced in a single year. CDNL is based on C-weighted noise, which emphasizes lower frequency sound vibrations. C weighting better targets the lower frequencies that are "felt," instead of "heard" – usually impulsive noise like explosions or sonic booms. CDNL weights nighttime events as described for DNL above.

2.2.3 Sonic Boom Overpressure

The intensity of individual sonic booms depends on several factors including aircraft size, shape, weight, altitude, and the maneuver being conducted at the time of the boom (e.g., climbing, diving, turning). The intensity of the boom is measured as an overpressure reported in pounds per square foot (psf). This is not an indicator of how loud a sonic boom is, but rather overpressure is the pressure above normal atmospheric pressure created by the shock wave generated by a sonic boom.

2.2.4 Supplemental Noise Metrics

While the cumulative metric, DNL, is the U.S. Government standard for modeling the noise exposure and assessing community noise impacts, additional supplemental metrics are often used to provide a full description of noise impacts to noise sensitive locations as described in the DNWG guidelines (DNWG 2009).

2.2.4.1 Maximum Sound Level (L_{max})

The maximum A-weighted sound level (L_{max}) is the highest sound level measured during a single event in which the sound changes with time. L_{max} is the maximum level that occurs over one-eighth of a second and denoted as "fast" response on a sound level meter (American National Standards Institute [ANSI] 1988). This metric is useful in determining when a noise event may interfere with conversation, TV or radio listening, or other common activities, but L_{max} does not account for how long the total sound is heard for the event.

2.2.4.2 Sound Exposure Level (SEL)

Sound exposure level (SEL) combines both the intensity of a sound and its duration by providing the sound level that would contain the same sound energy of an event if occurring over a one second period. This means that SEL does not represent a sound level that is heard directly at any given time. However, SEL provides a better metric for comparison of different types of aircraft flyovers than L_{max} because it allows normalization of disparate events to their one second energy average. SEL values are larger than L_{max} for the same event because aircraft noise events last more than a few seconds.

2.2.4.3 Equivalent Sound Level (L_{eq})

The equivalent sound level (L_{eq}) is a cumulative metric that combines a series of noise events over a period of time by averaging the sound energy. The time period specified for L_{eq} is typically provided along with the value and relates to a type of activity and presented in parenthesis (e.g., $L_{eq(24)}$ for 24 hours). An $L_{eq(8)}$ is used in this study to represent a typical school day occurring from 7:00 a.m. to 3:00 p.m.

2.2.4.4 Potential for Hearing Loss

People exposed to high noise environments over a long period of time are at an increased risk of experiencing permanent hearing loss. Hearing loss is generally interpreted as a decrease in the ear's sensitivity to perceived sound, which can be either temporary or permanent. Various governmental organizations, including the Occupational Safety and Health Administration, have identified noise thresholds varying from 70 to 85 dB L_{eq} to protect workers with the exposure assumption of 40 hours per week over a 40-year work lifetime.

Exposure to noise for people residing in areas adjacent to airfields is quite different from a work environment. When people are indoors, the sound levels experienced decrease due to building attenuation. Additionally, when people spend time away from home, the exposure to noise from the airfield in question is removed so the Occupational Safety and Health Administration standards would tend to overpredict the hearing loss risk. The DoD uses a screening threshold of 80 dB DNL exposure to ensure a conservative approach to assessing the potential for hearing loss (DNWG 2012). If residences are identified within the 80 dB DNL exposure range, or greater, additional analysis of L_{eq} should be performed.

2.2.4.5 Classroom Learning Interference

A noisy environment can adversely affect and interfere with classroom learning. Various governmental organizations have identified both L_{eq} and number of interfering events as suitable criteria for classroom impacts. Consistent with DoD recommendations, this study used an exterior L_{eq} of 60 dB over an 8-hour school day (equivalent to 45 dB interior L_{eq} with windows open) as a screening criterion to determine

schools surrounding the airfield at risk of classroom learning effects (DNWG 2009). Locations that exceed this threshold have been further analyzed by counting the number of events per hour above an interior L_{max} of 50 dB, which equates to the highest permissible classroom level for speech intelligibility. The standard noise level reduction due to building attenuation of 15 dB for windows open and 25 dB for windows closed have been utilized to convert between exterior and interior sound levels. The duration, in minutes, that interior sound levels would exceed 50 dB has also been computed to provide an assessment of the relative time per day that students and teachers may be impacted.

2.3 NOISE IMPACT THRESHOLDS

The U.S. Environmental Protection Agency (EPA) has identified 55 DNL as a level that protects public health and welfare with an adequate margin of safety (EPA 1982). This means that 55 DNL is a threshold below which adverse noise effects are not expected to occur.

According to the Federal Interagency Committee on Urban Noise, noise exposure greater than 65 DNL is considered generally incompatible with residential, public use (i.e., schools), or recreational and entertainment areas (Federal Interagency Committee on Urban Noise 1980).

For aircraft activities in the airspace (i.e., within PRTC), FAA requires that an action proponent prepare noise exposure tables to identify where noise will change by the following specified amounts in noise sensitive areas (FAA Order 1050.1G):

- For DNL 65 dB and higher: +/- DNL 1.5 dB (significant)
- For DNL 60 dB to <65 dB: +/- DNL 3 dB (reportable)
- For DNL 45 dB to <60 dB: +/- DNL 5 dB (reportable)

Per FAA Order 1050.1G, a noise sensitive area is defined as an area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife and waterfowl refuges, and cultural and historical sites.

The U.S. Army Public Health Command indicates that 62 C-weighted decibels (dBC) CDNL is the level at which one could expect a rise in annoyance similar to that of a DNL level of 65 dB for subsonic noise (U.S. Army Center for Health Promotion and Preventive Medicine 2005). FAA Order 1050.1G also defines a significance threshold for impulsive noise sources (e.g., sonic booms) as actions that would result in noise exposure that meet or exceed 60 CDNL.

3.0 EXISTING CONDITIONS

The following subsections detail the modeling data and the resultant noise exposure for the existing conditions at the Ellsworth AFB airfield and PRTC airspaces associated with aircraft operations.

3.1 ELLSWORTH AFB AIRFIELD

3.1.1 Modeling Data

3.1.1.1 Airfield Flight Operations

Ellsworth AFB is comprised of one runway, Runway 13/31 oriented in a northwest and southeast direction. All fixed-wing aircraft operations occur along Runway 13/31. Transient rotary-wing aircraft were modeled to arrive at runway ends before turning to their ramp to park and depart directly from the runway end, similar to fixed-wing aircraft.

Existing conditions comprise a total of 10,318 flight operations at Ellsworth AFB (**Table 3.1-1**) with 3,393 operations occurring during the DNL nighttime period, as summarized in **Table 3.1-2** (3,373 based aircraft) **and Table 3.1-3** (20 transient aircraft). The day and night periods in **Tables 3.1-2 and 3.1-3** refer to 'acoustic periods' applicable to the DNL metric (see Section 2.1.1.1).

Table 3.1-1 Existing Total Annual Operations Modeled at Ellsworth AFB

Agency	*Aircraft*	*A/C Type Modeled*	*Operations*			
			Arrivals	*Departures*	*Closed Patterns*	*Total*
DAF – Based Aircraft	B-21	B-2A	1,232	1,232	7,200	9,664
DoD Transient	C-12	C-12	34	34	0	68
DoD Transient	C-130	C-130J	56	56	0	112
DoD Transient	F-18	F-18E/F	22	22	0	44
DoD Transient	Tanker	KC-135R	10	10	98	118
DoD Transient	Heavy	737-700	6	6	50	62
DoD Transient	Trainer	T-1	114	114	0	226
DoD Transient	Helo	UH-60A	11	11	0	22
TOTAL			**1,485**	**1,485**	**7,348**	**10,318**

Legend: A/C = aircraft; AFB = Air Force Base; DAF = Department of the Airforce; DoD = Department of Defense

Table 3.1-2 Existing Based Aircraft Operations at Ellsworth AFB

Aircraft	*A/C Type Modeled*	*Total Operations*				
		Day	*% Day*	*Night*	*%Night*	*Total*
B-21	B-2	6,291	60%	3,373	40%	9,664
TOTAL		6,291	60%	3,373	40%	9,664

Legend: % = percent; A/C = aircraft; AFB = Air Force Base

Table 3.1-3 Existing Transient Military Operations at Ellsworth AFB

Aircraft	*A/C Type Modeled*	*Total Operations*				
		Day	*% Day*	*Night*	*% Night*	*Total*
C-12	C-12	66	*97%*	2	*3%*	68
C-130	C-130J	109	*97%*	3	*3%*	112
F-18	F-18E/F	43	*97%*	1	*3%*	44
Tanker	KC-135R	114	*97%*	4	*3%*	118
Heavy	737-700	60	*97%*	2	*3%*	62
Trainer	T-1	219	*97%*	7	*3%*	226
Helo	UH-60A	21	*97%*	1	*3%*	22
TOTAL		632	97%	20	3%	652

Legend: % = percent; A/C = aircraft; AFB = Air Force Base; DoD = Department of Defense

3.1.1.2 Runway and Acoustic Time of Day Operations

Table 3.1-4 shows runway utilization and time of day operations for all aircraft operating at Ellsworth AFB.

3.1.1.3 Maintenance and Ground Run-up Operations

Table 3.1-5 provides the existing ground runup operations with each location depicted in **Figure 3.1-1**. Ellsworth AFB conducts 440 annual maintenance operations at three parking areas (70, 80, and 90) and at three parking locations within each parking area. Prior to each sortie, pre-flight (PF) operations occur at three parking areas (70, 80, and 90) and at three parking locations within each parking area. There would be no change to these maintenance and ground run-up operations under the Proposed Action.

3.1.2 Noise Exposure

3.1.2.1 Cumulative Noise Exposure – DNL Contours

Figure 3.1-2 shows the DNL noise contours from 65 to 85 dB in 5-dB increments for the existing conditions at Ellsworth AFB. Noise generated from aircraft operations at Ellsworth occurs both within and outside the airfield. Portions of the 65 dB DNL contour extend northwest of the airfield boundary by 0.9 mile and to the southeast by 0.6 mile. **Table 3.1-6** shows representative acreage within each DNL noise contour on- and off-base.

There are no noise sensitive Points of Interest (POIs) (schools, childcare centers, places of worship, etc.) within the 65+ dB DNL contour. A selected set of noise sensitive POIs outside the 65 dB DNL contour have been included in the analysis to provide a better description of the potential changes to noise exposure beyond this contour and are illustrated on **Figure 3.1-2**. **Table 3.1-7** shows the DNL values at each of the selected POIs under the existing conditions.

3.1.2.2 Maximum SEL Values

Table 3.1-8 lists the maximum SEL values at each of the POIs under the existing conditions. SEL is associated with a single overflight. Values range from 87 to 111 dB SEL at the POIs. The values presented are predominately a result of transient fighter aircraft departures associated with LFEs which occur infrequently.

3.1.2.3 Classroom Learning Interference

The school screening threshold of 60 dB $L_{eq(8hr)}$ equates to an interior level of 45 dB $L_{eq(8hr)}$ with windows open and represents the point at which studies have found classroom learning impacts (DNWG 2009, 2013a). Under the existing conditions, Vandenberg Elementary School and Vandenberg Daycare are exposed to exterior $L_{eq(8hr)}$ greater than or equal to 60 dB for the windows open condition (**Table 3.1-9**).

3.1.2.4 Potential for Hearing Loss

DoD guidance prescribes analysis of the potential for hearing loss (PHL) resulting from elevated aircraft noise levels. The screening process begins by identifying residential areas exposed to DNL of 80 dB or greater (DNWG 2013b). No areas outside of the Ellsworth AFB airfield boundary are exposed to 80 dB DNL or greater, so no residents experience the PHL under existing conditions.

Table 3.1-4 Runway and Acoustic Time of Day Operations

Aircraft (Actual/Modeled)		Runway 13													
		Arrivals					Departures					Closed Patterns				
		Day 0700–2200	% Day	Night 2200–0700	% Night	Total Arrivals	Day 0700–2200	% Day	Night 2200–0700	% Night	Total Departures	Day 0700–2200	% Day	Night 2200–0700	% Night	Total Closed
B-21	B-2A	222	*60%*	148	*40%*	370	370	*100%*	0	*0%*	370	1,296	*60%*	864	*40%*	2,160
C-12	C-12	10	*97%*	1	*3%*	11	10	*97%*	1	*3%*	11	0	*0%*	0	*0%*	0
C-130	C-130J	16	*97%*	1	*3%*	17	16	*97%*	1	*3%*	17	0	*0%*	0	*0%*	0
F-18	F-18E/F	6	*97%*	1	*3%*	7	6	*97%*	1	*3%*	7	0	*0%*	0	*0%*	0
Tanker	KC-135R	3	*97%*	0	*3%*	3	3	*97%*	0	*3%*	3	29	*97%*	1	*3%*	30
Heavy	737-700	2	*97%*	0	*3%*	2	2	*97%*	0	*3%*	2	15	*97%*	1	*3%*	16
Trainer	T-1	33	*97%*	1	*3%*	34	33	*97%*	1	*3%*	34	0	*0%*	0	*0%*	0
Helo	UH-60A	3	*97%*	0	*3%*	3	3	*97%*	0	*3%*	3	0	*0%*	0	*0%*	0
	TOTALS	295	*66%*	152	*34%*	447	443	*99%*	4	*1%*	447	1,340	*61%*	866	*39%*	2,206

Aircraft (Actual/Modeled)		Runway 31													
		Arrivals					Departures					Closed Patterns				
		Day 0700–2200	% Day	Night 2200–0700	% Night	Total Arrivals	Day 0700–2200	% Day	Night 2200–0700	% Night	Total Departures	Day 0700–2200	% Day	Night 2200–0700	% Night	Total Closed
B-21	B-2A	517	*60%*	345	*40%*	862	862	*100%*	0	*0%*	862	3,024	*60%*	2,016	*40%*	5,040
C-12	C-12	23	*97%*	1	*3%*	24	23	*97%*	1	*3%*	24	0	*0%*	0	*0%*	0
C-130	C-130J	38	*97%*	1	*3%*	39	38	*97%*	1	*3%*	39	0	*0%*	0	*0%*	0
F-18	F-18E/F	15	*97%*	1	*3%*	16	15	*97%*	1	*3%*	16	0	*0%*	0	*0%*	0
Tanker	KC-135R	7	*97%*	0	*3%*	7	7	*97%*	0	*3%*	7	67	*97%*	2	*3%*	69
Heavy	737-700	4	*97%*	0	*3%*	4	4	*97%*	0	*3%*	4	34	*97%*	1	*3%*	35
Trainer	T-1	77	*97%*	2	*3%*	79	77	*97%*	2	*3%*	79	0	*0%*	0	*0%*	0
Helo	UH-60A	7	*97%*	1	*3%*	8	7	*97%*	1	*3%*	8	0	*0%*	0	*0%*	0
	TOTALS	689	*66%*	351	*34%*	1,040	1,034	99%	6	*1%*	1,040	3,125	*61%*	2,019	*39%*	5,144

Legend: * = Includes all transient military aircraft, see **Enclosure A** for breakdown of fleet mix; # = Military transients do no complete closed patterns; % = percent; A/C = aircraft; N/A = Not Applicable

Table 3.1-5 Maintenance and Ground Run-up Operations at Ellsworth AFB

Aircraft Actual/Modeled	*Engine*	*Noise Suppressor*	*Profile*	*Pad*	*Heading*	*Power*	*Units*	*Num Day*	*Num Night*	*Duration*	*Num Engines*
B-21 / B-2A	F118-GE-100	NONE	B213Hold	13Hold	220	73	% NC	1.000882	0.020427	300	4
B-21 / B-2A	F118-GE-100	NONE	B231Hold	31Hold	220	73	% NC	2.335412	0.047666	300	4
B-21 / B-2A	F118-GE-100	NONE	B2MX71	70-1	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-21 / B-2A	F118-GE-100	NONE	B2PF71	70-1	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-21 / B-2A	F118-GE-100	NONE	B2MX72	70-2	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-21 / B-2A	F118-GE-100	NONE	B2PF72	70-2	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-21 / B-2A	F118-GE-100	NONE	B2MX73	70-3	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-21 / B-2A	F118-GE-100	NONE	B2PF73	70-3	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-21 / B-2A	F118-GE-100	NONE	B2MX81	80-1	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-21 / B-2A	F118-GE-100	NONE	B2PF81	80-1	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-21 / B-2A	F118-GE-100	NONE	B2MX82	80-2	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-21 / B-2A	F118-GE-100	NONE	B2PF82	80-2	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-21 / B-2A	F118-GE-100	NONE	B2MX83	80-3	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-21 / B-2A	F118-GE-100	NONE	B2PF83	80-3	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-21 / B-2A	F118-GE-100	NONE	B2MX91	90-1	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-21 / B-2A	F118-GE-100	NONE	B2PF91	90-1	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-21 / B-2A	F118-GE-100	NONE	B2MX92	90-2	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-21 / B-2A	F118-GE-100	NONE	B2PF92	90-2	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4

Aircraft Actual/Modeled	***Engine***	***Noise Suppressor***	***Profile***	***Pad***	***Heading***	***Power***	***Units***	***Num Day***	***Num Night***	***Duration***	***Num Engines***
B-21 / B-2A	F118-GE-100	NONE	B2MX93	90-3	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-21 / B-2A	F118-GE-100	NONE	B2PF93	90-3	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4

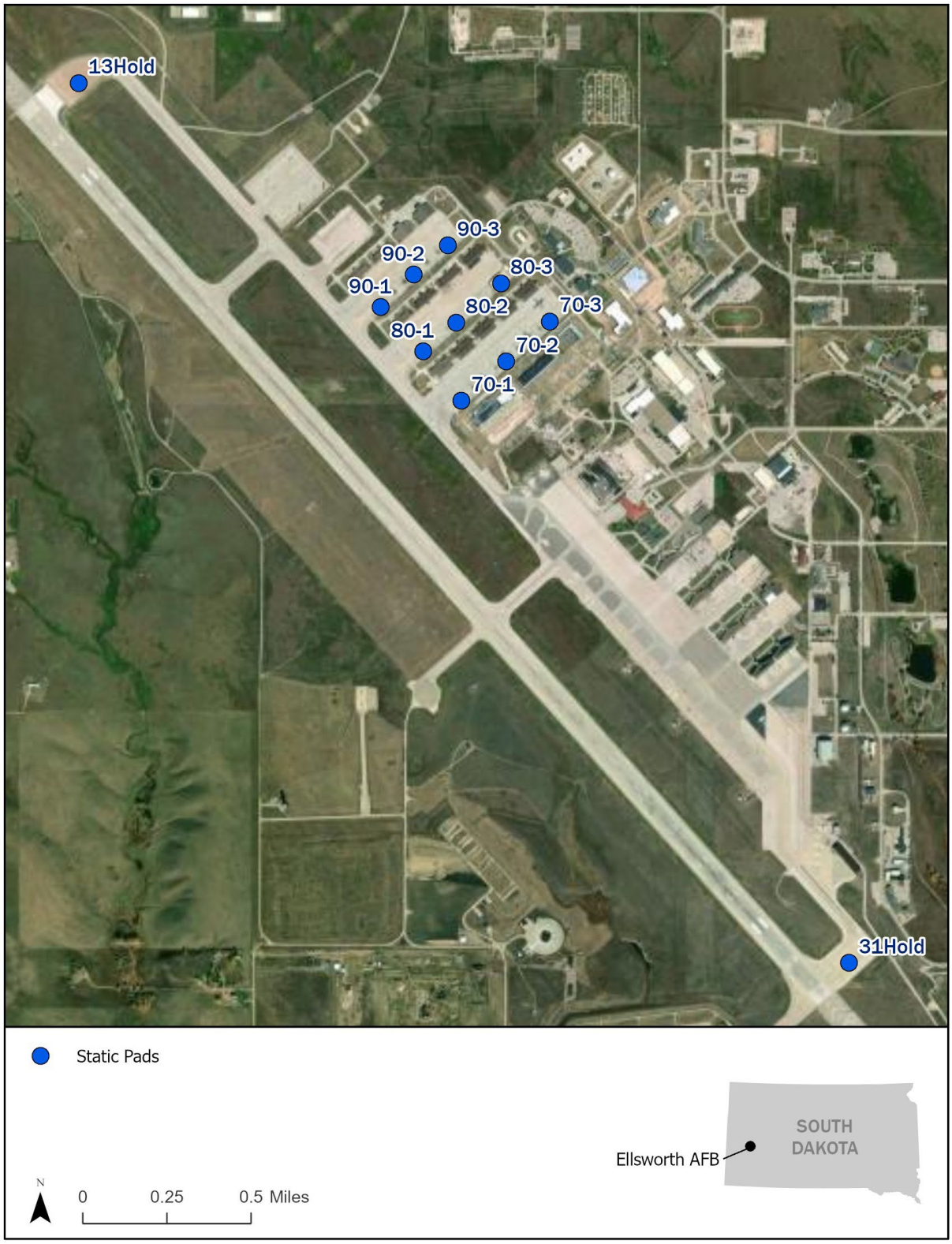


Figure 3.1-1 Maintenance Operations Locations at Ellsworth AFB

Table 3.1-6 Existing Noise Exposure Acreage in the Vicinity of Ellsworth AFB

DNL (dB)	*Existing/No Action Acreage*		
	On Base	*Off-Base*	*Total*
65–70	576	1,352	1,928
70–75	500	348	848
75–80	368	5	373
80–85	222	0	222
85+	101	0	101
Total >65 dB	**1,767**	**1,705**	**3,472**

Legend: > = Greater than; AFB = Air Force Base; dB = decibel; DNL = Day-Night Average Sound Level

Table 3.1-7 Existing Noise Exposure at POIs in the Vicinity of Ellsworth AFB

Point Type	*Named POI*	*DNL (dB)*
Child Development Center	Badger Clark Daycare	52
Child Development Center	Child Development Services	54
Child Development Center	District Daycare	53
School	Douglas High School	55
School	Douglas Middle School	51
School	East Middle School	48
Child Development Center	Ellsworth School-age Care Program	55
Place of Worship	Emmanuel Baptist Church	59
Child Development Center	Francis Case Daycare	53
School	Patriot Elementary	52
Child Development Center	Vandenberg Daycare	58
School	Vandenberg Elementary	58
Recreation	Watiki Indoor Waterpark Resort	44

Legend: dB = decibel; DNL = Day-Night Average Sound Level; POI = Point of Interest

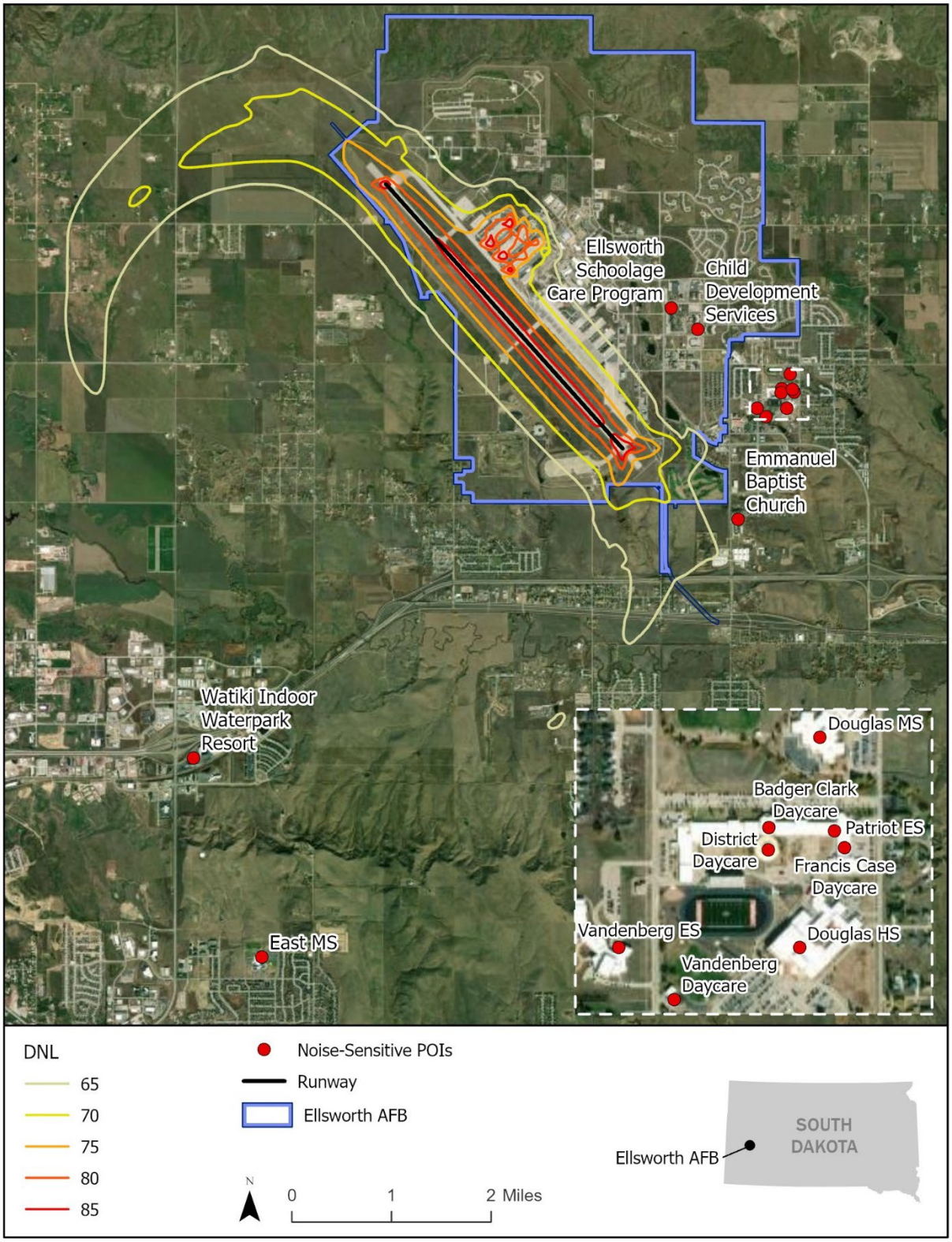


Figure 3.1-2 Existing DNL Contours and POIs in the Vicinity of Ellsworth AFB

Table 3.1-8 Existing SEL Values at POIs in the Vicinity of Ellsworth AFB

Point Type	*Named POI*	*SEL (dB)*
Child Development Center	Badger Clark Daycare	101
Child Development Center	Child Development Services	103
Child Development Center	District Daycare	101
School	Douglas High School	102
School	Douglas Middle School	101
School	East Middle School	87
Child Development Center	Ellsworth School-age Care Program	104
Place of Worship	Emmanuel Baptist Church	111
Child Development Center	Francis Case Daycare	101
School	Patriot Elementary	101
Child Development Center	Vandenberg Daycare	103
School	Vandenberg Elementary	103
Recreation	Watiki Indoor Waterpark Resort	84

Legend: AFB = Air Force Base; dB = decibel; POI = Point of Interest; SEL = Sound Exposure Level

Table 3.1-9 Existing Classroom Learning Interference in the Vicinity of Ellsworth AFB

Point Type	*Named POI*	*$L_{eq(8hr)}$ (dB)*	*Speech Interfering Events per hour*	*Time above 50 dB (minutes) per 8-hour day*
Child Development Center	Badger Clark Daycare	56	1	2
Child Development Center	Child Development Services	54	1	3
Child Development Center	District Daycare	56	1	2
School	Douglas High School	58	1	2
School	Douglas Middle School	53	1	2
School	East Middle School	44	0	1
Child Development Center	Ellsworth School-age Care Program	55	1	3
Child Development Center	Francis Case Daycare	55	1	2
School	Patriot Elementary	55	1	2
Child Development Center	Vandenberg Daycare	61	1	2
School	Vandenberg Elementary	61	1	2

Legend: AFB = Air Force Base; dB = decibel; $L_{eq(8hr)}$ = 8-hour Equivalent Sound Level; POI = Point of Interest

3.2 PRTC

3.2.1 Modeling Data

Table 3.2-1 displays the current average annual sorties within the PRTC airspace. A sortie includes the takeoff, mission, and landing of a single aircraft. Current day-to-day operations occur in PR 1, 2, 3, and 4 along with the associated ATCAAs, and Gateway West ATCAA. LFE operations take place throughout all of the PRTC. LFE training is currently limited to 10 days per year within the PRTC. Forty percent of B-1, B-2, and B-52 operations and three percent of all other aircraft operations occur during acoustic nighttime.

Table 3.2-1 Existing PRTC Aircraft Operations

Aircraft	*Modeled Aircraft*	*Average Annual Sorties*
B-1	B-1	1,945
B-2	B-2A	8
B-52	B-52H	1,086
Tanker	KC-135R	134
Transient Fighter	F-15E	5
	F-16C	16
	F-18E/F	16
	F-22	5
	F-35A	10
Transient Heavy	E-3A	5
RQ/MQ	Cessna-441	4
Total		**3,234**

Legend: PRTC = Powder River Training Complex

The specific mix of transient aircraft varies from exercise to exercise and year to year. Those included in the modeling are an average annual fleet mix of transient fighter aircraft that is representative for the current operating conditions.

Supersonic operations are only authorized during LFEs in all airspaces except for PR 1C. Minimum altitude is 20,000 feet mean sea level (MSL) for the B-1 and 10,000 feet above ground level (AGL) for transient fighter aircraft. **Table 3.2-2** displays existing supersonic sorties.

Table 3.2-2 Existing Supersonic Flight for LFE Operations

Aircraft	*Annual Supersonic Sorties*
B-1	60
Transient F-15	20
Transient F-16	60
Transient F-18	10
Transient F-22	10
Transient F-35	0
Total	**160**

Legend: LFE = Life Force Exercise

Tables 3.2-3 and **3.2-4 s**how the average distribution of time spent within each airspace unit for every aircraft type for both the day-to-day and LFE operations. Similarly, **Tables 3.2-5** and **3.2-6** display the distribution of time spent within each altitude block for each aircraft type. Note that all percentages are

rounded to the nearest whole number and some lines within these tables may not add up to exactly 100% due to this rounding.

Table 3.2-3 Existing Percent of Time Spent in Airspace for Day-to-Day Operations

Aircraft	*PR 1 MOA & ATCAA*	*PR 2 MOA & ATCAA*	*PR 3 MOA & ATCAA*	*PR 4 MOA & ATCAA*	*Gateway West ATCAA*
B-1	11	56	11	11	11
B-2	0	82	0	0	18
B-52	5	67	6	6	16
Tanker	10	53	16	11	10
Transient	5	56	11	6	22

Legend: ATCAA = Air Traffic Control Assigned Airspace; MOA = Military Operations Area

Table 3.2-4 Existing Percent of Time Spent in Airspace for LFE Operations

Aircraft	*PR 1 MOA & ATCAA*	*PR 2 MOA & ATCAA*	*PR 3 MOA & ATCAA*	*PR 4 MOA & ATCAA*	*Gap A,B,C*	*Gateway East ATCAA*	*Gateway West ATCAA*
B-1	22	24	15	19	9	4	7
B-52	21	22	13	17	9	6	12
Tanker	45	4	2	45	1	1	2
Transient	22	24	15	19	9	4	7

Legend: ATCAA = Air Traffic Control Assigned Airspace; LFE = Large Force Exercise; MOA = Military Operations Area

Table 3.2-5 Existing Percent of Time Spent in Altitude Block for Day-to-Day Operations

Aircraft	*500–999 AGL*	*1,000–1,999 AGL*	*2,000–4,999 AGL*	*5,000 AGL–12,000 MSL*	*12,000–18,000 MSL*	*FL180–FL260*
B-1	4	8	4	2	5	77
B-2	0	0	0	5	5	90
B-52	0	7	1	0	7	84
Tanker	0	0	0	1	1	98
Transient	2	2	1	1	3	91

Legend: AGL = above ground level; FL = Flight Level; MSL = mean sea level

Table 3.2-6 Existing Percent of Time Spent in Altitude Block for LFE Operations

Aircraft	*500–999 AGL*	*1,000–1,999 AGL*	*2,000–4,999 AGL*	*5,000 AGL–12,000 MSL*	*12,000–18,000 MSL*	*FL180–FL260*
B-1	3	8	3	2	6	78
B-52	0	0	0	0	0	100
Tanker	0	0	0	0	0	100
Transient	4	4	0	0	19	73

Legend: AGL = above ground level; FL = Flight Level; LFE = Large Force Exercise; MSL = mean sea level

The airspace noise modeling process requires average airspeed, engine power, and length of sorties time for each airframe included in the study. **Table 3.2-7** contains approximations for these data points verified by recent DAF NEPA airspace studies and pilot interviews.

Table 3.2-7 Average Airspeed, Engine Power, and Sortie Duration

Aircraft	*Day-to-Day Training*			*LFE Training*		
	Airspeed (knots)	*Power Setting*	*Time (hours)*	*Airspeed (knots)*	*Power Setting*	*Time (hours)*
B-1	510	100% RPM	2	510	100% RPM	4
B-2	420	100% NC	2	420	100% NC	4
B-52	420	20,000 LBS/HR	2	420	20,000 LBS/HR	4
Tanker	410	70% NF	2	410	70% NF	4
Transient F-15	450	95% NC	2	450	95% NC	2
Transient F-16	450	95% NC	2	450	95% NC	2
Transient F-18	450	95% NC	2	450	95% NC	2
Transient F-22	450	100% ETR	2	450	100% ETR	2
Transient F-35	450	100% ETR	2	450	100% ETR	2
Transient Heavy	300	65% NF	2	300	65% NF	2
RQ/MQ	160	70% RPM	2	160	70% RPM	4

Legend: % NC = Engine Power in Speed of Compressor Stage; % NF = Engine Power in Speed of Turbine Spin; ETR = Engine Thrust Request; LBS/HR = pounds per hour; LFE = Large Force Exercise; RPM = revolutions per minute

3.2.2 Subsonic Noise Exposure

This noise exposure analysis is performed by modeling the busiest month of the year within the PRTC. Assuming 20 flying days per month, LFE training could only be permitted a maximum of three of those days. The remaining 17 days were modeled as normal day-to-day operations.

Table 3.2-8 displays the cumulative noise exposure below the PRTC airspaces. These results, derived from busy-month data, provide the highest noise exposure for the area. LFEs would not occur in all months as they are limited to no more than 10 days total with no more than 3 days quarterly. Months without LFE training would be slightly quieter than the levels reported below. As most day-to-day and LFE training occurs withing PR 1, PR 2, and PR 3, noise levels are highest beneath these airspaces. B-1 operations are the greatest contributor to the noise environment at PRTC.

Table 3.2-8 Existing Subsonic Noise Exposure at PRTC

Airspace Name	*L_{dnmr} (dB)*	*DNL (dB)*
PR 1	51	50
PR 2	55	54
PR 3	51	50
PR 4	38	38
Gateway West	39	38
Gateway East	38	38
Gap A	46	46
Gap B	46	45
Gap C	38	38

Legend: dB = decibel; DNL = day-night average sound level; L_{dnmr} = onset rate adjusted day-night average sound level

3.2.3 Supersonic Noise Exposure

Supersonic operations are only authorized during LFEs, in all airspace except for PR 1C. The authorized minimum altitude is 20,000 MSL for B-1 and 10,000 feet AGL for transient fighter aircraft. On average,

four supersonic events occur annually within the MOAs (10,000 feet AGL–17,999 feet MSL) for a total of less than three minutes per year of supersonic exposure. During LFEs the entire airspace is used, with opposing forces typically staging in PR 1 at one end and PR 4 at the other, then proceeding in general west to east and east and west direction and conducting combat primarily in the center of the complex. This results in primarily an elliptical area encompassing PR 2, PR 3, and Gap B where most supersonic speed occurs.

Approximately 156 events occur annually within the ATCAAs (18,000 feet MSL–26,000 feet MSL) for a total of about 61 minutes per year of supersonic exposure. The maximum cumulative supersonic noise exposure beneath the center of the PRTC airspace (PR 2, PR 3, and Gap B) is 36 dB CDNL. Areas towards the edges of the PRTC would experience cumulative supersonic noise levels less than this.

4.0 ALTERNATIVE 1

The following section details the modeling data and the resultant noise exposure for the proposed Alternative 1 conditions at the Ellsworth AFB airfield and PTRC airspaces associated with aircraft operations.

Specific changes under Alternative 1 include:

- Actions to improve day-to-day operations (**Figure 4.0-1**):
  - Raise the ceiling of PR 2 and Gateway West ATCAAs from FL260 to FL600
  - Change times of use to 07:00 to 00:30 (7:00 a.m. to 12:30 a.m.) Monday to Thursday, 07:00 to 18:00) 7:00 a.m. to 6:00 p.m. Friday, and other times by NOTAM
  - These changes to day-to-day training do not change the annual total operations in the complex.
- Actions to improve training capability of LFEs (**Figure 4.0-2**):
  - Raise the ceiling of all PRTC from FL260 to FL600
  - Increase the total days allowed annually from 10 days to 30 days
  - Increase duration allowed for individual LFE events from 3 days to 12 days (no weekend flying)
  - The additional LFE days would increase annual total operations in the complex.

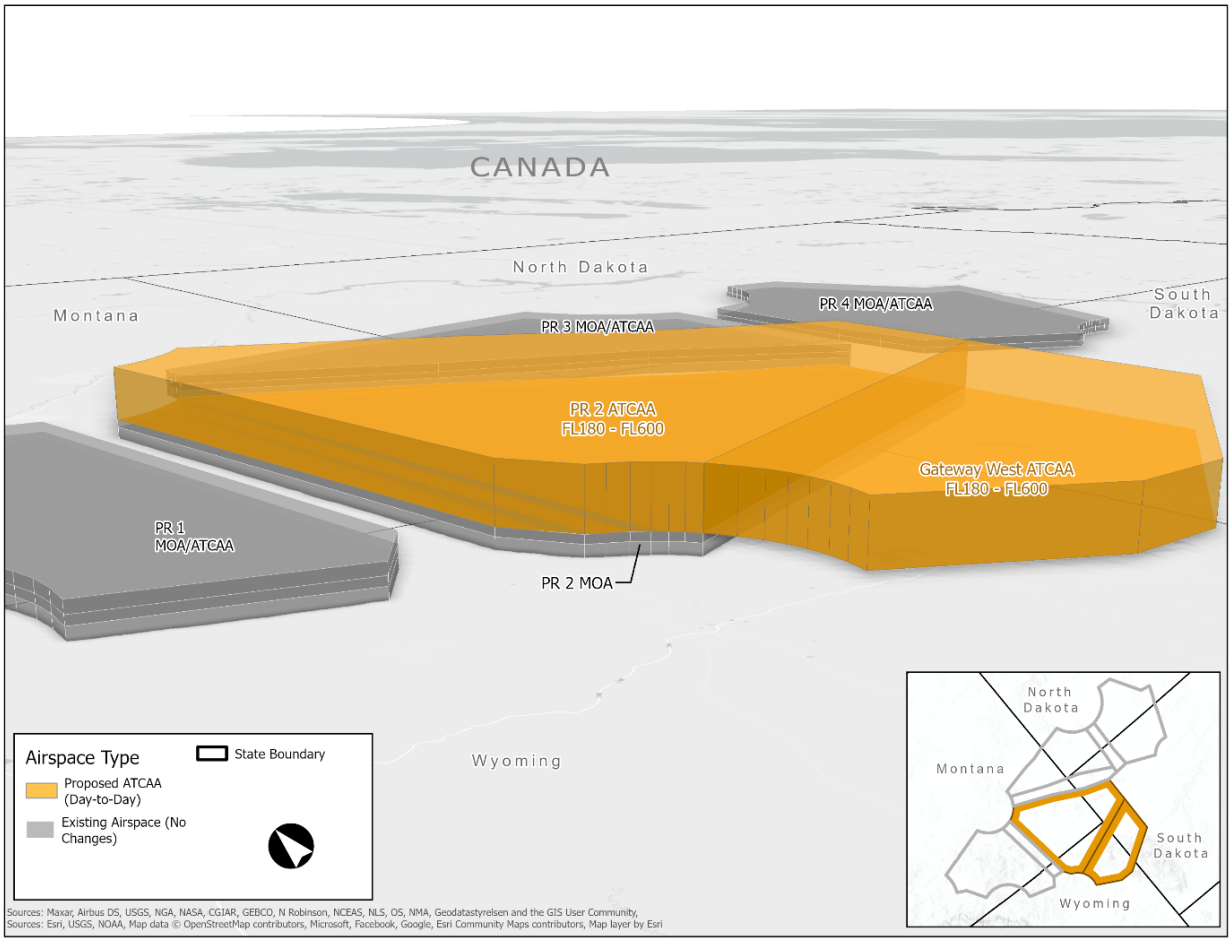


Figure 4.0-1 Alternative 1 Proposed Changes for Day-to-Day Operations

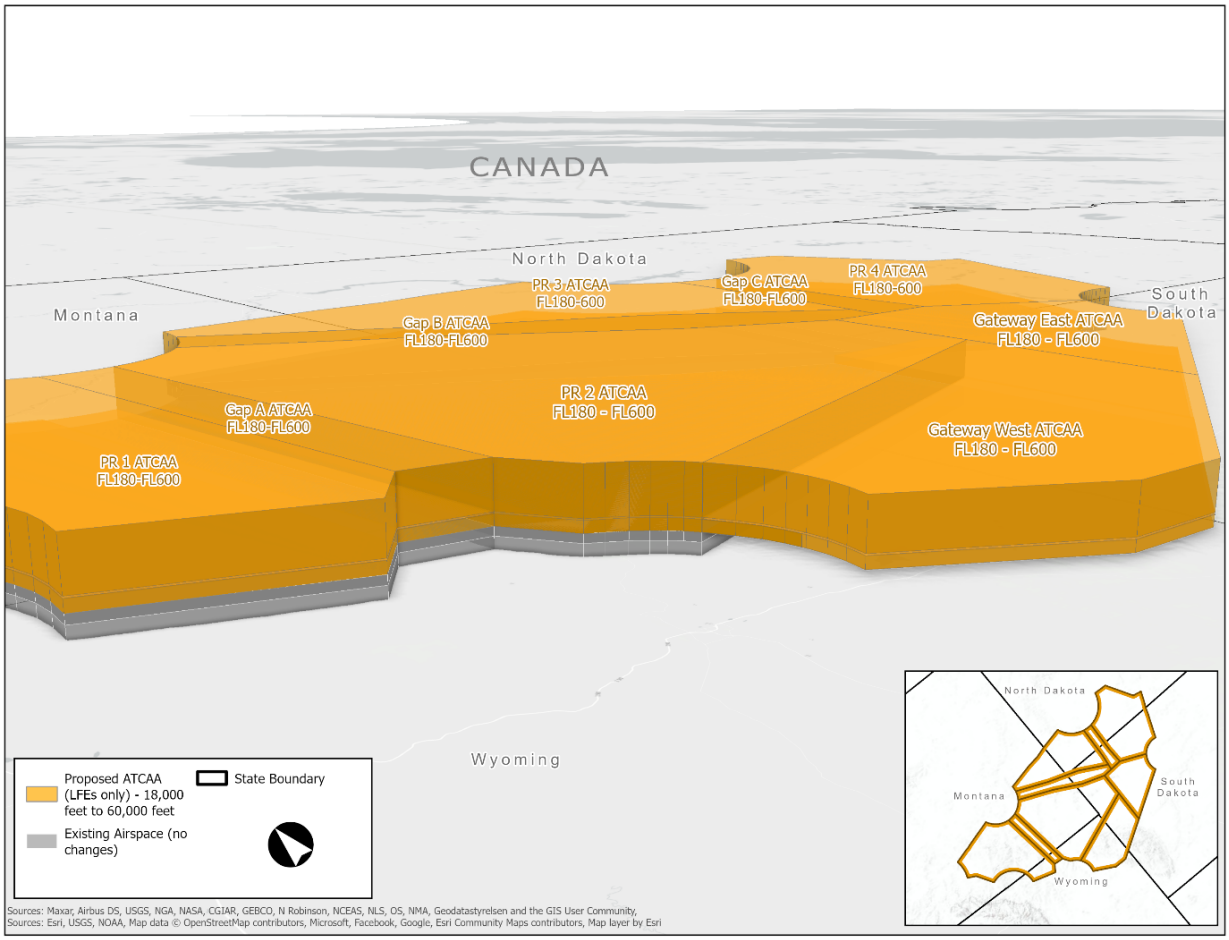


Figure 4.0-2 Alternative 1 Proposed Changes for LFEs

4.1 ELLSWORTH AFB AIRFIELD

4.1.1 Modeling Data

Annual flight operations, maintenance and static operations, closed pattern altitudes, and flight tracks would remain as described under existing conditions for the following aircraft: B-21, Transient C-12, Transient C-130, Transient Trainer, and Transient Helicopters. Regarding noise modeling inputs at the airfield, the following would change due to the increase in LFE days when compared to the existing conditions.

- Increase in F-18 aircraft operations to 355 sorties and incorporation of overhead arrivals.
- Increase in Tanker and Heavy aircraft operations
- Introduction of 334 F-22 aircraft sorties.
- Introduction of 334 F-35 aircraft sorties.
- Introduction of 100 UAV sorties.

4.1.2 Noise Exposure

4.1.2.1 Cumulative Noise Exposure – DNL Contours

Figure 4.1-1 shows the DNL noise contours from 65 to 85 dB in 5-dB increments for implementation of Alternative 1 compared with the Existing/No Action Alternative. As with the Existing/No Action Alternative, noise generated by aircraft operations at Ellsworth would occur both within and outside of the airfield. Portions of the 65 dB DNL contour extend northwest of the airfield boundary by 1.5 miles and 1.25 miles to the southeast; however, as with the No Action Alternative there are no noise sensitive POIs within this contour. **Table 4.1-1** shows the acreage within each DNL noise contour off-base and the difference in acreage when comparing the Existing/No Action Alternative to Alternative 1.

