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.

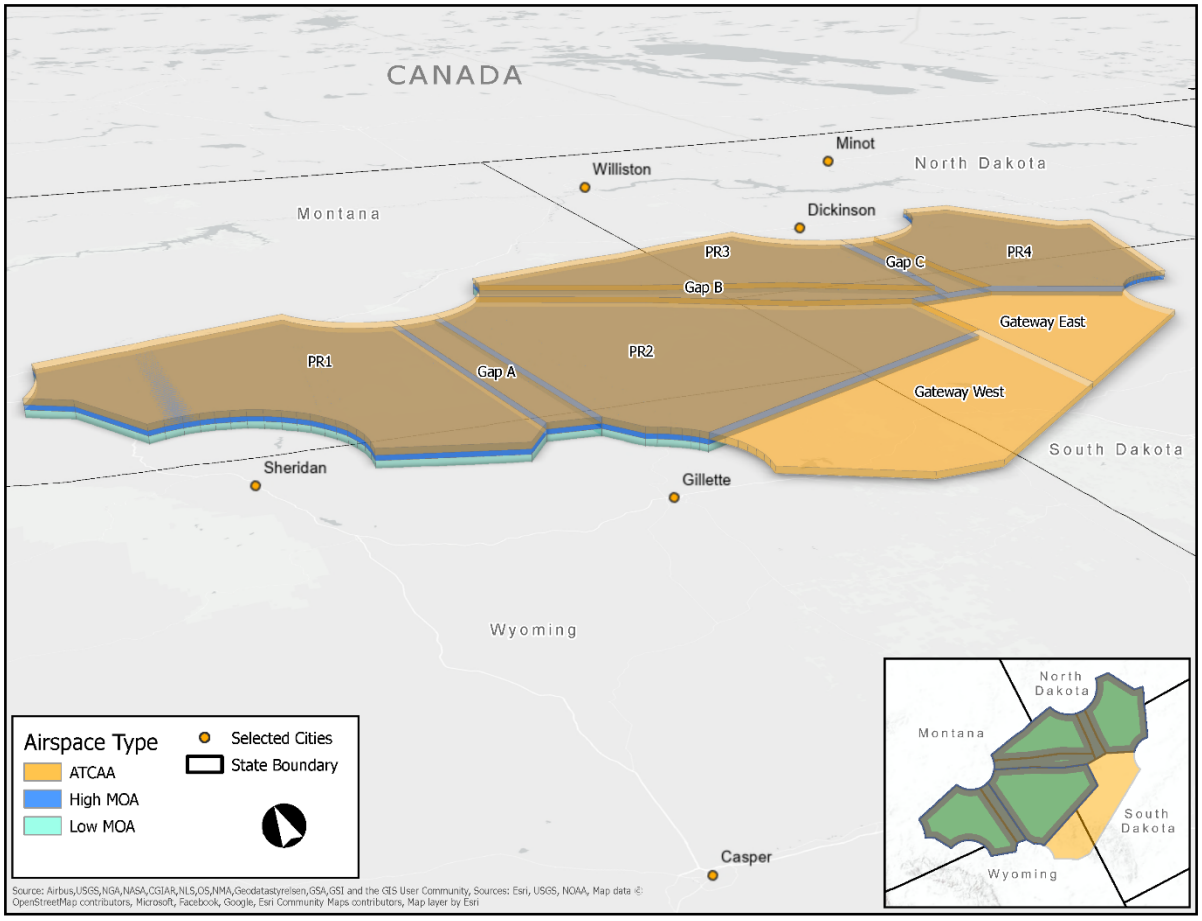

Figure 1.1-1 Powder River Training Complex Overview

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

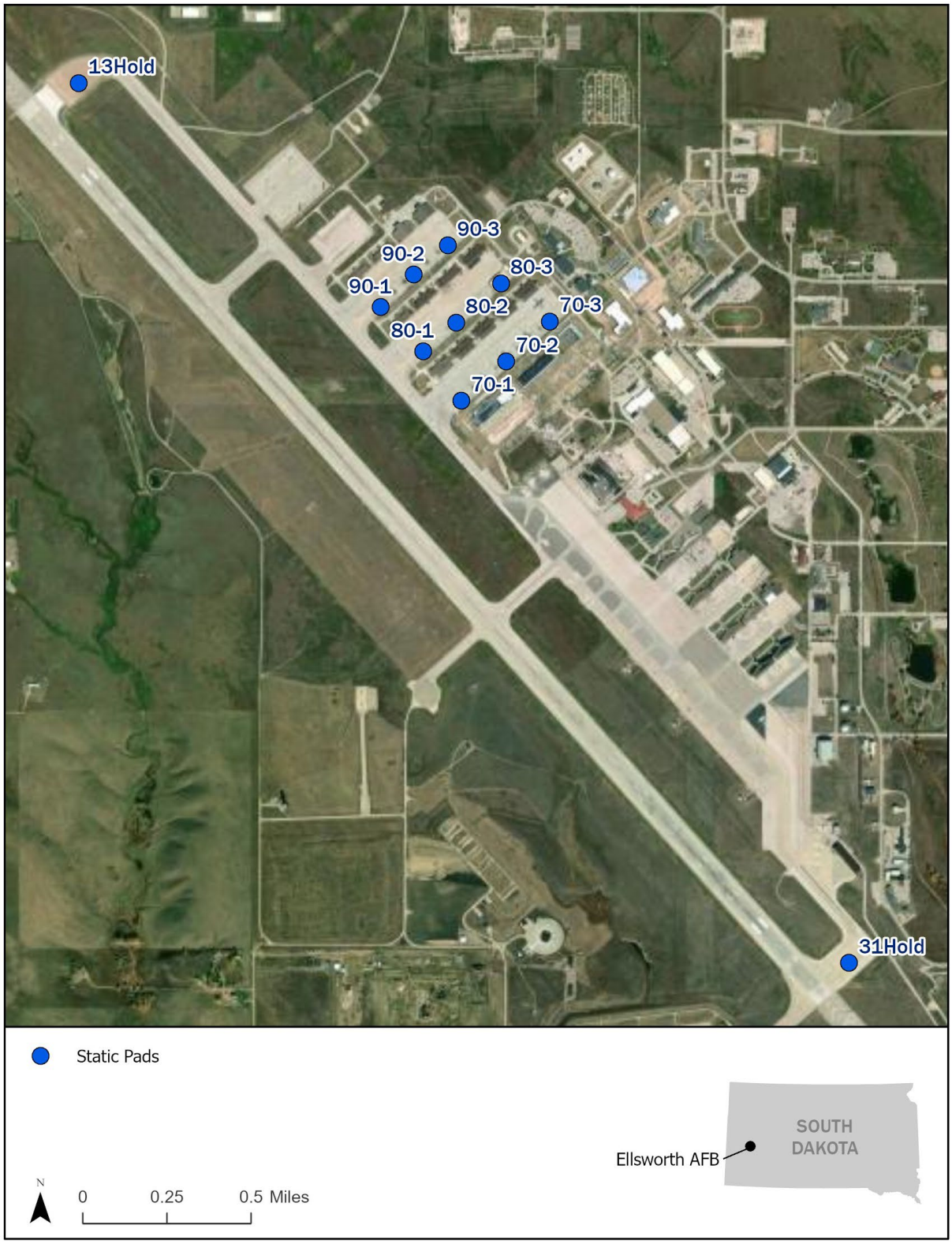

Figure 3.1-1 Maintenance Operations Locations at Ellsworth AFB

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