Table 4.1-1 Alternative 1 Noise Exposure Acreage in the Vicinity of Ellsworth AFB

DNL (dB)	*Existing/No Action Off-base Acreage*	*Alternative 1 Off-base Acreage*	*Difference Off-base Acreage*
65–70	1,352	2,535	1,183
70–75	348	1,141	793
75–80	5	511	506
80–85	0	0	0
85+	0	0	0
Total >65 dB	**1,705**	**4,187**	**2,482**

Legend: AFB = Air Force Base; dB = decibel; DNL = Day-Night Average Sound Level

Table 4.1-2 shows the DNL values at each of the POIs under the existing conditions. As shown, none of the POIs would be within the new 65 dB DNL contour. Values range from 45 to 64 dB DNL, thus, no residential areas, schools, or hospitals are currently exposed to 65 dB DNL or greater, which is the DoD threshold for land use recommendations for noise sensitive land uses.

Table 4.1-2 DNL at POIs Under Alternative 1 in the Vicinity of Ellsworth AFB

Named POI	*Existing DNL (dB)*	*Proposed DNL (dB)*	*Difference (dB)*
Badger Clark Daycare	52	57	+5
Child Development Services	54	59	+5
District Daycare	53	57	+4
Douglas High School	55	58	+3
Douglas Middle School	51	55	+4
East Middle School	48	48	0
Ellsworth School-age Care Program	55	60	+5
Emmanuel Baptist Church	59	64	+5
Francis Case Daycare	53	56	+3
Patriot Elementary	52	56	+4
Vandenberg Daycare	58	61	+3
Vandenberg Elementary	58	61	+3
Watiki Indoor Waterpark Resort	44	45	+1

Legend: AFB = Air Force Base; dB = decibel; DNL = Day-Night Average Sound Level; POI = Point of Interest

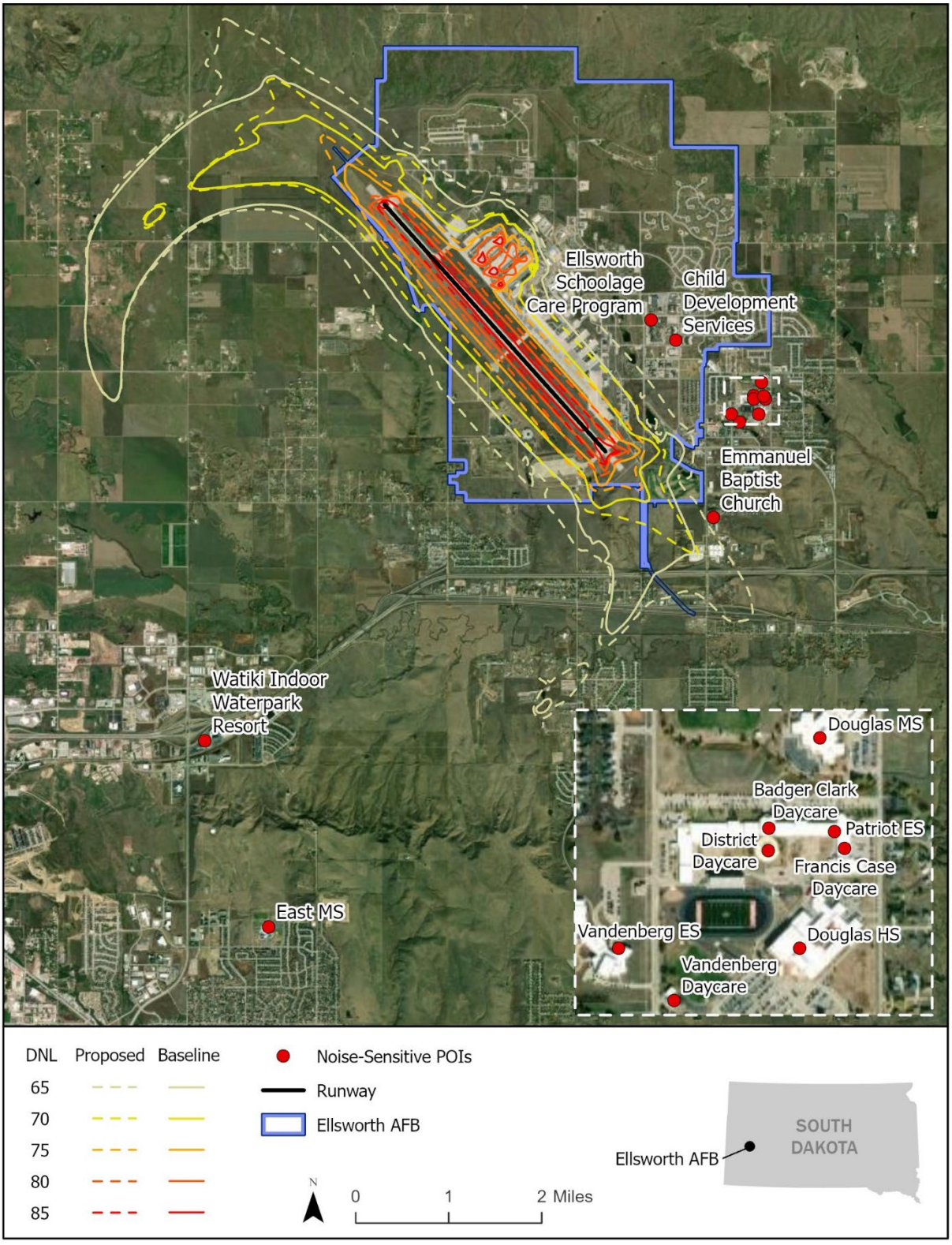


Figure 4.1-1 Comparison of Alternative 1 and No Action DNL Noise Contours and POIs in the Vicinity of Ellsworth AFB

4.1.2.2 Maximum SEL Values

Table 4.1-3 shows the maximum possible SEL values at each of the POIs under Alternative 1. Values would range from 85 to 111 dB SEL. The values presented are predominately based on changes to the type of transient military fighter aircraft during LFEs and their anticipated departures and overhead arrivals. These transient flight operations would occur infrequently (primarily during LFEs only). The change in SEL value at each POI when compared to Existing Conditions would be based on the introduction of a new aircraft or a new flight track in the vicinity of the POI. For example, if an aircraft starts its departure roll further down the runway when compared to the Existing Conditions, operates along the same flight path and with the same flight profile (e.g., power setting, airspeed, climb rate), the SEL value would increase over Existing Conditions at a given location as the aircraft would be at a lower altitude when encountering the given location. Under Alternative 1, 11 POIs would experience an increase in SEL values when compared to Existing Conditions.

Table 4.1-3 Alternative 1 SEL Values at POIs in the Vicinity of Ellsworth AFB

Named POI	*Existing SEL (dB)*	*Proposed SEL (dB)*	*Difference (dB)*
Badger Clark Daycare	101	109	+8
Child Development Services	103	105	+2
District Daycare	101	109	+8
Douglas High School	102	107	+5
Douglas Middle School	101	109	+8
East Middle School	87	87	0
Ellsworth School-age Care Program	104	109	+5
Emmanuel Baptist Church	111	111	0
Francis Case Daycare	101	107	+6
Patriot Elementary	101	108	+7
Vandenberg Daycare	103	109	+6
Vandenberg Elementary	103	109	+6
Watiki Indoor Waterpark Resort	84	85	+1

Legend: dB = decibel; POI = Point of Interest; POI = Point of Interest; SEL = Sound Exposure Level

4.1.2.3 Classroom Learning Interference

The school screening threshold of 60 dB $L_{eq(8hr)}$ equates to an interior level of 45 dB $L_{eq(8hr)}$ with windows open and represents the point at which studies have found classroom learning impacts (DNWG 2009, 2013a). Alternative 1 operations at Ellsworth AFB would result in nine POIs being exposed to exterior $L_{eq(8hr)}$ greater than or equal to 60 dB for windows open condition (**Table 4.1-4**). Given that the screening threshold of 60 dB $L_{eq(8hr)}$ was exceeded, additional classroom learning interference assessment categories (number of speech interfering events and time above 50 dB) were calculated for those POIs (see Table 4.1-4). Total speech interfering events per hour would not change from existing conditions while the time above 50 dB per 8-hour day increases by 1–2 minutes when compared to the existing conditions (see **Section 3.1.2.3**, **Table 3.1-9** for existing conditions).

Table 4.1-4 Alternative 1 Classroom Learning Interference in the Vicinity of Ellsworth AFB

Named POI	*$L_{eq(8hr)}$ (dB)*	*Difference Compared to Existing*	*Speech Interfering Events per hour*	*Difference Compared to Existing*	*Time above 50 dB (minutes) per 8-hour day*	*Difference Compared to Existing*
Badger Clark Daycare	60	+4	1	0	3	+1
Child Development Services	61	+7	1	0	4	+1
District Daycare	61	+5	1	0	3	+1
Douglas High School	62	+4	1	0	3	+1
Douglas Middle School	59	+6				
East Middle School	45	+1				
Ellsworth School-age Care Program	62	+7	1	0	4	+1
Francis Case Daycare	60	+5	1	0	3	+1
Patriot Elementary	59	+4				
Vandenberg Daycare	64	+3	1	0	4	+2
Vandenberg Elementary	64	+3	1	0	4	+2

Legend: AFB = Air Force Base; dB = decibel; $L_{eq(8hr)}$ = 8-hour Equivalent Sound Level; POI = Point of Interest

4.1.2.4 Potential for Hearing Loss

DoD guidance prescribes analysis of the PHL resulting from elevated aircraft noise levels. The screening process begins by identifying residential areas exposed to DNL of 80 dB or greater (DNWG 2013b). Under Alternative 1, no areas outside of the Ellsworth AFB airfield boundary are exposed to 80 dB DNL or greater, so no residents experience the PHL.

4.2 PRTC

Alternative 1 includes changes to improve day-to-day operations and training capability of LFEs. **Tables 4.2-1** and **4.2-2** summarize the changes.

Table 4.2-1 Alternative 1 Changes to Day-to-Day Operations

Airspace	*Existing Altitudes*	*Proposed Change*
PR 2 ATCAA	FL180–FL260	FL180–FL600
Gateway West ATCAA	FL180–FL260	FL180–FL600
Crossbow ATCAA	FL270–FL310	Absorbed into PR 2 and Gateway West ATCAA changes

Legend: ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level

Table 4.2-2 Alternative 1 Changes to LFE Operations

LFE Criteria	*Current*	*Proposed*
PRTC Airspace	No higher than FL260	Up to FL600, as assigned
Total LFE Days	10 days per year/3 days per quarter	30 days total, no quarter restriction. 10 fly days out of 12 (Monday–Friday flying, off Saturday and Sunday).

Legend: FL = Flight Level; LFE = Large Force Exercise; PRTC = Powder River Training Complex

4.2.1 Modeling Data

Raising the ceiling of the PR 2 and Gateway West ATCAAs would allow for operations to occur in the higher altitudes but would not change the existing 3,234 total day-to-day sorties in PRTC. PR 2 and

Gateway West ATCAAs would continue to be the primary areas used for day-to-day operations accounting for over 87 percent of the training time. Increasing the duration and frequency of LFEs would increase the total sorties within PRTC by approximately 53 percent. **Table 4.2-3** shows the proposed total annual operations.

Table 4.2-3 Alternative 1 PRTC Aircraft Operations

Aircraft	*Modeled Aircraft*	*Average Annual Sorties*
B-1	B-1	1,945
B-2	B-2A	128
B-52	B-52H	1,086
Tanker	KC-135R	254
Transient Fighter	F-15E	125
	F-16C	376
	F-18E/F	376
	F-22	125
	F-35A	250
Transient Heavy	E-3A	185
RQ/MQ	Cessna-441	124
Total		**4,974**

Legend: PRTC = Powder River Training Complex

Supersonic operations would continue to occur during LFEs. The authorized minimum altitude would be unchanged: 20,000 feet MSL for B-1 and 10,000 feet AGL for transient fighter aircraft. Accommodating more fighter aircraft over more LFE days would increase the total supersonic sorties from the current operations. Supersonic sorties by aircraft type are provided in **Table 4.2-4**.

Table 4.2-4 Alternative 1 Supersonic Flight for LFE Operations

Aircraft	*Annual Supersonic Sorties*
B-1	180
Transient F-15	230
Transient F-16	300
Transient F-18	180
Transient F-22	490
Transient F-35	300
Total	**1,680**

Legend: LFE = Large Force Exercise

Tables 4.2-5 and **4.2-6** show the average distribution of time spent within each airspace unit for every aircraft type for the day-to-day and LFE operations, respectively. **Tables 4.2-7** and **4.2-8** display the distribution of time spent within each altitude block for each aircraft type for day-to-day and LFE operations, respectively. Note that all percentages are rounded to the nearest whole number and some lines within these tables may not add up to exactly 100% due to this rounding. Operating conditions for aircraft operations in the PRTC (average airspeed, engine power, time) remain the same as the existing conditions (see **Table 3.2-7**).

Table 4.2-5 Alternative 1 Percent of Time Spent in Airspace for Day-to-Day Operations

Aircraft	*PR 1 MOA & ATCAA*	*PR 2 MOA & ATCAA*	*PR 3 MOA & ATCAA*	*PR 4 MOA & ATCAA*	*Gateway West ATCAA*
B-1	5	67	5	5	18
B-2	0	67	0	0	33
B-52	5	72	3	2	18
Tanker	8	70	5	3	14
Transient	8	62	6	6	18

Legend: ATCAA = Air Traffic Control Assigned Airspace; MOA = Military Operations Area

Table 4.2-6 Alternative 1 Percent of Time Spent in Airspace for LFE Operations

Aircraft	*PR 1 MOA & ATCAA*	*PR 2 MOA & ATCAA*	*PR 3 MOA & ATCAA*	*PR 4 MOA & ATCAA*	*Gap A,B,C*	*Gateway East ATCAA*	*Gateway West ATCAA*
B-1	21	24	15	19	9	5	7
B-2	20	23	13	17	9	6	12
B-52	20	22	13	18	9	6	12
Tanker	45	4	2	45	1	1	2
Transient Fighter	21	24	15	19	9	5	7
Transient EA-18G	21	24	15	19	9	5	7
C2ISR (E-3/E-7)	24	1	10	35	5	15	10
RQ/MQ	22	24	15	19	9	4	7

Legend: ATCAA = Air Traffic Control Assigned Airspace; LFE = Life Force Exercise; MOA = Military Operations Area

Table 4.2-7 Alternative 1 Percent of Time Spent in Altitude Block for Day-to-Day Operations

Aircraft	*500–999 AGL*	*1,000–1,999 AGL*	*2,000–4,999 AGL*	*5,000 AGL–12,000 MSL*	*12,000–18,000 MSL*	*FL180–FL320*	*FL330-FL410*	*FL420-FL600*
B-1	1	1	1	5	2	85	5	0
B-2	0	0	0	5	5	40	40	10
B-52	1	1	1	3	4	50	39	1
Tanker	0	0	0	1	1	97	1	0
Transient	2	2	1	1	4	40	30	20

Legend: AGL = above ground level; FL = Flight Level; MSL = mean sea level

Table 4.2-8 Alternative 1 Percent of Time Spent in Altitude Block for LFE Operations

Aircraft	*500–999 AGL*	*1,000–1,999 AGL*	*2,000–4,999 AGL*	*5,000 AGL–12,000 MSL*	*12,000–18,000 MSL*	*FL180–FL320*	*FL330-FL410*	*FL420-FL600*
B-1	1	1	1	1	5	90	1	0
B-2	0	0	0	0	0	15	45	40
B-52	1	1	1	1	1	15	75	5
Tanker	0	0	0	0	5	90	5	0
Transient Fighter	2	2	1	1	4	15	65	10
Transient EA-18G	1	1	1	1	16	80	0	0
C2ISR (E-3/E-7)	0	0	0	0	0	70	30	0
RQ/MQ	0	0	0	5	5	75	15	0

Legend: AGL = above ground level; FL = Flight Level; LFE = Large Force Exercise; MSL = mean sea level

4.2.2 Subsonic Noise Exposure

The noise exposure analysis is performed modeling the busiest month of the year within the PRTC. Assuming 20 flying days per month, LFE training could occur a maximum of 10 of those days under Alternative 1. The remaining 10 days are modeled as normal day-to-day operations.

Table 4.2-9 displays the cumulative noise exposure below the PRTC airspaces. These results, derived from busy-month data, provide the highest noise exposure for the area. Months without LFE training would be slightly quieter than the levels reported below. B-1 operations remain the greatest contributor to the noise environment at PRTC.

Table 4.2-9 Alternative 1 Subsonic Noise Exposure at PRTC

Airspace Name	*L_{dnmr} (dB)*			*DNL (dB)*			*FAA Significance Determination*
	Alternative 1	*Existing/No Action*	*Change*	*Alternative 1*	*Existing/No Action*	*Change*	
PR 1	48	51	-3	47	50	-3	Insignificant
PR 2	50	55	-5	49	54	-5	Reportable[1]
PR 3	48	51	-3	47	50	-3	Insignificant
PR 4	40	38	2	40	38	2	Insignificant
Gateway West	38	39	-1	38	38	0	Insignificant
Gateway East	39	38	1	39	38	1	Insignificant
Gap A	48	46	2	47	46	1	Insignificant
Gap B	47	46	1	46	45	1	Insignificant
Gap C	39	38	1	39	38	1	Insignificant

Note: [1] +/- 5 dB DNL change for DNL 45 dB to <60 dB is "reportable" per FAA Order 1050.1G.
Legend: dB = decibel; DNL = day-night average sound level; FAA = Federal Aviation Administration; L_{dnmr} = onset rate adjusted day-night average sound level; PRTC = Powder River Training Complex

Increases to noise exposure below PR 4, Gateway East, and Gap A, B, and C MOAs is due solely to the additional 1,740 annual LFE training sorties within the PTRC. Raising the airspace ceiling under Alternative 1 allows for aircraft, particularly the B-1, to perform their training at higher altitudes than under the existing conditions. Moving operations from the dominate noise contributor to higher altitudes would result in improvements to the noise environment below PR 1, PR 2, PR 3, and Gateway West under

Alternative 1. Areas beneath PR 4, Gateway East, and Gap A, B, and C MOAs would experience insignificant increases of up to 2 dB L_{dnmr}/DNL.

Noise exposure beneath PRTC would range from 38 to 50 dB DNL, thus, no sensitive noise receptors would be exposed to 65 dB DNL or greater, which is the DoD threshold for land use recommendations for noise sensitive land uses such as residences, schools, daycares, and hospitals. In most places there would be a reduction in noise exposure or an unnoticeable change. The change in noise exposure beneath PR 2 would be considered "reportable" in accordance with FAA Order 1050.1G since the change is +/- 5 dB; however, the noise exposure would be less than the baseline/no action and does not present a negative impact (see **Section 2.3.1**), thus further supplemental metrics are not necessary.

4.2.3 Supersonic Noise Exposure

Supersonic operations would continue to occur during LFEs. The authorized minimum altitude would be unchanged: 20,000 feet MSL for B-1 and 10,000 feet AGL for fighter aircraft. Accommodating more fighter aircraft over more LFE days would increase the total annual supersonic sorties from 160 to 1,680. Approximately 95 percent of supersonic operations would occur in the ATCAAs above FL180.

Under Alternative 1, the maximum cumulative noise exposure beneath the center (PR 2, PR 3, and Gap B) of the PRTC airspace would be 51 dB CDNL, a 15 dB increase over the existing conditions. This increase is attributable to the increase in fighter aircraft participating in LFEs which are authorized to fly supersonic down to 10,000 feet AGL. Areas towards the edges of the PRTC would experience slightly lower noise levels. The CDNL would not exceed 62 CDNL indicating there would be no land use compatibility concerns nor would it exceed the significance criteria determined by FAA Order 1050.1G (see Section 2.3.1).

4.2.4 Supplemental Metrics

While DNL/CDNL is the U.S. Government standard metric for assessing noise impacts, supplemental metrics are used to produce more detailed noise exposure information for the decision process and to improve communication with the public and stakeholders. Supplemental metrics are not intended to replace the DNL/CDNL metric as the primary descriptor of cumulative noise exposure and anticipated significance of impacts but rather are useful tools to supplement the impact information disclosed by the DNL/CDNL metric.

4.2.4.1 Low-Level Overflights

Table 4.2-10 provides single-event calculations for a representative set of aircraft that would operate within PRTC. Low-level flights are possible throughout most of the PRTC. However, the higher altitudes (above FL180) would continue to be the primary area used for day-to-day operations accounting for over 90 percent of the training time. Total day-to-day operations at the low-altitude level would remain unchanged and as noted in Section 4.2.2 moving operations of the noisiest of the day-to-day aircraft (B-1) to higher altitudes would reduce the cumulative noise exposure in most areas. During day-to-day training low-level flights by the bomber aircraft would continue to be possible and could result in a peak noise exposure of up to 117 dB. During LFE events, low-level flights by both bombers and fighter aircraft are possible and a range of peak noise exposure could be experienced. The peak noise exposures in **Table 4.2-10** would occur for flights at the lowest possible altitude within the PRTC which varies by location. The Gateway East and West ATCAAs do not have MOAs below, thus the lowest possible flight in those areas would be at FL180

(approximately 18,000 feet). This maximum noise exposure would be consistent with the existing conditions in PRTC; however, the increase in LFE days (and the corresponding increase in fighter aircraft operations) would slightly increase the probability of experiencing a low-level flight as detailed in **Table 4.2-11** and **4.2-12.**

Table 4.2-10 Maximum Noise Exposure by Aircraft Types and Altitudes

Aircraft	*500-foot Overflight (L_{max} in dB)*	*12,000-foot Overflight (L_{max} in dB)*	*18,000-foot Overflight (L_{max} in dB)*
Day-to-Day and LFEs			
B-1	117	86	80
B-2[1]	n/a	71	64
B-52[1]	n/a	76	69
LFEs Only			
F-16	115	78	71
F-18	124	84	78
F-22	120	84	78
F-35	119	85	78

Note: [1] B-2 and B-52 do not fly at low-levels.
Legend: dB = decibel; LFE = Large Force Exercise; L_{max} = Maximum Sound Level

Table 4.2-11 Alternative 1 – Probability[1] of Overflight at Lowest Altitude for Day-to-Day Training

Airspace	*Lowest Altitude Available for Use*	*Probability of Overflight at Lowest Altitude (Day-to-Day) No Action Alternative*	*Probability of Overflight at Lowest Altitude (Day-to-Day) Alternative 1*	*Difference*
PR 1 MOA	500 feet AGL	3%	1%	-2%
PR 2 MOA	500 feet AGL	3%	1%	-1%
PR 3 MOA	500 feet AGL	4%	1%	-3%
PR 4 MOA	12,000 feet MSL	3%	2%	-1%

Note: [1] Probability per week of experiencing a low-level overflight at any given point beneath the MOA.
Legend: % = percent; AGL = above ground level; MOA = Military Operations Area; MSL = mean sea level

Table 4.2-12 Alternative 1 – Probability[1] of Overflight at Lowest Altitude for LFE Training

Airspace	*Lowest Altitude Available for Use*	*Probability of Overflight at Lowest Altitude (LFEs) No Action Alternative*	*Probability of Overflight at Lowest Altitude (LFEs) Alternative 1*	*Difference*
PR 1, 2, 3 and Gap A, B MOAs	500 feet AGL	1%	2%	+1%
PR 4 and Gap C MOAs	12,000 feet MSL	1%	11%	+10%

Note: [1] Probability of experiencing a low-level overflight at any given point beneath the MOA during a week with an LFE.
Legend: % = percent; AGL = above ground level; LFE = Large Force Exercise; MOA = Military Operations Area; MSL = mean sea level

4.2.4.2 Supersonic Overpressure

The location and intensity of individual sonic booms depend on several factors including aircraft size, shape, weight, altitude, and the maneuver being conducted at the time of the boom (e.g., climbing, diving, turning). Supersonic flight is only authorized during LFEs. Supersonic flights from fighter aircraft could occur in the MOAs (10,000 feet AGL and above) while supersonic flight from B-1 would be limited to ATCAAs only (20,000 feet MSL). **Table 4.2-13** shows calculated overpressures in psf for the B-1 and representative transient fighter aircraft within PRTC. The psf is not an indicator of how loud a sonic boom is, but rather the pressure above normal atmospheric pressure created by the shock wave generated by a sonic boom. This change in pressure occurs very quickly (i.e., in significantly less than 1 second).

Table 4.2-13 Maximum Sonic Boom Overpressures

Aircraft	*Lowest Supersonic Flight Altitude*	*Overpressure (psf)*
B-1	20,000 feet MSL	5.31
F-16	10,000 feet AGL	4.24
F-22	10,000 feet AGL	5.37
F-35	10,000 feet AGL	4.9

Legend: AGL = above ground level; MSL = mean sea level; psf = pounds per square foot

5.0 ALTERNATIVE 2

The following section details the modeling data and the resultant noise exposure for the proposed Alternative 2 conditions in PTRC airspaces associated with aircraft operations.

Specific changes under Alternative 2 include:

- Actions to improve day-to-day operations (**Figure 5.0-1**):
  - Raise the ceiling of PR 2, Gateway West, and Gateway East ATCAAs from FL260 to FL600
  - Change times of use to 07:00 to 00:30 (7:00 a.m. to 12:30 a.m.) Monday to Thursday, 07:00 to 18:00 (7:00 a.m. to 6:00 p.m.) Friday, and other times by NOTAM
  - These changes to day-to-day training do not change the annual total operations in the complex.
- Actions to improve training capability of LFEs (same as Alternative 1):
  - Raise the ceiling of all PRTC from FL260 to FL600
  - Increase the total days allowed annually from 10 days to 30 days
  - Increase duration allowed for individual LFE events from 3 days to 12 days (no weekend flying)
  - The additional LFE days would increase annual total operations in the complex.

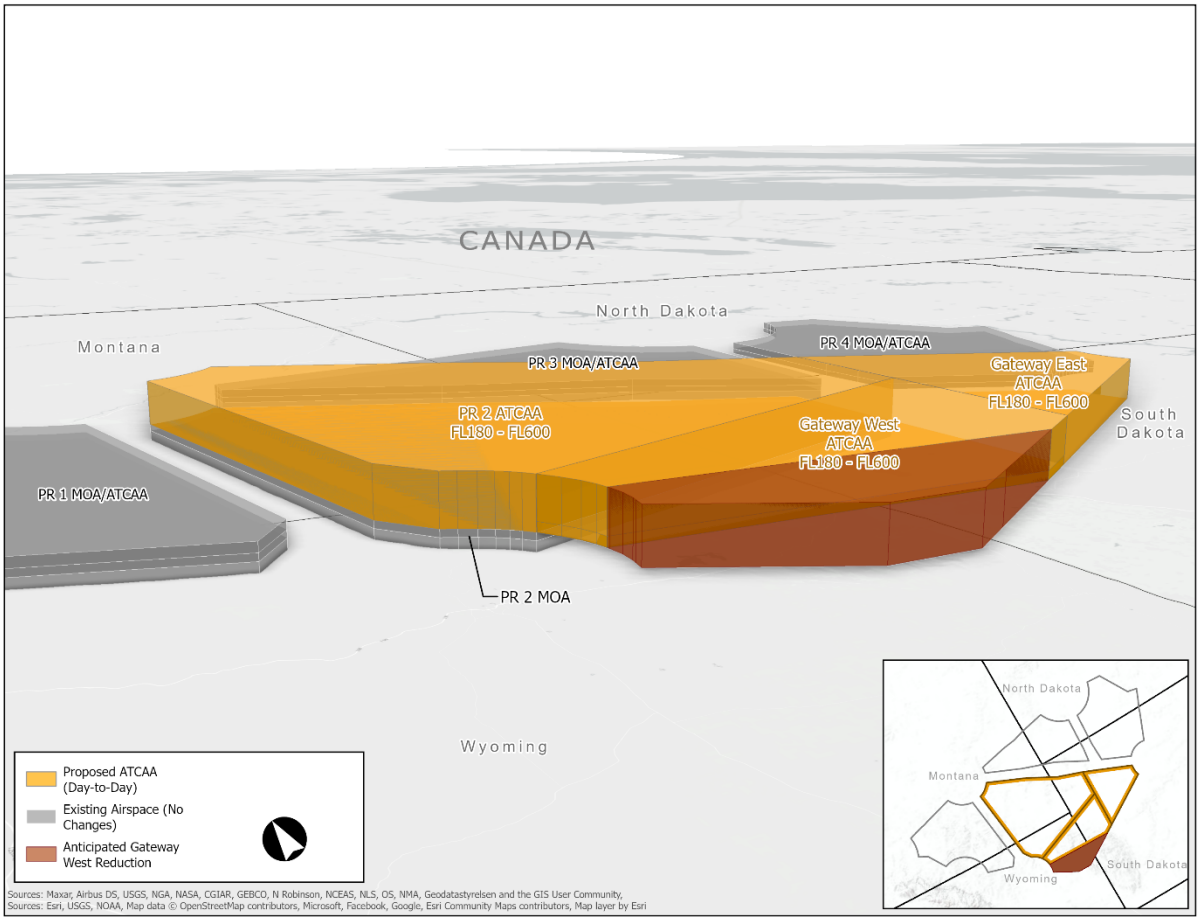


Figure 5.0-1 Alternative 2 Proposed Changes for Day-to-Day Operations

5.1 ELLSWORTH AFB AIRFIELD

Alternative 2 proposed changes associated with LFE operations are the same as Alternative 1. The LFE changes would increase military transient use of Ellsworth AFB airfield as described in Section 4.1.

5.2 PRTC

5.2.1 Modeling Data

Raising the ceiling of the PR 2, Gateway East, and Gateway West ATCAAs would allow for day-to-day training in a larger area and also allow for operations at higher altitude but would not change the existing 3,234 total day-to-day sorties in PRTC. Increasing the duration and frequency of LFEs would increase the total sorties within PRTC by approximately 53 percent. Total annual sorties under Alternative 2 would be the same as Alternative 1 (see **Table 4.2-3**). Supersonic operations under Alternative 2 would be identical to Alternative 1 (see **Table 4.2-4**).

Table 5.2-1 shows the average distribution of time spent within each airspace unit for every aircraft type for the day-to-day operations. The distribution of time spent within each altitude block for each aircraft type would be the same as Alternative 1 (see **Table 4.2-7**). Note that all percentages are rounded to the nearest whole number and some lines within the table may not add up to exactly 100% due to this rounding.

Table 5.2-1 Alternative 2 Percent of Time Spent in Airspace for Day-to-Day Operations

Aircraft	*PR 1 MOA & ATCAA*	*PR 2 MOA & ATCAA*	*PR 3 MOA & ATCAA*	*PR 4 MOA & ATCAA*	*Gateway West ATCAA*	*Gateway West ATCAA*
B-1	5	58	5	5	15	12
B-2	0	55	0	0	25	20
B-52	5	63	3	2	15	12
Tanker	8	62	5	3	12	10
Transient	8	53	6	6	15	12

Legend: ATCAA = Air Traffic Control Assigned Airspace; MOA = Military Operations Area

5.2.2 Cumulative Noise Exposure

The cumulative noise exposure analysis is performed modeling the busiest month of the year within the PRTC. Assuming 20 flying days per month, LFE training could occur a maximum of 10 of those days under Alternative 2. The remaining 10 days are modeled as normal day-to-day operations. Thus, the subsonic noise exposure and supersonic noise exposure under Alternative 2 would be identical to Alternative 1 (see **Section 4.2**).

6.0 NO ACTION ALTERNATIVE

The No Action Alternative represents the condition that corresponds to not implementing the Proposed Action (Alternative 1 or 2). All aircraft operations in PRTC and at the airfield would remain as described under the existing conditions. Therefore, overall noise exposure would remain as analyzed in **Section 3.0**, *Existing Conditions*.

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Enclosure A
Flight Operations, Flight Tracks, Flight Profiles

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Enclosure A

Noise Modeling Data for Ellsworth Air Force Base in Support of the Powder River Training Complex Supplemental Environmental Impact Statement

Ellsworth Air Force Base, South Dakota



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1.0 MODELING ASSUMPTIONS

1.1 SUMMARY OF METHODOLOGY

Baseline aircraft operations were developed from the prior modeling effort associated with the B-21 Beddown EIS (2021) and proposed aircraft operations developed from proposed Powder River Training Complex (PRTC) operations.

1.2 RUNWAY SPLIT

Ellsworth Air Force Base (AFB) has one runway that is oriented in a northwest/southeast direction. Runway 13 and Runway 31 utilization is approximately 30 and 70 percent, respectively, and handles a mix of varying types of aircraft (small and large, fixed-wing, and helicopter). The data reflected in this package shows that we plan to model the aircraft use in accordance with subject matter expert (SME) input.

1.3 WEATHER

Weather affects sound propagation. The Department of Defense (DoD) standard noise modeling software takes this into account by including the average monthly values of temperature, humidity, and station atmospheric pressure. We plan to use the year 2024, shown in Table 1-1 (monthly averages taken from WeatherUnderground.com for 2024).

Table 1-1 Average Monthly Climate Ellsworth AFB

Climatological Factor	Monthly Average											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Temperature (F)	21.9	34.4	35.8	47.9	55.7	68.2	76.7	72.8	70.7	55.1	35.6	32.2
Relative Humidity (%)	72.8	72.2	68.8	64.2	70.8	69.3	70.2	70.2	63.7	61.4	67.4	68.8
Pressure (in Hg)	26.55	26.47	26.49	26.44	26.44	26.51	26.53	26.65	26.56	26.63	26.52	26.58

Source: WeatherUnderground 2025.

1.4 MAINTENANCE

Dedicated/extended maintenance checks are modeled, depicted, and listed later in this document.

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2.0 OVERALL EXISTING AIRCRAFT OPERATIONS

Tables 2-1 and 2-2 depict aircraft, annual operations, type of operation, and time of day.

Table 2-1 Existing Aircraft Operations at Ellsworth AFB

A/C Type Modeled		Runway 13														
		Arrivals					Departures					Closed Patterns				
		Day 0700–2200	% Day	Night 2200–0700	% Night	Total Arrivals	Day 0700–2200	% Day	Night 2200–0700	% Night	Total Departures	Day 0700–2200	% Day	Night 2200–0700	% Night	Total Closed
B-21	B-2A	222	*60%*	148	*40%*	370	370	*100%*	0	*0%*	370	1,296	*60%*	864	*40%*	2,160
C-12	C-12	10	*97%*	1	*3%*	11	10	*97%*	1	*3%*	11	0	*0%*	0	*0%*	0
C-130	C-130J	16	*97%*	1	*3%*	17	16	*97%*	1	*3%*	17	0	*0%*	0	*0%*	0
F-18	F-18E/F	6	*97%*	1	*3%*	7	6	*97%*	1	*3%*	7	0	*0%*	0	*0%*	0
Tanker	KC-135R	3	*97%*	0	*3%*	3	3	*97%*	0	*3%*	3	29	*97%*	1	*3%*	30
Heavy	737-700	2	*97%*	0	*3%*	2	2	*97%*	0	*3%*	2	15	*97%*	1	*3%*	16
Trainer	T-38A	33	*97%*	1	*3%*	34	33	*97%*	1	*3%*	34	0	*0%*	0	*0%*	0
Helo	UH-60A	3	*97%*	0	*3%*	3	3	*97%*	0	*3%*	3	0	*0%*	0	*0%*	0
TOTALS		295	*66%*	152	*34%*	447	443	*99%*	4	*1%*	447	1,340	*61%*	866	*39%*	2,206

A/C Type Modeled		Runway 13														
		Arrivals					Departures					Closed Patterns				
		Day 0700–2200	% Day	Night 2200–0700	% Night	Total Arrivals	Day 0700–2200	% Day	Night 2200–0700	% Night	Total Departures	Day 0700–2200	% Day	Night 2200–0700	% Night	Total Closed
B-21	B-2A	517	*60%*	345	*40%*	862	862	*100%*	0	*0%*	862	3,024	*60%*	2,016	*40%*	5,040
C-12	C-12	23	*97%*	1	*3%*	24	23	*97%*	1	*3%*	24	0	*0%*	0	*0%*	0
C-130	C-130J	38	*97%*	1	*3%*	39	38	*97%*	1	*3%*	39	0	*0%*	0	*0%*	0
F-18	F-18E/F	15	*97%*	1	*3%*	16	15	*97%*	1	*3%*	16	0	*0%*	0	*0%*	0
Tanker	KC-135R	7	*97%*	0	*3%*	7	7	*97%*	0	*3%*	7	67	*97%*	2	*3%*	69
Heavy	737-700	4	*97%*	0	*3%*	4	4	*97%*	0	*3%*	4	34	*97%*	1	*3%*	35
Trainer	T-38A	77	*97%*	2	*3%*	79	77	*97%*	2	*3%*	79	0	*0%*	0	*0%*	0
Helo	UH-60A	7	*97%*	1	*3%*	8	7	*97%*	1	*3%*	8	0	*0%*	0	*0%*	0
TOTALS		689	*66%*	351	*34%*	1,040	1,034	99%	6	*1%*	1,040	3,125	*61%*	2,019	*39%*	5,144

Table 2-2 Existing Day and Night Operations at Ellsworth AFB

A/C Type Modeled		Total Operations				
		Day	% Day	Night	% Night	Total
B-21	B-2A	6,291	*60%*	3,373	*40%*	**9,664**
C-12	C-12	66	*97%*	2	*3%*	**68**
C-130	C-130J	109	*97%*	3	*3%*	**112**
F-18	F-18E/F	43	*97%*	1	*3%*	**44**
Tanker	KC-135R	114	*97%*	4	*3%*	**118**
Heavy	737-700	60	*97%*	2	*3%*	**62**
Trainer	T-38A	219	*97%*	7	*3%*	**226**
Helo	UH-60A	21	*97%*	1	*3%*	**22**
TOTALS		6,924	*67%*	3,394	*33%*	**10,318**

Tables 2-3, 2-4, and 2-5 show daily arrival, departure, and closed pattern operations and runway percentage utilization, respectively.

Table 2-3 Existing Daily Arrival Operations and Runway Utilization

Arrival	Day	Night	Total
Total Operations	2.698	1.371	4.068
Runway 13	20%	10%	30%
Runway 31	46%	24%	70%
Total	66%	34%	100%

Table 2-4 Existing Daily Departure Operations and Runway Utilization

Departures	Day	Night	Total
Total Operations	4.048	0.020	4.068
Runway 13	30%	0.5%	30.5%
Runway 31	69%	0.5%	69.5%
Total	99%	1%	100%

Table 2-5 Existing Daily Closed Pattern Operations and Runway Utilization

Closed Patterns	Day	Night	Total
Total Operations	12.229	7.903	20.132
Runway 13	18%	12%	30%
Runway 31	43%	27%	70%
Total	61%	39%	100%

3.0 OVERALL PROPOSED AIRCRAFT OPERATIONS AT ELLSWORTH AFB

Tables 3-1 and 3-1 depict proposed aircraft, annual operations, type of operation, and time of day.

Table 3-1 Proposed Aircraft Operations at Ellsworth AFB

A/C Type Modeled		Runway 13														
		Arrivals					Departures					Closed Patterns				
		Day 0700–2200	% Day	Night 2200–0700	% Night	Total Arrivals	Day 0700–2200	% Day	Night 2200–0700	% Night	Total Departures	Day 0700–2200	% Day	Night 2200–0700	% Night	Total Closed
B-21	B-2A	222	*60%*	148	*40%*	370	370	*100%*	0	*0%*	370	1,296	*60%*	864	*40%*	2,160
C-12	C-12	10	*97%*	1	*3%*	11	10	*97%*	1	*3%*	11	0	*0%*	0	*0%*	0
C-130	C-130J	16	*97%*	1	*3%*	17	16	*97%*	1	*3%*	17	0	*0%*	0	*0%*	0
F-18	F-18E/F	103	*97%*	3	*3%*	106	103	*97%*	3	*3%*	106	0	*0%*	0	*0%*	0
F-22	F-22	97	*97%*	3	*3%*	100	97	*97%*	3	*3%*	100	0	*0%*	0	*0%*	0
F-35	F-35A	97	*97%*	3	*3%*	100	97	*97%*	3	*3%*	100	0	*0%*	0	*0%*	0
Tanker	KC-135R	8	*97%*	0	*3%*	8	8	*97%*	0	*3%*	8	78	*97%*	2	*3%*	80
Heavy	737-700	10	*97%*	0	*3%*	10	10	*97%*	0	*3%*	10	84	*97%*	3	*3%*	87
Trainer	T-1	33	*97%*	1	*3%*	34	33	*97%*	1	*3%*	34	0	*0%*	0	*0%*	0
Helo	UH-60A	3	*97%*	0	*3%*	3	3	*97%*	0	*3%*	3	0	*0%*	0	*0%*	0
UAV	T-6A	29	*97%*	1	*3%*	30	29	*97%*	1	*3%*	30	0	*0%*	0	*0%*	0
TOTALS		629	*80%*	160	*20%*	789	776	*98%*	13	*2%*	789	1,458	*61%*	869	*39%*	2,327

A/C Type Modeled		Runway 31														
		Arrivals					Departures					Closed Patterns				
		Day 0700–2200	% Day	Night 2200–0700	% Night	Total Arrivals	Day 0700–2200	% Day	Night 2200–0700	% Night	Total Departures	Day 0700–2200	% Day	Night 2200–0700	% Night	Total Closed
B-21	B-2A	517	*60%*	345	*40%*	862	862	*100%*	0	*0%*	862	3,024	*60%*	2,016	*40%*	5,040
C-12	C-12	23	*97%*	1	*3%*	24	23	*97%*	1	*3%*	24	0	*0%*	0	*0%*	0
C-130	C-130J	38	*97%*	1	*3%*	39	38	*97%*	1	*3%*	39	0	*0%*	0	*0%*	0
F-18	F-18E/F	241	*97%*	7	*3%*	248	241	*97%*	7	*3%*	248	0	*0%*	0	*0%*	0
F-22	F-22	227	*97%*	7	*3%*	234	227	*97%*	7	*3%*	234	0	*0%*	0	*0%*	0
F-35	F-35A	227	*97%*	7	*3%*	234	227	*97%*	7	*3%*	234	0	*0%*	0	*0%*	0
Tanker	KC-135R	18	*97%*	1	*3%*	19	18	*97%*	1	*3%*	19	182	*97%*	6	*3%*	188
Heavy	737-700	24	*97%*	1	*3%*	25	24	*97%*	1	*3%*	25	197	*97%*	6	*3%*	203
Trainer	T-1	77	*97%*	2	*3%*	79	77	*97%*	2	*3%*	79	0	*0%*	0	*0%*	0
Helo	UH-60A	7	*97%*	1	*3%*	8	7	*97%*	1	*3%*	8	0	*0%*	0	*0%*	0

A/C Type Modeled		Runway 31														
		Arrivals					Departures					Closed Patterns				
		Day 0700–2200	**% Day**	**Night 2200–0700**	**% Night**	**Total Arrivals**	**Day 0700–2200**	**% Day**	**Night 2200–0700**	**% Night**	**Total Departures**	**Day 0700–2200**	**% Day**	**Night 2200–0700**	**% Night**	**Total Closed**
UAV	T-6A	68	*97%*	2	*3%*	70	68	*97%*	2	*3%*	70	0	*0%*	0	*0%*	0
TOTALS		1,469	*80%*	374	*20%*	1,843	1,814	98%	29	*2%*	1,843	3,403	*63%*	2,028	*37%*	5,431

Table 3-2 Proposed Day and Night Operations at Ellsworth AFB

A/C Type Modeled		Total Operations				
		Day	**% Day**	**Night**	**% Night**	**Total**
B-21	B-2A	6,291	*60%*	3,373	*40%*	**9,664**
C-12	C-12	66	*97%*	2	*3%*	**68**
C-130	C-130J	109	*97%*	3	*3%*	**112**
F-18	F-18E/F	689	*97%*	21	*3%*	**710**
F-22	F-22	648	*97%*	20	*3%*	**668**
F-35	F-35A	648	*97%*	20	*3%*	**668**
Tanker	KC-135R	312	*97%*	10	*3%*	**322**
Heavy	737-700	351	*97%*	11	*3%*	**362**
Trainer	T-1	221	*97%*	7	*3%*	**228**
Helo	UH-60A	21	*97%*	1	*3%*	**22**
UAV	T-6A	194	*97%*	6	*3%*	**100**
TOTALS		**9,550**	***73%***	**3,474**	***27%***	**13,024**

Tables 3-3, 3-4, and 3-5 show proposed daily arrival, departure, and closed pattern operations and runway percentage utilization, respectively.

Table 3-3 Proposed Daily Arrival Operations and Runway Utilization

Arrival	Day	Night	Total
Total Operations	5.748	1.465	7.214
Runway 13	24%	6%	30%
Runway 31	56%	14%	70%
Total	80%	20%	100%

Table 3-4 Proposed Daily Departure Operations and Runway Utilization

Departures	Day	Night	Total
Total Operations	7.099	0.115	7.214
Runway 13	29%	1%	30%
Runway 31	69%	1%	70%
Total	98%	2%	100%

Table 3-5 Proposed Daily Closed Pattern Operations and Runway Utilization

Closed Patterns	Day	Night	Total
Total Operations	12.229	7.903	20.132
Runway 13	19%	11%	30%
Runway 31	44%	26%	70%
Total	63%	37%	100%

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4.0 B-21

4.1 EXISTING

- 1,232 Annual Sorties
- Arrivals:
  - 60% Day/40% Night
  - Runway 31 70%/Runway 13 30%
  - Instrument Landing System (ILS) 43%
  - Tactical Air Navigation (TACAN) 27%
  - Visual Flight Rules (VFR) 30%
    - North 75%
    - South 10%
    - West 10%
    - East 5%
- Departures:
  - 100% Day
  - Runway 31 70%/Runway 13 30%
  - West 80%
  - South 10%
  - North 5%
  - East 5%
- Closed Patterns:
  - 3,600 Closed Patterns (7,200 Operations)
  - 60% Day/40% Night
  - Runway 31 70%/Runway 13 30%
  - Radar 70%/VFR 30%
  - West Pattern 100%

B-21 flight tracks are presented in Figures 4-1 through 4-6 and operations assigned to associated flight tracks are presented in Table 4-1.

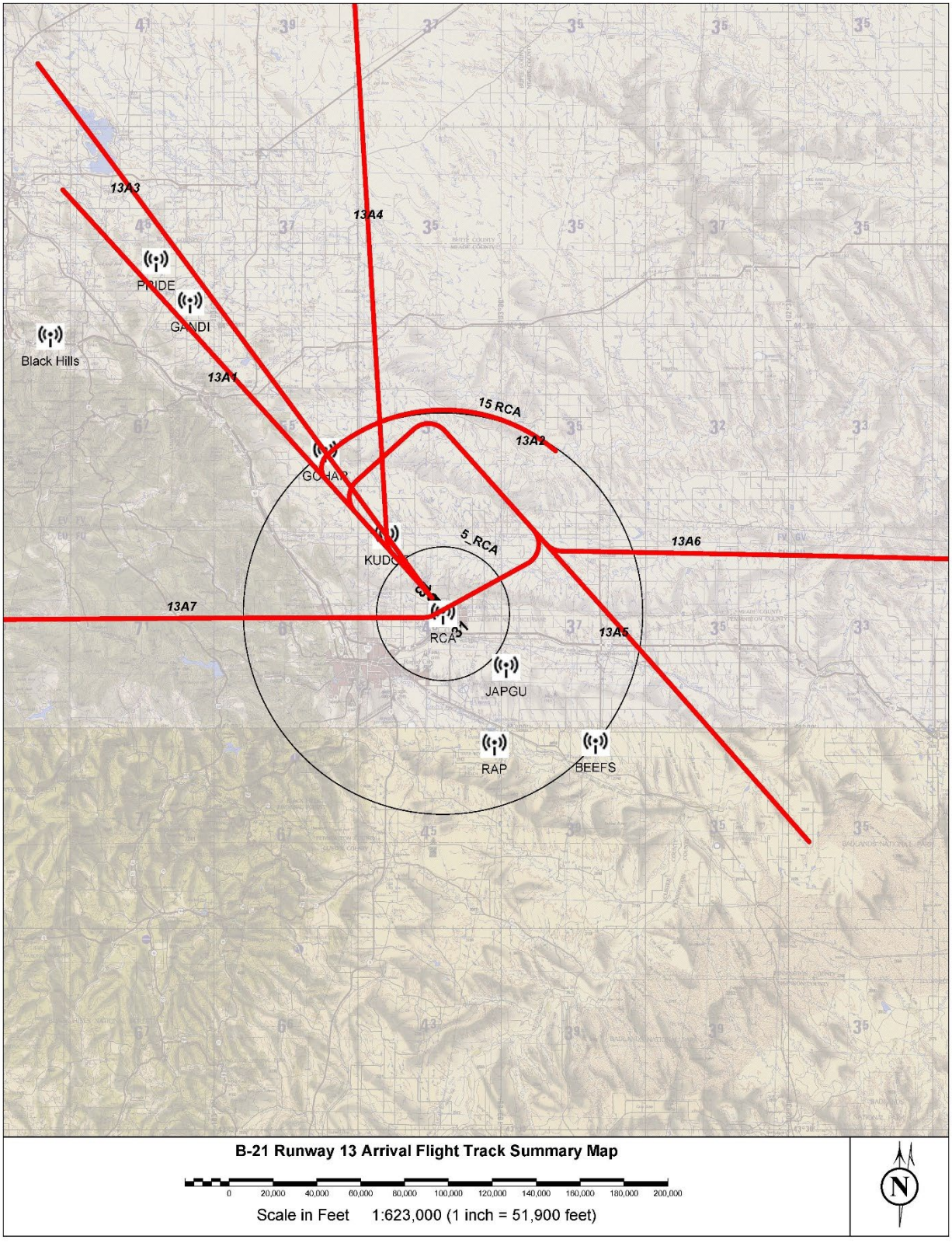


Figure 4-1 B-21 Runway 13 Arrivals

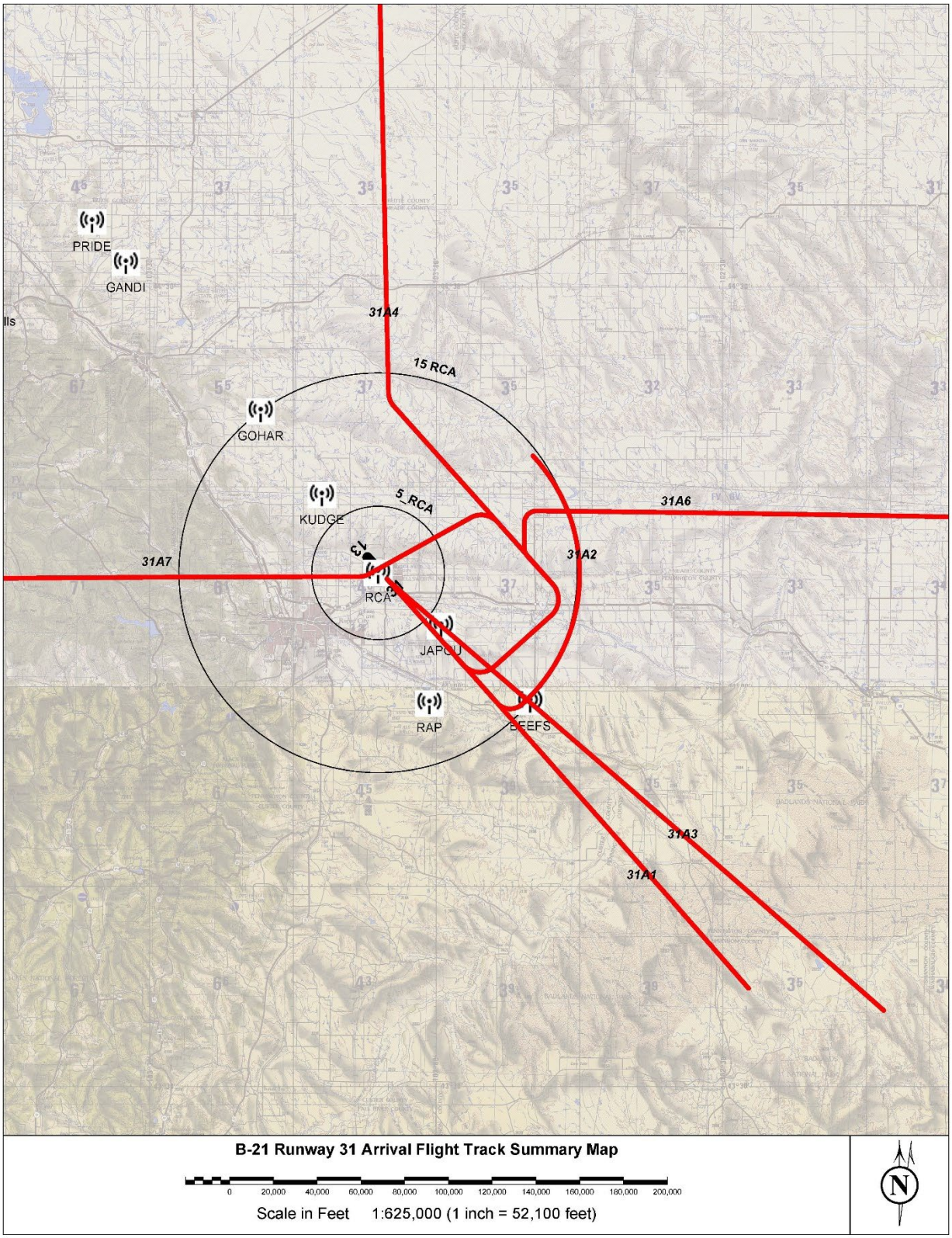


Figure 4-2 B-21 Runway 31 Arrivals

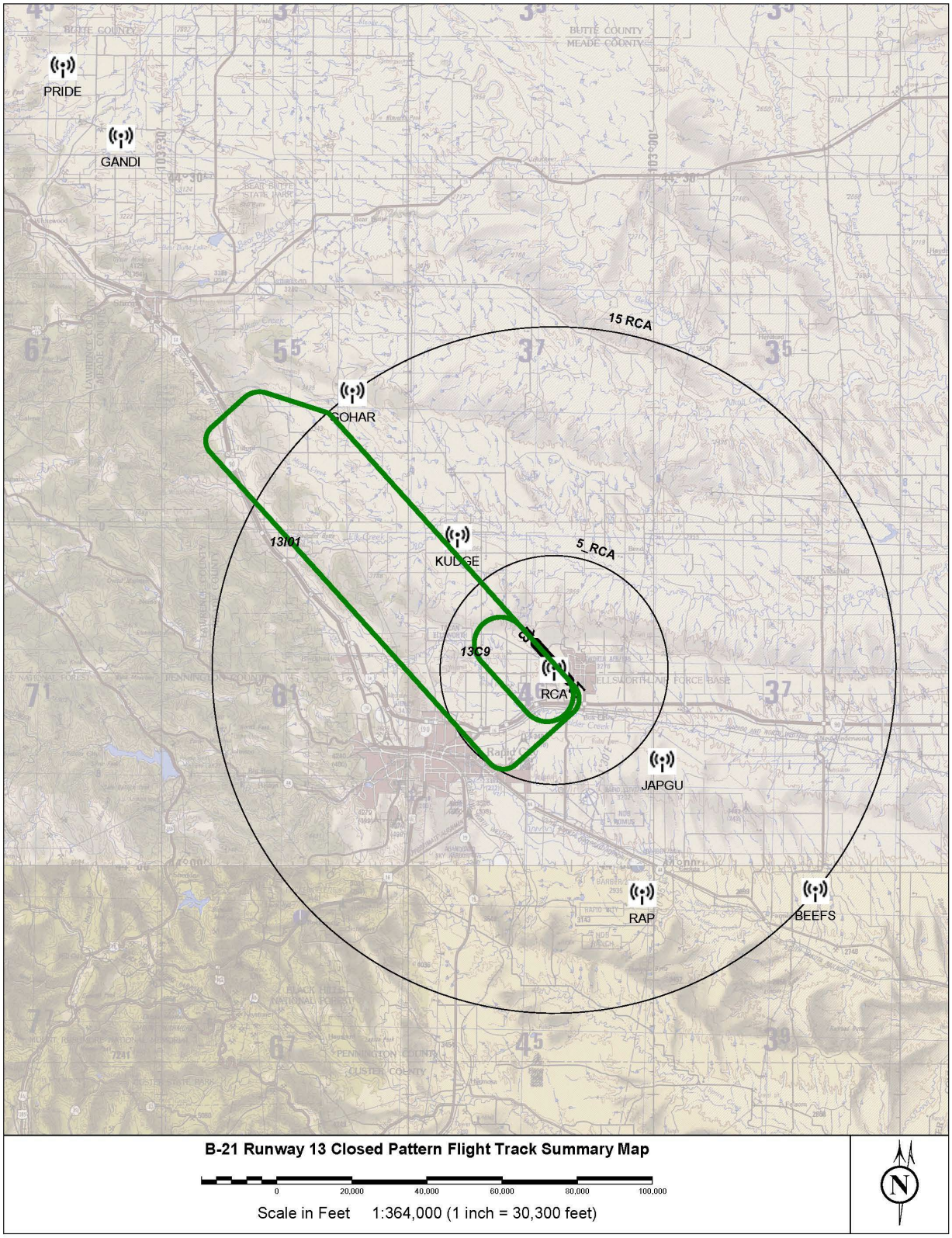


Figure 4-3 B-21 Runway 13 Closed Patterns

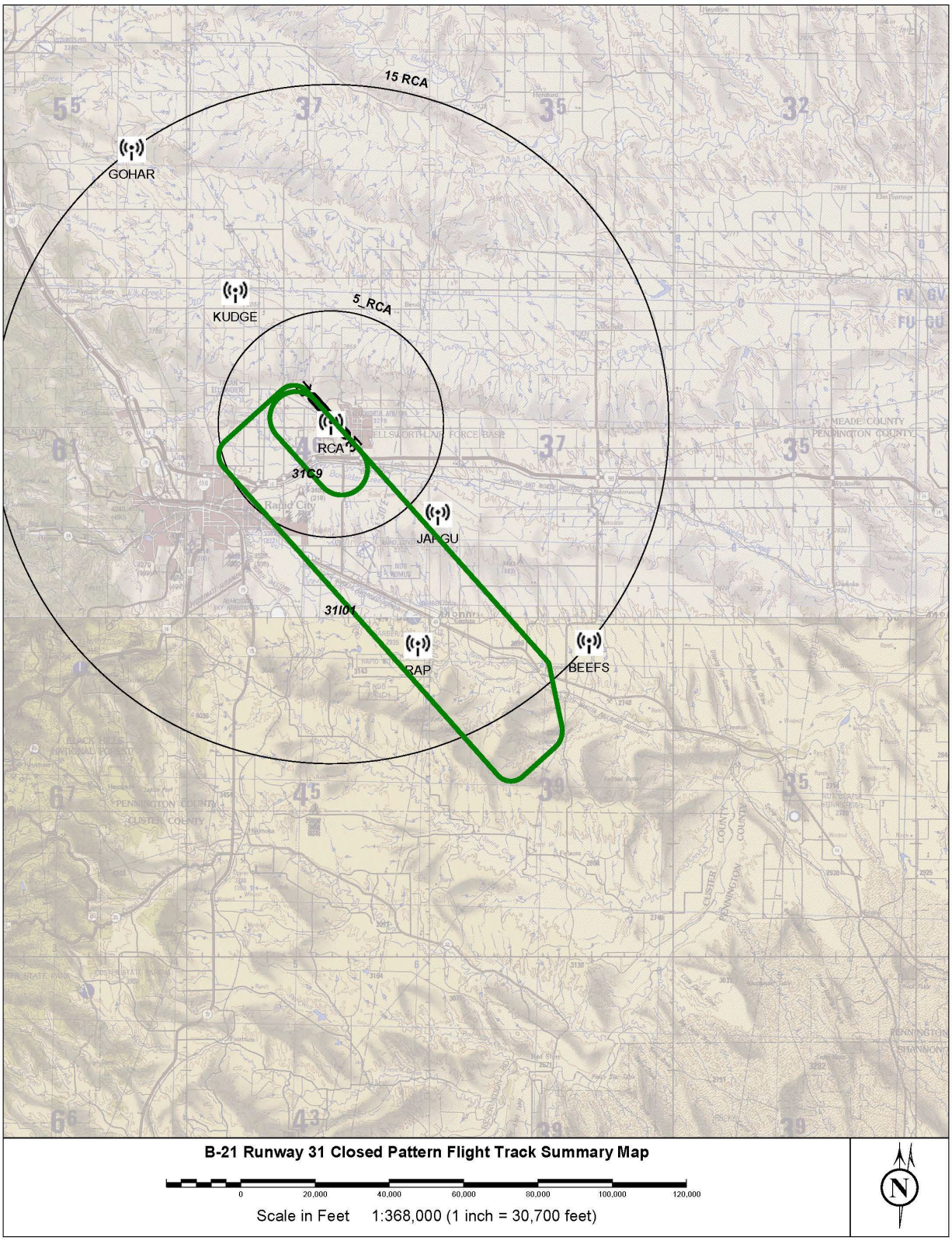


Figure 4-4 B-21 Runway 31 Closed Patterns

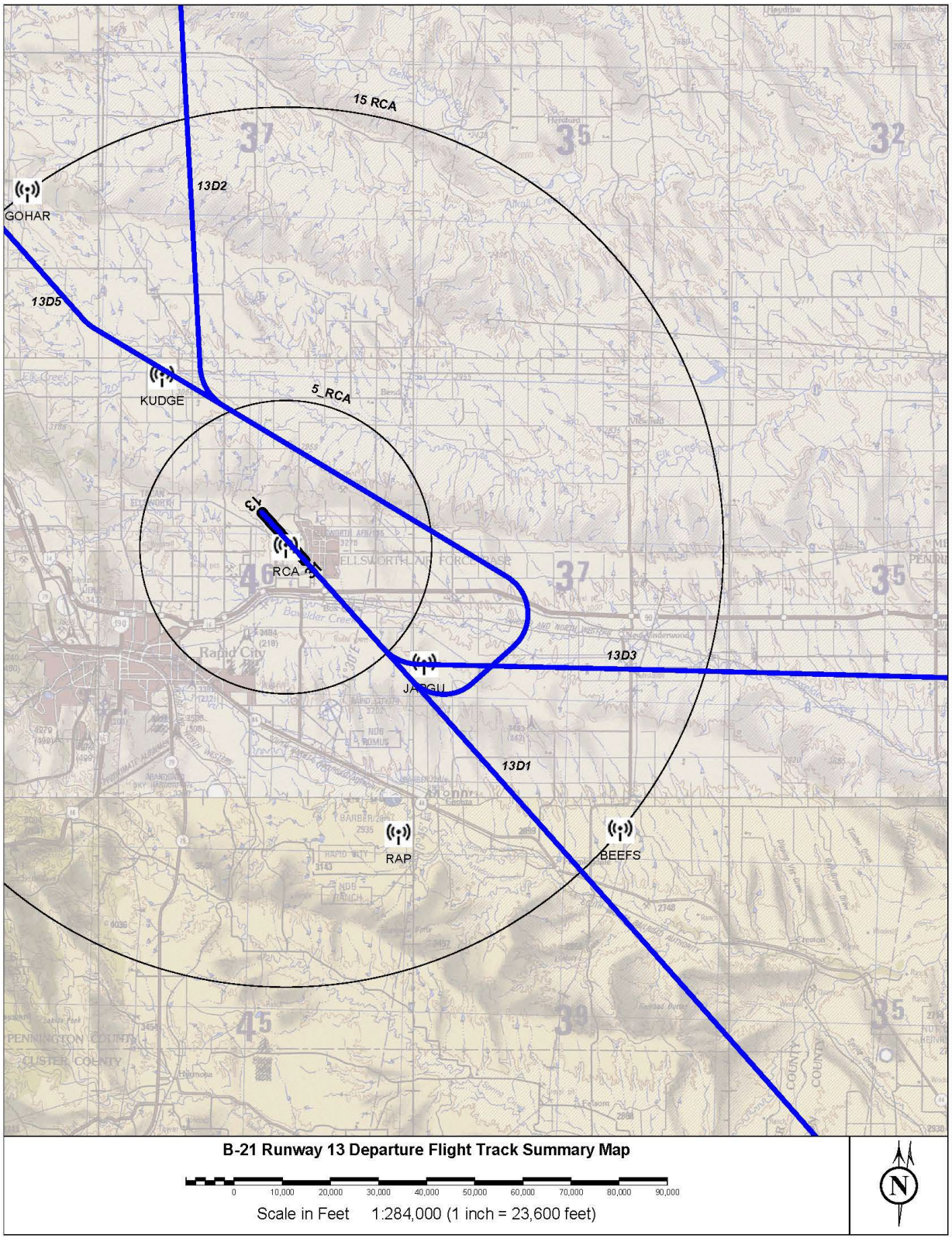


Figure 4-5 B-21 Runway 13 Departures

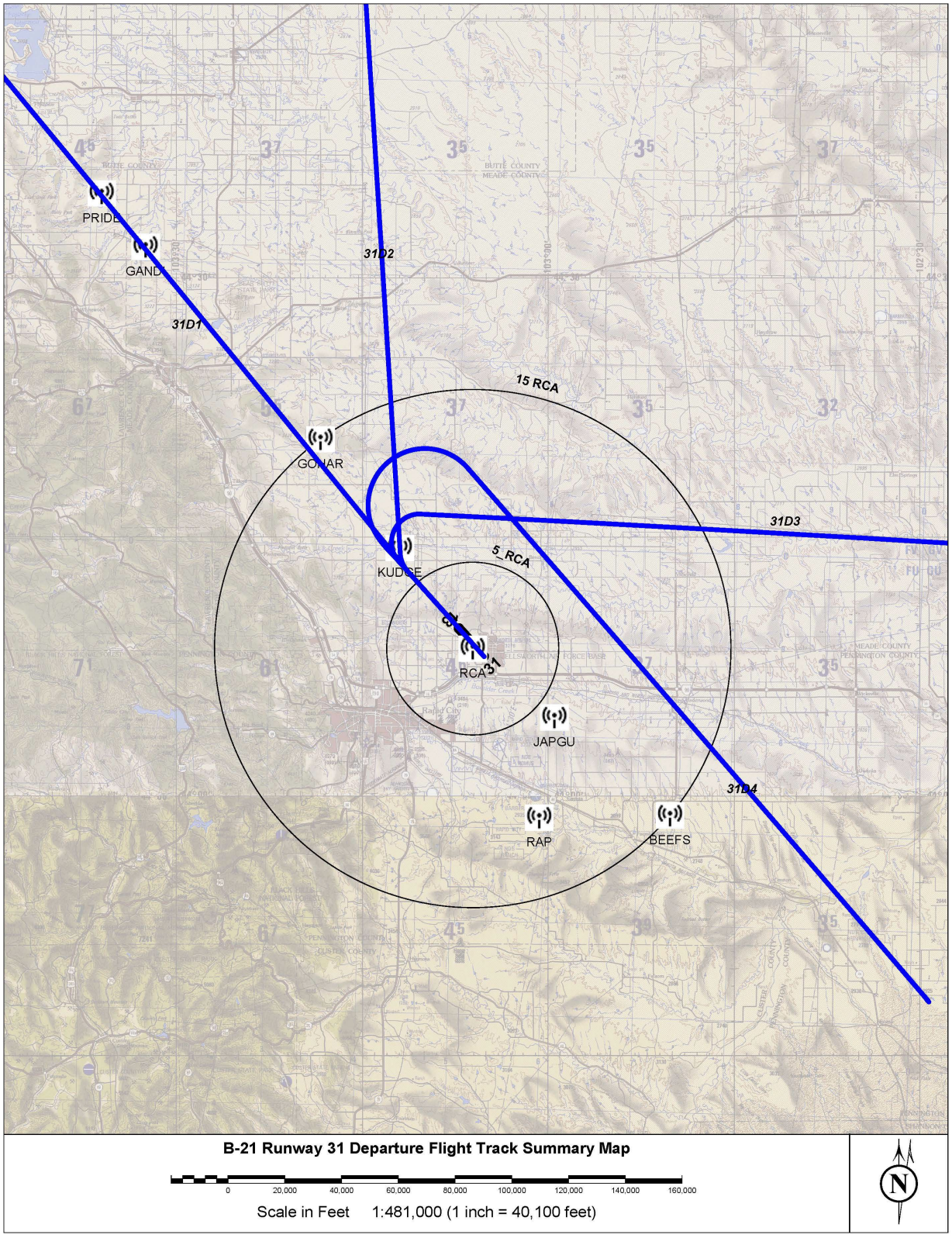


Figure 4-6 B-21 Runway 31 Departures

Table 4-1 B-21 Existing Operations

Operation	Profile	Track	Annual	Per Day	Per Night	Total	% Day	% Night	% Total
Arrival	B2A01	13A4	6	0.010126	0.006751	0.016877	60.00%	40.00%	1%
	B2A02	13A1	85	0.140079	0.093386	0.233465	60.00%	40.00%	7%
	B2A03	13A5	6	0.010126	0.006751	0.016877	60.00%	40.00%	1%
	B2A04	13A7	12	0.020252	0.013502	0.033754	60.00%	40.00%	1%
	B2A05	13A6	1	0.001688	0.001125	0.002813	60.00%	40.00%	1%
	B2A06	31A4	213	0.350447	0.233631	0.584078	60.00%	40.00%	17%
	B2A07	31A1	14	0.023628	0.015752	0.03938	60.00%	40.00%	1%
	B2A08	31A7	29	0.047256	0.031504	0.078759	60.00%	40.00%	2%
	B2A09	31A6	2	0.003938	0.002625	0.006563	60.00%	40.00%	1%
	B2A10	13A2	158	0.259433	0.172955	0.432388	60.00%	40.00%	13%
	B2A11	13A3	101	0.165867	0.110578	0.276445	60.00%	40.00%	8%
	B2A12	31A2	368	0.605343	0.403562	1.008905	60.00%	40.00%	30%
	B2A13	31A3	235	0.387023	0.258015	0.645038	60.00%	40.00%	19%
Total			**1232**	**2.025205**	**1.350137**	**3.375342**	**60.00%**	**40.00%**	
Departures	B2D01	13D2	18	0.05063	0	0.05063	100.00%	0.00%	2%
	B2D02	13D5	296	0.810082	0	0.810082	100.00%	0.00%	24%
	B2D03	13D3	18	0.05063	0	0.05063	100.00%	0.00%	2%
	B2D04	13D1	37	0.10126	0	0.10126	100.00%	0.00%	3%
	B2D05	31D2	43	0.118137	0	0.118137	100.00%	0.00%	3%
	B2D06	31D1	690	1.890192	0	1.890192	100.00%	0.00%	56%
	B2D07	31D3	43	0.118137	0	0.118137	100.00%	0.00%	3%
	B2D08	31D4	86	0.236274	0	0.236274	100.00%	0.00%	7%
Total			**1232**	**3.375342**	**0**	**3.375342**	**100.00%**	**0.00%**	
Closed Patterns	B2C01	13C9	324	0.532603	0.355069	0.887671	60.00%	40.00%	9%
	B2C02	31C9	756	1.24274	0.828493	2.071233	60.00%	40.00%	21%
	B2I01	13I01	756	1.24274	0.828493	2.071233	60.00%	40.00%	21%
	B2I02	31I01	1764	2.899726	1.933151	4.832877	60.00%	40.00%	49%
Total			**3600**	**5.917808**	**3.945206**	**9.863014**	**60.00%**	**40.00%**	

Table 4-2 depicts Static and Maintenance operations of based B-21 Operations. Ellsworth AFB conducts 440 annual B-21 maintenance operations at three parking areas (70, 80, and 90) and at three parking locations within each parking area (Figure 4-7). Prior to each sortie, pre-flight (PF) operations occur at three parking areas (70, 80, and 90) and at three parking locations within each parking area.

Table 4-2 Existing B-21 Maintenance and Pre-flight Operations

Aircraft	Engine	Noise Suppressor	Profile	Pad	Heading	Power	Units	Num Day	Num Night	Duration	Num Engines
B-2A	F118-GE-100	NONE	B213Hold	13Hold	220	73	% NC	1.000882	0.020427	300	4
B-2A	F118-GE-100	NONE	B231Hold	31Hold	220	73	% NC	2.335412	0.047666	300	4
B-2A	F118-GE-100	NONE	B2MX71	70-1	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-2A	F118-GE-100	NONE	B2PF71	70-1	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-2A	F118-GE-100	NONE	B2MX72	70-2	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-2A	F118-GE-100	NONE	B2PF72	70-2	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-2A	F118-GE-100	NONE	B2MX73	70-3	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-2A	F118-GE-100	NONE	B2PF73	70-3	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-2A	F118-GE-100	NONE	B2MX81	80-1	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-2A	F118-GE-100	NONE	B2PF81	80-1	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-2A	F118-GE-100	NONE	B2MX82	80-2	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-2A	F118-GE-100	NONE	B2PF82	80-2	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-2A	F118-GE-100	NONE	B2MX83	80-3	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-2A	F118-GE-100	NONE	B2PF83	80-3	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4

Aircraft	Engine	Noise Suppressor	Profile	Pad	Heading	Power	Units	Num Day	Num Night	Duration	Num Engines
B-2A	F118-GE-100	NONE	B2MX91	90-1	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-2A	F118-GE-100	NONE	B2PF91	90-1	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-2A	F118-GE-100	NONE	B2MX92	90-2	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-2A	F118-GE-100	NONE	B2PF92	90-2	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4
B-2A	F118-GE-100	NONE	B2MX93	90-3	310	73	% NC	0.10067	0.03349	3360	4
						85	% NC	0.10067	0.03349	840	4
B-2A	F118-GE-100	NONE	B2PF93	90-3	310	73	% NC	0.370698	0.007565	7200	4
						85	% NC	0.370698	0.007565	60	4

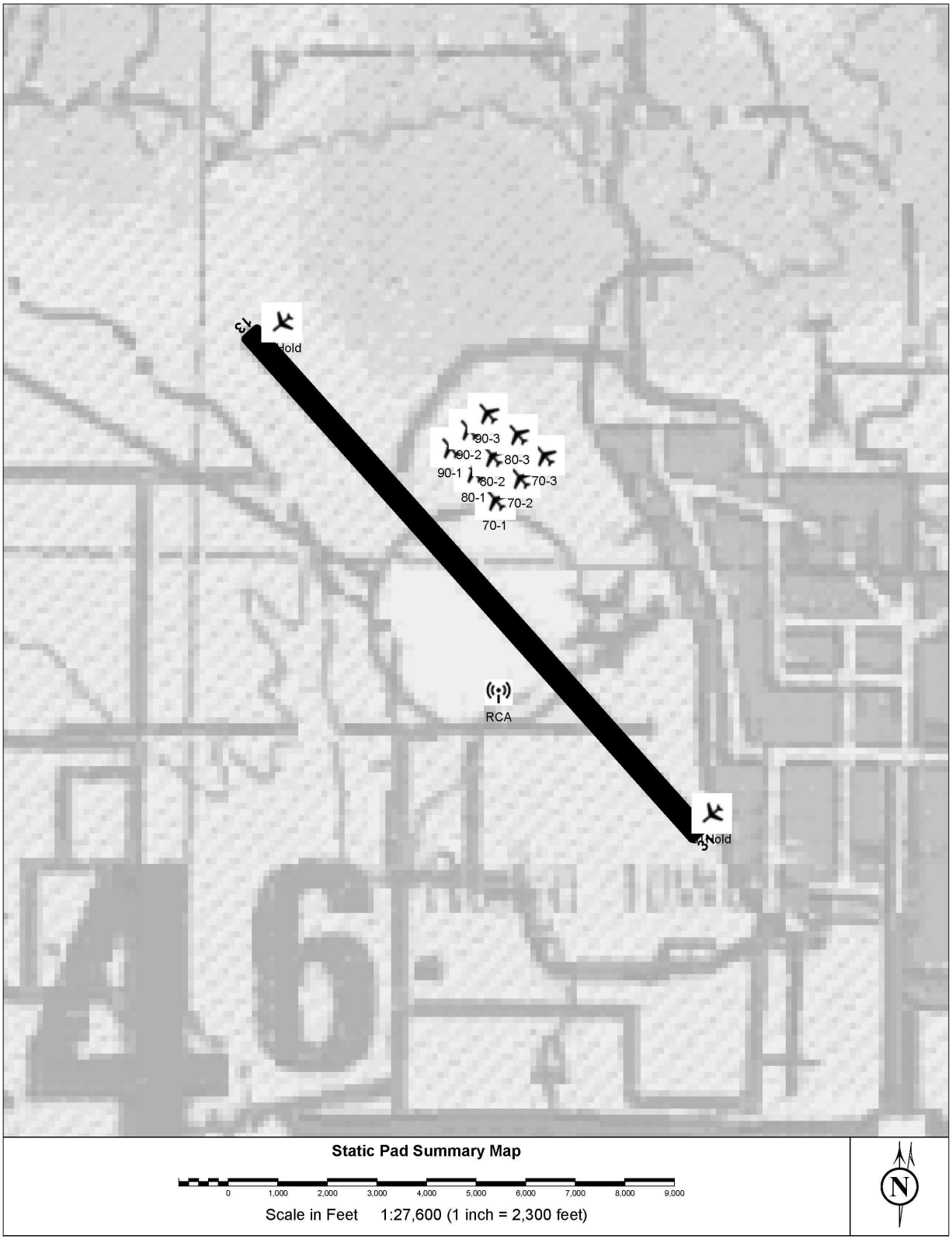


Figure 4-7 B-21 Maintenance and Pre-Flight Operation Location

4.2 PROPOSED ACTION

B-21 Departures, Arrivals, Closed Patterns, Maintenance, and Pre-Flight operations would remain as described under Existing Conditions.

5.0 TRANSIENT

5.1 EXISTING

- Annual Sorties
  - C-12: 34 Sorties
  - C-130: 56 Sorties
  - F-18: 22 Sorties
  - Tanker: 10 Sorties/49 Closed Patterns
  - Heavy: 6 Sorties/25 Closed Patterns
  - Helo: 11 Sorties
  - Trainer: 114 Sorties
- Arrivals
  - Runway 31 70%/Runway 13 30%
  - Day 97%/Night 3%
  - Straight In from 15 nautical miles (NM)
- Departures
  - Runway 31 70%/Runway 13 30%
  - Day 97%/Night 3%
  - Ellsworth Three Departure
  - F-18: Afterburner 100%
- Closed Patterns
  - Only Tanker and Heavy Aircraft
  - Runway 31 70%/Runway 13 30%
  - Day 97%/Night 3%
  - VFR 100%
  - West Pattern 100%

Transient aircraft flight tracks are presented in Figures 5-1, 5-2, and 5-3 with operations assigned to associated flight tracks are presented in Table 5-1.

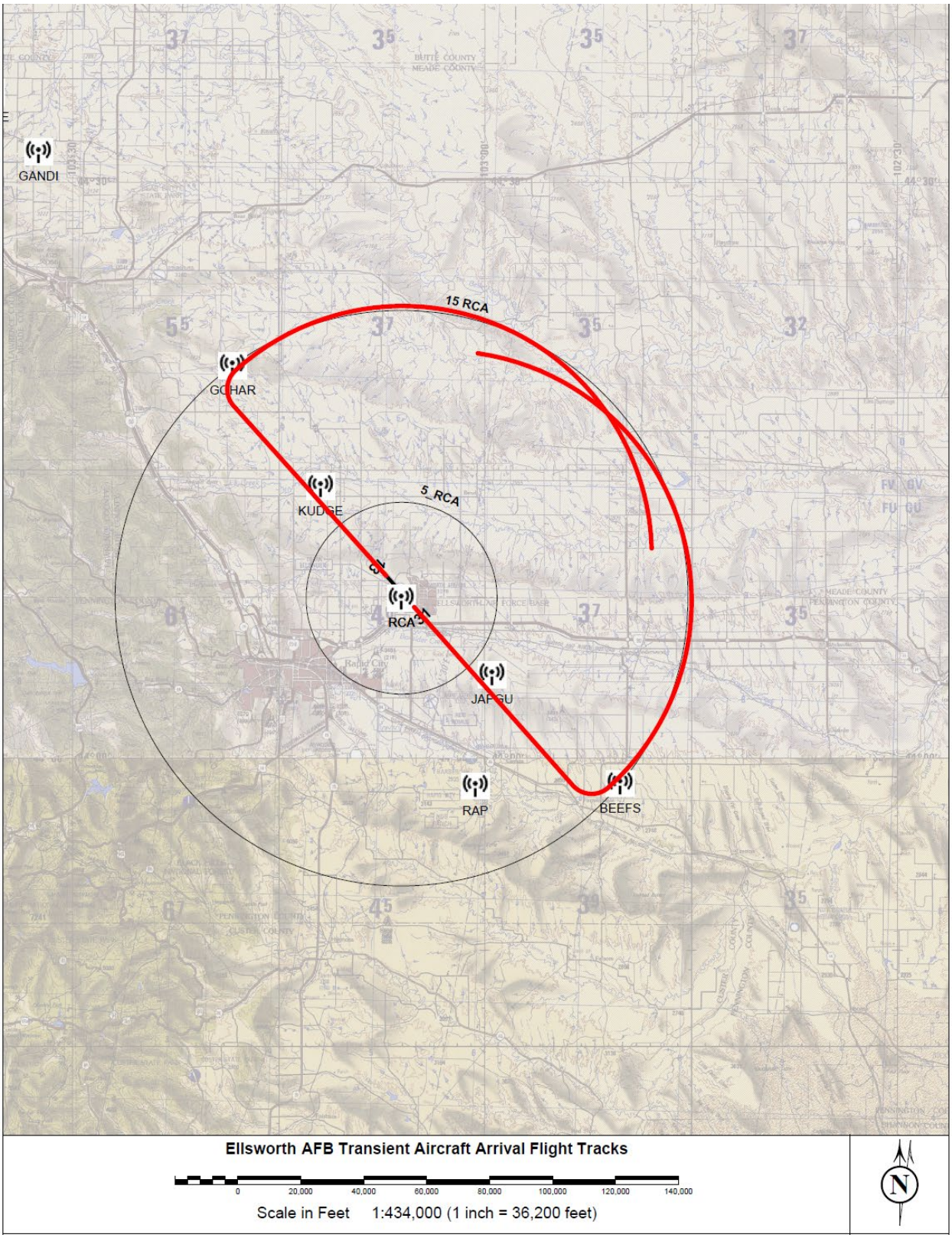


Figure 5-1 Transient Aircraft Arrival Flight Tracks at Ellsworth AFB

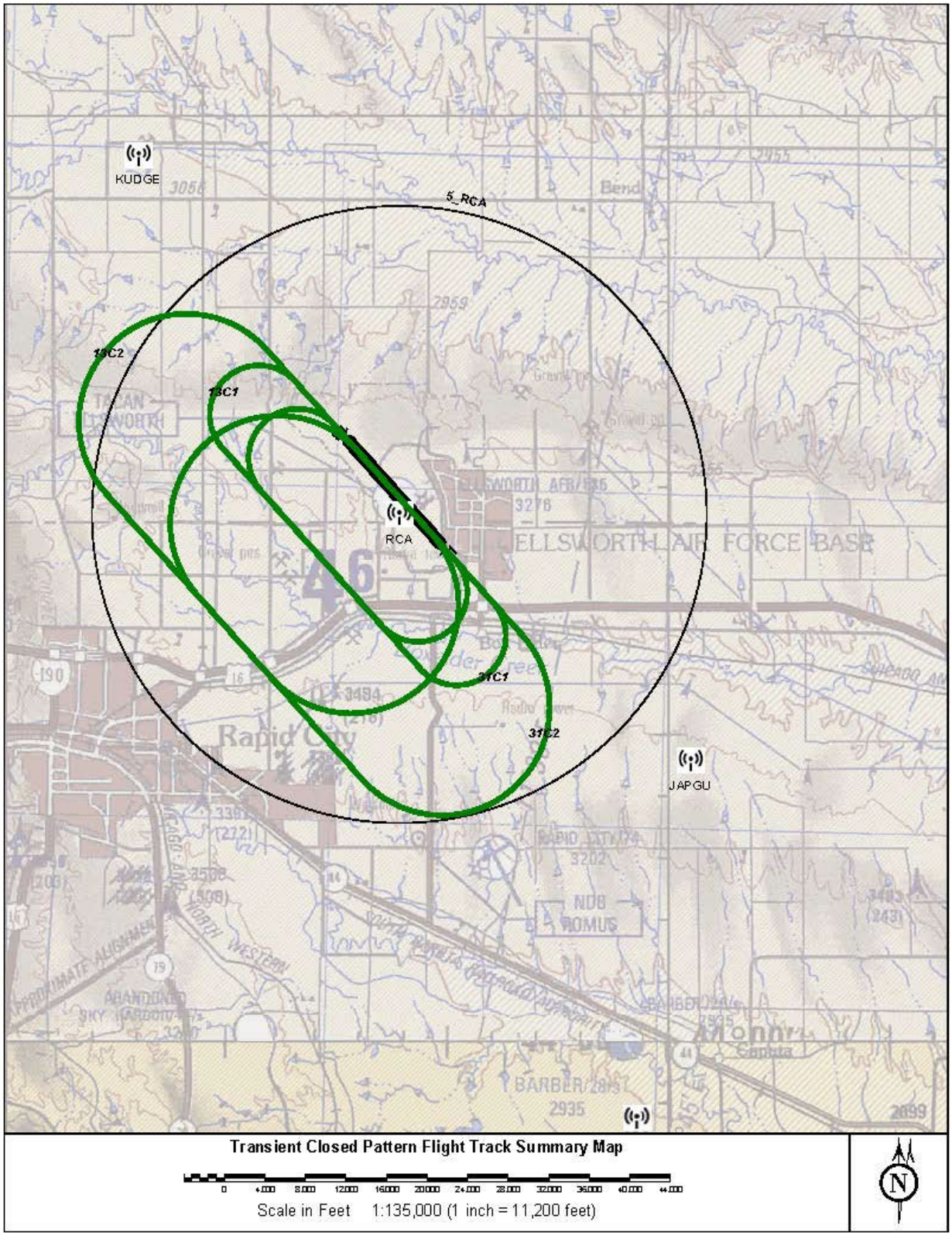


Figure 5-2 Transient Aircraft Closed Pattern Flight Tracks at Ellsworth AFB

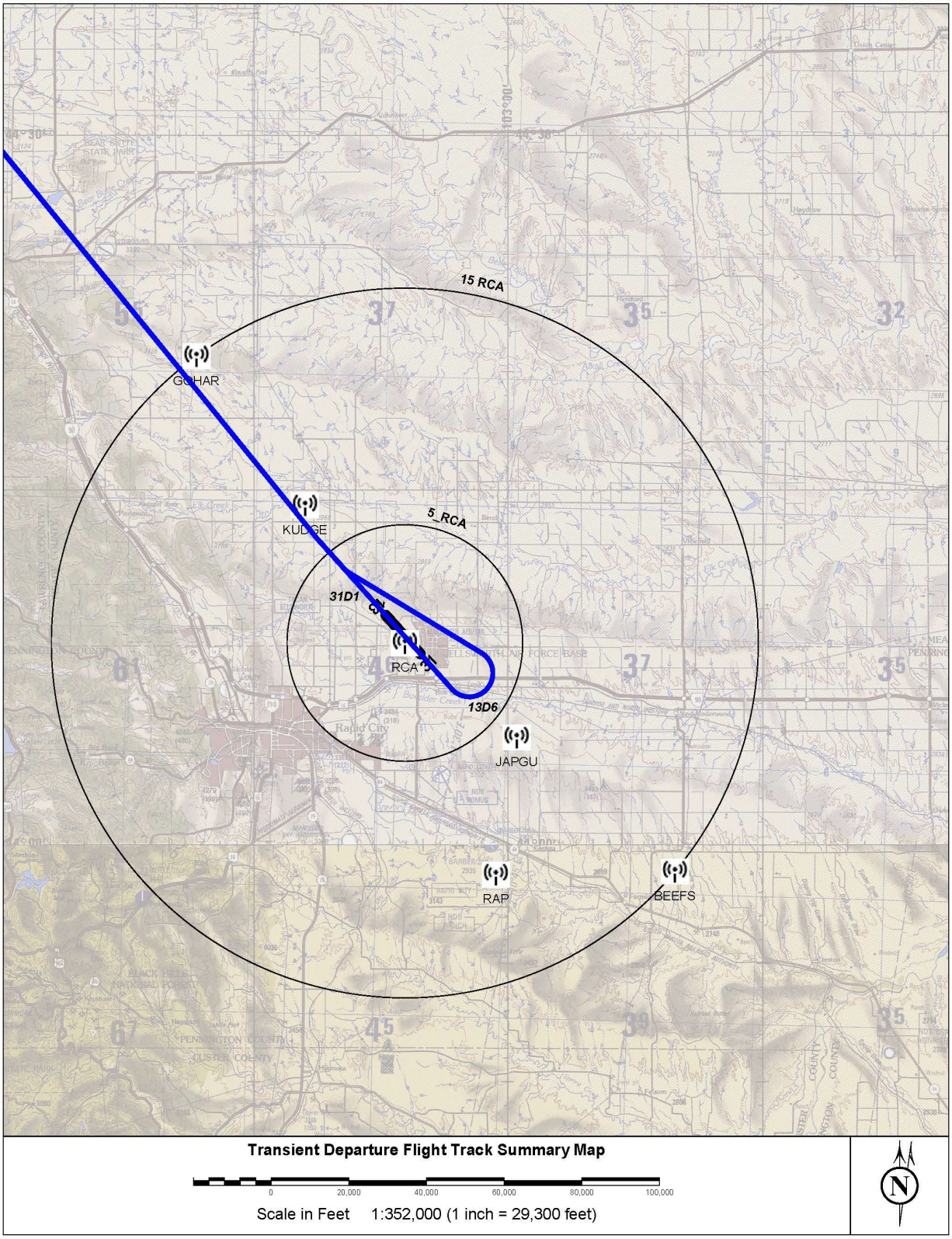


Figure 5-3 Transient Aircraft Departure Flight Tracks at Ellsworth AFB

Table 5-1 Baseline Transient Operations at Ellsworth AFB

Aircraft	Operation	Profile	Track	Annual	Per Day	Per Night	Total	% Day	% Night	% Total
C-12	Arrival	TC12A01	13A2	10	0.027107	0.000838	0.027945	97.00%	3.00%	30%
		TC12A02	31A2	24	0.063249	0.001956	0.065205	97.00%	3.00%	70%
Total				**34**	**0.090356**	**0.002795**	**0.093151**	**97.00%**	**3.00%**	
C-12	Departure	TC12D01	13D6	10	0.027107	0.000838	0.027945	97.00%	3.00%	30%
		TC12D02	31D1	24	0.063249	0.001956	0.065205	97.00%	3.00%	70%
Total				**34**	**0.090356**	**0.002795**	**0.093151**	**97.00%**	**3.00%**	
C-130	Arrival	TC130A01	13A2	17	0.044647	0.001381	0.046027	97.00%	3.00%	30%
		TC130A02	31A2	39	0.104175	0.003222	0.107397	97.00%	3.00%	70%
Total				**56**	**0.148822**	**0.004603**	**0.153425**	**97.00%**	**3.00%**	
C-130	Departure	TC130D01	13D6	17	0.044647	0.001381	0.046027	97.00%	3.00%	30%
		TC130D02	31D1	39	0.104175	0.003222	0.107397	97.00%	3.00%	70%
Total				**56**	**0.148822**	**0.004603**	**0.153425**	**97.00%**	**3.00%**	
F-18	Arrival	TF18_13A2	13A2	7	0.01754	0.000542	0.018082	97.00%	3.00%	30%
		TF18_31A2	31A2	15	0.040926	0.001266	0.042192	97.00%	3.00%	70%
Total				**22**	**0.058466**	**0.001808**	**0.060274**	**97.00%**	**3.00%**	
F-18	Departure	TF18ED01	13D6	7	0.01754	0.000542	0.018082	97.00%	3.00%	30%
		TF18ED02	31D1	15	0.040926	0.001266	0.042192	97.00%	3.00%	70%
Total				**22**	**0.058466**	**0.001808**	**0.060274**	**97.00%**	**3.00%**	
Tanker	Arrival	TK135A01	13A2	3	0.007973	0.000247	0.008219	97.00%	3.00%	30%
		TK135A02	31A2	7	0.018603	0.000575	0.019178	97.00%	3.00%	70%
Total				**10**	**0.026575**	**0.000822**	**0.027397**	**97.00%**	**3.00%**	
Tanker	Departure	TK135D01	13D6	3	0.007973	0.000247	0.008219	97.00%	3.00%	30%
		TK135D02	31D1	7	0.018603	0.000575	0.019178	97.00%	3.00%	70%
Total				**10**	**0.026575**	**0.000822**	**0.027397**	**97.00%**	**3.00%**	
Tanker	Closed Pattern	TK135C01	13C2	29	0.080548	0	0.080548	100.00%	0.00%	30%
		TK135C02	31C2	69	0.187945	0	0.187945	100.00%	0.00%	70%
Total				**98**	**0.268493**	**0**	**0.268493**	**100.00%**	**0.00%**	
Heavy	Arrival	TP8A01	13A2	2	0.004784	0.000148	0.004932	97.00%	3.00%	30%
		TP8A02	31A2	4	0.011162	0.000345	0.011507	97.00%	3.00%	70%
Total				**6**	**0.015945**	**0.000493**	**0.016438**	**97.00%**	**3.00%**	
Heavy	Departure	TP8D01	13D6	2	0.004784	0.000148	0.004932	97.00%	3.00%	30%
		TP8D02	31D1	4	0.011162	0.000345	0.011507	97.00%	3.00%	70%

Aircraft	Operation	Profile	Track	Annual	Per Day	Per Night	Total	% Day	% Night	% Total
Total				**6**	**0.015945**	**0.000493**	**0.016438**	**97.00%**	**3.00%**	
Heavy	Closed Pattern	TP8C01	13C1	15	0.041096	0	0.041096	100.00%	0.00%	30%
		TP8C02	31C1	35	0.09589	0	0.09589	100.00%	0.00%	70%
Total				**50**	**0.136986**	**0**	**0.136986**	**100.00%**	**0.00%**	
Helo	Arrival	TH60A01	13A2	3	0.00877	0.000271	0.009041	97.00%	3.00%	30%
		TH60A02	31A2	8	0.020463	0.000633	0.021096	97.00%	3.00%	70%
Total				**11**	**0.029233**	**0.000904**	**0.030137**	**97.00%**	**3.00%**	
Helo	Departure	TH60D01	13D6	3	0.00877	0.000271	0.009041	97.00%	3.00%	30%
		TH60D02	31D1	8	0.020463	0.000633	0.021096	97.00%	3.00%	70%
Total				**11**	**0.029233**	**0.000904**	**0.030137**	**97.00%**	**3.00%**	
Trainer	Arrival	TT38A01	13A2	34	0.090888	0.002811	0.093699	97.00%	3.00%	30%
		TT38A02	31A2	80	0.212071	0.006559	0.21863	97.00%	3.00%	70%
Total				**114**	**0.302959**	**0.00937**	**0.312329**	**97.00%**	**3.00%**	
Trainer	Departure	TT38D01	13D6	34	0.090888	0.002811	0.093699	97.00%	3.00%	30%
		TT38D02	31D1	80	0.212071	0.006559	0.21863	97.00%	3.00%	70%
Total				**114**	**0.302959**	**0.00937**	**0.312329**	**97.00%**	**3.00%**	

5.2 PROPOSED ACTION

- C-12, C-130, and Helo Sorties remain as described in Existing Conditions. Trainer aircraft have been revised to T-1 aircraft to depict real time utilization.
- Runway, Flight Track, Day/Night Utilization, and Aircraft Flight Profiles remain as described in Existing Conditions.
- Fighter aircraft arrivals: 50% Straight In: 50% Overhead/ 90% West and 10% East; 34% Break at Runway Threshold/33% at Midfield/33% Runway End
- Sorties
  - F-18: 355 Sorties
  - F-22: 334 Sorties
  - F-35: 334 Sorties
  - Tanker: 27 Sorties/134 Closed Patterns
  - Heavy: 34 Sorties/145 Closed Patterns
  - UAV: 100 Sorties

Proposed Transient Aircraft Operations at Ellsworth AFB are presented in Table 5-2.

Table 5-2 Proposed Transient Aircraft Operations at Ellsworth AFB

Aircraft	Operation	Profile	Track	Annual	Per Day	Per Night	Total	% Day	% Night	% Total
F-18	Arrival	TF18_13A2	13A2	53	0.141514	0.004377	0.145891	97.00%	3.00%	15.00%
		TF18_13A8_OH_NUM_W	13_A8A_FIGHTERS_OH_NUMBERS_W	15	0.040756	0.00126	0.042016	97.00%	3.00%	4.32%
		TF18_13A9_OH_NUM_E	13_A8B_FIGHTERS_OH_NUMBERS_E	2	0.004528	0.00014	0.004668	97.00%	3.00%	0.48%
		TF18_13A10_OH_MID_W	13_A9A_FIGHTERS_OH_MIDFIELD_W	17	0.04585	0.001418	0.047268	97.00%	3.00%	4.86%
		TF18_13A11_OH_MID_E	13_A9B_FIGHTERS_OH_MIDFIELD_E	2	0.005094	0.000158	0.005252	96.99%	3.01%	0.54%
		TF18_13A12_OH_RNWYEND_W	13_A10A_FIGHTERS_OH_RNWYEND_W	15	0.040756	0.00126	0.042016	97.00%	3.00%	4.32%
		TF18_13A13_OH_RNWAYEND_E	13_A10B_FIGHTERS_OH_RNWYEND_E	2	0.004528	0.00014	0.004668	97.00%	3.00%	0.48%
		TF18_31A2	31A2	124	0.330199	0.010212	0.340411	97.00%	3.00%	35.00%
		TF18_31A8_OH_NUM_W	31_A8A_FIGHTER_OH_NUMBERS_W	36	0.095097	0.002941	0.098038	97.00%	3.00%	10.08%
		TF18_31A9_OH_NUM_E	31_A8B_FIGHTER_OH_NUMBERS_E	4	0.010566	0.000327	0.010893	97.00%	3.00%	1.12%
		TF18_31A10_OH_MID_W	31_A9A_FIGHTER_OH_MIDFIELD_W	40	0.106984	0.003309	0.110293	97.00%	3.00%	11.34%
		TF18_31A11_OH_MID_E	31_A9B_FIGHTER_OH_MIDFIELD_E	4	0.011887	0.000368	0.012255	97.00%	3.00%	1.26%
		TF18_31A12_OH_RNWYEND_W	31_A10A_FIGHTER_OH_RNWAYEND_W	36	0.095097	0.002941	0.098038	97.00%	3.00%	10.08%
		TF18_31A13_OH_RNWAYEND_E	31_A10B_FIGHTER_OH_RNWAYEND_E	4	0.010566	0.000327	0.010893	97.00%	3.00%	1.12%
Total				**355**	**0.943425**	**0.029178**	**0.972603**	**97.00%**	**3.00%**	
F-18	Departure	TF18ED01	13D6	107	0.283027	0.008753	0.291781	97.00%	3.00%	30%
		TF18ED02	31D1	249	0.660397	0.020425	0.680822	97.00%	3.00%	70%
Total				**355**	**0.943425**	**0.029178**	**0.972603**	**97.00%**	**3.00%**	
F-22	Arrival	F22_13A2	13A2	50	0.133142	0.004118	0.13726	97.00%	3.00%	15.00%
		F22_13A8_OH_NUM_W	13_A8A_FIGHTERS_OH_NUMBERS_W	14	0.038345	0.001186	0.039531	97.00%	3.00%	4.32%
		F22_13A9_OH_NUM_E	13_A8B_FIGHTERS_OH_NUMBERS_E	2	0.004261	0.000132	0.004393	97.00%	3.00%	0.48%

Aircraft	Operation	Profile	Track	Annual	Per Day	Per Night	Total	% Day	% Night	% Total
		F22_13A10_OH_MID_W	13_A9A_FIGHTERS_OH_MIDFIELD_W	16	0.043138	0.001334	0.044472	97.00%	3.00%	4.86%
		F22_13A11_OH_MID_E	13_A9B_FIGHTERS_OH_MIDFIELD_E	2	0.004793	0.000148	0.004941	97.00%	3.00%	0.54%
		F22_13A12_OH_RNWYEND_W	13_A10A_FIGHTERS_OH_RNWYEND_W	14	0.038345	0.001186	0.039531	97.00%	3.00%	4.32%
		F22_13A13_OH_RNWYEND_E	13_A10B_FIGHTERS_OH_RNWYEND_E	2	0.004261	0.000132	0.004393	97.00%	3.00%	0.48%
		F22_31A2	31A2	117	0.310666	0.009608	0.320274	97.00%	3.00%	35.00%
		F22_31A8_OH_NUM_W	31_A8A_FIGHTER_OH_NUMBERS_W	34	0.089472	0.002767	0.092239	97.00%	3.00%	10.08%
		F22_31A9_OH_NUM_E	31_A8B_FIGHTER_OH_NUMBERS_E	4	0.009941	0.000307	0.010248	97.00%	3.00%	1.12%
		F22_31A10_OH_MID_W	31_A9A_FIGHTER_OH_MIDFIELD_W	38	0.100656	0.003113	0.103769	97.00%	3.00%	11.34%
		F22_31A11_OH_MID_E	31_A9B_FIGHTER_OH_MIDFIELD_E	4	0.011184	0.000346	0.01153	97.00%	3.00%	1.26%
		F22_31A12_OH_RNWYEND_W	31_A10A_FIGHTER_OH_RNWAYEND_W	34	0.089472	0.002767	0.092239	97.00%	3.00%	10.08%
		F22_31A13_OH_RNWYEND_E	31_A10B_FIGHTER_OH_RNWAYEND_E	4	0.009941	0.000307	0.010248	97.00%	3.00%	1.12%
Total				**334**	**0.887616**	**0.027452**	**0.915068**	**97.00%**	**3.00%**	
F-22	Departure	F22_13D6_AB	13D6	234	0.621331	0.019216	0.640548	97.00%	3.00%	70%
		F22_31D1_AB	31D1	100	0.266285	0.008236	0.27452	97.00%	3.00%	30%
Total				**334**	**0.887616**	**0.027452**	**0.915068**	**97.00%**	**3.00%**	
F-35	Arrival	F35_13A2	13A2	50	0.133142	0.004118	0.13726	97.00%	3.00%	15.00%
		F35_13A8_OH_NUM_W	13_A8A_FIGHTERS_OH_NUMBERS_W	14	0.038345	0.001186	0.039531	97.00%	3.00%	4.32%
		F35_13A9_OH_NUM_E	13_A8B_FIGHTERS_OH_NUMBERS_E	2	0.004261	0.000132	0.004393	97.00%	3.00%	0.48%
		F35_13A10_OH_MID_W	13_A9A_FIGHTERS_OH_MIDFIELD_W	16	0.043138	0.001334	0.044472	97.00%	3.00%	4.86%
		F35_13A11_OH_MID_E	13_A9B_FIGHTERS_OH_MIDFIELD_E	2	0.004793	0.000148	0.004941	97.00%	3.00%	0.54%
		F35_13A12_OH_RNWYEND_W	13_A10A_FIGHTERS_OH_RNWYEND_W	14	0.038345	0.001186	0.039531	97.00%	3.00%	4.32%

Aircraft	Operation	Profile	Track	Annual	Per Day	Per Night	Total	% Day	% Night	% Total
		F35_13A13_OH_RNWYEND_E	13_A10B_FIGHTERS_OH_RNWYEND_E	2	0.004261	0.000132	0.004393	97.00%	3.00%	0.48%
		F35_31A2	31A2	117	0.310666	0.009608	0.320274	97.00%	3.00%	35.00%
		F35_31A8_OH_NUM_W	31_A8A_FIGHTER_OH_NUMBERS_W	34	0.089472	0.002767	0.092239	97.00%	3.00%	10.08%
		F35_31A9_OH_NUM_E	31_A8B_FIGHTER_OH_NUMBERS_E	4	0.009941	0.000307	0.010248	97.00%	3.00%	1.12%
		F35_31A10_OH_MID_W	31_A9A_FIGHTER_OH_MIDFIELD_W	38	0.100656	0.003113	0.103769	97.00%	3.00%	11.34%
		F35_31A11_OH_MID_E	31_A9B_FIGHTER_OH_MIDFIELD_E	4	0.011184	0.000346	0.01153	97.00%	3.00%	1.26%
		F35_31A12_OH_RNWYEND_W	31_A10A_FIGHTER_OH_RNWAYEND_W	34	0.089472	0.002767	0.092239	97.00%	3.00%	10.08%
		F35_31A13_OH_RNWYEND_E	31_A10B_FIGHTER_OH_RNWAYEND_E	4	0.009941	0.000307	0.010248	97.00%	3.00%	1.12%
Total				**334**	**0.887616**	**0.027452**	**0.915068**	**97.00%**	**3.00%**	
F-35	Departure	F35-D1_AB	31D1	234	0.621331	0.019216	0.640548	97.00%	3.00%	70%
		F35-D2_AB	13D1	100	0.266285	0.008236	0.27452	97.00%	3.00%	30%
Total				**334**	**0.887616**	**0.027452**	**0.915068**	**97.00%**	**3.00%**	
Tanker	Arrival	TK135A01	13A2	8	0.021526	0.000666	0.022192	97.00%	3.00%	30%
		TK135A02	31A2	19	0.050227	0.001553	0.051781	97.00%	3.00%	70%
Total				**27**	**0.071753**	**0.002219**	**0.073973**	**97.00%**	**3.00%**	
Tanker	Departure	TK135D01	13D6	8	0.021526	0.000666	0.022192	97.00%	3.00%	30%
		TK135D02	31D1	19	0.050227	0.001553	0.051781	97.00%	3.00%	70%
Total				**27**	**0.071753**	**0.002219**	**0.073973**	**97.00%**	**3.00%**	
Tanker	Closed Pattern	TK135C01	13C2	40	0.110137	0	0.110137	100.00%	0.00%	30%
		TK135C02	31C2	94	0.256986	0	0.256986	100.00%	0.00%	70%
Total				**134**	**0.367123**	**0**	**0.367123**	**100.00%**	**0.00%**	
UAV	Arrival	MQ9A01	31A2	30	0.079726	0.002466	0.082192	97.00%	3.00%	30%
		MQ9A02	13A2	70	0.186027	0.005753	0.191781	97.00%	3.00%	70%
Total				**100**	**0.265753**	**0.008219**	**0.273973**	**97.00%**	**3.00%**	
UAV	Departure	MQ9D01	13D6	30	0.079726	0.002466	0.082192	97.00%	3.00%	30%
		MQ9D02	31D1	70	0.186027	0.005753	0.191781	97.00%	3.00%	70%
Total				**100**	**0.265753**	**0.008219**	**0.273973**	**97.00%**	**3.00%**	
Heavy	Arrival	TP8A01	13A2	11	0.028701	0.000888	0.029589	97.00%	3.00%	30%

Aircraft	Operation	Profile	Track	Annual	Per Day	Per Night	Total	% Day	% Night	% Total
		TP8A02	31A2	25	0.06697	0.002071	0.069041	97.00%	3.00%	70%
Total				**36**	**0.095671**	**0.002959**	**0.09863**	**97.00%**	**3.00%**	
Heavy	Departure	TP8D01	13D6	11	0.028701	0.000888	0.029589	97.00%	3.00%	30%
		TP8D02	31D1	25	0.06697	0.002071	0.069041	97.00%	3.00%	70%
Total				**36**	**0.095671**	**0.002959**	**0.09863**	**97.00%**	**3.00%**	
Heavy	Closed Pattern	TP8C01	13C1	44	0.119178	0	0.119178	100.00%	0.00%	30%
		TP8C02	31C1	102	0.278082	0	0.278082	100.00%	0.00%	70%
Total				**145**	**0.39726**	**0**	**0.39726**	**100.00%**	**0.00%**	

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Appendix E
Air Conformity Applicability Model Reports

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Air Quality Analysis Resources and Methodologies

The following information is provided for additional detail on air pollutants evaluated in the Proposed Action and No Action Alternative air quality impacts analysis and on the methodologies used in the impact analysis.

Criteria Pollutants

National Ambient Air Quality Standards (NAAQS) are currently established for the criteria air pollutants ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter (including particulates equal to or less than 10 microns in diameter [PM_{10}] and particulates equal to or less than 2.5 microns in diameter [$PM_{2.5}$]), and lead (Pb). The primary NAAQS represent maximum levels of background air pollution that are considered safe, with an adequate margin of safety to protect public health. Secondary NAAQS represent the maximum pollutant concentration necessary to protect vegetation, crops, and other public resources in addition to maintaining visibility standards.

The criteria pollutant O_3 is not usually emitted directly into the air but is formed in the atmosphere by photochemical reactions involving sunlight and previously emitted pollutants, or "O_3 precursors." These O_3 precursors consist primarily of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) that are directly emitted from a wide range of emission sources. For this reason, regulatory agencies limit atmospheric O_3 concentrations by controlling VOC pollutants (also identified as reactive organic gases) and NO_x.

The United States (U.S.) Environmental Protection Agency (EPA) has recognized that particulate matter emissions can have different health effects depending on particle size and, therefore, developed separate NAAQS for coarse particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$). The pollutant $PM_{2.5}$ can be emitted from emission sources directly as very fine dust and/or liquid mist or formed secondarily in the atmosphere as condensable particulate matter, typically forming nitrate and sulfate compounds. Secondary (indirect) emissions vary by region depending upon the predominant emission sources located there and thus which precursors are considered significant for $PM_{2.5}$ formation and identified for ultimate control.

The Clean Air Act and EPA delegated responsibility for ensuring compliance with NAAQS to the states and local agencies. As such, each state must develop air pollutant control programs and promulgate regulations and rules that focus on meeting NAAQS and maintaining healthy ambient air quality levels. When a region or area fails to meet a NAAQS for a pollutant, that region is classified as "non-attainment" for that pollutant. In such cases, the affected state must develop a State Implementation Plan (SIP) that is subject to EPA review and approval. A SIP is a compilation of regulations, strategies, schedules, and enforcement actions designed to move the state into compliance with all NAAQS. Any changes to the compliance schedule or plan (e.g., new regulations, emissions budgets, controls) must be incorporated into the SIP and approved by EPA.

Analytical Methodology

Departures, landings, closed patterns, and low flight patterns for aircraft were evaluated in ACAM. Time in modes (TIMs) for landings and takeoffs (LTOs), closed patterns and low flight patterns

were obtained from the *Final Data Validation Package for Ellsworth Air Force Base in Support of the Powder River Training Complex Supplemental Environmental Impact Statement* and *Final Data Validation Package for the Powder River Training Complex Supplemental Environmental Impact Statement*.

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *Environmental Impact Analysis Process* (EIAP, 32 CFR 989); the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis.

Report generated with ACAM version: 5.0.24a

a. Action Location:

Base: ELLSWORTH AFB
State: Montana
County(s): Rosebud
Regulatory Area(s): NOT IN A REGULATORY AREA; Lame Deer, MT

b. Action Title: Optimization of Powder River Training Complex

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2029

e. Action Description:

Expand training airspaces to utilize higher altitudes for training; expand day-to-day and LFE training events

f. Point of Contact:

Name: Raul Castillo
Title: Air Quality Analyst
Organization: Stantec
Email:
Phone Number:

2. Analysis: Total reasonably foreseeable net change in direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" (highest annual emissions) and "steady state" (no net gain/loss in emission stabilized and the action is fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

All emissions estimates were derived from various sources using the methods, algorithms, and emission factors from the most current *Air Emissions Guide for Air Force Stationary Sources*, *Air Emissions Guide for Air Force Mobile Sources*, and/or *Air Emissions Guide for Air Force Transitory Sources*. For greater details of this analysis, refer to the Detail ACAM Report.

____ applicable
__X__ not applicable

Conformity Analysis Summary:

2029

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.152		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

NOx	21.336		
CO	0.855		
SOx	1.067		
PM 10	1.058		
PM 2.5	0.935		
Pb	0.000		
NH3	0.000		
Lame Deer, MT			
VOC	0.152		
NOx	21.336		
CO	0.855		
SOx	1.067		
PM 10	1.058	100	No
PM 2.5	0.935		
Pb	0.000		
NH3	0.000		

2030 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.152		
NOx	21.336		
CO	0.855		
SOx	1.067		
PM 10	1.058		
PM 2.5	0.935		
Pb	0.000		
NH3	0.000		
Lame Deer, MT			
VOC	0.152		
NOx	21.336		
CO	0.855		
SOx	1.067		
PM 10	1.058	100	No
PM 2.5	0.935		
Pb	0.000		
NH3	0.000		

The Criteria Pollutants (or their precursors) with a General Conformity threshold listed in the table above are pollutants within one or more designated nonattainment or maintenance area/s for the associated National Ambient Air Quality Standard (NAAQS). These pollutants are driving this GCR Applicability Analysis. Pollutants exceeding the GCR thresholds must be further evaluated potentially through a GCR Determination.

The pollutants without a General Conformity threshold are pollutants only within areas designated attainment for the associated NAAQS. These pollutants have an insignificance indicator for VOC, NOx, CO, SOx, PM 10, PM 2.5, and NH3 of 250 ton/yr (Prevention of Significant Deterioration major source threshold) and 25 ton/yr for Pb (GCR de minimis value). Pollutants below their insignificance indicators are at rates so insignificant that they will not cause or contribute to an exceedance of one or more NAAQSs. These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Refer to the *Level II, Air Quality Quantitative Assessment Insignificance Indicators* for further details.

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

None of the annual net change in estimated emissions associated with this action are above the GCR threshold values established at 40 CFR 93.153 (b); therefore, the proposed Action has an insignificant impact on Air Quality and a General Conformity Determination is not applicable.

Raul Castillo, Air Quality Analyst	Apr 23 2026
Name, Title	**Date**

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APPENDIX F
ENDANGERED SPECIES ACT CONSULTATION CORRESPONDENCE

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 28TH BOMB WING (AFGSC)
ELLSWORTH AIR FORCE BASE SOUTH DAKOTA

June 14, 2026

Colonel Jonathan A. Keller, USAF
Commander
1958 Scott Dr
Ellsworth AFB SD 57706-4710

Ms. Marjorie Nelson
Assistant Regional Director
U.S. Fish and Wildlife Service
Mountain-Prairie Region
134 Union Blvd
Lakewood CO 80228

SUBJECT**:** Request for Consultation for Powder River Training Complex Optimization Environmental Impact Statement (Project Code: 2026-0046134)

Dear Ms. Nelson:

The Department of the Air Force (DAF) is requesting initiation of informal consultation under section 7(a)(2) of the Endangered Species Act and your concurrence with our effects determinations for listed species for proposed changes to the Powder River Training Complex (PRTC). The DAF is preparing a Draft Environmental Impact Statement (EIS) to evaluate potential environmental impacts associated with addressing shortfalls in aircrew readiness in the PRTC. The PRTC is a group of Military Operations Areas (MOAs) and Air Traffic Control Assigned Airspaces (ATCAAs), which overlie parts of South Dakota, North Dakota, Wyoming, and Montana. It serves as the training airspace used by aircrews at Ellsworth Air Force Base (AFB) and Minot AFB for day-to-day training and it is also used for Large Force Exercises (LFEs) a few times a year that bring together joint forces to participate in realistic combat training scenarios. The proposed action includes improvements to the airspace structure to address shortfalls in day-to-day training and increasing LFE capability to meet emerging threats to National Security.

Pursuant to Section 7 of the Endangered Species Act (ESA) of 1973 (16 USC 1531-1544), the DAF has determined that the proposal *may affect but is not likely to adversely affect* federally listed species. The assessment supporting the DAF's findings with regards to threatened and endangered species is provided in **Attachment 1**. We request your written concurrence if you agree with our determinations.

Proposed Action

Day-to-day training operations at PRTC are currently limited to or below Flight Level (FL) 260 (approximately 26,000 feet). This precludes training at higher altitudes, which is a necessity to accomplish certain flying missions. To improve day-to-day training, the DAF is proposing to raise the available altitude of some of the training airspace to FL600 (approximately 60,000 feet). There would be no horizontal or vertical changes to any of the MOAs; the change for day-to-day training is

limited to raising the ceiling of the ATCAAs. The existing total operations and types of day-to-day training within PRTC would not change, but those operations would be more vertically dispersed in higher altitudes.

PRTC hosts LFEs, which include bomber aircraft assigned to Ellsworth and Minot AFBs, as well as fighter, surveillance, command/control, and refueling aircraft from units across the country. LFEs are designed to prepare servicemen and women for real-world scenarios. Longer duration exercises enable units to achieve complex realistic training. Longer durations also allow non-local units to meet multiple training requirements, justifying the cost of moving non-local units and their support equipment to participate in the exercises. Ellsworth AFB is currently authorized to host up to four LFEs annually (limited to 10 days per year with no more than 3 days per quarter) and the altitude for these events is also limited to or below FL260 (approximately 26,000 feet). These limitations (in duration and altitude) reduce the complexity for the LFE scenarios and deters non-local units from participating due to high mobilization effort and cost. The DAF is proposing to raise the altitude of the PRTC up to FL600 (approximately 60,000 feet) for LFEs and to increase the total LFE days to 30 days per year without a quarterly restriction. This modification would accommodate a 2-week LFE which would maximize complexity of the event and participation.

In summary:

- Proposed actions to improve day-to-day operations:
  - Raise the ceiling of most used ATCAAs
- Proposed actions to improve training capability of LFEs:
  - Raise the ceiling of all ATCAAs during the event
  - Increase the total days allowed annually
  - Increase duration allowed for individual LFEs

Threatened and Endangered Species

A list of species was obtained through the U.S Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) System to determine whether any federally threatened, endangered, proposed, or candidate species, or their critical habitats, have the potential to occur beneath the PRTC. The IPaC report is provided with this letter (**Attachment 2**). These species and effects determinations are summarized in **Table 1**. There are no proposed or designated critical habitats under the PRTC. **Attachment 1** provides our detailed assessment that supports these determinations.

Table 1 Federally Listed Species with the Potential to Occur Beneath Airspace

Common Name	Scientific Name	Status	Effects Determination
Black-footed Ferret	*Mustela nigripes*	EXPN	May affect, not likely to adversely affect
Northern Long-eared Bat	*Myotis septentrionalis*	E	May affect, not likely to adversely affect
Tricolored Bat	*Perimyotis subflavus*	PE	May affect, not likely to adversely affect
Piping Plover	*Chardrius melodus*	T	May affect, not likely to adversely affect

Table 1 Federally Listed Species with the Potential to Occur Beneath Airspace			
Common Name	**Scientific Name**	**Status**	**Effects Determination**
Rufa Red Knot	*Calidris canutus rufa*	T	May affect, not likely to adversely affect
Whooping Crane	*Grus americana*	E	May affect, not likely to adversely affect
Pallid Sturgeon	*Scaphirhynchus albus*	E	No effect
Monarch Butterfly	*Danaus Plexippus*	PT	No effect
Suckley's Cuckoo Bumble Bee	*Bombus suckleyi*	PE	No effect
Western Regal Fritillary	*Argynnis idalia occidentalis*	PT	No effect
Ute Ladies'-tresses	*Spiranthes diluvialis*	T	No effect

Legend: E: Endangered; T: Threatened; EXPN: Experimental Nonessential Population; PT: Proposed Threatened, PE: Proposed Endangered.
Source: USFWS 2026

The DAF requests concurrence with our effects determinations for listed species with the potential to occur under the PRTC. Please respond within thirty (30) days of receipt of this letter to Mr. John Carreiro, Natural Resources Manager, who can be reached via email at john.carreiro@us.af.mil, phone at 605-385-2690, or mail at 28 CES/CIE, 2125 Scott Dr, Ellsworth AFB SD 57706. Thank you for your assistance.

Sincerely

KELLER.JONATHAN.ABNER.1242491714
Digitally signed by KELLER.JONATHAN.ABNER.1242491714
Date: 2026.06.14 14:07:03 -06'00'

JONATHAN A. KELLER, Colonel, USAF
Commander

2 Attachments:
1. Biological Evaluation for USFWS
2. IPaC Report

References:
US Fish and Wildlife Service. 2026. Powder River Training Complex Optimization. List of Threatened and Endangered Species. Project Code: 2026-0046134. U.S. Fish and Wildlife Service Montana Ecological Services Office. February 5, 2026.

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Biological Evaluation
For
Optimization of the Powder River Training Complex
Ellsworth Air Force Base, South Dakota

April 2026

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ACRONYMS AND ABBREVIATIONS

ACC	Air Combat Command
AFB	Air Force Base
AGL	above ground level
AHAS	Avian Hazard Advisory System
ATCAA	Air Traffic Control Assigned Airspace
BASH	bird-aircraft strike hazard
BE	Biological Evaluation
BO	Biological Opinion
C.F.R.	Code of Federal Regulation
DAF	Department of the Air Force
dB	decibel
dBA	A-weighted decibel
DoD	Department of Defense
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FL	flight level
Hz	hertz
IPaC	Information for Planning and Consultation
kHz	kilohertz
LFE	Large Force Exercise
L_{max}	Maximum Sound Level
MOA	Military Operations Area
MSL	mean sea level
NPS	National Park Service
PR	Powder River
PRTC	Powder River Training Complex
psf	pounds per square foot
ROD	Record of Decision
TTP	tactics, techniques, and procedures
U.S.	United States
USFWS	U.S. Fish and Wildlife Service

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1.0 INTRODUCTION

The Powder River Training Complex (PRTC) is a group of Military Operations Areas (MOAs) and Air Traffic Control Assigned Airspaces (ATCAAs), which overlie parts of South Dakota, North Dakota, Wyoming, and Montana. Currently it is the day-to-day training complex for aircrews operating B-1 aircraft from Ellsworth Air Force Base (AFB) and B-52 aircraft from Minot AFB. The PRTC also hosts Large Force Exercises (LFEs) for joint forces to participate in realistic combat training scenarios.

The Department of the Air Force (DAF) is proposing to alleviate training shortfalls and address evolving training needs for aircrews by requesting that the Federal Aviation Administration (FAA) implement airspace modifications to the PRTC.

Section 7(a)(2) of the Endangered Species Act (ESA), [Public Law 93-205] requires federal agencies to ensure that any action authorized, funded, or carried out by such agencies is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. There is no designated critical habitat beneath PRTC. This Biological Evaluation (BE) has been prepared to evaluate the potential effects of the Proposed Action on species listed or proposed for listing as threatened and endangered by the ESA.

1.1 PROJECT OVERVIEW

An appropriate training environment is required by the Department of Defense (DoD) National Defense Strategy. Each type of aircraft has a set of practices used by pilots to ensure effective, safe, and efficient operations known as Tactics, Techniques, and Procedures (TTPs). As the type and sophistication of threats to National Security have evolved, so has the National Defense Strategy, resulting in changes to aircraft capabilities and weapons systems. These advanced capabilities have led to changes in the TTPs, which in turn drive training requirements and the airspace needed to meet those requirements.

MOAs and ATCAAs are units of airspace with lateral and vertical limits that are designated to contain non-hazardous military flight activities. The vertical limits of MOAs can extend from ground level to 18,000 feet. ATCAAs exist from 18,000 feet up to a defined ceiling and are often associated with an underlying MOA.

The PRTC consists of several MOAs and ATCAAs used for day-to-day training and LFEs (**Figure 1.1-1**). All airspace shown on **Figure 1.1-1** can be used during LFEs. Day-to-day training is limited to Powder River (PR) 1, 2, 3, and 4 MOAs/ATCAAs and the Gateway West ATCAA. The PR MOAs are vertically segmented into a low and high MOA and have an ATCAA above. This provides a combined vertical training space from 500 feet above ground level (AGL) up to Flight Level (FL) 260 which is approximately 26,000 feet. The Gateway West and East ATCAAs do not have MOAs below and provide vertical training space of FL180 to FL260, which is approximately 18,000 feet to 26,000 feet. See **Figure 1.1-2** for a three-dimensional view of the PRTC. The Gap MOAs and their associated ATCAAs are designed (and only activated) for LFEs, to provide larger contiguous airspace for these integrated exercises. Day-to-day these deactivated spaces provide corridors between the PR MOAs/ATCAAs for other air traffic to pass without conflicting with military training. **Table 1.1-1** provides the specific parameters of all the PRTC airspace components.

Day-to-day training operations and LFEs at PRTC are currently limited to or below FL260 (approximately 26,000 feet). This precludes training at higher altitudes, which is a necessity to accomplish certain flying missions. Additionally, LFEs are currently limited to 10 days per year and no more than 3 days per quarter. This short duration limits the complexity and effectiveness of these training events. These are the contributing factors to the existing shortfalls that are being addressed with the Proposed Action.

1.2 ESTABLISHMENT OF PRTC AND CONSULTATION HISTORY

The establishment and use of the PRTC as it currently exists was evaluated in the Environmental Impact Statement for Powder River Training Complex and implemented by a Record of Decision (ROD) signed in January 2015 (DAF 2015). Consultation with United States (U.S.) Fish and Wildlife Service (USFWS) took place at that time. Below is a summary of previous DAF and other related DoD consultations with the USFWS on impacts of similar activities to the species included in this BE.

On December 18, 2024, the USFWS issued a Biological Opinion (BO), concurrence, and conference opinion (#09E30000-2023-0090495-S7) in response to the DAF's proposed activities related to flight operations at 32 installations, including Ellsworth AFB, across the contiguous U.S. The proposed activities include military aircraft flight operations on and around the airfields at these installations, which encompass takeoffs, landings, and local training and maintenance flights for aircraft home-based at the installation, as well as transient aircraft operations. Routine ground maintenance activities are also part of the proposed action. Species covered by this BO that have the potential to occur under the PRTC include the Northern long-eared bat (*Myotis septentrionalis*), tricolored bat (*Perimyotis subflavis*), piping plover (*Charadrius melodus*), rufa red knot (*Calidris canutus rufa*), and whooping crane (*Grus americana*).

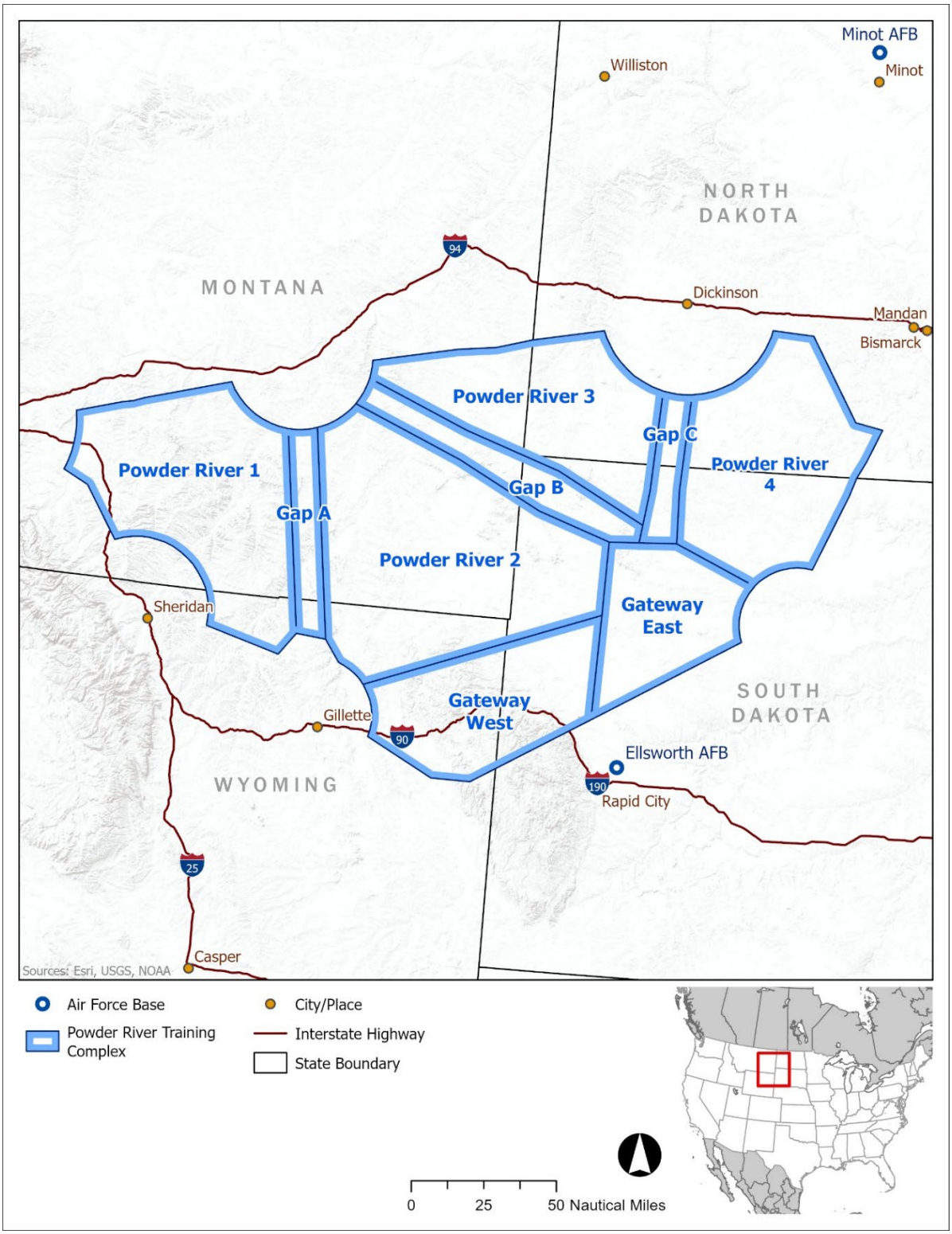


Figure 1.2-1 Powder River Training Complex Overview

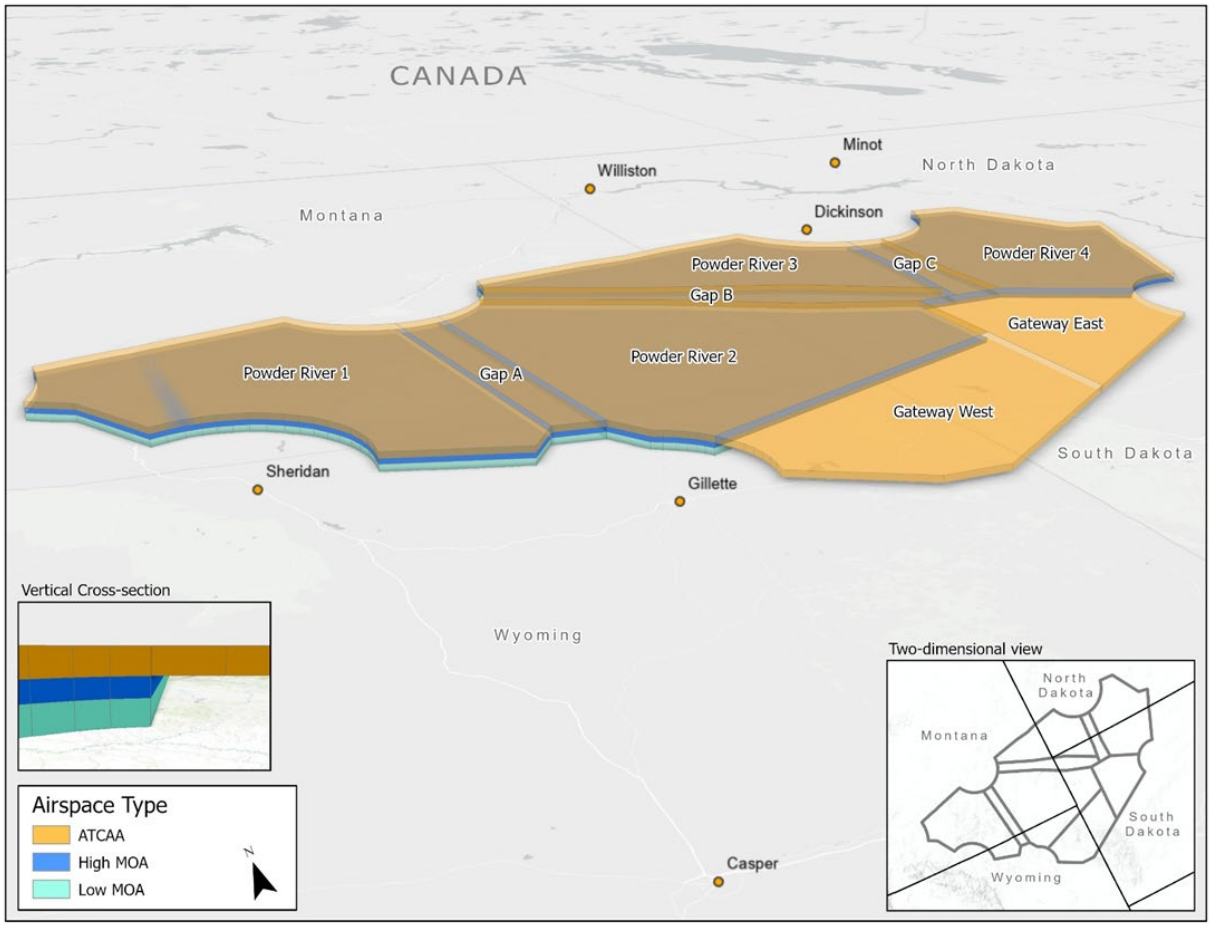


Figure 1.2-2 Powder River Training Complex – Three-dimensional View

Table 1.1-1 Existing Powder River Training Complex Airspace

Component	Availability	Floor/Ceiling
Powder River 1 (PR 1)[1]		
PR 1 Low MOA	Day-to-day and LFE	500 AGL–12,000 MSL
PR 1 High MOA	Day-to-day and LFE	12,000 MSL–FL180
PR 1 ATCAA	Day-to-day and LFE	FL180–FL260
Powder River 2 (PR 2)		
PR 2 Low MOA	Day-to-day and LFE	500 AGL–12,000 MSL
PR 2 High MOA	Day-to-day and LFE	12,000 MSL–FL180
PR 2 ATCAA	Day-to-day and LFE	FL180–FL260
Powder River 3 (PR 3)		
PR 3 Low MOA	Day-to-day and LFE	500 AGL–12,000 MSL
PR 3 High MOA	Day-to-day and LFE	12,000 MSL–FL180
PR 3 ATCAA	Day-to-day and LFE	FL180–FL260
Powder River 4 (PR 4)		
PR 4 High MOA	Day-to-day and LFE	12,000 MSL–FL180
PR 4 ACTAA	Day-to-day and LFE	FL180–FL260
Gap A		
Gap A Low MOA	LFE only	500 AGL–12,000 MSL
Gap A High MOA	LFE only	12,000 MSL–FL180
Gap A ATCAA	LFE only	FL180–FL260
Gap B		
Gap B Low MOA	LFE only	500 AGL–12,000 MSL
Gap B High MOA	LFE only	12,000 MSL–FL180
Gap B ATCAA	LFE only	FL180–FL260
Gap C		
Gap C High MOA	LFE only	12,000 MSL–FL180
Gap C ATCAA	LFE only	FL180–FL260
Gateway East ATCAA	LFE only	FL180–FL260
Gateway West ATCAA	Day-to-day and LFE	FL180–FL260

Note: [1] PR 1 is horizontally subdivided into four segments 1A, 1B, 1C, and 1D. Each of those segments is vertically divided into a low and high MOA with an ATCAA above, but the availability of those segments varies. The PR 1A and 1C High MOAs and ATCAAs are only available for LFEs.

Legend: AGL = above ground level; ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; LFE = Large Force Exercise; MOA = Military Operations Area; MSL = mean sea level; PR = Powder River

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2.0 PROPOSED ACTION

2.1 PROPOSED CHANGES TO PRTC

The DAF is proposing to address shortfalls in aircrew readiness by improving day-to-day training and increasing the capability of LFEs hosted at PRTC to meet emerging threats to National Security.

2.1.1 Changes to Day-to-Day Operations

Day-to-day training operations at PRTC are currently limited to FL260 or below (approximately 26,000 feet) as assessed in DAF 2015. This precludes training at higher altitudes, which is a necessity to accomplish certain flying missions. To improve day-to-day training, the DAF is proposing to raise the available altitude of some of the training airspace to FL600 (**Figure 2.1-1**). There would be no horizontal or vertical changes to any of the MOAs; the change for day-to-day training is limited to raising the ceiling of the ATCAAs. The existing total operations and types of day-to-day training within PRTC would not change, but those operations would be more vertically dispersed in higher altitudes (**Table 2.1-1**). Most of the existing and proposed day-to-day training occurs in the ATCAAs (above FL180). Supersonic flight is not authorized for day-to-day training; thus, no sonic booms are possible on a day-to-day basis.

Table 2.1-1 Percentage of Day-to-Day Operations by Altitude Distribution

Operations	MOAs (500 feet AGL–FL180)	ATCAAs (above FL180)
Existing Operations (capped at FL260)	12%	88%
Proposed Operations (capped at FL600)	8%	92%
Change	-4%	4%

Legend: % = percent; AGL = above ground level; ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; MOA = Military Operations Area

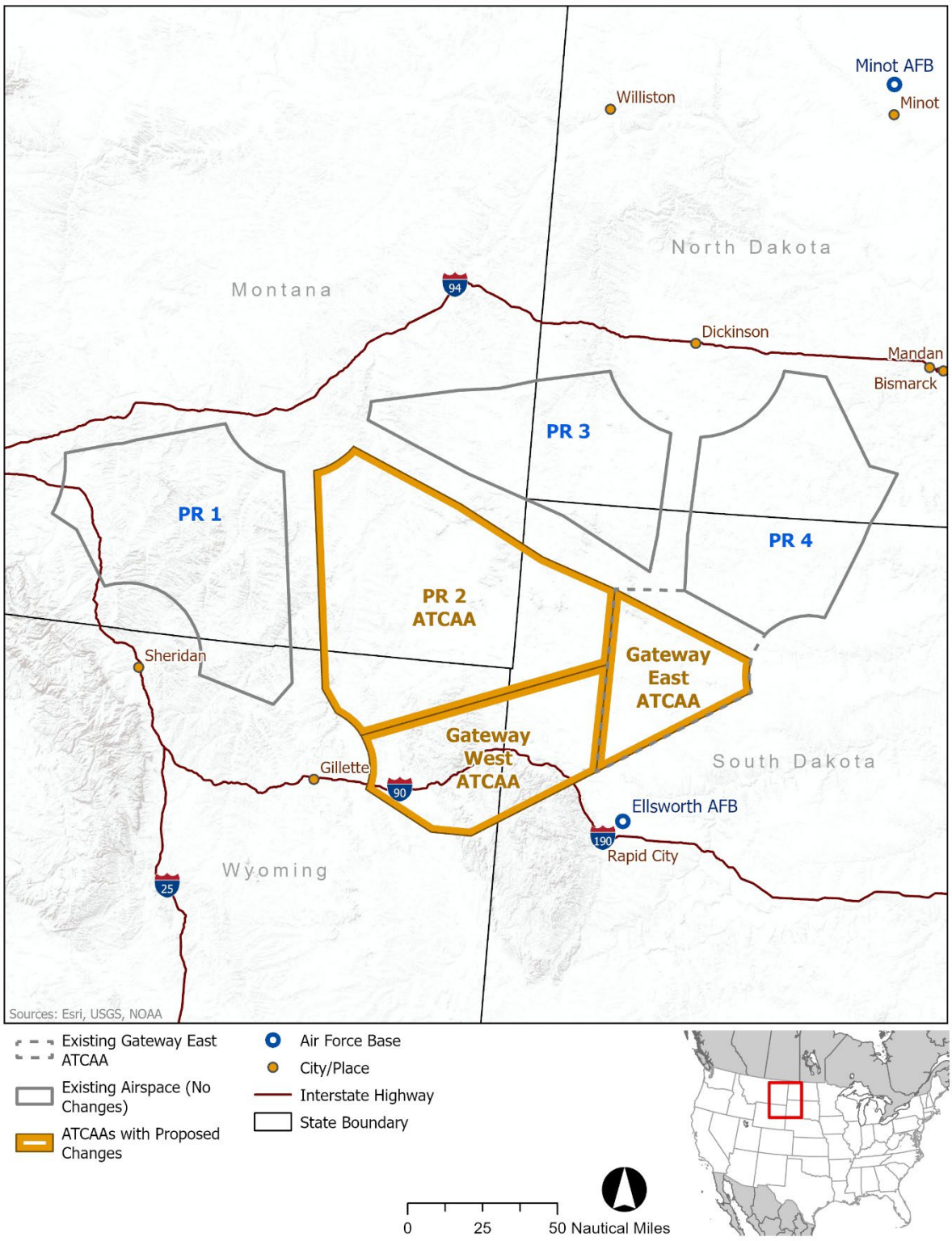


Figure 2.1-1 Proposed Changes for Day-to-Day Operations

2.1.2 Changes to Large Force Exercises

PRTC hosts LFEs, which include bomber aircraft assigned to Ellsworth and Minot AFBs, as well as fighter, surveillance, command/control, and refueling aircraft from units across the country. LFEs are designed to prepare servicemen and women for real-world scenarios. Longer duration exercises enable units to achieve complex realistic training. Longer durations also allow non-local units to meet multiple training requirements, justifying the cost of moving non-local units and their support equipment to participate in the exercises.

Ellsworth AFB is currently authorized to host up to four LFEs annually as assessed in DAF 2015. The 2015 ROD capped the PRTC altitude at or below FL260 and limited LFEs to 10 days per year (no more than 3 days per quarter). This limits the complexity for the LFE scenarios and also deters non-local units from participating due to high mobilization effort and cost. Supersonic flight in PRTC is only authorized during LFEs as assessed in DAF 2015. The current altitude limitations for supersonic flight would remain the same: fighter aircraft limited to above 10,000 feet AGL and bomber aircraft limited to above 20,000 feet mean sea level (MSL).

The DAF is proposing to raise the altitude up to FL600 (approximately 60,000 feet) across the entire PRTC for LFEs (**Figure 2.1-2**). This vertical expansion would create a more realistic and efficient training environment during LFEs. The Proposed Action also includes increasing the LFE days from 10 days total per year (no more than 3 days per quarter) to a total of 30 days per year with no quarterly restriction. This modification would accommodate LFEs that benefit from a longer duration. Under the Proposed Action, the PRTC would be able to support a 2-week LFE which would maximize participation. A 2-week LFE would include 5 weekdays of flying, no flying on Saturday or Sunday, followed by another 5 weekdays of flying. Non-local participants would get the most training for their invested time, effort, and money for a single event. A 2-week LFE would be the maximum or worst-case scenario for these events, most events would likely be shorter in duration.

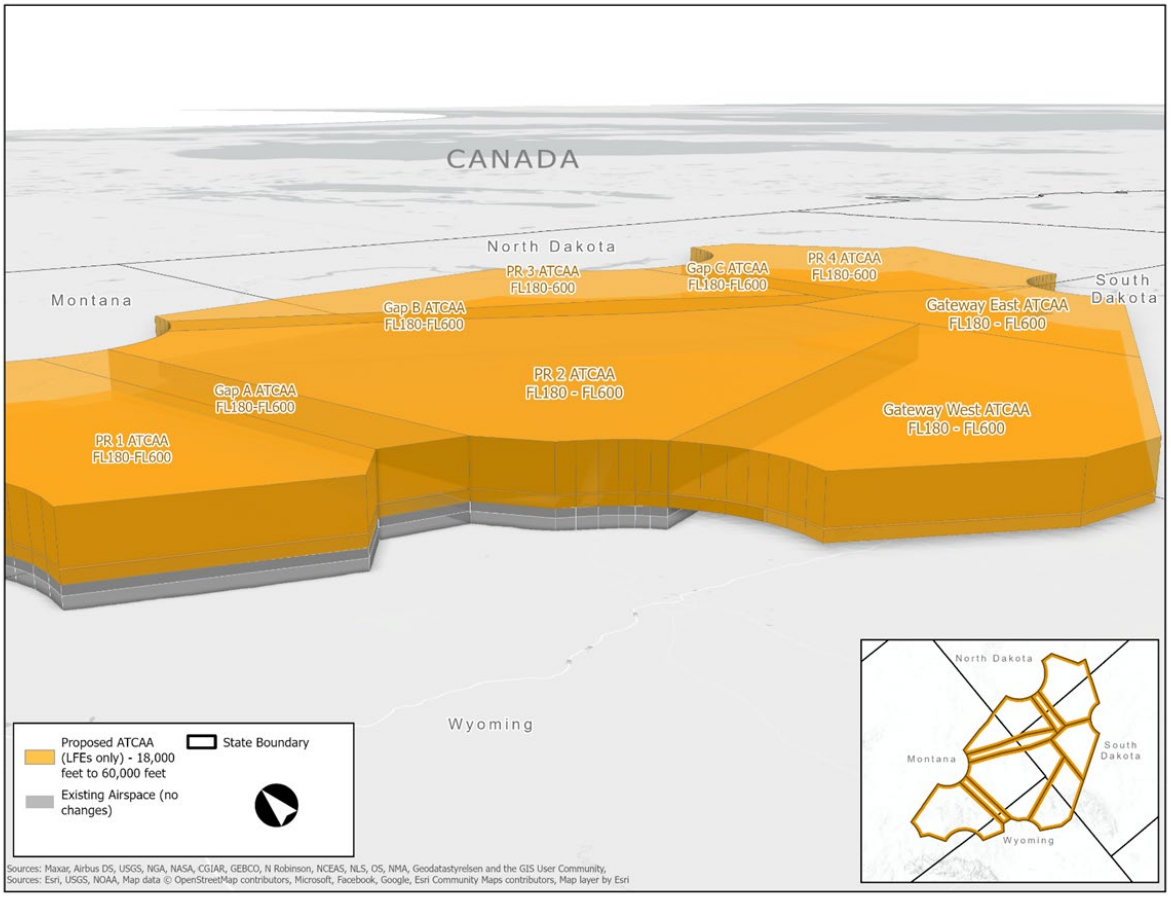


Figure 2.1-2 Proposed Altitude Increase for LFEs

Increasing the duration and total days of LFEs would increase annual operations within PRTC (**Table 2.1-2**). However, while the total annual operations would increase, the distribution of training across the PRTC and by altitude would remain relatively unchanged. Use of the high-altitude airspace would continue to account for approximately 90 percent of the training time (**Table 2.1-3**).

Table 2.1-2 Proposed Increase in Sorties[1] Associated with LFEs

Aircraft Type	Existing Sorties[2]	Proposed Increase in LFE Sorties	Total Annual Sorties
Bombers	3,039	120	3,159
Fighters	52	1,200	1,252
Other	143	420	563
Total	**3,234**	**1,740**	**4,974**

Note: [1] A sortie is the takeoff, mission, and landing of a single aircraft. Multiple sorties can occur at the same time throughout the PRTC.
[2] Existing sorties include those associated with day-to-day training and current LFEs. The sorties associated with day-to-day training would not change with this Proposed Action.
Legend: LFE = Large Force Exercise

Table 2.1-3 Percentage of LFE Operations by Altitude Distribution

Operations	MOAs (500 feet AGL–FL180)	ATCAAs (above FL180)
Existing Operations (capped at FL260)	12%	88%
Proposed Operations (capped at FL600)	7%	93%
Change	-5%	5%

Legend: % = percent; AGL = above ground level; ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; LFE = Large Force Exercise; MOA = Military Operations Area

Supersonic operations would continue to occur during LFEs. The authorized minimum altitudes would remain unchanged (10,000 feet AGL for fighters, 20,000 feet MSL for bombers). Supersonic speed does not occur for the duration of the flight, but rather a fraction of the time (approximately 30 seconds for fighters and up to 1 minute for bombers). Accommodating more fighter aircraft over more LFE days would increase the total supersonic sorties from the current operations. Supersonic flight would not occur with every sortie and would vary depending on the training exercise being performed. Supersonic sorties by aircraft type are provided in **Table 2.1-4**. These sorties are *not in addition* to those presented in **Table 2.1-2**, but rather a subset of that total. As shown, approximately 95 percent of the supersonic activity would continue to be in the ATCAAs above FL180.

Table 2.1-4 Supersonic Operations During LFEs

Aircraft Type	Supersonic Sorties		Time in MOAs (minutes/year)		Time in ATCAAs (minutes/year)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
Bombers (20,000 feet MSL and above)	60	180	0	0	15	45
Fighters (10,000 feet AGL and above)	100	1,500	2	750	46	14,250
Total	**160**	**1,680**	**2**	**750**	**61**	**14,295**

Legend: AGL = above ground level; ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; LFE = Large Force Exercise; MOA = Military Operations Area; MSL = above mean sea level

2.2 NOISE FROM AIRCRAFT

There are two types of aircraft noise discussed in this assessment: subsonic noise and supersonic noise. Conventional subsonic noise is noise generated by an aircraft's engines and airframe. Responses to noise vary widely not only according to the type of noise and the characteristics of the sound source, but also according to the sensitivity and expectations of the receptor, the distance between the noise source and the receptor, and time of day. The intensity of sound is measured in decibels (dB). Sound intensity varies widely and is measured on a logarithmic scale to accommodate this wide range.

2.2.1 Subsonic Noise

Low-level overflights (those flights within the MOAs) have the potential to generate the most noise on the ground. **Tables 2.2-1 and 2.2-2** provide the lowest altitude for each MOA and ATCAA in PRTC as well as the probability of experiencing an overflight at the lowest possible altitude during day-to-day training and LFEs. During LFEs, the entire PRTC is used so **Table 2.2-2** presents the spaces grouped together by lowest altitude. The Gateway East and West ATCAAs do not have associated MOAs; thus, no low-level overflights are possible in these airspaces. The Proposed Action would not change where low-level flights currently occur or the lowest possible altitude for any MOA. Raising the ceilings of the airspace would result in a lower likelihood of experiencing an overflight compared to existing conditions; however, increasing the total LFE days would increase the number of days it would be possible to experience a direct overflight. As shown, the probability of experiencing such an overflight would continue to be rare. No low-level overflights would take place in the ATCAAs as the floors of these are 18,000 feet.

Table 2.2-1 Probability[1] of Overflight at Lowest Altitude during Day-to-Day Training

Airspace	Lowest Altitude Available for Use	Existing Conditions	Proposed Action
PR 1 MOA	500 feet AGL	3%	1%
PR 2 MOA	500 feet AGL	3%	1%
PR 3 MOA	500 feet AGL	4%	1%
PR 4 MOA	12,000 feet MSL	3%	2%

Note: [1] Probability per week of experiencing a low-level overflight at any given point beneath the MOA.
Legend: % = percent; AGL = Above Ground Level; MOA = Military Operations Area; MSL = Mean Sea Level; PR = Powder River

Table 2.2-2 Probability of Overflight at Lowest Altitude during Large Force Exercises

Airspace	Lowest Altitude (MOA Floor)	Probability of Overflight at Lowest Altitude [1]
PR 1, 2, 3 and Gap A, B MOAs	500 feet AGL	2%
PR 4 and Gap C MOAs	12,000 feet MSL	11%

Note: [1] Probability of experiencing a low-level overflight beneath the MOA during a week with an LFE.
Legend: % = percent; AGL = Above Ground Level; MOA = Military Operations Area; MSL = Mean Sea Level; PR = Powder River

Experiencing noise from an aircraft that is directly overhead at the lowest possible altitude would be rare. The MOAs in the region are very large and any particular location on the ground would be overflown at low altitudes relatively infrequently. Flight at low altitudes requires an extreme level of aircrew vigilance and time spent at the lowest available altitudes would be only as needed to accomplish low-altitude training requirements.

From the ground, the sound level of an aircraft flying overhead changes continuously, starting at the ambient (background) level, increasing to a maximum as the aircraft passes closest to the receiver, and then decreasing to ambient as the aircraft flies into the distance. The noise metric

used for the maximum or peak noise for aircraft is known as L_{max} which is reported in dB. During LFE events, low-level flights by both bombers and fighter aircraft are possible and a range of peak noise exposure could be experienced. **Table 2.2-3** provides the L_{max} for a representative set of aircraft that could operate within PRTC. The Gateway East and West ATCAAs do not have MOAs below, thus the lowest possible flight in those areas would be at FL180 (approximately 18,000 feet). Peak noise would occur for about 1/8 of a second. Lateral offset from a direct overflight significantly reduces these values. To provide a frame of reference, the average noise level for some common noise sources include: firecrackers (140 dB), a rock band concert (120 dB), a lawnmower (95 dB), a vacuum cleaner 10 feet away (85 dB), a garbage disposal (75 dB), and conversation (60 dB).

Table 2.2-3 Highest Possible Noise Exposure for Single Low-level Overflight[1]

Aircraft	500 feet (L_{max} in dB)	12,000 feet (L_{max} in dB)	18,000 feet (L_{max} in dB)
Day-to-Day Training and LFE			
B-1	117	86	80
B-2	n/a	71	64
B-52	n/a	76	69
LFE only			
F-16	115	78	71
EA-18	124	84	78
F-22	120	84	78
F-35	119	85	78

Note: [1] The highest noise exposure for each altitude has been shaded gray for the reader's convenience.
Legend: AGL = above ground level; dB = decibel; LFE = Large Force Exercise; L_{max} = Maximum Sound Level; n/a = not applicable

2.2.2 Supersonic Noise

When an aircraft flies faster than the speed of sound (known as supersonic flight), shock waves are generated, which can result in an audible sonic boom. A sonic boom is characterized as an overpressure, which is not a sound level but rather a rapid rise in pressure followed by a rapid drop-off before the pressure returns to normal atmospheric levels. This change occurs very quickly (significantly less than 1 second). Overpressure is measured in pounds per square foot (psf). The intensity of the psf depends on the aircraft's size, weight, geometry, flight altitude, speed, maneuvering, and the altitude at which the flight occurs. The higher the aircraft, the lower the intensity of the sonic boom. Sonic booms could be described as ranging from the sound of distant thunder to a sharp double crack. For comparison and better understanding of psf, some common impulsive events and their associated psf are provided in **Table 2.2-4**.

Table 2.2-4 Typical Impulsive Event Levels

Peak Overpressure (pounds/square foot)	Decibel	Example Noise Source
0.3	117	Distant thunder
2	134	Thunder resulting from lightning strikes at 1 kilometer
4	140	Car door slam from inside standard sedan with windows raised
5	142	Handgun at 1 meter
12	149	Fireworks display from viewing stand

Supersonic flight is only authorized during LFEs. The potential for sonic booms would only be possible for a total of 30 days annually. Supersonic flights of fighter aircraft could occur in MOAs (10,000 feet AGL and above) while supersonic flight of the B-1 would be limited to ATCAAs only (20,000 feet MSL). **Table 2.2-5** shows calculated overpressures in psf for the B-1 and representative transient fighter aircraft that could participate in LFEs at PRTC. The intensity of sonic booms would vary and these values represent the maximum possible psf. Likewise, the location where a boom may be experienced would be widely distributed across the entire PRTC airspace, but unlikely to occur at the outer edges of the complex. It is estimated that 95 percent of supersonic flight would occur in the ATCAAs, above 18,000 feet.

Table 2.2-5 Maximum Sonic Boom Overpressures for Relevant Aircraft (pounds/square foot)

Aircraft	Lowest Supersonic Flight Altitude	Overpressure (psf)[1]
B-1	20,000 feet MSL	5.31
F-16	10,000 feet AGL	4.24
F-22	10,000 feet AGL	5.37
F-35	10,000 feet AGL	4.9

Note: [1] Assumes straight and level flight at Mach 1.2 speed.
Legend: AGL = above ground level; MSL = above mean sea level; psf =pounds per square foot

3.0 ACTION AREA AND EXISTING CONDITIONS

The Action Area includes the airspace within and lands that underlie the boundary of the PRTC in South Dakota, North Dakota, Montana, and Wyoming. Military training flights would be distributed throughout the airspace but few would occur near the edges of the airspace. Thus, noise would not be expected to extend beyond the ground footprint of the MOAs. No physical ground-disturbing activities are proposed; therefore, plant communities and terrestrial habitats would not be affected.

3.1 ECOREGIONS WITHIN THE ACTION AREA

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; they are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components (U.S. Environmental Protection Agency [EPA] 2025). **Figure 3.1-1** depicts the EPA Level III ecoregions associated with the land beneath the airspace and **Table 3.1-1** provides the acreage of each ecoregion beneath the airspace.

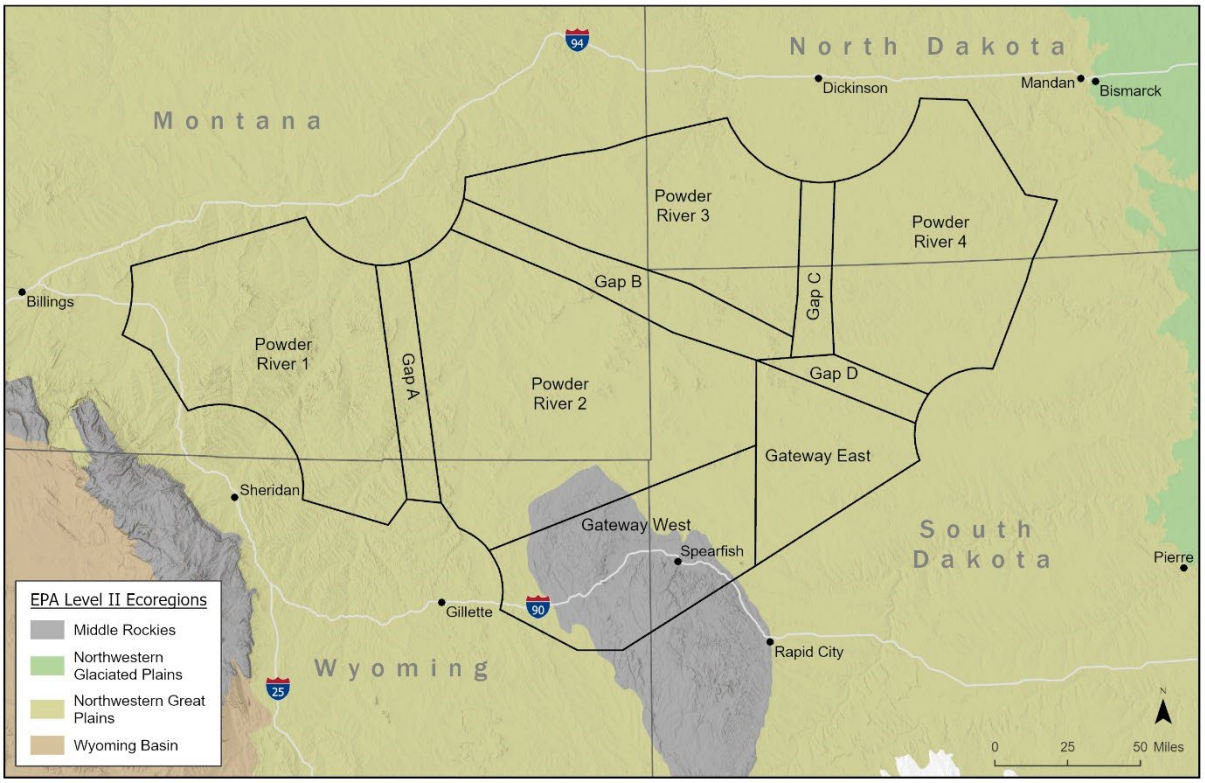


Figure 3.1-1 Level III Ecoregions and Airspace

Table 3.1-1 Ecoregion Acreage Beneath Airspace

Airspace	Middle Rockies	Northwestern Great Plains
PR 1 MOA	0	3,832,457
PR 2 MOA	250,471	5,015,163
PR 3 MOA	0	2,912,713
PR 4 MOA	0	3,384,579
Gap A MOA	0	606,429
Gap B MOA	0	1,051,414
Gap C MOA	0	463,548
Gap D ATCAA	0	339,982
Gateway East ATCAA	0	1,483,096
Gateway West ATCAA	1,455,499	991,432
Totals	**1,705,970**	**20,080,811**

Note: Numbers are rounded to the nearest whole acre.
Legend: ATCAA = Air Traffic Control Assigned Airspace; MOA = Military Operations Area; PR = Powder River
Source: EPA 2024

The Northwestern Great Plains ecoregion comprises approximately 92 percent of the Action Area. This ecoregion is characterized by the Missouri Plateau section of the Great Plains. The ecoregion is a semiarid rolling plain of shale, siltstone, and sandstone punctuated by occasional buttes and badlands. Native grasslands within the Northwestern Great Plains persist in areas of steep or broken topography. Grazing or hunting animals is most common land use for this ecoregion, but spring wheat and alfalfa farming also occur. Agriculture is mostly restricted by erratic precipitation and limited opportunities for irrigation (EPA 2013).

The Middle Rockies ecoregion covers approximately 8 percent of the Action Area and comprises a landscape of mountains with Douglas-fir, subalpine fir, and Engelmann spruce forests, as well as some large alpine areas. Forests within the ecoregion can have open canopies. The foothills are partly wooded or shrub- and grass-covered. The intermontane valleys are grass and/or shrub-covered and contain a mosaic of terrestrial and aquatic fauna that is distinct from the nearby mountains. Many perennial streams occur and differentiate the intermontane valleys from the Northwestern Great Plains. Common land uses within the ecoregion include recreation, logging, mining, and summer livestock grazing (EPA 2013).

Overall, the lands below the airspace are dominated by mixed-grass and shortgrass prairies with scattered trees and shrubs, primarily sagebrush and rabbitbrush (Bailey 1995). Typical grasses include buffalograss, blue grama, western wheatgrass, and needlegrass. The region is primarily flat but has occasional valleys and foothills that support woodlands (Bailey 1995).

Common mammals found in these communities include pronghorn, mule deer, whitetail deer, coyote, badger, whitetail jackrabbit, desert cottontail, prairie dog, and thirteen-lined ground squirrel (Bailey 1995). Common birds include sage grouse, greater prairie chickens, sharp-tailed grouse, horned lark, lark bunting, and western meadowlark. Two bird species are unique to the shortgrass prairies east of the Rockies, the mountain plover and McCown's longspur (Bailey 1995).

4.0 DESCRIPTION OF THE LISTED SPECIES THAT MAY BE AFFECTED BY THE PROPOSED ACTION

On February, 5, 2026, the USFWS assigned Project Code: 2026-0046134 to this project (USFWS 2026). Lists of species that have potential to occur beneath each of the MOAs were obtained through the USFWS Information for Planning and Consultation (IPaC) website (USFWS 2025a-j). There is no designated critical habitat for listed species beneath PRTC.

Table 4.0-1 lists the species for which the DAF has made a determination of *no effect*. No ground-disturbing activities are proposed, eliminating impacts to plants and limiting impacts to other species' habitats. The effects of aircraft overflight noise on fish and invertebrates have not been well documented. Studies summarized in Manci et al. (1988) suggest that fish have not been found to be sensitive to in-air noise or sonic booms. Although studies of longer periods of noise exposure have documented effects on invertebrate behavior and reproductive success, brief, intermittent noise exposure did not appear to negatively affect the invertebrate species studied and most invertebrates hear poorly in the frequency range of aircraft noise (Bowles 1995).

Table 4.0-1 Federally Listed Species for Which a No Effect Determination is Made

Species	Status
Pallid sturgeon (*Scaphirhynchus albus*)	Endangered
Monarch butterfly (*Danaus plexippus*)	Proposed Threatened
Suckley's cuckoo bumble bee *(Bombus suckleyi)*	Proposed Endangered
Western regal fritillary (*Argynnis idalia occidentalis*)	Proposed Threatened
Ute's ladies'-tresses (*Spiranthes diluvialis*)	Threatened

Table 4.0-2 contains a list of those species that could be affected by the proposed aircraft operations, their federal listing status on lands beneath airspace, and their occurrence beneath the airspace. A description of each species follows the table.

Table 4.0-2 Occurrence of Federally Listed Species Potentially Affected by the Proposed Action

Species	Status	Potential PRTC Occurrence
Black-footed ferret (*Mustela nigripes*)	Experimental Non-essential	PR 4 MOA
Northern long-eared bat (*Myotis septentrionalis*)	Endangered	PR 1–4 MOAs, Gap A–C MOAs, Gateway East and West ATCAAs
Tricolored bat (*Perimyotis subflavus*)	Proposed Endangered	Gateway West ATCAA
Piping plover (*Charadrius melodus*)	Threatened	PR 3–4 MOAs, Gap C MOA, Gateway East ATCAA

Species	Status	Potential PRTC Occurrence
Rufa red knot (*Calidris canutus rufa*)	Threatened	PR 2–4 MOAs, Gap B–C MOAs, Gateway East and West ATCAAs
Whooping crane (*Grus americana*)	Endangered	PR 3–4 MOAs, Gap C MOA, Gateway East ATCAA

Legend: ATCAA = Air Traffic Control Assigned Airspace; MOA = Military Operations Area; PR = Powder River; PRTC = Powder River Training Complex
Source: USFWS 2025a-j

4.1 BLACK-FOOTED FERRET

The black-footed ferret (*Mustela nigripes*) was listed as an endangered species under early endangered species legislation on March 11, 1967 (32 *Federal Register* 4001), and again on June 2, 1970 (35 *Federal Register* 8491). When the ESA was enacted in 1973, the black-footed ferret was included on the list of endangered species (39 *Federal Register* 1171). No critical habitat is designated for the black-footed ferret because they were listed prior to the 1978 amendments requiring critical habitat. On August 21, 1991, portions of Arizona, Colorado, Montana, South Dakota, and Utah were designated as non-essential experimental populations, which accounts for the locations where most reintroduced black-footed ferrets have been released. Currently, all known black-footed ferret populations are a result of reintroduction efforts (Montana Natural Heritage Program and Montana Fish, Wildlife, and Parks 2025a). Within the Action Area, a portion of the PR 4 MOA overlaps the nonessential experimental population range in northwest South Dakota (USFWS 2025j).

The species remains vulnerable to several threats, including disease, loss of habitat, and related declines in prey (National Park Service [NPS] 2020). The black-footed ferret is endemic to North America and was historically found across the Great Plains, mountain basins, and semi-arid grasslands of North America wherever prairie dogs occurred (Hillman and Clark 1980). Because black-footed ferrets depend entirely on prairie dogs for food and shelter (utilizing their burrows), their range and habitat align with the ranges of black-tailed prairie dog (*Cynomys ludovicianus*), Gunnison's prairie dog (*C. gunnisonii*), and the white-tailed prairie dog (*C. leucurus*) (Hillman and Clark 1980; USFWS 2013).

The black-footed ferret is generally a nocturnal predator, appearing above ground at irregular intervals and for irregular durations (Clark et al. 1986). Black-footed ferrets are solitary animals with the exceptions of breeding season and caring for their young (NPS 2020). In the wild, breeding season begins at approximately 1 year of age from mid-March through early April (NPS 2020). The life expectancy for black-footed ferret females and males in the wild is 5 and 4 years of age, respectively (USFWS 2019).

Predators of the black-footed ferret include golden eagles, owls, coyotes, badgers, and bobcats. In addition, reintroduced ferrets are at a higher risk of becoming prey because animals raised in captivity typically lack general survival skills (NPS 2020).

4.2 NORTHERN LONG-EARED BAT

The Northern long-eared bat (*Myotis septentrionalis*) was first listed as threatened under the ESA on April 2, 2015 (81 *Federal Register* 1900-1922). Later, its status was changed to endangered on November 30, 2022 (87 *Federal Register* 73488-73504). The Northern long-eared bat occurs throughout much of the eastern and north central U.S. and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia (USFWS 2022). In the U.S., the species' range reaches from Maine west to Montana, south to eastern Kansas, eastern Oklahoma, Arkansas, and east to South Carolina. The species range comprises 37 states total in the U.S., including North Dakota, South Dakota, Wyoming, and Montana (USFWS 2022). The Northern long-eared bat species range is scattered throughout North Dakota, South Dakota, Wyoming, and Montana underneath PRTC airspace (USFWS 2025a-j). However, the species is rare and has only been identified in a few locations in North Dakota, including forested habitat in the Turtle Mountains and the riparian corridors of the Little Missouri and Missouri Rivers (Dyke et al. 2015). Northern long-eared bat presence in South Dakota is mainly only in the Black Hills National Forest (U.S. Forest Service 2025). Northern long-eared bat is reputed among the rarest mammal species within Montana. Between 2016 and 2019, the USFWS conducted surveys using mist net and acoustic methods in eastern Montana. Northern long-eared bats were captured in small numbers on the Missouri and Yellowstone Rivers in 2016, 2017, and 2018. No individuals were captured in 2019 (Bachen 2019). Wyoming is on the extreme western edge of the species' range. The Northern long-eared bat has only been documented in the northeastern corner of Wyoming in the vicinity of the Bear Lodge Mountains and Black Hills (Wyoming Game and Fish Department n.d.).

Northern long-eared bats predominantly overwinter in hibernacula that include various-sized caves and mines. During the summer and portions of the fall and spring, they roost in forested areas (USFWS 2022). Northern long-eared bats are nocturnal foragers and feed by capturing insects such as moths, flies, leafhoppers, caddisflies, and beetles (USFWS 2022). During late summer and early autumn, Northern long-eared bats migrate from their summering sites to swarming sites, where mating likely occurs (Johnson et al. 2015).

The predominant threat to the Northern long-eared bat is white-nose syndrome. White-nose syndrome is a disease of bats caused by a fungal pathogen. Habitat loss also influences viability of this species and includes deprivation of suitable roosting or foraging habitat, resulting in longer flights between habitats due to habitat fragmentation, separation of maternity colony networks, and direct injury or mortality (USFWS 2022).

4.3 TRICOLORED BAT

The tricolored bat (*Perimyotis subflavus*) was proposed to be listed as an endangered species on September 14, 2022 (87 *Federal Register* 56381). The species is wide ranging across the eastern and central United States and portions of southern Canada, Mexico, and Central America (Smith et al. 2022). The species range comprises 37 states, including a small part of eastern Wyoming and southwest South Dakota (Bulliner 2024). Tricolored bats may occur under the Gateway West

ATCAA (USFWS 2025f). The species was first documented in South Dakota in 2004 and has only been observed during hibernacula counts. Its current distribution and summer habitat use in South Dakota are currently unknown. County-level observational data, including net captures, hibernacula surveys, museum specimens, and acoustic recordings indicate the species' presence in Pennington and Custer counties, located in the southwest region of the state (Pendleton et al. 2025). Neither of these counties lie beneath the Gateway West ATCAA. In recent years, the range of tricolored bats has expanded into southeastern Wyoming; however, published reports in the past decade have not included tricolored bats from these areas nor have surveys been published which show significant efforts to find presence or absence (McCoshum et al. 2023).

Tricolored bats primarily roost in the foliage of live and dead deciduous hardwood trees in the spring, summer, and fall. In the winter, tricolored bats hibernate in caves and other subterranean habitats (USFWS 2021). Tricolored bats converge at cave and mine entrances between mid-August and mid-October to swarm and mate. The species disperse from winter hibernacula to summer roosting habitat in the spring. Tricolored bats emerge early in the evening and forage at treetop level or above but may forage closer to ground later in the evening. Tricolored bats are also known to forage most commonly over waterways and forest edges (USFWS 2021).

The primary threats to this species include white-nose syndrome and habitat loss. Similar to the Northern long-eared bat, abundance of this species in most summer and winter colonies has declined due to white-nose syndrome. Loss or modification of winter habitats especially harm the species given the high site fidelity and narrow microclimate requirements for hibernation (USFWS 2021).

4.4 PIPING PLOVER

The piping plover (*Charadrius melodus*) (Northern Great Plains population) was listed as threatened on December 11, 1985 (50 *Federal Register* 50726). The Northern Great Plains breeding population of piping plover extends from Nebraska, north along the Missouri River through South Dakota, North Dakota, and eastern Montana. It also includes alkaline, or salty, lakes along the Missouri River Coteau, which is a large plateau that extends north and east of the Missouri River, in North Dakota, Montana, and into Canada (USFWS 2015). The piping plover range may occur under the PR 3 and PR 4 MOAs, Gap C MOA, and the Gateway East ATCAA (USFWS 2025c-d, USFWS 2025i-j). In North Dakota, the key areas for piping plovers are located in the Alkali Lakes Core Area and many plovers nest on sandbars of the Missouri River. The species primarily occurs in North Dakota from mid-April to August (North Dakota Game and Fish 2025). In South Dakota, the species nests mainly along the Missouri River below Gavins Point and Fort Randalls dams (Stukel 1996). In areas of Northeast Montana, the species is a rare breeding resident within the Missouri River drainage along and downstream of Fort Peck Reservoir (Montana Natural Heritage Program and Montana Fish, Wildlife, and Parks 2025b). Both the Alkali Lakes and the Missouri River lie outside the PRTC airspace; however, side channels or secondary channels branching from the Missouri River fall within it. According to the Cornell Lab

of Ornithology's eBird online database of bird observations, minimal sightings of the plover have occurred in North Dakota and South Dakota with only one sighting in Wyoming and none in Montana (Cornell Lab of Ornithology 2025a).

In the Northern Great Plains, piping plovers breed and raise young on sparsely vegetated sandbars and reservoir shorelines on river systems, as well as on the shorelines of alkaline lakes. On the wintering grounds, piping plovers forage and roost along barrier and mainland beaches; sand, mud, and algal flats; washover passes; salt marshes; and coastal lagoons (USFWS 2015).

Piping plovers start arriving on breeding grounds in early April, followed by mating and nesting in mid-to-late April. Hatching begins in late May to early June, generally peaking in June and early July. The species appear to be low-density migrants throughout its range and do not have regularly used stopover sites (USFWS 2015). Spring migration for piping plover generally occurs between March and the middle of May (Fink et al. 2024). Fall migration for this species occurs between the middle of June and the beginning of November (Fink et al. 2024). Migratory piping plovers over marine environments fly at an average heigh of 288 m (944 feet, Loring et al. 2020)

Changes in the quality and quantity of riverine habitat are the primary threat to piping plovers. Human disturbance, predation, and invasive plants further reduce breeding and wintering habitat quality and affect survival of the species (USFWS 2015).

4.5 RUFA RED KNOT

The rufa red knot (*Calidris cantus rufa*) was listed as threatened under the ESA on January 12, 2015 (79 *Federal Register* 73705). The species range includes inland areas, for a total of 40 U.S. states and two U.S. territories, as well as 24 other countries, 2 British territories, and 3 French overseas regions. Throughout their range, rufa red knots occur primarily along the coasts but can also migrate across areas of open ocean and land. During both the northbound migration in the spring and southbound migration in the fall, groups of rufa red knots can be found anywhere along the coastal and inland U.S. migration corridors between Argentina to Canada (USFWS 2020). Spring migration for red knots generally occurs between the beginning of March and the beginning of June (Fink et al. 2024). Fall migration for this species occurs between the middle of July and the end of December (Fink et al. 2024).

Specifically in the U.S., rufa red knots use both coastal and interior routes during migration, including the Central, Mississippi, and Atlantic flyways. Most records in the interior states show small numbers of knots, but there are multiple records in every inland state (USFWS 2014). Rufa red knots use North Dakota and Montana for stopovers, and there are clusters of sightings records along the tributaries to the Mississippi River and along the Great Lakes (USFWS 2014). The Cornell Lab of Ornithology's eBird online database shows no reports of the species in Montana, South Dakota, and Wyoming under the Action Area; however, few sightings of the species were recorded in North Dakota (Cornell Lab of Ornithology 2025b). The rufa red knot migrates through North Dakota in mid-May and mid-September to October and uses both alkaline and freshwater

lakes; however, there are no stopover sites consistently used by the species (North Dakota Game and Fish 2026). This species is considered a rare migrant in the Action Area.

The red knot breeds in the central Canadian Arctic, from the islands of northern Hudson Bay to the Foxe Basin shorelines of Prince Charles and Baffin Islands, and west to Victoria Island. Red knots generally nest in dry, slightly elevated tundra locations, often on windswept slopes with little vegetation. Pair bonds form soon after the birds arrive on the breeding grounds, in late May or early June (USFWS 2020).

Primary threats to the rufa red knot include loss of breeding and nonbreeding habitat, disruption of natural predator cycles on the breeding grounds, reduced prey availability throughout the nonbreeding range, and increasing frequency of absences in the timing of the birds' annual migratory cycle relative to favorable food and weather conditions (USFWS 2020).

4.6 WHOOPING CRANE

The whooping crane (*Grus americana*) was listed as endangered under the ESA on March 11, 1967 (32 *Federal Register* 4001). Currently, whooping cranes are still listed as endangered under the ESA wherever they are found, except where nonessential experimental populations exist. Currently, there are four geographically distinct populations of whooping cranes that occur in the wild. Three of the four are reintroduced experimental populations. The population found within the Action Area is outside of the Section 10(j) areas designated for experimental populations; therefore, individuals occurring in the Action Area are listed as endangered. The whooping crane occurs only in North America, specifically within Canada and the United States. Multiple states have documented presence of this species including North Dakota, South Dakota, Montana, and Wyoming (Canadian Wildlife Service and USFWS 2007). Portions of the Action Area with potential presence of the whooping crane extends into PR 3 and PR 4 MOAs, Gap C MOA, and the Gateway East ATCAA (USFWS 2025c-d, USFWS 2025i-j). This species could potentially use the Action Area during migration and for stopover habitat. The Cornell Lab of Ornithology's eBird online database shows very minimal sightings of the whooping crane with only one to two sightings per state in the area underneath the airspace (Cornell Lab of Ornithology 2025c).

The whooping crane breeds, migrates, winters, and forages in a variety of habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields. Whooping cranes are monogamous and form their pairs at 2 or 3 years of age. Nesting may start as early as 3 years of age, and eggs are normally laid in late April to mid-May (Canadian Wildlife Service and USFWS 2007).

Spring migration occurs between the middle of January and beginning of May (Fink et al. 2024). During spring migration, cranes migrate at multiple altitudes, depending on the wind conditions. The highest average flight altitude recorded during studies of crane migration in Oklahoma was 600m (2,000 ft, Brandt and Pearse 2024). Autumn migration normally begins in mid-September, with most birds arriving on the wintering grounds between late October and mid-November

(Canadian Wildlife Service and USFWS 2007, Fink et al 2024). Autumn migration flight altitudes are usually lower than spring. The maximum average flight altitude recorded during studies in Oklahoma was approximately 350m (1,100 feet, Brandt and Pearse 2024). During migration they stop over on wide shallow river flats, and they winter mainly in coastal marshes and estuaries (Cornell University 2025). Foods utilized during migration may include frogs, fish, plant tubers, crayfish, insects, and agricultural grains (Canadian Wildlife Service and USFWS 2007).

Population declines were caused primarily by shooting and destruction of habitat in the prairies from agricultural development. Primary threats to whooping cranes include human disturbance and habitat loss and degradation (Canadian Wildlife Service and USFWS 2007).

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5.0 ANALYSIS OF EFFECTS

5.1 AIRCRAFT STRIKE

Bird and bat aircraft strikes are a significant concern due to the risk of damage to aircraft, injury to aircrews, and civilians in the event of an aircraft crash, as well as the risk to the bird species in the collisions. Bird-aircraft strike hazard (BASH) programs exist at every installation where there is an active flying mission. BASH programs identify seasonal concentrations birds and provide guidance for pilots to maintain appropriate elevational and lateral separation to avoid or minimize the potential for collision. The DAF maintains the Avian Hazard Advisory System (AHAS) to detect and assess the risk of a bird strike. AHAS utilizes RADAR and weather data to predict and monitor the presence of birds in airspace (Air Force Safety Center 2015). AHAS, together with each unit's BASH Management Plan, is used to evaluate bird strike risks and manage flight operations on low-level routes, training ranges, and special use airspace. When safety procedures identify an increased risk, limits are placed on low-altitude flights and some types of training (e.g., multiple approaches, closed pattern work). Furthermore, special briefings are provided to pilots whenever the potential exists for greater bird-strike risks within airspace. Adherence to these programs has minimized bird-aircraft strikes.

Under the Proposed Action, aircrews would operate in the same airspace as they do currently. Flight altitudes of the listed bird species may interact with the floors of some of the existing airspace (PR1 Low, PR2 Low, PR3 Low, Gap A Low, and Gap B Low MOAs). Because no airspace floors would be lowered; listed species are rare and occur seasonally in the Action Area; and with the implementation of the safety measures described above, the potential for bird aircraft strikes is so low as to be discountable for the three listed bird species.

The tricolored bat has the potential to occur under the Gateway West ATCAA (airspace floor approximately 18,000 feet). Tricolored bats flights are low level (e.g., 3-6 feet above tree canopy, Caire et al 1984). Therefore, tricolored bat would not occur in training airspace, and there would be no effect from aircraft strike.

5.2 NOISE

Continuous, intense noise exposure has been shown to cause health effects to animals in laboratory experiments, but extensive experiments show that intermittent noise does not (Bowles 1995). This is because animals' ears recover between the intermittent exposures. Animal species differ greatly in their responses to noise. Species-specific research on the impacts of military aircraft noise on the ESA-listed species that could occur in the Action Area is not available. This effects discussion relies on available scientific studies on the effects of noise on bird and mammal species.

5.2.1 Mammals

Sound levels above 90 dB may be associated with a number of behaviors such as retreat from the sound source, freezing, or a strong startle response (Manci et al.1988). If a noise arouses an animal

(i.e., gets their attention, wakes them, or increases their activity), the increased activity has the potential to affect its metabolic rate. The increased activity could deplete energetic reserves. A few studies have documented increases in activity after aircraft approaches, but the response was fairly mild, such as starting a few steps or walking away slowly from the site of the disturbance (Bowles 1995). Early studies of terrestrial mammals showed that noise levels of 120 A-weighted decibels (dBA) could damage mammals' ears, and levels of 95 dBA could cause temporary loss of hearing acuity.

Bell (1972) reviewed reports and studies of animal response to sonic booms. Specific reactions differ according to the species involved, whether the animal is alone or whether the animal has been previously exposed to sonic booms. Trampling, moving, raising the head, stampeding, jumping, and running are among the reactions reported. Reactions vary from boom to boom and are not predictable, but animal reactions to booms were found to be similar to their reactions to low-altitude subsonic airplane flights, helicopters, and sudden noises (Bell 1972).

Carnivores. It has been speculated that repeated aircraft overflight (e.g., surveillance flights along a pipeline) could affect large carnivores by causing changes in home ranges, foraging patterns, and breeding behavior (Dufour 1980). These possible effects have not been borne out in subsequent studies, and Bowles (1995a) indicated that acute exposure to noise (i.e., brief and occasional) only damaged an animals' hearing at levels above 140 dB.

Wolves have been shown to be disturbed by low-altitude flights that were 25 to 1,000 feet AGL. However they adapt to aircraft overflights and noise as long as they were not being hunted from aircraft (Dufour 1980). Incidental observations of wolves and bears exposed to fixed-wing aircraft and helicopters indicated a stronger reaction to helicopters. Wolves were less disturbed by helicopters than other large mammals such as wild ungulates, while individual grizzly bears showed the greatest response of any animal species observed (Manci et al. 1988). Wolves are known to inhabit areas with human disturbance but may adjust time-of-day activity or other behaviors (Frey 2018). This suggests that wolves may adapt behavior to temporary noise disturbances but are unlikely to show significant behavior change or other negative impacts from temporary overhead military flights.

Cats have one of the broadest hearing ranges among mammals whose hearing is known (Heffner and Heffner 1985). Larger cats are able to hear fainter lower-frequency sounds better than smaller species, allowing them to communicate more effectively over greater distances (Kitchener et al. 2010). Undomesticated cats rely on hearing to detect and capture prey. The potential for external noise to mask important detections for prey is unlikely for intermittent brief noise exposures such as military jet overflight.

Ungulates. Wild ungulates appear to be more sensitive to noise disturbance than domestic livestock (Manci et al. 1988). Ungulate reactions to aircraft overflights and noise are typically minor behavioral reactions. Behavioral reactions may be related to the history of disturbances by such things as humans and aircraft. Minor behavioral reactions would include turning to orient toward the aircraft. Moderate responses to disturbance may be nervous behaviors, such as trotting

a short distance. Escape behavior would represent a typical severe response, but it is rarely observed in response to overflights above 500 feet AGL (Bowles 1995; Dufour 1980).

Landon et al. (2003) evaluated whether Sonoran pronghorn used areas with noise levels produced by military aircraft on the Barry M. Goldwater Range, Arizona. They found that Sonoran pronghorn tend to select areas with the lower noise levels and avoid areas with the higher noise levels. However, whether pronghorn avoid these areas because of the noise or because of other human-related activities is unknown. In a number of studies of the endangered Sonoran pronghorn, behaviors were observed to be similar with and without anthropogenic stimuli with some minor change in activity during rotary-wing or multiple aircraft overflights. Animals quickly returned to activities, and the temporary change in behavior was not detrimental (Krausman et al. 2004; Krausman and Harris 2002). Overall, the data from this study found that behavior patterns of Sonoran pronghorn were similar with and without the presence of military stimuli (Krausman et al. 2004). Female ungulates with young may be more responsive to overflights than at other times of the year. Female desert bighorn sheep with lambs were more likely to exhibit vigilant behavior (Krausman et al. 1998) as were female caribou with calves (Murphy et al. 1993). Although few studies have been conducted on the response of wild ungulates to sonic booms, these disturbances appear to have little to no adverse effects. Workman et al. (1992) studied the physiological and behavioral responses of captive pronghorn, elk, and bighorn sheep to sonic booms. All three species exhibited an increase in heart rate that lasted for 30 to 90 seconds in response to their first exposure to a sonic boom. Behaviorally, the animals responded to their first exposure to a sonic boom by running a short distance (less than 30 feet reported for elk). After successive sonic booms, the heart rate response decreased greatly, and the animals remained alert but did not run. The authors suggested the animals became habituated in response to successive exposures (Workman et al. 1992).

Bats. The USFWS Species Status Assessment Reports for the Northern long-eared bat (USFWS 2022) and tricolored bat (USFWS 2021) concluded that anthropogenic activities, including noise and vibrations, are threatening to the species' roosting sites. Vibrations and noise over the top of a roosting cave can create disturbance and increase the risk of abandonment. Nocturnal mammals have the most sensitive hearing among terrestrial vertebrates; however, hibernating mammals are difficult to arouse with noise (Bowles 1995; Bowles et al. 1995). Studies have shown that bats are less likely to feed in areas with distracting noise sources, which overall affects their suitability for foraging areas (Schaub et al. 2008; Siemers and Schaub 2011).

Bat responses to aircraft noise could be similar to responses described for other mammals and would likely include startle or alerting to the noise source (Dufour 1980). Studies of the effects of noise on bats have not documented any behavioral responses to jet or other noise, including during hibernation (Dalton and Dalton 1993 and 3D/Environmental 1996a, as cited in Delaney 2002). Another concern for bat species would be masking of echolocation pulses that could disrupt flight or foraging. A study on New Zealand long-tailed bats found that low-level aircraft activity did not mask echolocation pulses since the aircraft noise was most intense at less than 10 kilohertz (kHz);

and, bat echolocation pulses are 40 kHz. There were no statistically significant differences in mean bat activity during and after overflights compared with pre-aircraft activity (Le Roux and Waas 2012).

Small Mammals. A study was conducted from 1991 to 1994 evaluating the effects of low-altitude aircraft overflights on small mammals, specifically heteromyid rodents, within the Barry M. Goldwater Range, Arizona (Bowles et al. 1995). The results of this study indicated that many of the small mammal species within the study area spent the day in burrows or dens, which was thought to protect them from aircraft noise. However, the A-weighted sound exposure level in the burrows averaged less than 3 dB lower than at 1.2 meters above the surface, so the burrows only provided a buffer from the noise. Significant attenuation was seen only above 1,300 hertz (Hz), and heteromyid rodents are able to hear well down to 100 Hz and were therefore likely to hear the aircraft sounds in their burrows (Bowles et al. 1995). Although the data suggested that the aircraft noise reached the small mammals in their burrows, no significant differences in small mammal species diversity, population numbers, and animal weights were found between the sound-exposed areas and control areas not exposed to sound. This suggests that the small rodents' populations were not affected by aircraft noise. Few field studies on the effects of aircraft noise on small mammals have been conducted, but those that have suggest no population level effects from airport noise (Bowles 1995).

5.2.2 Birds

In comparison to humans, birds typically hear less well over a narrower frequency bandwidth (Dooling and Popper 2007). The majority of the published literature on bird hearing focuses on terrestrial birds and their ability to hear in air. A review of 32 terrestrial and marine species reveals that birds generally have greatest hearing sensitivity between 1 and 4 kHz, and very few can hear below 20 Hz (Beason 2004). Most concerns related to the effects of noise on birds involve the masking of communications among members of the same species, reducing the detectability of biologically relevant signals, including the sounds of predators and prey, and temporarily or permanently decreasing hearing sensitivity (Dooling and Popper 2007). A study of captive zebra finches given a choice of foraging in noisy and quiet areas found no significant difference in the amount of time birds spent in noisy and quiet areas though those foraging in noisy areas spent more time being vigilant, resulting in less efficient foraging than those in quiet areas (Evans et al. 2018). In a study of ovenbirds, Habib et al. (2007) found chronic noise exposure near compressor stations affected pairing success, attributable to masking and distorting the song of breeding males on territories. In birds, hearing loss is difficult to characterize since birds regenerate hair cells even after substantial losses that can result in temporary threshold shifts (Bowles 1995).

In a literature review of raptor responses to aircraft noise, Manci et al. (1988) found that most raptors did not show a negative response to overflights. When negative responses were observed, they were predominantly associated with rotor-winged aircraft or jet aircraft that were repeatedly passing within 0.5 mile of a nest. Ellis et al. (1991) performed a study to estimate the effects of low-level military jet aircraft and mid- to high-altitude sonic booms (both actual and simulated)

on nesting peregrine falcons and seven other raptors (common black hawk, Harris' hawk, zone-tailed hawk, red-tailed hawk, golden eagle, prairie falcon, and bald eagle). Re-occupancy and productivity rates were within or above expected values for self-sustaining populations. In a 1997 helicopter overflight study, Mexican spotted owls did not flush from a nest or perch unless a helicopter was as close as 330 feet (Delaney et al. 1999). Researchers in Colorado found that Mexican spotted owl responses to F-16 overflights were often less significant than responses to naturally occurring events such as thunderstorms. Similarly, Delaney et al. (1999) found that Mexican spotted owls quickly returned to normal day-roosting behavior after being disturbed by helicopters. A 6-year study within the Gila National Forest found that low-level aircraft overflight had no effect on occupancy of Mexican spotted owl activity centers and found no correlations among measures of aircraft exposure and nesting success (Air Combat Command [ACC] 2008). Movement and flight as a behavioral response to overflights has been treated as a potential concern since it exposes the owl, chicks, or eggs to predation. However, the results of the 6-year study showed that Mexican spotted owl flights in response to military jet overflights were so rare that the rate could not be distinguished from normal rates of flight. In fact, females were never observed flushing from nests in response to military jets or other low-flying aircraft. Observations during this study confirmed that flight and flushing responses are close-range defensive responses (ACC 2008).

Manci et al. (1988) noted that aircraft can be particularly disturbing to waterfowl, like the whooping crane. The USFWS Waterfowl Management Handbook (Korschgen and Dahlgren 1992) lists "loud noise" caused by aircraft as the top disturbance category for waterfowl. Several studies showed that migratory waterfowl (e.g., ducks and geese) expend more energy when exposed to repeated aircraft overflights, at least in the short term (Bowles 1995). Waterfowl are sensitive to disturbance because of their aggregation into large flocks during their migration and overwintering. In the study area, concentrations of waterfowl would be present during seasonal migrations along the Pacific Flyway, where they would stop over to feed and rest in large waterbodies. When at rest, the flocks are typically in water bodies or wetlands exposed to the open sky and subject to aerial and ground predation. Taking flight is their defense against either type of predation. Waterfowl flocks seem to be as sensitive as their most responsive individual in the flock, so that larger flocks would have a greater chance of responding than small flocks (Bowles 1995).

A study performed on black ducks and wood ducks showed that ducks habituated to both visual and auditory aircraft activity over the course of 17 days (Conomy et al. 1998), suggesting that waterfowl may initially react to aircraft activity, but the disturbances would be unlikely to represent significant harm over time.

In a study evaluating the impacts of military and civilian overflights on water birds, including least terns, with a MOA in North Carolina, no evidence was found that visual or acoustic stimuli from military aircraft flying between 2,100 feet AGL and 3,500 feet AGL elicited behavioral stress responses that would negatively impact nesting colonial waterbird demographic rates (Hillman 2012).

Birds occasionally run, fly, or crowd in the presence of a sonic boom (Bell 1972). Bell (1972) also examined the effects of booms on eggs hatched under commercial conditions, and no effects on hatching success were found. Teer and Truett (1973) conducted a study near Glen Rose, Texas to determine whether occurrence of sonic booms created by overflying aircraft were adversely affecting reproduction of wild birds. The examination area was subject to sonic booms occurring 2 or 3 times a week, and the control area was essentially free from sonic boom disturbance. In the final analysis, there was no evidence found that sonic boom disturbance affected phases of bird reproduction and the overpressures had no effects on hatching success, growth rates, or mortality (Teer and Truett 1973).

5.3 EFFECTS TO SPECIES

5.3.1 Black-footed Ferret

The black-footed ferret has the potential to occur beneath the PR 4 MOA, where it is designated an experimental non-essential population. The floor of the PR 4 MOA is 12,000 feet and would remain unchanged with the Proposed Action; therefore, low-level military overflight would not occur. The maximum sound level that could be experienced is 86 dB, as is currently the case. **Table 5.3-1** provides a summary of the potential subsonic noise exposure, probability of exposure in a given week (during day-to-day training and LFEs), and effects on the species (see **Table 2.2-1** for a comparison to existing conditions). Sonic booms could occur more frequently but would be limited to LFEs (maximum of 30 days per year). **Table 2.2-5** illustrates the maximum overpressure that could be experienced at various altitudes. A range of overpressures would continue to be possible beneath PR 4 depending on the type of aircraft, up to a maximum of 5.37 psf. Supersonic flight can occur as low as 12,000 feet (the authorization is 10,000 feet; but the aircraft cannot fly below the MOA floor) for fighter aircraft and 20,000 feet for bomber aircraft but 95 percent would occur in the ATCAAs, above 18,000 feet.

Table 5.3-1 Summary of Possible Noise Effects on Black-footed ferret

Airspace	Floor (feet)	Availability	L_{max} (dB)	Probability	Determination
PR 4	12,000	Day-to-day LFE	86	Day-to-Day: 2% LFE:11%	NLAA

Legend: % = percent; dB = decibel; LFE=large force exercise; L_{max} = Maximum Sound Level; NLAA = not likely to adversely affect; PR=Powder River

As discussed in **Section 5.2**, black-footed ferrets could exhibit temporary behavioral responses to aircraft overflights, which would be brief and uncommon, and localized. Though the potential for exposure to overflights is unlikely, the proposed overflights could disturb individuals overflown potentially resulting in behavioral effects. Effects to this species would be insignificant and discountable. *Therefore, the Proposed Action may affect but is not likely to adversely affect experimental non-essential populations of the black-footed ferret.*

5.3.2 Northern Long-eared Bat

The endangered Northern long-eared bat has the potential to occur beneath: PR 1–4 MOAs, Gap A–C MOAs, and the Gateway East and West ATCAAs. There is no change to any of the airspace floors or the frequency of day-to-day operations. LFEs would occur up to 30 days per year. **Table 5.3-2** provides a summary of the potential subsonic noise exposure, probability of exposure in a given week (during day-to-day training and LFE), and effects on the species (see **Table 2.2-1** for a comparison to existing conditions). Sonic booms could occur more frequently but would be limited to LFEs (maximum of 30 days per year). **Table 2.2-5** illustrates the maximum overpressure that could be experienced at various altitudes. A range of overpressures would continue to be possible beneath depending on the type of aircraft, up to a maximum of 5.37 psf. Supersonic flight can occur as low as 10,000 feet for fighter aircraft and 20,000 feet for bomber aircraft but 95 percent would occur in the ATCAAs, above 18,000 feet.

Table 5.3-2 Summary of Possible Noise Effects on Northern Long-eared Bat

Airspace	Floor (feet)	Availability	L_{max} (dB)	Probability	Determination
PR 1	500	Day-to-day LFE	124	Day-to-Day: 1% LFE: 2%	NLAA
PR 2	500	Day-to-day LFE	124	Day-to-Day: 1% LFE: 2%	NLAA
PR 3	500	Day-to-day LFE	124	Day-to-Day: 1% LFE: 2%	NLAA
PR 4	12,000	Day-to-day LFE	86	Day-to-Day: 2% LFE: 11%	NLAA
Gap A	500	LFE	124	LFE: 2%	NLAA
Gap B	500	LFE	124	LFE: 2%	NLAA
Gap C	12,000	LFE	86	LFE: 11%	NLAA
Gateway East ATCAA	18,000	Day-to-day LFE	80	Day-to-Day: 0[1] LFE: 0[1]	NLAA
Gateway West ATCAA	18,000	Day-to-day LFE	80	Day-to-Day: 0[1] LFE: 0[1]	NLAA

Note: [1] no low-level overflights would occur in ATCAAs
Legend: % = percent; dB = decibel; LFE=large force exercise; L_{max} = Maximum Sound Level; NLAA = not likely to adversely affect; PR=Powder River

As discussed in **Section 5.2,** it is possible that bats could exhibit temporary behavioral responses to aircraft overflights, but these would be brief, uncommon, and localized. Though the potential for exposure to overflights is unlikely, the proposed overflights could disturb individuals overflown. Effects to this species would be insignificant and discountable. *Therefore, the Proposed Action may affect but is not likely to adversely affect Northern long-eared bats.*

5.3.3 Tricolored Bat

The proposed endangered tricolored bat has the potential to occur beneath the Gateway West ATCAA. There is no change to any of the airspace floors or the frequency of day-to-day operations. LFEs would occur up to 30 days per year. **Table 5.3-3** provides a summary of the

potential subsonic noise exposure, probability of exposure in a given week (during day-to-day training and LFE), and effects on the species (see **Table 2.2-1** for a comparison to existing conditions). Sonic booms could occur more frequently but would be limited to LFEs (maximum of 30 days per year). **Table 2.2-5** illustrates the maximum overpressure that could be experienced at various altitudes. A range of overpressures would continue to be possible beneath depending on the type of aircraft, up to a maximum of 5.31 psf.

Table 5.3-3 Summary of Possible Noise Effects on Tricolored Bat

Airspace	Floor (feet)	Availability	L_{max} (dB)	Probability	Determination
Gateway West ATCAA	18,000	Day-to-day LFE	80	Day-to-Day: 0[1] LFE: 0[1]	NLAA

Note: [1] no low-level overflights would occur in ATCAAs
Legend: dB = decibel; LFE=large force exercise; L_{max} = Maximum Sound Level; NLAA = not likely to adversely affect

As discussed in **Section 5.2**, it is possible that bats could exhibit temporary behavioral responses to aircraft overflights, but these would be brief, uncommon, and localized. Though the potential for exposure to overflights is unlikely, the proposed overflights could disturb individuals overflown. Effects to this species would be insignificant and discountable. *Therefore, the Proposed Action may affect but is not likely to adversely affect the species.*

5.3.4 Piping Plover

The threatened piping plover has the potential to occur beneath the PR 3–4 MOAs, Gap C MOA, and the Gateway East ATCAA. There is no change to any of the airspace floors or the frequency of day-to-day operations. LFEs would occur up to 30 days per year. **Table 5.3-4** provides a summary of the potential subsonic noise exposure, probability of exposure in a given week (during day-to-day training and LFE), and effects on the species (see **Table 2.2-1** for a comparison to existing conditions). Sonic booms could occur more frequently but would be limited to LFEs (maximum of 30 days per year). **Table 2.2-5** illustrates the maximum overpressure that could be experienced at various altitudes. A range of overpressures would continue to be possible beneath depending on the type of aircraft, up to a maximum of 5.37 psf. Supersonic flight can occur as low as 10,000 feet for fighter aircraft and 20,000 for bomber aircraft but 95 percent would occur in the ATCAAs, above 18,000 feet.

Table 5.3-4 Summary of Possible Noise Effects on Piping Plover

Airspace	Floor (feet)	Availability	L_{max} (dB)	Probability	Determination
PR 3	500	Day-to-day LFE	124	Day-to-Day: 1% LFE: 2%	NLAA
PR 4	12,000	Day-to-day LFE	86	Day-to-Day: 2% LFE: 11%	NLAA
Gap C	12,000	LFE	86	LFE: 11%	NLAA
Gateway East ATCAA	18,000	Day-to-day LFE	80	Day-to-Day: 0[1] LFE: 0[1]	NLAA

Note: [1] no low-level overflights would occur in ATCAAs
Legend: % = percent; dB = decibel; LFE=large force exercise; L_{max} = Maximum Sound Level; NLAA = not likely to adversely affect; PR=Powder River

Per **Section 5.1**, the likelihood of bird aircraft strike is discountable. As discussed in **Section 5.2**, birds could exhibit temporary behavioral responses to aircraft overflights, which could also mask intraspecific communication and reduce detectability of predators. Though the species is rare, and potential for exposure to overflights is extremely unlikely, the proposed overflights could disturb individuals overflown. Effects to this species would be insignificant and discountable. *Therefore, the Proposed Action may affect but is not likely to adversely affect piping plovers*.

5.3.5 Rufa Red Knot

The threatened rufa red knot has the potential to occur beneath the PR 2–4 MOAs, Gap B–C MOAs, and Gateway East and West ATCAAs. There is no change to any of the airspace floors or the frequency of day-to-day operations. LFEs would occur up to 30 days per year. **Table 5.3-5** provides a summary of the potential subsonic noise exposure, probability of exposure in a given week (during day-to-day training and LFE), and effects on the species (see **Table 2.2-1** for a comparison to existing conditions). Sonic booms could occur more frequently but would be limited to LFEs (maximum of 30 days per year). **Table 2.2-5** illustrates the maximum overpressure that could be experienced at various altitudes. A range of overpressures would continue to be possible beneath depending on the type of aircraft, up to a maximum of 5.37 psf. Supersonic flight can occur as low as 10,000 feet for fighter aircraft and 20,000 for bomber aircraft but 95 percent would occur in the ATCAAs, above 18,000 feet.

Table 5.3-5 Summary of Possible Noise Effects on Rufa Red Knot

Airspace	Floor (feet)	Availability	L_{max} (dB)	Probability	Determination
PR 2	500	Day-to-day LFE	124	Day-to-Day: 1% LFE: 2%	NLAA
PR 3	500	Day-to-day LFE	124	Day-to-Day: 1% LFE: 2%	NLAA
PR 4	12,000	Day-to-day LFE	86	Day-to-Day: 2% LFE: 11%	NLAA
Gap B	500	LFE	124	LFE: 2%	NLAA
Gap C	12,000	LFE	86	LFE: 11%	NLAA

Airspace	Floor (feet)	Availability	L_{max} (dB)	Probability	Determination
Gateway East ATCAA	18,000	Day-to-day LFE	80	Day-to-Day: 0[1] LFE: 0[1]	NLAA
Gateway West ATCAA	18,000	Day-to-day LFE	80	Day-to-Day: 0[1] LFE: 0[1]	NLAA

Note: [1] no low-level overflights would occur in ATCAAs
Legend: % = percent; dB = decibel; LFE=large force exercise; L_{max} = Maximum Sound Level; NLAA = not likely to adversely affect; PR=Powder River

Per **Section 5.1**, the likelihood of bird aircraft strike is discountable As discussed in **Section 5.2**, birds could exhibit temporary behavioral responses to aircraft overflights, which could also mask intraspecific communication and reduce detectability of predators. Though the species is rare and only has the potential to occur during migration, and potential for exposure to overflights is extremely unlikely, the proposed overflights could disturb individuals overflown. Effects to this species would be insignificant and discountable. *Therefore, the Proposed Action may affect but is not likely to adversely affect rufa red knots.*

5.3.6 Whooping Crane

The endangered whooping crane has the potential to occur beneath the PR 3–4 MOAs, Gap C MOA, and the Gateway East ATCAA. There is no change to any of the airspace floors or the frequency of day-to-day operations. LFEs would occur up to 30 days per year. **Table 5.3-6** provides a summary of the potential subsonic noise exposure, probability of exposure in a given week (during day-to-day training and LFE), and effects on the species (see **Table 2.2-1** for a comparison to existing conditions). Sonic booms could occur more frequently but would be limited to LFEs (maximum of 30 days per year). **Table 2.2-5** illustrates the maximum overpressure that could be experienced at various altitudes. A range of overpressures would continue to be possible beneath depending on the type of aircraft, up to a maximum of 5.37 psf. Supersonic flight can occur as low as 10,000 feet for fighter aircraft and 20,000 for bomber aircraft but 95 percent would occur in the ATCAAs, above 18,000 feet.

Table 5.3-6 Summary of Possible Noise Effects on Whooping Crane

Airspace	Floor (feet)	Availability	L_{max} (dB)	Probability	Determination
PR 3	500	Day-to-day LFE	124	Day-to-Day: 1% LFE: 2%	NLAA
PR 4	12,000	Day-to-day LFE	86	Day-to-Day: 2% LFE: 11%	NLAA
Gap C	12,000	LFE	86	LFE: 11%	NLAA
Gateway East ATCAA	18,000	Day-to-day LFE	80	Day-to-Day: 0[1] LFE: 0[1]	NLAA

Note: [1] no low-level overflights would occur in ATCAAs
Legend: % = percent; dB = decibel; LFE=large force exercise; L_{max} = Maximum Sound Level; NLAA = not likely to adversely affect; PR=Powder River

Per **Section 5.1**, the likelihood of bird aircraft strike is discountable As discussed in **Section 5.2**, birds could exhibit temporary behavioral responses to aircraft overflights, which could also mask intraspecific communication and reduce detectability of predators. Though the species is rare and only has the potential to occur during migration, and potential for exposure to overflights is extremely unlikely, the proposed overflights could disturb individuals overflown. Effects to this species would be insignificant and discountable. *Therefore, the Proposed Action may affect but is not likely to adversely affect whooping cranes.*

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6.0 DETERMINATION

In accordance with Section 7(c) of the ESA, the DAF has analyzed the effects of optimizing the MOAs/ATCAAs on federally listed species within the Action Area (**Table 6.1-1**).

Based on the evaluation presented above, the DAF has made the following determination of effects on listed species from implementation of the Proposed Action within the Action Area.

Table 6.1.1 Summary of Effects Determinations for Federally-Listed Species in the Action Area

Species	PR 1 MOA/ATCAA	PR 2 MOA/ATCAA	PR 3 MOA/ATCAA	PR 4 MOA/ATCAA	Gap A MOA/ATCAA	Gap B MOA/ATCAA	Gap C MOA/ATCAA	Gateway East ATCAA	Gateway West ATCAA
Black-footed ferret				NLAA					
Northern long-eared bat	NLAA	NLAA	NLAA	NLAA	NLAA	NLAA	NLAA	NLAA	NLAA
Tricolored bat									NLAA
Piping plover			NLAA	NLAA			NLAA	NLAA	
Rufa red knot		NLAA	NLAA	NLAA		NLAA	NLAA	NLAA	NLAA
Whooping crane			NLAA	NLAA			NLAA	NLAA	

Legend: ATCAA = Air Traffic Control Assigned Airspace; MOA = Military Operations Area; NLAA=Not Likely to Adversely Affect

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8.0 LIST OF PREPARERS

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
420 S Garfield Ave, Suite 400
Pierre, South Dakota 57501-5408

In Reply Refer to:
FWS/R6/PRTC Optimization

July 14, 2026

Mr. John Carreiro
Natural Resources Manager
U.S. Air Force
2125 Scott Drive
Ellsworth AFB, South Dakota 57706

Dear Mr. Carreiro:

Thank you for your letter received June 15, 2026, requesting concurrence for the proposed actions that would improve day-to-day operations and training capability of large force exercises (LFE) in the Powder River Training Complex. The Department of Air Force (DAF) is proposing to raise the ceiling of most used Air Traffic Control Assigned Airspaces from the current flight level of 26,000 feet to flight level of 60,000 feet for both day-to-day operations and during LFEs. The DAF is also proposing to increase the total number of days allowed for LFEs from 10 to 30 days. Lastly, the DAF is proposing to remove the current quarterly restriction for LFEs to help increase readiness/participation and decrease mobilization effort and cost. This project is located in Montana, North Dakota, South Dakota, and Wyoming. This letter represents our collective response to the proposed action.

The DAF requested Service concurrence with your "may affect, not likely to adversely affect" determination for the Black-footed Ferret (*Mustela nigripes*), Northern Long Eared Bat (*Myotis septentrionalis*), Piping Plover (*Chardrius melodus*), Rufa Red Knot (*Calidris canutus rufa*), Whooping Crane (*Grus americana*) and proposed endangered Tricolored Bat (*Perimyotis subflavus*). In accordance with Section 7 of the Endangered Species Act of 1973, as amended (ESA) (16 U.S.C. 1531 *et seq*.), we concur with your determination.

DAF determined that there will be "no effect" to, the Pallid Sturgeon (*Scaphirhynchus albus*), Ute Ladies-tresses (*Spiranthes diluvialis*), proposed endangered Suckley's cuckoo bumble bee (*Bombus suckleyi*), and proposed threatened monarch butterfly (*Danaus plexippus*) and western regal fritillary (*Argynnis idalia occidentalis*). There is no requirement under the implementing regulations of the ESA (50 CFR part 402) for action agencies to receive Service concurrence with "no effect" determinations, therefore the responsibility for "no effect" determinations remain with the DAF. We recommend you document your "no effect" determination and retain the documentation in your decisional record.

Mr. John Carreiro

The Service appreciates the opportunity to provide comments. If changes are made in the project plans or operating criteria, or if additional information becomes available, the Service must be informed so that the above determinations can be reconsidered. If you have any questions about these comments, please contact Dylan Turner of this office at (605) 280-6704.

Sincerely,

LUKE TOSO

Digitally signed by LUKE TOSO
Date: 2026.07.14 11:20:26 -05'00'

Luke Toso
Acting North and South Dakota Field Supervisor

APPENDIX G
NATIONAL HISTORIC PRESERVATION ACT CONSULTATION CORRESPONDENCE

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 28TH BOMB WING (AFGSC)
ELLSWORTH AIR FORCE BASE SOUTH DAKOTA

June 14, 2026

Colonel Jonathan A. Keller, USAF
Commander
1958 Scott Dr
Ellsworth AFB SD 57706-4710

Mr. RJ Hillman
Montana State Historic Preservation Office
P.O. Box 201201
Helena MT 59620

Dear Mr. Hillman

Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, the Department of the Air Force (DAF) is preparing an Environmental Impact Statement (EIS) to evaluate the potential environmental effects of addressing shortfalls in aircrew readiness in the Powder River Training Complex (PRTC). The PRTC is the training airspace used by aircrews at Ellsworth Air Force Base (AFB) and Minot AFB for day-to-day training and it is also used for Large Force Exercises (LFEs) a few times a year that bring together joint forces to participate in realistic combat training scenarios. The PRTC was originally established in 2015 and overlies parts of South Dakota, North Dakota, Wyoming, and Montana. The proposed action includes improvements to the airspace structure to address shortfalls in day-to-day training and increasing LFE capability to meet emerging threats to National Security.

Day-to-day training operations at PRTC are currently limited to or below Flight Level (FL) 260 (approximately 26,000 feet). This precludes training at higher altitudes, which is a necessity to accomplish certain flying missions. To improve day-to-day training, the DAF is proposing to raise the available altitude of some of the training airspace to FL600 (approximately 60,000 feet).

PRTC hosts LFEs, which include bomber aircraft assigned to Ellsworth and Minot AFBs, as well as fighter, surveillance, command/control, and refueling aircraft from units across the country. LFEs are designed to prepare servicemen and women for real-world scenarios. Longer duration exercises enable units to achieve complex realistic training. Longer durations also allow non-local units to meet multiple training requirements, justifying the cost of moving non-local units and their support equipment to participate in the exercises. Ellsworth AFB is currently authorized to host up to four LFEs annually (limited to 10 days per year with no more than 3 days per quarter) and the altitude for these events is also limited to or below FL260 (approximately 26,000 feet). These limitations (in duration and altitude) reduce the complexity for the LFE scenarios and deter non-local units from participating due to high mobilization effort and cost. The DAF is proposing to raise the altitude of the PRTC up to FL600 (approximately 60,000 feet) for LFEs and to increase the total LFE days to 30 days per year without a quarterly restriction. This modification would accommodate a 2-week LFE which would maximize complexity of the event and participation.

The DAF is requesting to continue consultation pursuant to Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations at 36 CFR Part 800, Protection of Historic Properties.

Sample_SHPO Cover Letter

The DAF has determined that the project is an undertaking pursuant to Section 106. The DAF received your concurrence with the Area of Potential Effects (APE) on August 5, 2025.

For this undertaking, DAF identified historic properties within the four states (and associated counties) within the APE. The historic properties include architectural resources, archaeological resources, and traditional cultural places (TCPs). The list was developed from databases of properties listed in or eligible for listing in the National Register of Historic Places (NRHP) as well as state registers of historic properties and National Historic Landmarks (NHLs).

As described in Attachment 1, given the existing avoidances for specific properties beneath PRTC, the short duration of the potential exposure to low-level overflights (noise and visual), no potential for structural damage, and the rarity of these events for any given point on the ground, there would be no adverse effect to non-NHL historic properties in accordance with 36 CFR 800.5(b).

With regards to NHLs, there would be no low-level overflights at six of the seven NHLs. While Medicine Rocks State Park has the potential to experience a low-level overflight during an LFE, as is the current situation, the probability of this occurring would still be relatively rare and as such would not result in an adverse effect pursuant to 36 CFR section 800.5(b).

The DAF invited 24 Tribes into Government-to-Government consultation concerning TCPs. There are three TCPs that do not have current avoidance measures. All of these are currently overflown during day-to-day operations and LFEs. The undertaking would not substantially change the existing environment and these places would continue to be rarely overflown at low-level. The associated noise from these overflights would not be at a level to cause structural damage, but their visual presence could be considered annoying to visitors or individuals participating in ceremonies. As is the current practice, Ellsworth AFB would establish temporary or seasonal avoidances for specific events or ceremonies if given notice by the Tribe(s).

Attached for your review is a detailed assessment of these effects that support the DAF's findings and determinations (Attachment 1). The DAF appreciates your concurrence with these determinations within 30 days of receipt of this letter. My point of contact for this project is Mr. John Carreiro, Cultural Resources Manager, who can be reached via email at john.carreiro@us.af.mil, phone at 605-385-2690, or mail at 28 CES/CIE, 2125 Scott Dr, Ellsworth AFB SD 57706. Please reach out if you have any questions or would like to discuss this project in more detail. I look forward to receiving any input you may have regarding this endeavor and our continued consultation. Thank you in advance for your assistance in this effort.

Sample SHPO Cover Letter

Sincerely

KELLER.JONATHAN.ABNER.1242491714

Digitally signed by KELLER.JONATHAN.ABNER.1242491714
Date: 2026.06.14 14:04:53 -06'00'

JONATHAN A. KELLER, Colonel, USAF
Commander

1 Attachment:
Section 106 Assessment of Effects

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 28TH BOMB WING (AFGSC)
ELLSWORTH AIR FORCE BASE SOUTH DAKOTA

Colonel Jonathan A. Keller, USAF
Commander
1958 Scott Dr
Ellsworth AFB SD 57706-4710

Chairperson Durell Cooper
Apache Tribe of Okalahoma
511 E Colorado Dr
P.O. Box 1330
Anadarko, OK 73005

Dear Chairperson Cooper

Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, the Department of the Air Force (DAF) is preparing an Environmental Impact Statement (EIS) to evaluate the potential environmental effects of addressing shortfalls in aircrew readiness in the Powder River Training Complex (PRTC). The PRTC is the training airspace used by aircrews at Ellsworth Air Force Base (AFB) and Minot AFB for day-to-day training and it is also used for Large Force Exercises (LFEs) a few times a year that bring together joint forces to participate in realistic combat training scenarios. The PRTC was originally established in 2015 and overlies parts of South Dakota, North Dakota, Wyoming, and Montana. The proposed action includes improvements to the airspace structure to address shortfalls in day-to-day training and increasing LFE capability to meet emerging threats to National Security.

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Sample_Tribe Cover Letter

The DAF is requesting to continue consultation pursuant to Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations at 36 CFR Part 800, Protection of Historic Properties. The DAF previously reached out to you in July 2025 concurrent with publication of the Notice of Intent (NOI) to prepare the EIS. The DAF has determined that the project is an undertaking pursuant to Section 106.

For this undertaking, DAF identified historic properties within the four states (and associated counties) within the Area of Potential Effect (APE). The historic properties include architectural resources, archaeological resources, and traditional cultural places (TCPs). The list was developed from databases of properties listed in or eligible for listing in the National Register of Historic Places (NRHP) as well as state registers of historic properties and National Historic Landmarks (NHLs).

As described in Attachment 1, given the existing avoidances for specific properties beneath PRTC, the short duration of the potential exposure to low-level overflights (noise and visual), no potential for structural damage, and the rarity of these events for any given point on the ground, there would be no adverse effect to non-NHL historic properties in accordance with 36 CFR 800.5(b).

With regards to NHLs, there would be no low-level overflights at six of the seven NHLs. While Medicine Rocks State Park has the potential to experience a low-level overflight during an LFE, as is the current situation, the probability of this occurring would still be relatively rare and as such would not result in an adverse effect pursuant to 36 CFR section 800.5(b).

There are three known TCPs that do not have current avoidance measures. All of these are currently overflown during day-to-day operations and LFEs. The undertaking would not substantially change the existing environment and these places would continue to be rarely overflown at low-level. The associated noise from these overflights would not be at a level to cause structural damage, but their visual presence could be considered annoying to visitors or individuals participating in ceremonies. As is the current practice, Ellsworth AFB would establish temporary or seasonal avoidances for specific events or ceremonies if given notice by the Tribe.

Attached for your review is a detailed assessment of these effects that support the DAF's findings and determinations (Attachment 1). While there is no formal timeline for this consultation effort, we respectfully request you provide your comments or identify additional properties we should consider within 30 days of receipt of this letter to align with the mandated NEPA timeline. My point of contact for this project is Mr. John Carreiro, Cultural Resources Manager, who can be reached via email at john.carreiro@us.af.mil, phone at 605-385-2690, or mail at 28 CES/CIE, 2125 Scott Dr, Ellsworth AFB SD 57706. Please reach out if you have any questions or would like to discuss this project in more detail. I look forward to receiving any input you may have regarding this endeavor and our continued consultation. Thank you in advance for your assistance in this effort.

Sample_Tribe Cover Letter

Sincerely

KELLER.JONATHAN.ABNER.1242491714

Digitally signed by KELLER.JONATHAN.ABNER.1242491714
Date: 2026.06.14 14:06:36 -06'00'

JONATHAN A. KELLER, Colonel, USAF
Commander

1 Attachment:
Section 106 Assessment of Effects

NATIONAL HISTORIC PRESERVATION ACT SECTION 106

CONSULTATION DOCUMENTATION

TO SUPPORT THE

ENVIRONMENTAL IMPACT STATEMENT FOR OPTIMIZATION OF POWDER RIVER TRAINING COMPLEX

ELLSWORTH AIR FORCE BASE SOUTH DAKOTA

April 2026

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AGL	above ground level
APE	Area of Potential Effects
ATCAA	Air Traffic Control Assigned Airspaces
C.F.R.	Code of Federal Regulations
DAF	Department of the Air Force
dB	decibel
DoD	Department of Defense
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
FL	flight level
LFE	Large Force Exercise
L_{max}	Maximum Sound Level
MOA	Military Operations Area
MSL	mean sea level
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Properties
psf	pounds per square foot
PR	Powder River
PRTC	Powder River Training Complex
ROD	Record of Decision
SHPO	State Historic Preservation Office
TCP	traditional cultural place
TTPs	Tactics, Techniques, and Procedures

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1.0 DESCRIPTION OF PROPOSED UNDERTAKING

The Powder River Training Complex (PRTC) is a group of Military Operations Areas (MOAs) and Air Traffic Control Assigned Airspaces (ATCAAs), which overlie parts of South Dakota, North Dakota, Wyoming, and Montana. Currently it is the day-to-day training complex (Monday through Friday) for aircrews operating B-1 aircraft from Ellsworth Air Force Base (AFB) and B-52 aircraft from Minot AFB. The PRTC also hosts Large Force Exercises (LFEs) which are discrete training events that bring together a variety of aircrews and support services from local and non-local units to train together simulating realistic combat missions.

The Department of the Air Force (DAF) is proposing to alleviate training shortfalls and address evolving training needs for aircrews by requesting that the Federal Aviation Administration (FAA) implement airspace modifications to the PRTC.

1.1 BACKGROUND

An appropriate training environment is required by the Department of Defense (DoD) National Defense Strategy. Each type of aircraft has a set of practices used by pilots to ensure effective, safe, and efficient operations known as Tactics, Techniques, and Procedures (TTPs). As the type and sophistication of threats to National Security have evolved, so has the National Defense Strategy, resulting in changes to aircraft capabilities and weapons systems. These advanced capabilities have led to changes in the TTPs, which in turn drive training requirements and the airspace needed to meet those requirements.

MOAs and ATCAAs are units of airspace with lateral and vertical limits that are designated to contain non-hazardous military flight activities. The vertical limits of MOAs can extend from ground level to 18,000 feet. ATCAAs exist from 18,000 feet up to a defined ceiling and are often associated with a MOA below.

The PRTC is comprised of several MOAs and ATCAAs used for day-to-day training and a few LFEs per year (**Figure 1.1-1**). All airspace shown on **Figure 1.1-1** can be used during LFEs. Day-to-day training is limited to Powder River (PR) 1, 2, 3, and 4 MOAs/ATCAAs and the Gateway West ATCAA. The PR MOAs are vertically segmented into a low and high MOA and include an ATCAA above. This provides a combined vertical training space from 500 feet above ground level (AGL) up to Flight Level (FL) 260 which is approximately 26,000 feet[1]. The Gateway West and East ATCAAs do not have MOAs below and only provide vertical training space of FL180 to FL260, which is approximately 18,000 feet to 26,000 feet. See **Figure 1.1-2** for a three-dimensional view of the PRTC to see how these components vertically stack upon each other. The Gap MOAs and their associated ATCAAs are designed (and only activated) for LFEs, to provide larger contiguous airspace for these integrated exercises. Day-to-day these deactivated spaces provide corridors between the PR MOAs/ATCAAs for other air traffic to pass without conflicting with military training. **Table 1.1-1** provides the specific parameters of all the PRTC airspace components.

Day-to-day training operations and LFEs at PRTC are currently limited to or below FL260 (approximately 26,000 feet). This precludes training at higher altitudes, which is a necessity to accomplish certain flying missions. Additionally, LFEs are currently limited to 10 days per year and no more than 3 days per quarter. This short duration limits the complexity and effectiveness of these training events. These are the contributing factors to the existing shortfalls that are being addressed with the Proposed Action.

1.1.1 Establishment of PRTC and Consultation History

The establishment and use of the PRTC as it currently exists was evaluated in the *Environmental Impact Statement (EIS) for Powder River Training Complex* and implemented by a Record of Decision (ROD) signed in January 2015 (DAF 2015). National Historic Preservation Act (NHPA) Section 106 consultation for that effort was completed in 2014 prior to the ROD with all four State Historic Preservation Offices (SHPOs).

A Programmatic Agreement among Ellsworth AFB, the SHPOs of Montana, North Dakota, South Dakota, and Wyoming, and the Advisory Council on Historic Preservation was developed in 2015. The Agreement, which has since expired, outlined communication protocols and reporting requirements between the consulting parties, and stipulated certain avoidance, minimization, or mitigation of adverse effects. Ellsworth AFB has adhered to all mitigations identified in that Agreement despite expiration of the signed document. An updated Programmatic Agreement will be developed concurrently with the Section 106 consultation.

[1] Altitude references for aircraft operations are presented in several units of measure:

- Above ground level (AGL) references are usually used at lower altitudes (almost always below 5,000 feet), when clearance from terrain is more of a concern for aircraft operation.
- Mean sea level (MSL) altitudes are used in aviation when operating at or below 18,000 feet when clearance from terrain is less of a concern for aircraft operation.
- Flight Level (FL) is used to describe the cruising altitudes for aircraft traveling long distances above 18,000 feet. Flight Levels are given in hundreds of feet, e.g. FL300 is 30,000 feet.

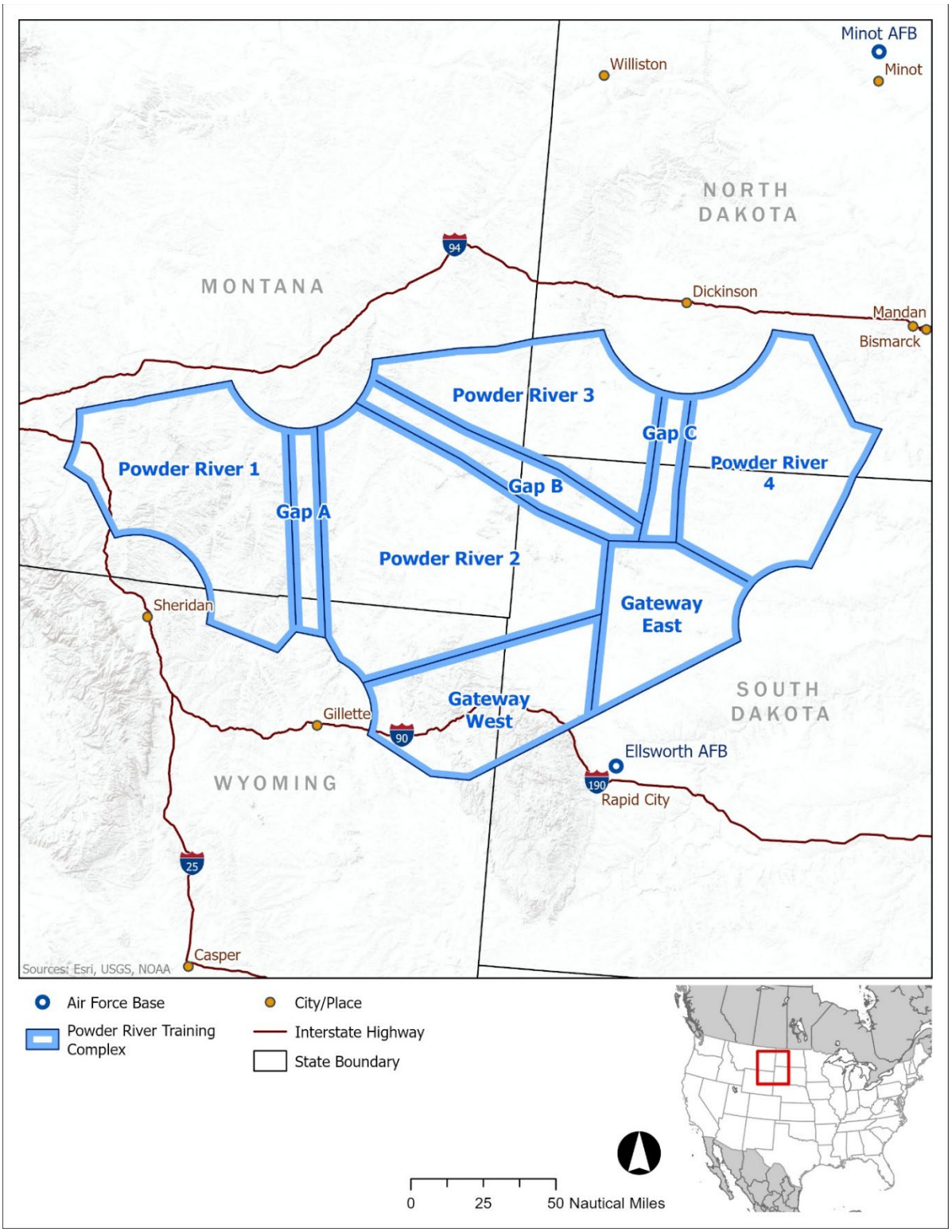


Figure 1.1-1 Powder River Training Complex Overview

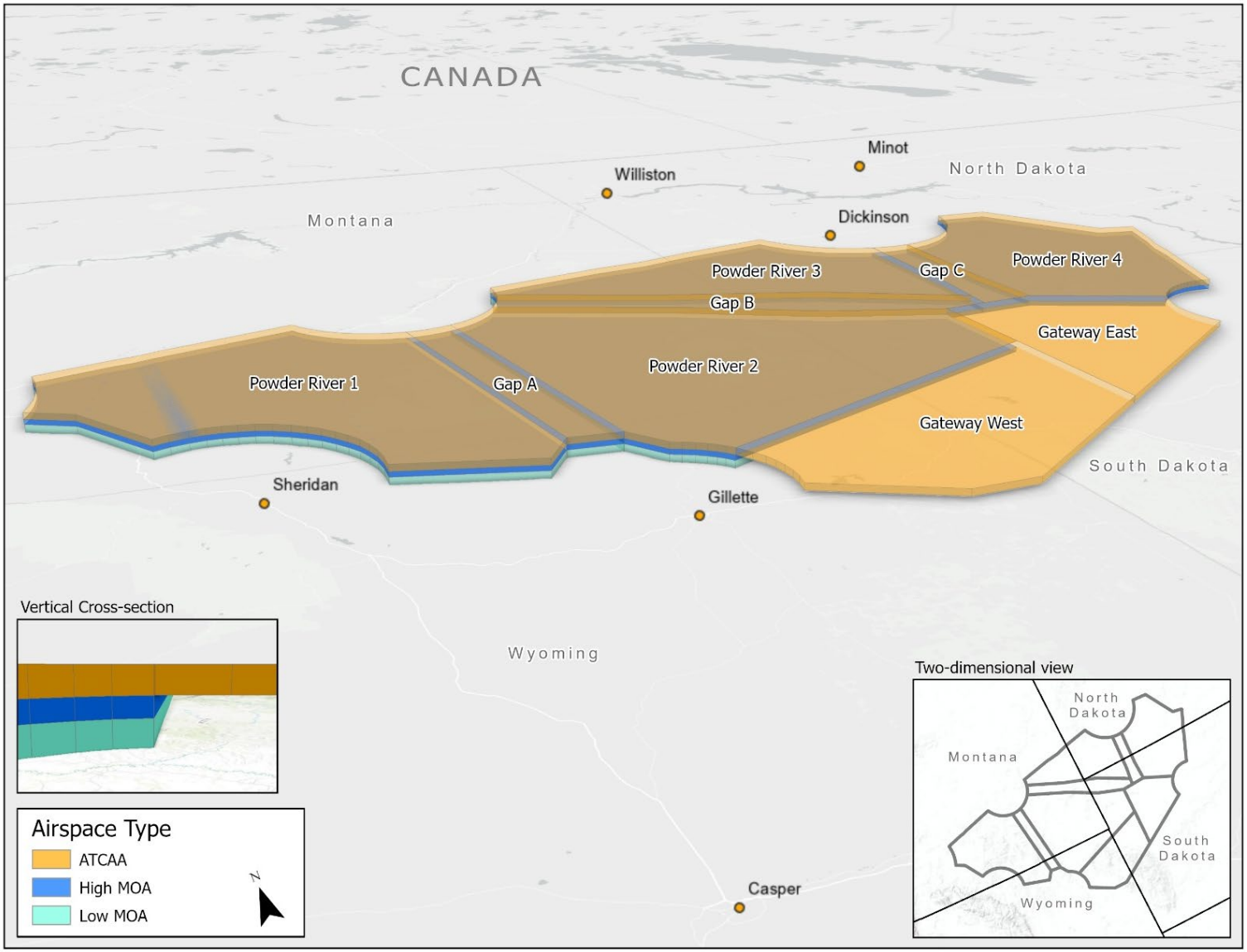


Figure 1.1-2 Powder River Training Complex – Three-dimensional View

Table 1.1-1 Existing Powder River Training Complex Airspace

Component	Availability	Floor/Ceiling
Powder River 1 (PR 1)[1]		
PR 1 Low MOA	Day-to-day and LFE	500 AGL–12,000 MSL
PR 1 High MOA	Day-to-day and LFE	12,000 MSL–FL180
PR 1 ATCAA	Day-to-day and LFE	FL180–FL260
Powder River 2 (PR 2)		
PR 2 Low MOA	Day-to-day and LFE	500 AGL–12,000 MSL
PR 2 High MOA	Day-to-day and LFE	12,000 MSL–FL180
PR 2 ATCAA	Day-to-day and LFE	FL180–FL260
Powder River 3 (PR 3)		
PR 3 Low MOA	Day-to-day and LFE	500 AGL–12,000 MSL
PR 3 High MOA	Day-to-day and LFE	12,000 MSL–FL180
PR 3 ATCAA	Day-to-day and LFE	FL180–FL260
Powder River 4 (PR 4)		
PR 4 High MOA	Day-to-day and LFE	12,000 MSL–FL180
PR 4 ACTAA	Day-to-day and LFE	FL180–FL260
Gap A		
Gap A Low MOA	LFE only	500 AGL–12,000 MSL
Gap A High MOA	LFE only	12,000 MSL–FL180
Gap A ATCAA	LFE only	FL180–FL260
Gap B		
Gap B Low MOA	LFE only	500 AGL–12,000 MSL
Gap B High MOA	LFE only	12,000 MSL–FL180
Gap B ATCAA	LFE only	FL180–FL260
Gap C		
Gap C High MOA	LFE only	12,000 MSL–FL180
Gap C ATCAA	LFE only	FL180–FL260
Gateway East ATCAA	LFE only	FL180–FL260
Gateway West ATCAA	Day-to-day and LFE	FL180–FL260

Note: [1] PR 1 is horizontally subdivided into four segments 1A, 1B, 1C, and 1D. Each of those segments is vertically divided into a low and high MOA with an ATCAA above, but the availability of those segments varies. The PR 1A and 1C High MOAs and ATCAAs are only available for LFEs.

Legend: AGL = above ground level; ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; LFE = Large Force Exercise; MOA = Military Operations Area; MSL = mean sea level; PR = Powder River

1.1.2 Existing Avoidances and Mitigation Measures

The current design of PRTC incorporates avoidances and mitigations that were implemented to reduce or eliminate the impact to other airspace users, historic properties, and Tribal land beneath the PRTC. These avoidances and mitigations are illustrated on **Figure 1.1-3** and would not change under this EIS Proposed Action:

- Large towns (population over 1,000) avoided by 2,000 feet AGL.
- Small towns (population over 100) avoided by 1,000 feet AGL.
- Northern Cheyenne Reservation (including Deer Medicine Rocks National Historic Landmark [NHL]) is excluded from the PR 1 Low MOA; thus, flights remain above 12,000 feet mean sea level (MSL) in the High MOA and ATCAA only.

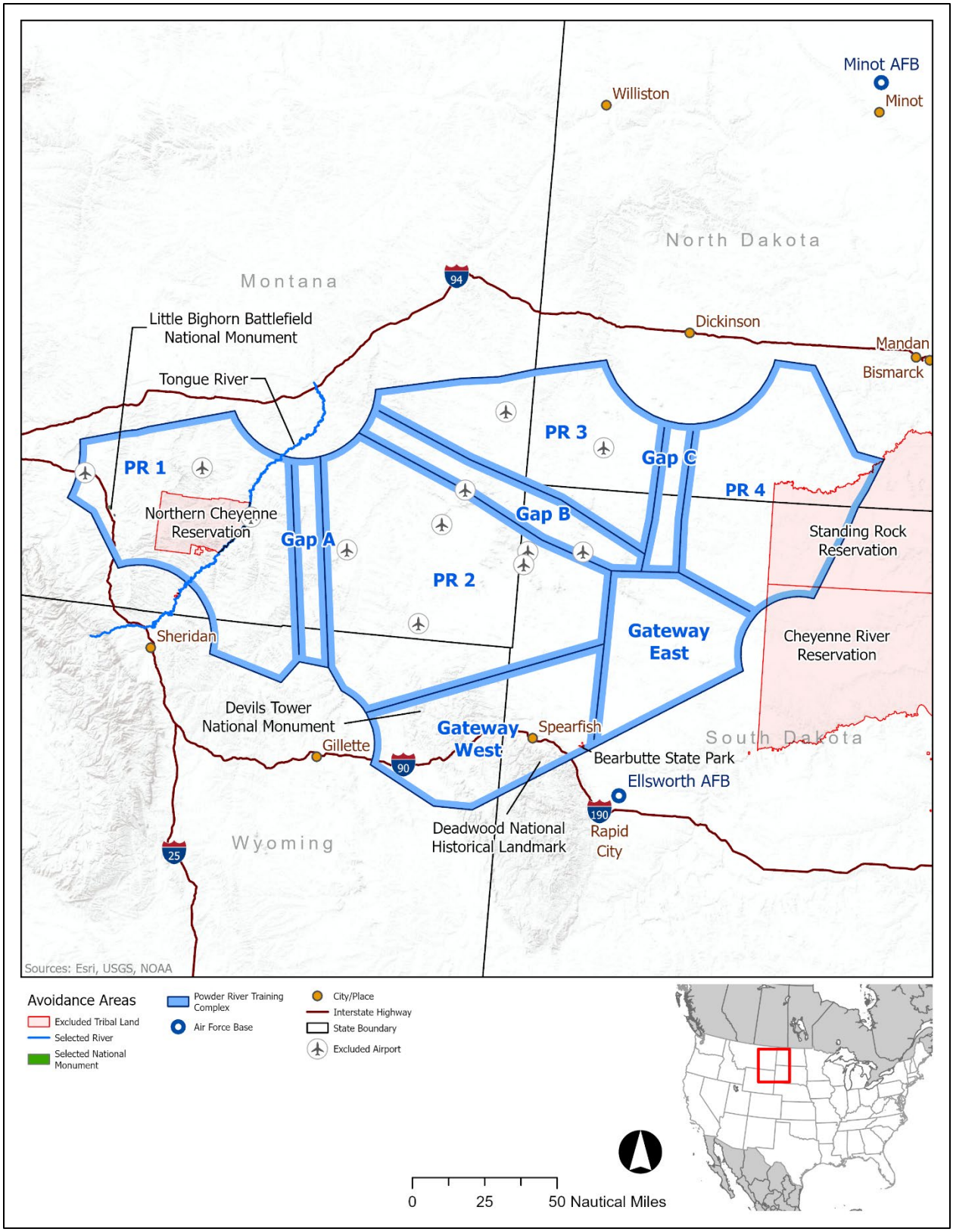


Figure 1.1-3 Existing Avoidance Areas

- Flights remain above 12,000 feet MSL above Cheyenne River Reservation and the Standing Rock Reservation (no PR 4 Low MOA; high MOA and ATCAA only).
- Little Bighorn Battlefield (beneath PR 1) is avoided by 5,000 feet AGL +/- 1 hour park hours.
- No supersonic flights over Little Bighorn Battlefield.
- Flights must cross perpendicularly to the Tongue River (traverses PR 1) (i.e., flight cannot follow the river valley to reduce visual and noise intrusion); the river was identified as an important area for the Tribes.
- Devils Tower National Monument, Deadwood NHL, and Bear Butte NHL are avoided by 18,000 feet. These properties are beneath Gateway West ATCAA (which has a floor of FL180 [approximately 18,000 feet]).

1.2 PROPOSED CHANGES TO PRTC

The DAF is proposing to address shortfalls in aircrew readiness by improving day-to-day training and increasing the capability of LFEs hosted at PRTC to meet emerging threats to National Security.

1.2.1 Changes to Day-to-Day Operations

Day-to-day training operations at PRTC are currently limited to or below FL260 (approximately 26,000 feet) as assessed in DAF 2015. This precludes training at higher altitudes, which is a necessity to accomplish certain flying missions. To improve day-to-day training, the DAF is proposing to raise the available altitude of some of the training airspace to FL600 (**Figure 1.2-1**). There would be no horizontal or vertical changes to any of the MOAs; the change for day-to-day training is limited to raising the ceiling of the ATCAAs. The existing total operations and types of day-to-day training within PRTC would not change, but those operations would be more vertically dispersed at higher altitude (**Table 1.2-1**). Most of the existing and proposed day-to-day training occurs in the ATCAAs (above FL180). Supersonic flight is not authorized for day-to-day training; thus, no sonic booms are possible on a day-to-day basis.

Table 1.2-1 Percentage of Day-to-Day Operations by Altitude Distribution

Operations	MOAs (500 feet AGL–FL180)	ATCAAs (above FL180)
Existing Operations (capped at FL260)	12%	88%
Proposed Operations (capped at FL600)	8%	92%
Delta	**-4**	**4**

Legend: % = percent; AGL = Above Ground Level; ATCAA = Air Traffic Control Assigned Airspaces; FL = Flight Level; MOA = Military Operations Area

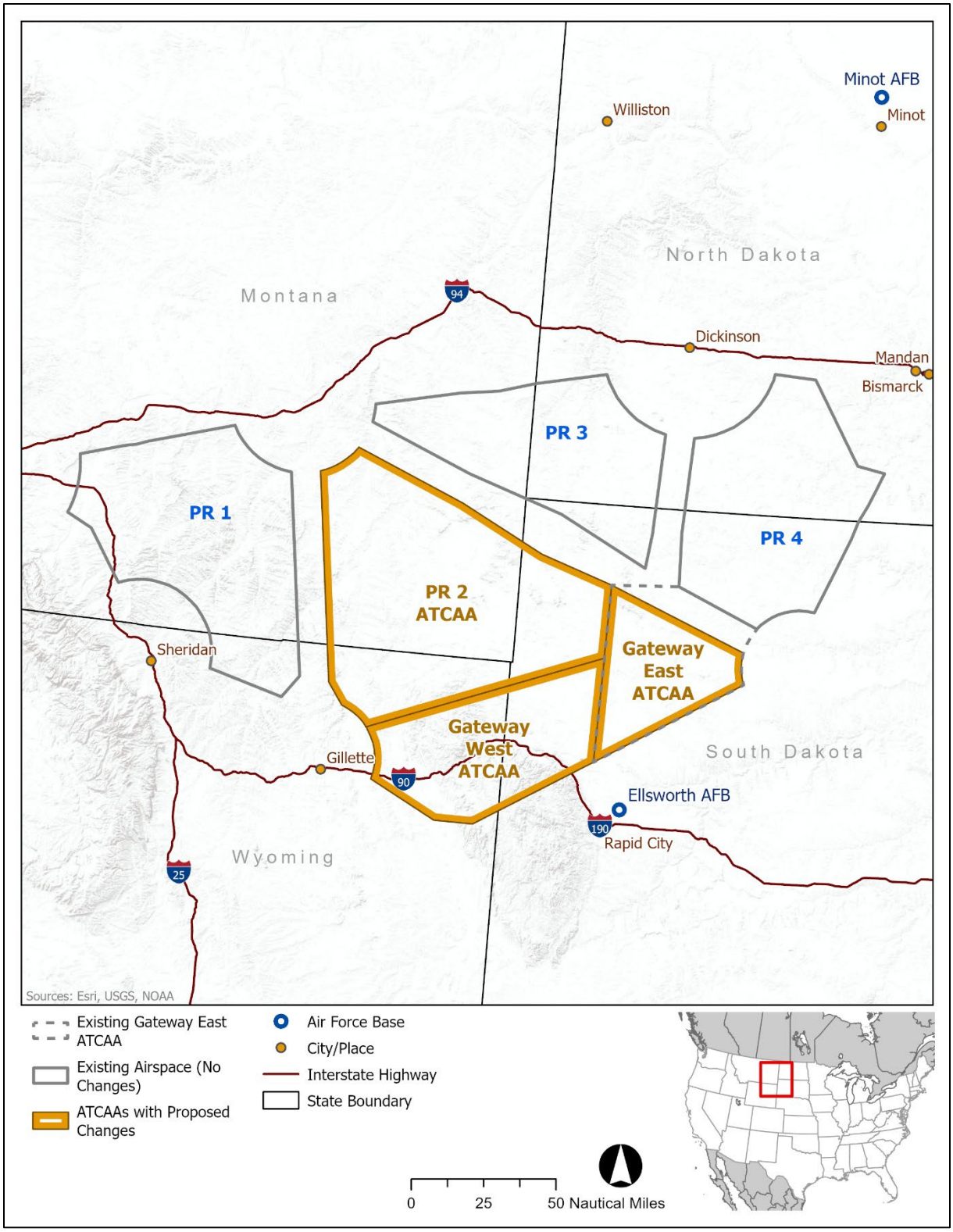


Figure 1.2-1 Proposed Changes for Day-to-Day Operations

1.2.2 Changes to LFEs

PRTC hosts LFEs, which include bomber aircraft assigned to Ellsworth and Minot AFBs, as well as fighter, surveillance, command/control, and refueling aircraft from units across the country. LFEs are designed to prepare servicemen and women for real-world scenarios. Longer duration exercises enable units to achieve complex realistic training. Longer durations also allow non-local units to meet multiple training requirements, justifying the cost of moving non-local units and their support equipment to participate in the exercises.

Ellsworth AFB is currently authorized to host up to four LFEs annually as assessed in DAF 2015. The 2015 ROD capped the PRTC altitude at or below FL260 and limited LFEs to 10 days per year (no more than 3 days per quarter). This limits the complexity for the LFE scenarios and also deters non-local units from participating due to high mobilization effort and cost. Supersonic flight in PRTC is only authorized during LFEs as assessed in DAF 2015. The current altitude limitations for supersonic flight would remain the same: fighter aircraft limited to above 10,000 feet AGL and bomber aircraft limited to above 20,000 feet MSL.

The DAF is proposing to raise the altitude up to FL600 (approximately 60,000 feet) across the entire PRTC for LFEs (**Figure 1.2-2**). This vertical expansion would create a more realistic and efficient training environment during LFEs. The Proposed Action also includes increasing the LFE days from 10 days total per year (no more than 3 per quarter) to a total of 30 days per year with no quarter restriction. This modification would accommodate LFEs that benefit from a longer duration. Under the Proposed Action, the PRTC would be able to support a 2-week LFE which would maximize participation. A 2-week LFE would include 5 weekdays of flying, no flying on Saturday or Sunday, followed by another 5 weekdays of flying. Non-local participants would get the most training for their invested time, effort, and money for a single event. A 2-week LFE would be the maximum or worst-case scenario for these events, most events would likely be shorter in duration.

Increasing the duration and total days of LFEs would increase annual operations within PRTC (**Table 1.2-2**). However, while the total annual operations would increase, the distribution of training across the PRTC and by altitude would remain relatively unchanged. Use of the high-altitude airspace would continue to account for approximately 90 percent of the training time (**Table 1.2-3**).

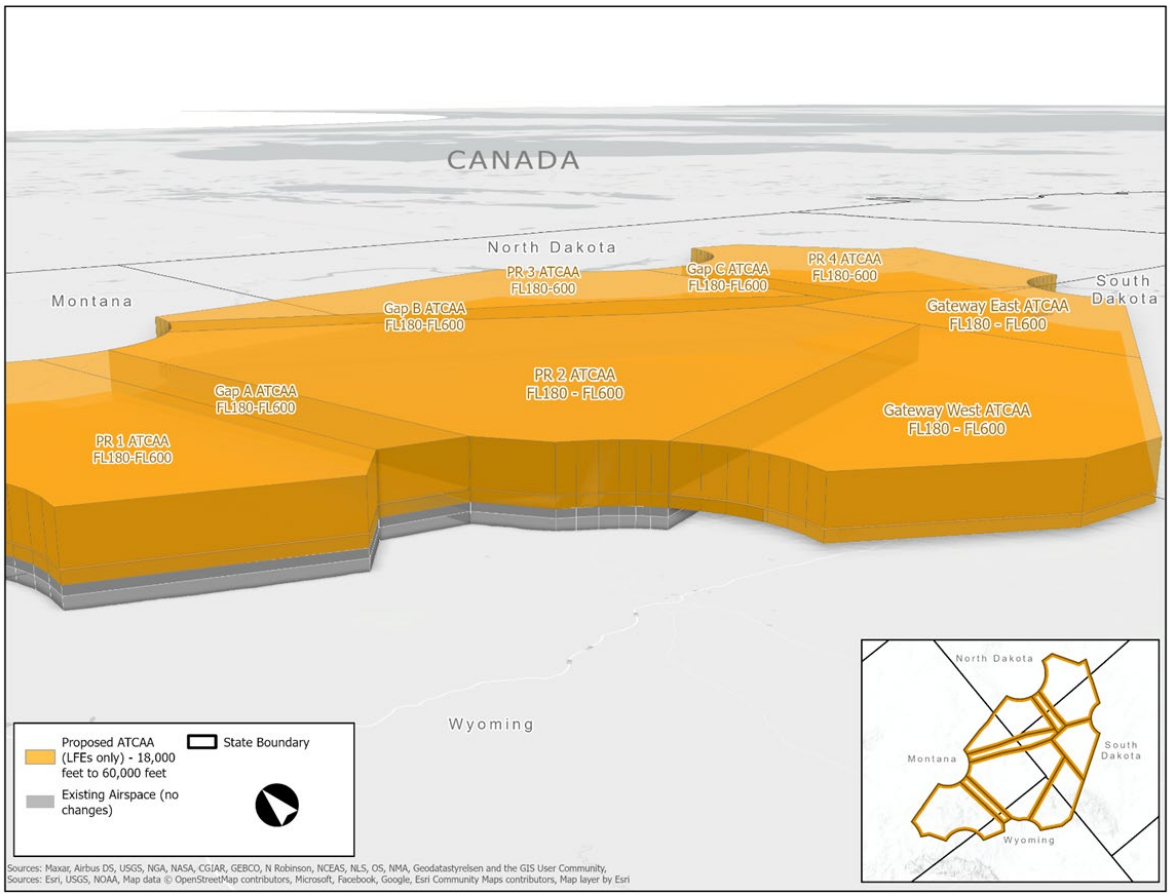


Figure 1.2-2 Proposed Altitude Increase for LFEs

Table 1.2-2 Proposed Increase in Sorties[1] Associated with LFEs

Aircraft Type	Existing Sorties[2]	Proposed Increase in LFE Sorties	Total Annual Sorties
Bombers	3,039	120	3,159
Fighters	52	1,200	1,252
Other	143	420	563
Total	**3,234**	**1,740**	**4,974**

Notes: [1] A sortie is the takeoff, mission, and landing of a single aircraft. Multiple sorties can occur at the same time throughout the PRTC.
[2] Existing sorties include those associated with day-to-day training and current LFEs. The sorties associated with day-to-day training would not change with this Proposed Action.
Legend: LFE = Large Force Exercise

Table 1.2-3 Percentage of LFE Operations by Altitude Distribution

Operations	MOAs (500 feet AGL–FL180)	ATCAAs (above FL180)
Existing Operations (capped at FL260)	12%	88%
Proposed Operations (capped at FL600)	7%	93%
Delta	**-5**	**5**

Legend: % = percent; ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; LFE = Large Force Exercise; MOA = Military Operations Area

During LFEs, the entire complex is used with opposing forces typically staging in PR 1 at one end and PR 4 at the other, then proceeding in general west to east and east and west direction and conducting combat mostly in the center of the complex. This results in primarily an elliptical area encompassing PR 2, PR 3, and Gap B where most supersonic speed occurs.

The authorized minimum altitudes would remain unchanged (10,000 feet AGL for fighters, 20,000 feet MSL for bombers). Supersonic speed does not occur for the duration of the flight, but rather a fraction of the time (approximately 30 seconds for fighters and up to 1 minute for bombers). Accommodating more fighter aircraft over more LFE days would increase the total supersonic sorties from the current LFE operations. Supersonic flight would not occur with every sortie and would vary depending on the training exercise being performed. Supersonic sorties by aircraft type are provided in **Table 1.2-4**. These sorties are not *in addition* to those presented in **Table 1.2-2**, but rather a subset of that total. As shown, approximately 95 percent of the supersonic activity would continue to be in the ATCAAs, above FL180.

Table 1.2-4 Supersonic Operations During LFEs

Aircraft Type	Supersonic Sorties		Time in MOAs (minutes/year)		Time in ATCAAs (minutes/year)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
Bombers (20,000 feet MSL and above)	60	180	0	0	15	45
Fighters (10,000 feet AGL and above)	100	1,500	2	750	46	14,250
Total	**160**	**1,680**	**2**	**750**	**61**	**14,295**

Legend: AGL = above ground level, ATCAA = Air Traffic Control Assigned Airspaces; LFE = Large Force Exercise; MOA = Military Operations Area; MSL = mean sea level

1.3 AREA OF POTENTIAL EFFECTS

The DAF has determined the Area of Potential Effects (APE) is the land beneath the PRTC as illustrated in **Figure 1.3-1**. The APE was provided to all SHPOs during scoping for the EIS (July 2025) and all provided their concurrence with the APE.

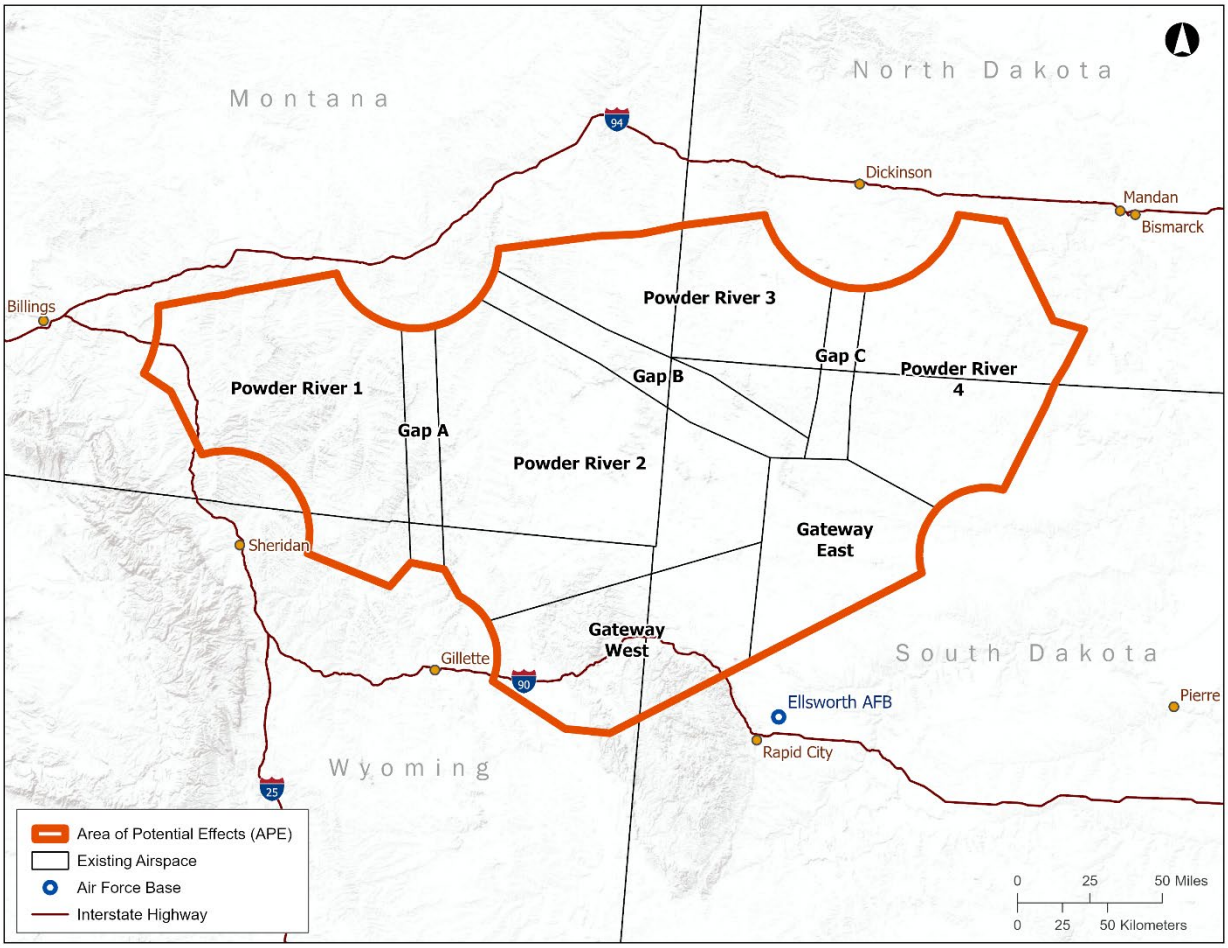


Figure 1.3-1 Area of Potential Effects

2.0 IDENTIFICATION OF HISTORIC PROPERTIES

For this undertaking, DAF identified historic properties within the four states (and associated counties) under the PRTC airspace. The historic properties include architectural resources, archaeological resources, and traditional cultural places (TCPs).

2.1 NATIONAL REGISTER PROPERTIES

Because the APE for this undertaking is the same as the APE under the 2014 EIS, DAF utilized the list of historic properties from the 2014 analysis as a starting point for the current effort. This list was verified for accuracy and supplemented with more recent information from databases of properties listed in or eligible for listing in the National Register of Historic Places (NRHP) as well as state registers of historic properties and NHLs. The comprehensive list of properties considered in the analysis, organized by state, can be found in **Enclosure A**.

The change in setting from low-level overflights and possible sonic booms could have an adverse effect pursuant to 36 Code of Federal Regulations (C.F.R.) section 800.5(d)(2) on NHLs. In accordance with 36 C.F.R. section 800.10, special requirements for protecting NHLs, the DAF

must, to the maximum extent possible, minimize harm to any NHL that may be directly and adversely affected by an undertaking (36 C.F.R. 800.10(a)). There are seven NHLs beneath PRTC: Deer Medicine Rocks (PR 1); Medicine Rocks State Park (Gap B/PR 3); Rosebud Battlefield/Where the Girl Saved Her Brother (just outside PR 1); Wolf Mountain Battlefields/Where Big Crow Walked Back and Forth which is along the Tongue River (PR 1); Bear Butte (Gateway West ATCAA); Deadwood Historic District (Gateway West); and Frawley Historic Ranch (Gateway West). These properties are illustrated on **Figure 2.1-1**. Most of these are associated with an existing avoidance area (see **Section 1.1.2**) or are beneath Gateway West ATCAA where flights would be above 18,000 feet.

2.2 TRADITIONAL CULTURAL PLACES

The DAF invited 24 Tribes into Government-to-Government consultation concerning the Proposed Action (**Table 2.2-1**). TCPs and other areas of cultural significance that were identified have been included in this assessment.

Table 2.2-1 PRTC Optimization EIS Tribal Consultation List

No.	Tribe Name
1	Apache Tribe of Oklahoma
2	Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation, Montana
3	Black Feet Nation
4	Cheyenne and Arapaho Tribes
5	Cheyenne River Sioux Tribe of the Cheyenne River Reservation, South Dakota
6	Chippewa Cree Indians of the Rocky Boy's Reservation, Montana
7	Confederated Salish and Kootenai Tribes of the Flathead Reservation
8	Crow Creek Sioux Tribe of the Crow Creek Reservation, South Dakota
9	Crow Tribe of Montana
10	Eastern Shoshone Tribe (Shoshone Tribe of the Wind River Reservation)
11	Flandreau Santee Sioux Tribe of South Dakota
12	Fort Belknap Indian Community of the Fort Belknap Reservation of Montana
13	Lower Brule Sioux Tribe of the Lower Brule Reservation, South Dakota
14	Northern Arapaho
15	Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation, Montana
16	Oglala Sioux Tribe
17	Rosebud Sioux Tribe of the Rosebud Indian Reservation, South Dakota
18	Shoshone-Bannock Tribes of the Fort Hall Reservation
19	Sisseton-Wahpeton Oyate of the Lake Traverse Reservation, South Dakota
20	Spirit Lake Tribe, North Dakota
21	Standing Rock Sioux Tribe of North and South Dakota
22	Three Affiliated Tribes of the Fort Berthold Reservation, North Dakota
23	Turtle Mountain Band of Chippewa Indians of North Dakota
24	Yankton Sioux Tribe of South Dakota

Legend: EIS = Environmental Impact Statement; PRTC = Powder River Training Complex

Table 2.2-2 provides the known TCPs that were identified during the initial consultation to establish the PRTC or through research associated with this Proposed Action. Many of these locations are associated with existing avoidances within PRTC (see **Section 1.1.2**). Consultation with the Tribes will continue throughout development of the EIS.

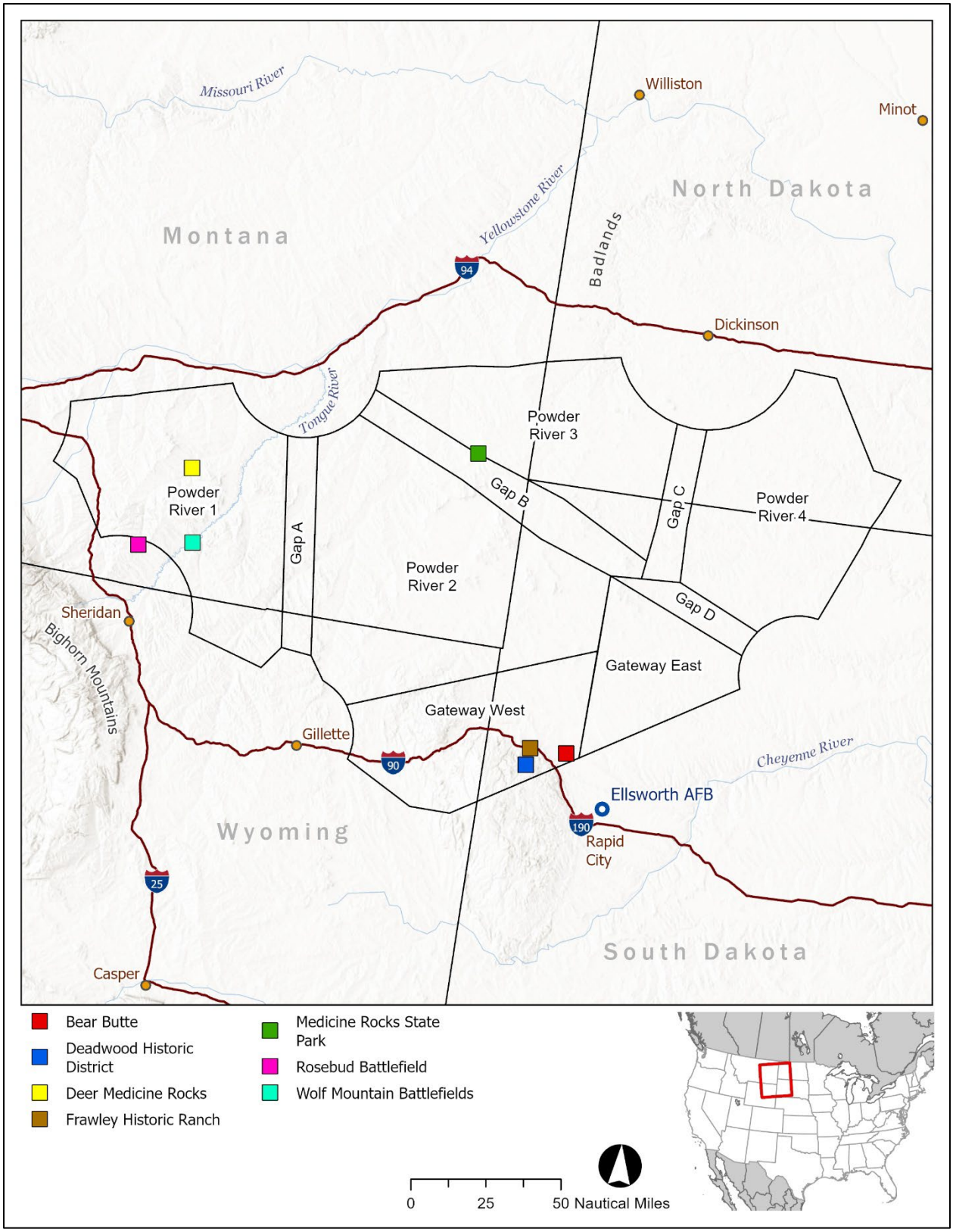


Figure 2.1-1 NHLs beneath PRTC

Table 2.2-2 Known TCPs Beneath PRTC

Area Name	General Location	Airspace
Wyoming		
Devils Tower National Monument[1]	Devils Tower	Gateway West ATCAA
Inyan Kara Mountain[1]	South of Sundance	Gateway West ATCAA
Unnamed 1[1]	North of Gillette	Gateway West ATCAA
Unnamed 2	Northwest of Hulett	PR 2
Montana		
Chalk Buttes	Ekalaka	Gap B
Deer Medicine Rocks[1,2]	Lame Deer	PR 1
Medicine Rocks State Park[2]	Ekalaka	PR 3/Gap B
Wolf Mountains Battlefield/Where Big Crow Walked Back and Forth National Historic Landmark[1,2]	Tongue River	PR 1
South Dakota		
Bear Butte National Historic Landmark[1,2]	Sturgis	Gateway West ATCAA

Notes: [1] Indicates area with existing avoidance or located beneath ATCAA-only space with no low-level overflights.
[2] Also an NHL

Legend: ATCAA = Air Traffic Control Assigned Airspaces; PR = Powder River; PRTC = Powder River Training Complex; TCP = Traditional Cultural Place

3.0 DESCRIPTION OF EFFECTS ON HISTORIC PROPERTIES

Procedures for assessing effects to historic properties are discussed in 36 C.F.R. 800.5. An undertaking results in an adverse effect to a cultural resource listed on or eligible for listing in the NRHP when it alters the characteristics that qualify the resource for inclusion in the NRHP. Adverse effects are most often a result of physical destruction, damage, or alteration of a resource; alteration of the character of the surrounding environment that contributes to the resource's integrity; introduction of visual, audible, or atmospheric intrusions out of character with the resource or its setting; neglect of the resource resulting in its deterioration or destruction; or transfer, lease, or sale of the property out of federal ownership (36 C.F.R. 800.5(a)(2)).

3.1 SOURCES OF EFFECTS

In general, possible sources of adverse effects can include ground disturbance, vandalism, noise vibrations, visual intrusions, and change in land status that reduces legal protection. The proposed undertaking does not include any ground activities that would cause direct or indirect adverse effects to historic properties such as construction or demolition, clearing, grading, paving, utility installation, or earth moving. The potential for effects would result from aircraft noise, sonic booms resulting from supersonic flight, or visual intrusions from low-level overflights.

This analysis considers alterations in the setting of historic properties and potential alterations of feeling and association by users of these places from overflights. This assessment considered the frequency, density, duration of overflights, and their auditory and visual characteristics.

3.2 ASSESSMENT OF EFFECTS

Actions described in **Section 1.2.1** for day-to-day operations include raising the available altitude for day-to-day training which would not create new visual or noise intrusions within the APE. All existing avoidances established in the 2015 ROD to protect historic properties beneath PRTC would remain in place. Thus, this portion of the undertaking would have no adverse effect to historic properties.

Actions described in **Section 1.2.2** for LFEs may potentially affect historic properties. The elements warranting consideration for effects to historic properties include:

- Increasing the total sorties for LFEs would increase the potential for subsonic and supersonic noise intrusions.
- Increasing the annual total days for LFEs from 10 to 30 total would increase the potential for visual intrusions of low-level overflights during these events.

All existing avoidances established in the 2015 ROD to protect historic properties would remain in place and were considered in this assessment (see **Section 1.1.2** and **Figure 1.1-3**). For historic properties, those specifically include:

- The Northern Cheyenne Reservation (including Deer Medicine Rocks NHL) is excluded from the PR 1 Low MOA; thus, flights remain above 12,000 feet MSL (in the High MOA and ATCAA only).
- There is no PR 4 Low MOA and flights remain above 12,000 feet MSL (in the High MOA and ATCAA only) which excludes the Cheyenne River Reservation, the Standing Rock Reservation, and all historic properties from low-level overflights.
- The Little Bighorn Battlefield (beneath PR 1) is avoided by 5,000 feet AGL +/- 1 hour park hours.
- No supersonic flights authorized over the Little Bighorn National Monument (beneath PR 1).
- Flights must cross perpendicularly to the Tongue River (beneath PR 1).
- Devils Tower National Monument, Deadwood NHL, and Bear Butte NHL are beneath the Gateway West ATCAA; thus, all flights would be above FL180 (approximately 18,000 feet).

3.2.1 Noise Intrusion

There are two types of aircraft noise discussed in this assessment: subsonic noise and supersonic noise. Conventional subsonic noise is noise generated by an aircraft's engines and airframe. This is the most familiar form of aircraft noise. The unit used to measure the intensity of sound is the decibel (dB).

When an aircraft flies at supersonic speeds (faster than the speed of sound), shock waves are generated resulting in a sonic boom. The resulting sonic boom depends on the aircraft's size,

weight, geometry, flight altitude, speed, and type of maneuvering. Aircraft exceeding the speed of sound always create a sonic boom; however, not all supersonic flight activities will cause a boom audible at the ground. The altitude at which the shock wave is created determines the distance shock waves travel before reaching the ground and affects the intensity of the boom. The higher the aircraft, the greater the distance the shock wave must travel before reaching receptors on the ground, reducing the intensity of the boom. The intensity of a sonic boom is characterized as an overpressure which is the pressure above normal atmospheric pressure created by the shock wave and is reported in pounds per square foot (psf).

3.2.1.1 Subsonic Noise

Low-level overflights (those flights within the MOAs) have the potential to generate the most noise intrusion for an observer on the ground or disturb the setting for an historic property. **Table 3.2-1** provides the lowest altitude for each MOA. During LFEs, the entire PRTC is used so this table presents the spaces grouped together by lowest altitude. The Gateway East and West ATCAAs do not have associated MOAs; thus, no low-level overflights are possible in these airspaces since the floor begins at FL180 (approximately 18,000 feet). There are historic properties beneath the Gateway East and West ATCAAs but none of these properties would experience low-level overflight. Also provided in **Table 3.2-1** is the probability of experiencing an overflight at the lowest possible altitude during a week with an LFE. The Proposed Action would not change where low-level flights currently occur or the lowest possible altitude for any MOA; however, increasing the total LFE days would slightly increase the frequency and/or probability of experiencing a low-level flight during those events. LFEs would be limited to no more than 30 days annually. As shown, the probability of experiencing such an overflight would be rare.

Table 3.2-1 Lowest Altitude for MOAs in PRTC and Probability of Overflight

Airspace	Lowest Altitude (MOA Floor)	Probability of Overflight at Lowest Altitude[1] (LFEs)
PR 1, 2, 3 and Gap A, B MOAs	500 feet AGL	2%
PR 4 and Gap C MOAs	12,000 feet MSL	11%

Note: [1] Probability of experiencing a low-level overflight beneath the MOA during a week with an LFE.

Legend: % = percent; AGL = Above Ground Leve; LFE = Large Force Exercise; MOA = Military Operations Area; MSL = Mean Sea Level; PRTC = Powder River Training Complex

Even in areas of the MOAs where no special flight restrictions apply (see **Section 1.1.2** and introduction to **Section 3.2** for existing avoidances), experiencing noise from an aircraft that is directly overhead at the lowest possible altitude would be rare. The following factors limit the frequency of exposure to low-altitude overflights within any MOA:

- Flight at low altitude requires an extreme level of vigilance on the part of the aircrew, and time spent at the lowest available altitude would be only as needed to accomplish low-altitude training requirements.

- Aircraft operating in MOAs do not fly at sustained low-level altitudes or along the MOA floor for extended periods of time but rather dip down to lower levels on rare occasions as part of larger training tactics and maneuvers.
- The MOAs in PRTC are very large and any particular location on the ground would be overflown at low altitudes relatively infrequently. Training within MOAs occurs randomly throughout the horizontal extent of the MOA.

From the ground, the sound level of an aircraft flying overhead changes continuously, starting at the ambient (background) level, increasing to a maximum as the aircraft passes closest to the receiver, and then decreasing to ambient as the aircraft flies into the distance. The noise metric used for the maximum or peak noise for aircraft is known as maximum sound level (L_{max}), which is reported in dB. During LFE events, low-level flights by both bombers and fighter aircraft are possible and a range of peak noise exposure could be experienced. **Table 3.2-2** provides the L_{max} for a representative set of bomber and fighter aircraft that would operate within PRTC during LFEs. This peak noise would occur for about 1/8 of a second. To provide a frame of reference and comparison, the average noise level for some common noise sources include: firecrackers (140 dB), a rock band concert (120 dB), a lawnmower (95 dB), a vacuum cleaner 10 feet away (85 dB), and a garbage disposal (75 dB).

Table 3.2-2 Peak Noise Exposure by Aircraft Types and Altitudes

Aircraft	500-foot Overflight (L_{max} in dB)	12,000-foot Overflight (L_{max} in dB)
B-1	117	86
B-2[1]	n/a	71
B-52[1]	n/a	76
F-16	115	78
EA-18	124	84
F-22	120	84
F-35	119	85

Note: [1]B-2 and B-52 do not fly at 500 feet.
Legend: dB = decibel; L_{max} = peak noise exposure; n/a = not applicable

Experimental data and models show that damage to architectural resources, including adobe buildings, is unlikely to be caused by subsonic noise and vibrations from aircraft overflights (Battis 1988; King 1985; King et al. 1988; Sutherland et al. 1990). Subsonic noise-related vibration damage to structures requires high dB levels generated at close proximity to the structures and in a low frequency range (Battis 1983, 1988; United States Forest Service 1992). Aircraft must generate a maximum sound level of at least 120 dB to potentially result in structural damage (Battis 1988) and, even at 130 dB, structural damage is unlikely. Sutherland et al. (1990) found that the probability of damage to a poorly constructed or poorly maintained wood frame building is less than 0.3 percent even when the building is directly under a large, high-speed aircraft flying only a few hundred feet above ground level. Conservatively, only sounds lasting more than 1 second above a sound level of 130 dB are potentially damaging to structural components (Committee on Hearing, Bioacoustics, and Biomechanics 1977). Peak

sound levels shown in **Table 3.2-2** would last for a fraction of a second and would not exceed this value. Given the existing avoidances for specific properties beneath PRTC, the short duration of the potential exposure, no potential for structural damage, and the rarity of these events for any given point on the ground, there would be no adverse effect to historic properties from subsonic noise in accordance with 36 C.F.R. 800.5(b).

3.2.1.2 Supersonic Noise

Supersonic flight is only authorized during LFEs. The potential for sonic booms would only be possible for a total of 30 days annually. As noted above, the intensity of a sonic boom is highly variable and depends on the aircraft's size, weight, geometry, flight altitude, speed, and type of maneuvering. Sonic booms could be described as ranging from the sound of distant thunder to a sharp double crack. For comparison and better understanding of psf, some common impulsive events and their associated psf are provided in **Table 3.2-3**. Sonic booms can be associated with structural damage. Most damage claims are for fragile or brittle objects, such as glass and plaster. There is a large degree of variability in damage experience, and much damage depends on the pre-existing condition of a structure as shown in **Table 3.2-4.**

Table 3.2-3 Typical Impulsive Event Overpressure

Peak Overpressure	Decibel	Example Noise Source
0.3 psf	117 dB	Distant thunder
2 psf	134 dB	Thunder resulting from lightning strikes at 1 kilometer
4 psf	140 dB	Car door slam from inside standard sedan with windows raised
5 psf	142 dB	Handgun at 1 meter
12 psf	149 dB	Fireworks display from viewing stand

Legend: dB = decibel; psf = pounds per square foot

Table 3.2-4 Potential Damage from Sonic Boom Overpressure

Sonic Boom Overpressure Nominal (psf)	Structural Element	Potential Type of Damage and Item(s) Affected
0.5–2 psf	Glass	Extension of existing crack; potential for failure for glass panes in bad repair; failure potential for existing good glass panes is less than 1 out of 10,000 at 2 psf.
	Ceiling Plaster	Fine cracks; extension of existing cracks; mostly from fragile areas.
	Wall Plaster	Fine cracks; extension of existing cracks less than in ceilings; over door frames; between some plasterboards; mostly from fragile areas.
	Roof	Older roofs may have slippage of existing loose tiles/slates; sometimes new cracking of old slates at nail hole; new and modern roofs are rarely affected.
	Bric-a-brac	Those carefully balanced or on edges can fall; fine glass, such as large goblets, can fall and break.
2–4 psf	Glass	Glass pane failures may occur that are difficult to forecast in terms of the glass panes' existing localized condition. Nominally in good condition.
	Ceiling Plaster	Estimated rate of cracking ranges from less than 1 out of 5,000 (2 psf) to 1 out of 625 (4 psf).
	Wall Plaster	Estimated rate of cracking ranges from less than 1 out of 10,000 (2 psf) to 1 out of 1,000 (4 psf).
	Roof	Potential for nail peg failure if eroded.
	Bric-a-brac	Increased risk of tipping or falling objects.
4–10 psf	Glass	Regular failures within a large population of well-installed glass (1 out of 50 [10 psf] to 500 [4 psf]); failure potential industrial and greenhouse glass panes.
	Ceiling Plaster	Estimate rate of cracking ranges from 1 out of 526 (4 psf) to 1 out of 10 (10 psf). Potential for partial ceiling collapse of good plaster; complete collapse of very new, incompletely cured, or very old plaster.
	Wall Plaster	Estimated rate of cracking ranges from less than 1 out of 1,000 (4 psf) to 1 out of 50 (10 psf). Measurable movement of inside "party" walls at 10 psf.
	Roof	Regular failures within a large population of nominally good slate, slurry wash; some change of failures in tiles on modern roofs; light roofs (bungalow) or large area can move bodily.
	Bric-a-brac	Increased risk of tipping or falling objects.
>10 psf	Glass	Some good glass will fail regularly (greater than 1 out of 10) to sonic booms and at an increased rate when the wavefront is normal to the glass pane. Glass with existing faults could shatter and fly. Large window frames move.
	Ceiling Plaster	Plasterboards displaced by nail popping.
	Wall Plaster	Most plaster affected. Internal "party" walls can move even if carrying fittings such as hand basins or taps; secondary damage due to water leakage.
	Roofs	Most slate/slurry roofs affected, some badly; large roofs having good tile can be affected; some roofs bodily displaced causing gale-end and will-plate cracks; rarely domestic chimneys dislodged if not in good condition.
	Bric-a-brac	Some nominally secure items can fall, e.g., large pictures, especially if fixed to "party" walls.

Legend: > = greater than; psf = pounds per square foot

Source: Haber and Nakaki 1989

Tests by the DAF on sonic booms have found that most structures in good condition are not affected by sonic booms with a peak overpressure of less than 16 psf. Tests by the National Aeronautics and Space Administration have shown that structures in good condition are undamaged by overpressures of up to 11 psf. Damage to plaster is in a comparable range of glass but depends on the condition of the plaster. Adobe faces risks similar to plaster, but assessment is complicated by adobe structures being exposed to weather, where they can deteriorate in the absence of any specific loads. Typical outdoor structures, such as buildings, windmills, radio towers, etc., are resilient and routinely subject to wind loads far in excess of sonic boom overpressures. In general, structural damage from sonic booms should be expected only for overpressures over 10 psf (Plotkin and Sutherland 1990).

Some prehistoric archaeological sites could contain natural structures such as rock shelters or caves, and petroglyphs or pictographs, which are etched or painted onto the rock surfaces. However, studies have found that these types of natural formations are not affected by noise vibrations, such as sonic booms, any more than by natural erosion, wind, or seismic activity (Battis 1983). A more recent study from 1999 analyzed sonic boom effects at four selected petroglyph/pictograph sites on Nellis Air Force Range and adjacent overflight lands (White and Orndorff 1999). Visual observation of the physical properties at each of these sites determined that the rock panel degradation was consistent with natural weathering and chemical alteration process and not the result of sonic booms (White and Orndorff 1999).

Supersonic flights of fighter aircraft could occur in MOAs (10,000 feet AGL and above) while supersonic flight of the B-1 would be limited to ATCAAs only (20,000 feet MSL). **Table 3.2-5** shows calculated overpressures in psf for the B-1 and representative transient fighter aircraft within PRTC. The intensity of sonic booms would vary as the altitude for supersonic flight would not all occur at the lowest possible altitude. The values in **Table 3.2-5** represent the maximum possible psf. Most sonic booms would average much less as they would occur in much higher altitudes. As shown in **Table 3.2-3**, these psf values would correlate to approximately 140–142 dB. As described in **Section 1.2.2**, supersonic flight would be concentrated in the center of the complex (PR 2, PR 3, and Gap B) and is less likely on the outer edges of the complex.

The types of structures most susceptible to sonic booms are glass and adobe or similar plaster-type materials. Historic standing structures within the lands beneath the affected airspace consist primarily of wood or log buildings with window glass and some adobe or earth block structures. Given the overpressure values shown in **Table 3.2-5**, the intensity of the sonic booms within PRTC and the infrequency and the random nature of the sonic booms suggest that structural damage to historic structures would be unlikely. Given the existing avoidances for specific properties beneath PRTC and the assessment above, there would be no adverse effect to historic properties from supersonic noise in accordance with 36 C.F.R. 800.5(b).

Table 3.2-5 Maximum Sonic Boom Overpressures

Aircraft	Lowest Supersonic Flight Altitude	Overpressure (psf)[1]
B-1	20,000 feet MSL	5.31
F-16	10,000 feet AGL	4.24
F-22	10,000 feet AGL	5.37
F-35	10,000 feet AGL	4.9

Note: [1] Assumes straight and level flight at Mach 1.2 speed.
Legend: AGL = above ground level; MSL = mean sea level; psf = pounds per square foot

3.2.2 Visual Intrusion

Low-level overflights have the potential to generate temporary visual intrusions for an observer on the ground or disturb the visual setting for an historic property. Individuals visiting a property could see the visual intrusion as an annoyance and an impact upon the value of the historic or cultural site. As shown in **Table 3.2-1**, low-level overflights would continue to be possible throughout the PRTC during LFEs; however, the probability of experiencing such an overflight would continue to be rare.

Visibility depends on the distance between the aircraft and the viewer. **Figure 3.2-1** presents the visual effect of a representative bomber and fighter aircraft to an observer at a spot under the airspace. The typical person has focused vision within an area represented by a 45- to 60-degree cone. Using a 55-degree cone of focused vision for this analysis, a 146-foot-long B-1, flying at 12,000 feet, would occupy only approximately 0.03 percent of the horizontal plane of that cone of vision. At 18,000 feet, it would occupy approximately 0.01 percent. Fighter aircraft, such as the F-16, are substantially smaller but flying lower would occupy approximately 0.38 percent of the horizontal plane cone of vision. Visibility is also affected by intervening objects such as landforms, vegetation, or structures that block the viewer from seeing the aircraft, particularly when aircraft are traveling at lower altitudes. Based on this analysis and limited amount of time an aircraft would be visible, temporary visual intrusion caused by transit of the training aircraft would not be expected to diminish the qualities of any cultural resources.

Viewer response and interpretation of aircraft overflight would vary. Depending upon cultural and instinctual perceptions of danger and sensitivity of the presence of an overflight, visual effects of overflights may have an indirect impact on qualities valued by an individual. During tribal ceremonies, overflights at any altitude could be seen as an unwelcome visual intrusion.

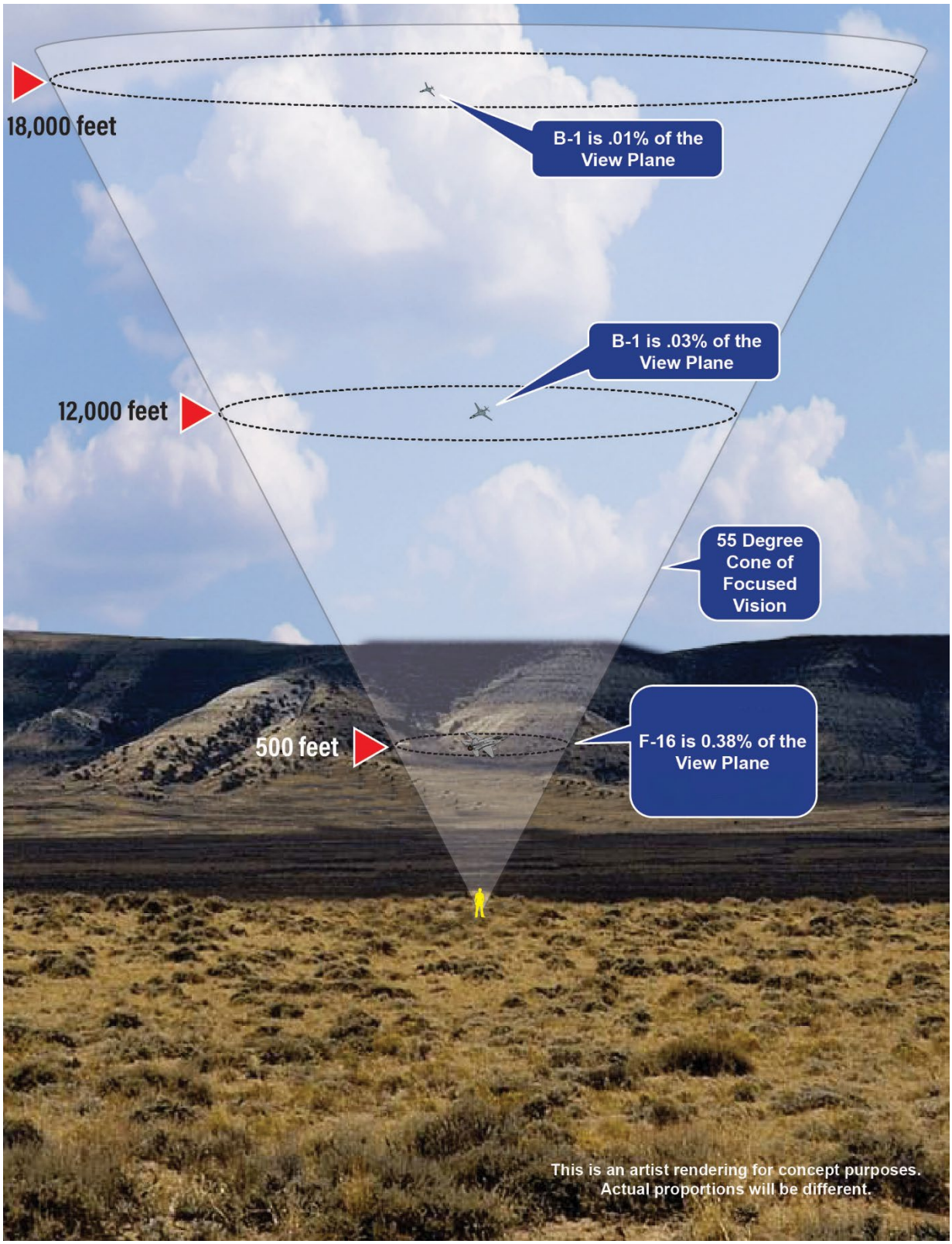


Figure 3.2-1 Visual Perspective of Bomber and Fighter Aircraft at Various Altitudes

Overall, increasing the total LFE days would slightly increase the frequency and/or probability of experiencing a low-level overflight during those events in the PRTC; however, the probability of experiencing an overflight at the lowest possible altitude would continue to be rare. Visual effects to any overflown historic property would be sporadic and temporary, given the infrequency of flights, the speed of the aircraft in transit, the size of the PRTC, and the dispersal of historic properties. The overflights would not result in any physical changes to the visual setting of underlying lands and have no potential to change the visual or aesthetic quality of any landscape. As described in **Section 1.1.2**, several avoidances or mitigation measures were incorporated into the PRTC structure and would remain in place. As such, there would be no adverse effect to historic properties from visual intrusion in accordance with 36 C.F.R. 800.5(b).

3.3 SUMMARY OF EFFECTS ASSESSMENT

Given the existing avoidances for specific properties beneath PRTC, the short duration of the potential exposure to low-level overflights (noise and visual), no potential for structural damage, and the rarity of these events for any given point on the ground, there would be no adverse effect to historic properties in accordance with 36 C.F.R. 800.5(b).

With regards to NHLs, there would be no low-level overflights at six of the seven NHLs given the existing avoidance areas, the location of the NHL beneath ATCAA-only airspace, or the location is just outside the MOA boundary. While Medicine Rocks State Park, beneath Gap B and PR 3, has the potential to experience a low-level overflight during an LFE, as is the current situation, the probability of this occurring would still be relatively rare (about 2 percent during an LFE week) and as such would not result in an adverse effect pursuant to 36 C.F.R. section 800.5(b).

The DAF invited 24 Tribes into Government-to-Government consultation concerning TCPs. There are three places that do not have current avoidance measures: “Unnamed 2” in Wyoming beneath PR 2; Medicine Rocks State Park in Montana beneath PR 3 and Gap B; and Chalk Buttes in Montana beneath Gap B. All of these places are currently overflown during day-to-day operations and LFEs. The Undertaking would not substantially change the existing environment and these places would continue to be rarely overflown at low-level. The associated noise from these overflights would not be at a level to cause structural damage, but their visual presence could be considered annoying to visitors or individuals participating in ceremonies. As is the current practice, Ellsworth AFB would establish temporary or seasonal avoidances for specific events or ceremonies if given notice by the Tribe(s).

The DAF recognizes there are likely numerous resources that have not been evaluated or identified beneath PRTC; however, given that no adverse effect would occur to NRHP-listed or eligible properties, the same conclusion could be made for those additional resources.

4.0 MEASURES TO AVOID, MINIMIZE, OR MITIGATE ADVERSE EFFECTS

The existing avoidances developed during the initial establishment and operation of the PRTC (see **Section 1.1.2**) would remain in place. Based on the assessment presented in this documentation, there are no additional mitigation measures necessary to protect historic properties beneath PRTC. Ellsworth AFB would continue to establish temporary or seasonal avoidances for specific ceremonies and events requested by the Tribes, if given sufficient notice.

5.0 REFERENCES

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ENCLOSURE A – IDENTIFICATION OF HISTORIC PROPERTIES

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Table A-1. Historic Properties Under PRTC Airspace

Property Name	General Location (County/Town)	Airspace
Montana		
Airport Site 24-RB-0	Rosebud/Birney	PR 1
Amid Creek Site 24-RB-249	Rosebud/Birney	PR 1
Archaeological Site 24-BH-288	Rosebud/City Unavailable	PR 1
Archaeological Site 24-BH-1030	Big Horn/ City Unavailable	PR 1
Archaeological Site 24-BH-1058	Big Horn/ City Unavailable	PR 1
Archaeological Site 24-BH-19494	Big Horn/ City Unavailable	PR 1
Archaeological Site 24-BH-1975	Big Horn/ City Unavailable	PR 1
Archaeological Site 24-BH-307	Big Horn/ City Unavailable	PR 1
Archaeological Site 24-BH-950	Big Horn/ City Unavailable	PR 1
Archaeological Site 24-BH-1001	Big Horn/ City Unavailable	PR 1
Archeological Site 24-PR-26	Powder River/Ashland	PR 1
Archeological Site 24-PR-36	Powder River/Ashland	PR 1
Archeological Site 24-PR-37	Powder River/Ashland	PR 1
Archeological Site 24-PR-39	Powder River/Ashland	PR 1
Archeological Site 24-PR-43	Powder River/Ashland	PR 1
Archeological Site 24-PR-48	Powder River/Ashland	PR 1
Archeological Site 24-PR-484	Powder River/Ashland	PR 1
Archeological Site 24-PR-486	Powder River/Ashland	PR 1
Archeological Site 24-PR-489	Powder River/Ashland	PR 1
Archeological Site 24-PR-493	Powder River/Ashland	PR 1
Archeological Site 24-PR-495	Powder River/Ashland	PR 1
Archeological Site 24-PR-496	Powder River/Ashland	PR 1
Archeological Site 24-PR-497	Powder River/Ashland	PR 1
Archeological Site 24-PR-498	Powder River/Ashland	PR 1
Archeological Site 24-PR-499	Powder River/Ashland	PR 1
Archeological Site 24-PR-55	Powder River/Ashland	PR 1
Archeological Site 24-PR-552	Powder River/Ashland	PR 1
Archeological Site 24-PR-563	Powder River/Ashland	PR 1
Archeological Site 24-PR-564	Powder River/Ashland	PR 1
Archeological Site 24-PR-565	Powder River/Ashland	PR 1
Archeological Site 24-PR-566	Powder River/Ashland	PR 1
Archeological Site 24-PR-568	Powder River/Ashland	PR 1
Archeological Site 24-PR-570	Powder River/Ashland	PR 1
Archeological Site 24-PR-573	Powder River/Ashland	PR 1
Archeological Site 24-PR-580	Powder River/Ashland	PR 1
Archeological Site 24-PR-583	Powder River/Ashland	PR 1
Archeological Site 24-PR-587	Powder River/Ashland	PR 1
Archeological Site 24-PR-588	Powder River/Ashland	PR 1
Archeological Site 24-PR-591	Powder River/Ashland	PR 1
Archeological Site 24-PR-593	Powder River/Ashland	PR 1
Archeological Site 24-PR-596	Powder River/Ashland	PR 1
Archeological Site 24-PR-597	Powder River/Ashland	PR 1
Archeological Site 24-PR-599	Powder River/Ashland	PR 1
Archeological Site 24-PR-678	Powder River/Ashland	PR 1
Archeological Site 24-PR-683	Powder River/Ashland	PR 1
Archeological Site 24-PR-686	Powder River/Ashland	PR 1
Archeological Site 24-PR-688	Powder River/Ashland	PR 1
Archeological Site 24-PR-697	Powder River/Ashland	PR 1
Archeological Site 24-RB-86	Powder River/Ashland	PR 1

Property Name	General Location (County/Town)	Airspace
Autumn View Site 24-RB-251	Rosebud/Birney	PR 1
Baker Hotel	Fallon/Baker	PR 3
Baldwin House	Big Horn/ Lodge Grass	PR 1
Bones Brothers Ranch	Rosebud/Birney	Gateway West
Boyum, John, House	Big Horn/ Hardin	PR 1
Bright Cloud Site	Rosebud/Birney	PR 1
Broken Tire Site 24-RB-217	Rosebud/Birney	PR 1
Burke, Thomas H., House	Big Horn/ Hardin	PR 1
Byers/Schaudel Homestead 24-RB-153	Rosebud/City Unavailable	PR 1
Cammock's Hotel	Big Horn/Lodge Grass	PR 1
Castle Rock Post Office 24-RB-335	Rosebud/Colstrip	PR 1
Cheever-Cain Ranch	Powder River/ Otter	PR 1
Chalk Buttes[4]	Carter/Ekalaka	Gap B
Chivers Memorial Church	Big Horn/Lodge Grass	PR 1
Commercial District	Big Horn/Hardin	PR 1
Cooley Place 24-RB-1064	Rosebud/Colstrip	PR 1
Cotant/Scott Site 24-RB-158	Rosebud/City Unavailable	PR 1
Cottonwood Creek Bridge[2]	Fallon/ Ismay	PR 3
Cross Ranch Headquarters	Powder River/ Broadus	PR 2
Crying Hawk	Rosebud/Colstrip	PR 1
Deer Medicine Rocks[1, 4]	Rosebud/Lame Deer	PR 1
Doc Taylor Place 24-RB-1065	Rosebud/Colstrip	PR 1
Drew, J.W., Grain Elevator	Big Horn/Lodge Grass	PR 1
Ebeling, William, House	Big Horn/Hardin	PR 1
Eder, Charles S. House	Big Horn/Hardin	PR 1
Ellison's Rock Site 24-RB-1020	Rosebud/Colstrip	PR 1
Engineer's Shelter	Rosebud/Colstrip	PR 1
Fadhl Homestead Site	Rosebud/Colstrip	PR 1
Fallon County Jail	Fallon/ Baker	PR 3
Farley Lookout Site 24-RB-1053K	Rosebud/Colstrip	PR 1
Fenceline Site	Rosebud/Ashland	PR 1
First Baptist Church	Big Horn/Hardin	PR 1
First National Bank of Ekalaka and Rickard Hardware Store Building	Carter/Ekalaka	Gap B
Haverfield Hospital	Big Horn/Hardin	PR 1
Head Chief-Young Mule Charge[3]	Rosebud/Lame Deer	PR 1
Insite 24-RB-874	Rosebud/Colstrip	PR 1
Inventory Site #31	Rosebud/Colstrip	PR 1
Iron Graveyard Site 24-RB-248	Rosebud/Ashland	PR 1
Ismay Jail	Custer/ Ismay	PR 3
Jamies Site	Rosebud/Ashland	PR 1
Jud McKelvery Homestead 24-RB-155	Rosebud/City Unavailable	PR 1
Karl Knoblock Homestead 24-RB-168	Rosebud/City Unavailable	PR 1
Katydid Site 24-RB-226	Rosebud/Birney	PR 1
King Creek Site 24-RB-221	Rosebud/Ashland	PR 1
Kopriva, Francis, House	Big Horn/Hardin	PR 1
Lithic City Site 24-FA-45	Fallon/City Unavailable	PR 3
Little Big Horn River Bridge[2]	Big Horn	PR 1
Little Bighorn Battlefield National Monument	Big Horn/Garryowen	PR 1
Little Bone Site 24-RB-233	Rosebud/Ashland	PR 1
Lodge Grass City Jail	Big Horn/Lodge Grass	PR 1

Property Name	General Location (County/Town)	Airspace
Lodge Grass Creek Bridge[2]	Big Horn/Lodge Grass	PR 1
Lodge Grass Merchandise Company Store	Big Horn/Lodge Grass	PR 1
Lookout Point Site & Petroglyph	Rosebud/Colstrip	PR 1
Lost Grave Site 24-RB-228	Rosebud/Ashland	PR 1
Medicine Rocks State Park[1,2,3, 4]	Carter/Ekalaka	PR 2
Milwaukee Railroad[2]	Rosebud County	PR 1
Moncure Tipi	Big Horn/Busby	PR 1
Mud Turtle Spring Site 24-PR-628	Powder River/near Ashland	PR 1
Muskrat Homestead 24-RB-887	Rosebud/Colstrip	PR 1
O'Dell Bison Jump Site 24-RB-234	Rosebud/Ashland	PR 1
O'Fallon Creek Bridge	Custer/Ismay	PR 3
OW Ranch[3]	Big Horn/Decker	PR 1
Owl Creek Site	Big Horn/near Lodge Grass	PR 1
Pease's, George, Second Store	Big Horn/Lodge Grass	PR 1
Ping, J.J. House	Big Horn/Hardin	PR 1
Poker Jim Butte Fire Lookout	Rosebud/Birney	PR 1
Power Quarry Site 24-RB-479	Rosebud/Colstrip	PR 1
Pyramid Mountain	Rosebud/Colstrip	PR 1
Reno Apartments	Big Horn/Hardin	PR 1
Reservoir Creek Homestead[2]	Powder River	PR 1, Gap A, or PR 2
Residential District	Big Horn/Hardin	PR 1
Reynold's Battlefield Historic District	Powder River/Moorehead	Gap A
Roof of the Tongue Site 24-RB-211	Rosebud/Ashland	PR 1
Rosebud Battlefield –Where the Girl Saved Her Brother[1,2]	Big Horn/Kirby	PR 1
Ryan's, John, House	Big Horn/Lodge Grass	PR 1
Sandrock Bison Kill	Rosebud/Colstrip	PR 1
Scatter Site 24-RB-212	Rosebud/Ashland	PR 1
Sharp's, Jay, Store	Big Horn/Lodge Grass	PR 1
Simmonsen's House	Big Horn/Lodge Grass	PR 1
Site 24-BH-1045	Big Horn/City Unavailable	PR 1
Site 24-BH-1046	Big Horn/City Unavailable	PR 1
Site 24-BH-1052	Big Horn/City Unavailable	PR 1
Site 24-BH-1583	Big Horn/City Unavailable	PR 1
Site 24-BH-1589	Big Horn/City Unavailable	PR 1
Site 24-BH-1591	Big Horn/City Unavailable	PR 1
Site 24-BH-1593	Big Horn/City Unavailable	PR 1
Site 24-BH-1595	Big Horn/City Unavailable	PR 1
Site 24-BH-1595	Big Horn/City Unavailable	PR 1
Site 24-BH-1597	Big Horn/City Unavailable	PR 1
Site 24-BH-1602	Big Horn/City Unavailable	PR 1
Site 24-BH-1606	Big Horn/City Unavailable	PR 1
Site 24-BH-1609	Big Horn/City Unavailable	PR 1
Site 24-BH-1610	Big Horn/City Unavailable	PR 1
Site 24-BH-1614	Big Horn/City Unavailable	PR 1
Site 24-BH-1618	Big Horn/City Unavailable	PR 1
Site 24-BH-1619	Big Horn/City Unavailable	PR 1
Site 24-CR-277	Custer/City Unavailable	PR 1, Gap A, PR 2, Gap B, or PR 3
Site 24-FA-39	Fallon/City Unavailable	PR 3
Site 24-FA-48	Fallon/City Unavailable	PR 3
Site 24-FA-60	Fallon/City Unavailable	PR 3

Property Name	General Location (County/Town)	Airspace
Site 24-FA-61	Fallon/City Unavailable	PR 3
Site 24-FA-62	Fallon/City Unavailable	PR 3
Site 24-FA-63	Fallon/City Unavailable	PR 3
Site 24-FA-69	Fallon/City Unavailable	PR 3
Site 24-FA-70	Fallon/City Unavailable	PR 3
Site 24-FA-71	Fallon/City Unavailable	PR 3
Site 24-FA-72	Fallon/City Unavailable	PR 3
Site 24-FA-74	Fallon/City Unavailable	PR 3
Site 24-FA-75	Fallon/City Unavailable	PR 3
Site 24-FA-76	Fallon/City Unavailable	PR 3
Site 24-FA-79	Fallon/City Unavailable	PR 3
Site 24-FA-80	Fallon/City Unavailable	PR 3
Site 24-MC-96	Fallon/City Unavailable	PR 3
Slewfoot	Rosebud/Colstrip	PR 1
Sly Bison Archeological Site THS 79-4	Rosebud/West of Colstrip	PR 1
Spirit Rock Site 24-RB-275	Rosebud/Birney	PR 1
Spring Creek Archeological District	Big Horn/City Unavailable	PR 1
St. Joseph Catholic Church	Big Horn/Hardin	PR 1
Stevens, Dominic, House	Big Horn/Lodge Grass	PR 1
Sullivan Rooming House	Big Horn/Hardin	PR 1
Sullivan, James J. House[3]	Big Horn/Hardin	PR 1
Ten Mile Road[2]	Powder River	PR 1, Gap A, or PR 2
Three Rock Ring Site 24-RB-229	Rosebud/Ashland	PR 1
Three Strike Site 24-RB-373	Rosebud/Colstrip	PR 1
Timber Bridge South of Ismay	Fallon/Ismay	PR 3
Timi's Shelter	Rosebud/Colstrip	PR 1
Tongue River Dam Homestead	Big Horn	PR 1
Trytten, J.M., House	Big Horn/Lodge Grass	PR 1
Tupper, J.S., House	Big Horn/Hardin	PR 1
Vegamatic Site	Rosebud/Colstrip	PR 1
Wold Barn	Rosebud/ Lame Deer	PR 1
Wolf Mountains Battlefield – Where Big Crow Walked Back and Forth[1, 4]	Rosebud/Birney	PR 1
Yellow Leaf Site 24-RB-215	Rosebud/Ashland	PR 1
Yonkee Reservoir Site 24-PR-402	Powder River/City Unavailable	PR 1, Gap A, or PR 2
Young, Alvin, Barn and Cabin Historic District	Big Horn/Busby	PR 1
Young's Creek Archeological District	Big Horn/City Unavailable	PR 1
North Dakota		
Adams County Courthouse	Adams/Hettinger	PR 4
Cannonball Stage Station[2]	Grant/near Carson	PR 4
Carson Roller Mill	Grant/ Carson	PR 4
Cedar Creek Bridge	Adams/Hettinger	PR 4
Erickson, Andrew, Barn[3]	Adams/Hettinger	PR 4
Evangelisch Lutheraner Dreieinigkeit Gemeinde	Grant/New Leipzig	PR 4
Fort Dilts[2]	Bowman/Rhame	PR 3
Hettinger County Courthouse	Hettinger/Mott	PR 4
Hope Lutheran Church	Grant/ Elgin	PR 4
H-T Ranch[2]	Slope/Amidon	PR 3
Medicine Rock State Historic Site[2]	Grant/Heil	PR 4
Mott Rainbow Arch Bridge	Hettinger/Mott	PR 4

Property Name	General Location (County/Town)	Airspace
Mystic Theatre	Slope/Marmarth	PR 3
Neuburg Congregational Church	Hettinger/Mott	PR 4
Schade, Emma Petznick and Otto, House	Bowman/Bowman	PR 3
Stern, John and Fredericka (Roth), Homestead	Hettinger/Mott	PR 4
US Post Office--Hettinger	Adams/Hettinger	PR 4
South Dakota		
Ainsworth, Oliver N., House	Lawrence/Spearfish	Gateway West
Anderson, Rasmus and Elemine, Homestead Ranch[3]	Lawrence/St. Onge	Gateway West
Antelope Creek Stage Station	Corson/Morristown	PR 4
Archeological Site No. 39CO39	Corson/Mahto	PR 4
Archeological Site No. 39HN1	Harding/Ludlow	PR 3
Archeological Site No. 39HN121	Harding/Ludlow	PR 3
Archeological Site No. 39HN150	Harding/Ludlow	PR 3
Archeological Site No. 39HN155	Harding/Ludlow	PR 3
Archeological Site No. 39HN159	Harding/Ludlow	PR 3
Archeological Site No. 39HN160	Harding/Ludlow	PR 3
Archeological Site No. 39HN162	Harding/Ludlow	PR 3
Archeological Site No. 39HN165	Harding/Ludlow	PR 3
Archeological Site No. 39HN167	Harding/Ludlow	PR 3
Archeological Site No. 39HN168	Harding/Ludlow	PR 3
Archeological Site No. 39HN17	Harding/Ludlow	PR 3
Archeological Site No. 39HN171	Harding/Ludlow	PR 3
Archeological Site No. 39HN174	Harding/Ludlow	PR 3
Archeological Site No. 39HN177	Harding/Ludlow	PR 3
Archeological Site No. 39HN18	Harding/Ludlow	PR 3
Archeological Site No. 39HN198	Harding/Ludlow	PR 3
Archeological Site No. 39HN199	Harding/Ludlow	PR 3
Archeological Site No. 39HN205	Harding/Ludlow	PR 3
Archeological Site No. 39HN207	Harding/Ludlow	PR 3
Archeological Site No. 39HN208	Harding/Ludlow	PR 3
Archeological Site No. 39HN209	Harding/Ludlow	PR 3
Archeological Site No. 39HN21	Harding/Ludlow	PR 3
Archeological Site No. 39HN210	Harding/Ludlow	PR 3
Archeological Site No. 39HN213	Harding/Ludlow	PR 3
Archeological Site No. 39HN217	Harding/Ludlow	PR 3
Archeological Site No. 39HN218	Harding/Ludlow	PR 3
Archeological Site No. 39HN219	Harding/Ludlow	PR 3
Archeological Site No. 39HN22	Harding/Ludlow	PR 3
Archeological Site No. 39HN227	Harding/Ludlow	PR 3
Archeological Site No. 39HN228	Harding/Ludlow	PR 3
Archeological Site No. 39HN232	Harding/Ludlow	PR 3
Archeological Site No. 39HN234	Harding/Ludlow	PR 3
Archeological Site No. 39HN26	Harding/Ludlow	PR 3
Archeological Site No. 39HN30	Harding/Ludlow	PR 3
Archeological Site No. 39HN484	Harding/Ludlow	PR 3
Archeological Site No. 39HN485	Harding/Ludlow	PR 3
Archeological Site No. 39HN486	Harding/Ludlow	PR 3
Archeological Site No. 39HN487	Harding/Ludlow	PR 3
Archeological Site No. 39HN5	Harding/Ludlow	PR 3

Property Name	General Location (County/Town)	Airspace
Archeological Site No. 39HN50	Harding/Ludlow	PR 3
Archeological Site No. 39HN53	Harding/Ludlow	PR 3
Archeological Site No. 39HN54	Harding/Ludlow	PR 3
Archeological Site No. 39LA165	Lawrence/Deadwood	Gateway West
Archeological Site No. 39LA481	Lawrence/Deadwood	Gateway West
Archeological Site No. 39MD81	Meade/Sturgis	Gateway West
Archeological Site No. 39MD82	Meade/Sturgis	Gateway West
Ashcroft, Thomas, Ranch	Harding/Reva	Gap B
Baker Bungalow	Lawrence/Spearfish	Gateway West
Bartlett, L.L., House	Meade/Stoneville	Gateway West
Bear Butte[1, 4]	Meade County/Sturgis	Gateway West
Beckon, Donald, Ranch	Meade County/Mud Butte	Gateway East
Belle Fourche Band Shell[3]	Butte/Belle Fourche	Gateway West
Belle Fourche Commercial Historic District	Butte/Belle Fourche	Gateway West
Belle Fourche Dam	Butte/Belle Fourche	Gateway West
Belle Fourche Experiment Farm	Butte/Newell	Gateway West
Bethany United Methodist Church	Perkins/Hettinger	Gap C
Black Hills National Cemetery[3]	Meade/Sturgis	Gateway West
Blake Ranch House	Harding/Buffalo	PR 2
Bolles, Charles, House	Butte/Belle Fourche	Gateway West
Butte County Courthouse and Historic Jail Building	Butte/Belle Fourche	Gateway West
Butte-Lawrence County Fairgrounds	Butte/Nisland	Gateway West
Carr No. 60 School	Perkins/Lodgepole	PR 4
Carr, Anna, Homestead	Perkins/Bison	PR 4
Central Perkins County Stockyard and Weighing Station	Perkins/Bison	PR 4
Chambers Dugout[3]	Butte/Belle Fourche	Gateway West
Cook, Fayette, House	Lawrence/Spearfish	Gateway West
Corbin, James A., House	Lawrence/Spearfish	Gateway West
Court, Henry, House	Lawrence/Spearfish	Gateway West
Dakota Club Library	Meade/Mud Butte	Gateway East
Dakota Tin and Gold Mine	Lawrence/Spearfish	Gateway West
Deadwood Historic District[1]	Lawrence/Deadwood	Gateway West
Dickey, Eleazer C. and Gwinnie, House	Lawrence/Spearfish	Gateway West
Dickey, Walter, House	Lawrence/Spearfish	Gateway West
Ditchrider House	Butte/Nisland	Gateway West
Driskill, William D., House	Lawrence/Spearfish	Gateway West
Duck Creek Lutheran Church and Cemetery	Perkins/Hettinger	Gap C
Emmanuel Lutheran Church and Cemetery	Harding/Ludlow	PR 3
Episcopal Church of All Angels	Lawrence/Spearfish	Gateway West
Erskine School	Meade/Sturgis	Gateway West
First Congregational United Church of Christ[2]	Butte/Belle Fourche	Gateway West
Fort Manuel	Corson/McIntosh	PR 4
Fort Meade District	Meade/Fort Meade	Gateway West
Fort Meade Veterans Administration Hospital[3]	Meade/Fort Meade	Gateway West
Foster Ranch House	Perkins/Meadow	PR 4

Property Name	General Location (County/Town)	Airspace
Fowler Hotel	Harding/Buffalo	Gap B
Frawley Historic Ranch[1]	Lawrence/Whitewood	Gateway West
Frozenman Stage Station	Meade	Gateway West
Fruitdale School	Butte/Fruitdale	Gateway West
Fruitdale Store	Butte/Fruitdale	Gateway West
Galena School	Lawrence/Deadwood	Gateway West
Gartner, Carl Frederick, Homestead	Butte/Newell	Gateway West
Gay, Thomas Haskins, House	Butte/Belle Fourche	Gateway West
Giannonatti Ranch	Harding/Ludlow	PR 3
Golden Rule Department Store	Perkins/Lemmon	PR 4
Golden Valley Norwegian Lutheran Church	Harding/Ralph	Gap C
Graf, Stephen and Maria, House	Meade/Sturgis	Gateway West
Grand River Stage Station	Corson/Morristown	PR 4
Halloran-Matthews-Brady House	Lawrence/Spearfish	Gateway West
Hardy Guard Station	Lawrence/Lead	Gateway West
Harriman, L. F., House	Perkins/Lemmon	PR 4
Harris, Fred S., House	Butte/Belle Fourche	Gateway West
Hay Creek Bridge	Butte/Belle Fourche	Gateway West
Hewes, Arthur, House	Lawrence/Spearfish	Gateway West
Homestake Mining Company Hydroelectric Plant No. 2[3]	Lawrence/Spearfish	Gateway West
Homestake Workers House	Lawrence/Spearfish	Gateway West
Hoover Store	Butte/Hoover	Gateway West
Hoover, Alexander, House	Butte/Hoover	Gateway West
Immanuel Lutheran Church	Perkins/Mud Butte	Gateway East
Jackson Boulevard Historic District[3]	Lawrence/Spearfish	Gateway West
Johnson, Axel, Ranch	Harding/Reva	Gateway East
Johnson, William, House	Butte/Hoover	Gateway West
Juso, Nels Homestead[2]	Lawrence/Lead	Gateway West
Keets, Henry, House	Lawrence/Spearfish	Gateway West
Kenaston, William G., House	Butte/Newell	Gateway West
Knight, Webb S., House	Lawrence/Spearfish	Gateway West
Kroll Meat Market and Slaughterhouse	Lawrence/Spearfish	Gateway West
Langdon School	Butte/Nisland	Gateway West
Lead Historic District	Lawrence/Lead	Gateway West
Lemmon Petrified Park	Perkins/Lemmon	PR 4
Lemmon, G. E., House	Perkins/Lemmon	PR 4
Lightning Spring (39HN204)	Harding/Ludlow	Gateway West
Lincoln School	Butte/Belle Fourche	Gateway West
Little Missouri Bank Building	Harding/Camp Crook	PR 2
Livingston, John and Daisy May, Ranch	Harding/Reva	Gateway East
Lown, William Ernest, House	Lawrence/Spearfish	Gateway West
Mail Building, The	Lawrence/Spearfish	Gateway West
McLaughlin Ranch Barn	Lawrence/Spearfish	Gateway West
McMillan, John and Elsie, House[3]	Meade/Sturgis	Gateway West
Minnesela Bridge	Butte/Belle Fourche	Gateway West
Mount Theodore Roosevelt Monument	Lawrence/Spearfish	Gateway West
Newell Depot Bridge	Butte/Newell	Gateway West
Newell High School	Butte/Newell	
Old Finnish Lutheran Church	Lawrence/Lead	Gateway West

Property Name	General Location (County/Town)	Airspace
Peace Valley Evangelical Church and Cemetery	Harding/Hettinger	PR 3
Pearson Cabin	Meade/Sturgis	Gateway West
Quamman, Ole, House[3]	Perkins/Lemmon	PR 4
Quillian, Thomas, House	Lawrence/Saint Onge	Gateway West
Raskob, Jacob and Elizabeth, Ranch	Meade/Sturgis	Gateway West
Redwater Bridge, Old	Lawrence/Spearfish	Gateway West
Richards Cabins	Meade/Faith	Gateway East
Riley, Almira, House	Lawrence/Spearfish	Gateway West
Rockford No. 40 School	Perkins/Lemmon	PR 4
Roosevelt School[3]	Butte/Belle Fourche	Gateway West
Saint Onge State Bank	Lawrence/Saint Onge	Gateway West
Scotney, John Aaron, House	Butte/Belle Fourche	Gateway West
Shevling, L. W., Ranch	Harding/Buffalo	PR 2
Site 39LA150	Lawrence/City Unavailable	Gateway West
Site 39LA177	Lawrence/City Unavailable	Gateway West
Site 39LA247	Lawrence/City Unavailable	Gateway West
Site 39LA257	Lawrence/City Unavailable	Gateway West
Site 39LA259	Lawrence/City Unavailable	Gateway West
Sittner Farm	Perkins/Meadow	PR 4
Small, Charles and Eleanor, House	Butte/Belle Fourche	Gateway West
Snoma Finnish Cemetery	Butte/Belle Fourche	Gateway West
Soper-Behymer Ranch	Butte/Belle Fourche	
Sorum Cooperative Store	Perkins/Lodgepole	Gap C
Sorum Hotel	Harding/Reva	Gateway East
South Dakota Dept. of Transportation Bridge No. 10-109-360	Butte/Belle Fourche	Gateway West
South Dakota Dept. of Transportation Bridge No. 10-270-338	Butte/Newell	Gateway West
South Dakota Dept. of Transportation Bridge No. 47-151-389	Meade/Sturgis	Gateway West
Spearfish City Hall	Lawrence/Spearfish	Gateway West
Spearfish Filling Station	Lawrence/Spearfish	Gateway West
Spearfish Fisheries Center	Lawrence/Spearfish	Gateway West
Spearfish Historic Commercial District	Lawrence/Spearfish	Gateway West
Spearfish Post Office (Old)	Lawrence/Mountain Plains	Gateway West
Spearfish Rest Stop Tipi[3]	Lawrence/Spearfish	Gateway West
Spring Creek School	Meade/Mud Butte	Gateway East
St. Lawrence O'Toole Catholic Church	Lawrence/Lead	Gateway West
St. Onge Schoolhouse	Lawrence/Saint Onge	Gateway West
Stokes, Oliver O., House	Harding/Buffalo	PR 2
Stomprude Trail Ruts	Meade	Gateway West
Stonelake Bridge	Butte/Newell	Gateway West
Sturgis City Auditorium[2]	Lawrence/Sturgis	Gateway West
Sturgis Commercial Block	Meade/Sturgis	Gateway West
Sturgis High School	Meade/ Sturgis	Gateway West
Sturgis Water Works Company Supply Works Site[3]	Meade/ Sturgis	Gateway West
Tallent, Annie, House	Meade/ Sturgis	Gateway West
Thoen Stone and Site[2]	Lawrence/Spearfish	Gateway West
Tomahawk Lake Country Club	Lawrence/Deadwood	Gateway West
Toomey House	Lawrence/Spearfish	Gateway West

Property Name	General Location (County/Town)	Airspace
Tri State Bakery	Butte/Belle Fourche	Gateway West
Tubbs, Poker Alice, House	Meade/Sturgis	Gateway West
Uhlig, Otto L., House	Lawrence/Spearfish	Gateway West
Vale Bridge	Butte/Newell	Gateway West
Vale Cut Off Belle Fourche River Bridge	Butte/Belle Fourche	Gateway West
Vale School	Butte/Vale	Gateway West
Veal, Thomas J., Ranch	Perkins/Meadow	PR 4
Vessey School	Harding/Ludlow	PR 3
Viken, Nicholas Augustus, Homestead	Butte/Newell	Gateway West
Vorhees Ranch[2]	Lawrence/Whitewood vicinity	Gateway West
Walsh Barn	Butte/Spearfish	Gateway West
Walton Ranch	Lawrence/Spearfish	Gateway West
Wenke, John G., House	Meade/Sturgis	Gateway West
Whitewood Historic District	Lawrence/Whitewood	Gateway West
Whitney, Mary, House	Lawrence/Spearfish	Gateway West
Wide Awake Grocery Building	Butte/Belle Fourche	Gateway West
William Holst Farmstead[2]	Lawrence/Vale vicinity	Gateway West
Wolzmuth, John, House	Lawrence/Spearfish	Gateway West
Woodmen Hall	Lawrence/Saint Onge	Gateway West
Wyoming		
Arch Creek Petroglyphs (48CK41)	Crook/Moorcroft	Gateway West
Basin Oil Field Tipi Rings 48CA1667	Campbell	PR 1, Gap A or PR 2
Bishop Road Site 48CA1612	Campbell	PR 1, Gap A or PR 2
DXN Bridge over Missouri River	Crook/Hulett	PR 2
EBF Bridge over Powder River	Sheridan/Arvada	PR 1
Entrance Road--Devils Tower National Monument	Crook/Devils Tower	Gateway West
Entrance Station--Devils Tower National Monument	Crook/Devils Tower	Gateway West
Gillette Post Office	Crook/Moorcroft	Gateway West
Inyan Kara Mountain[4]	Crook/Sundance	Gateway West
McKean Archeological Site (48CK7)	Crook/Moorcroft	Gateway West
Nine Mile Segment, Bozeman Trail 48CA264	Campbell	Gateway West
Old Headquarters Area Historic District	Crook/Devils Tower	Gateway West
Ranch A	Crook/Beulah	Gateway West
Rochelle Archeological District	Campbell/City Unavailable	Gateway West
Sundance School	Crook/Sundance	Gateway West
Sundance State Bank	Crook/Sundance	Gateway West
Tower Ladder--Devils Tower National Monument[4]	Crook/Devils Tower	Gateway West
Unnamed 1[4]	North of Gillette	Gateway West
Unnamed 2[4]	Northwest of Hulette	PR 2
Vore Buffalo Jump	Crook/Sundance	Gateway West
Wyoming Mercantile	Crook/Aladdin	Gateway West

Notes: [1]Property is also an NHL
[2]Property in State Register
[3]Property new to NRHP (eligible or listed) since 2014
[4] Property is a TCP

Table A-1 Historic Properties Sources

Montana Historical Society. 2018. Montana State-owned Heritage Properties by County. Available online: https://mhs.mt.gov/Shpo/docs/PropertiesListCounty.pdf. Accessed 29 October 2025.

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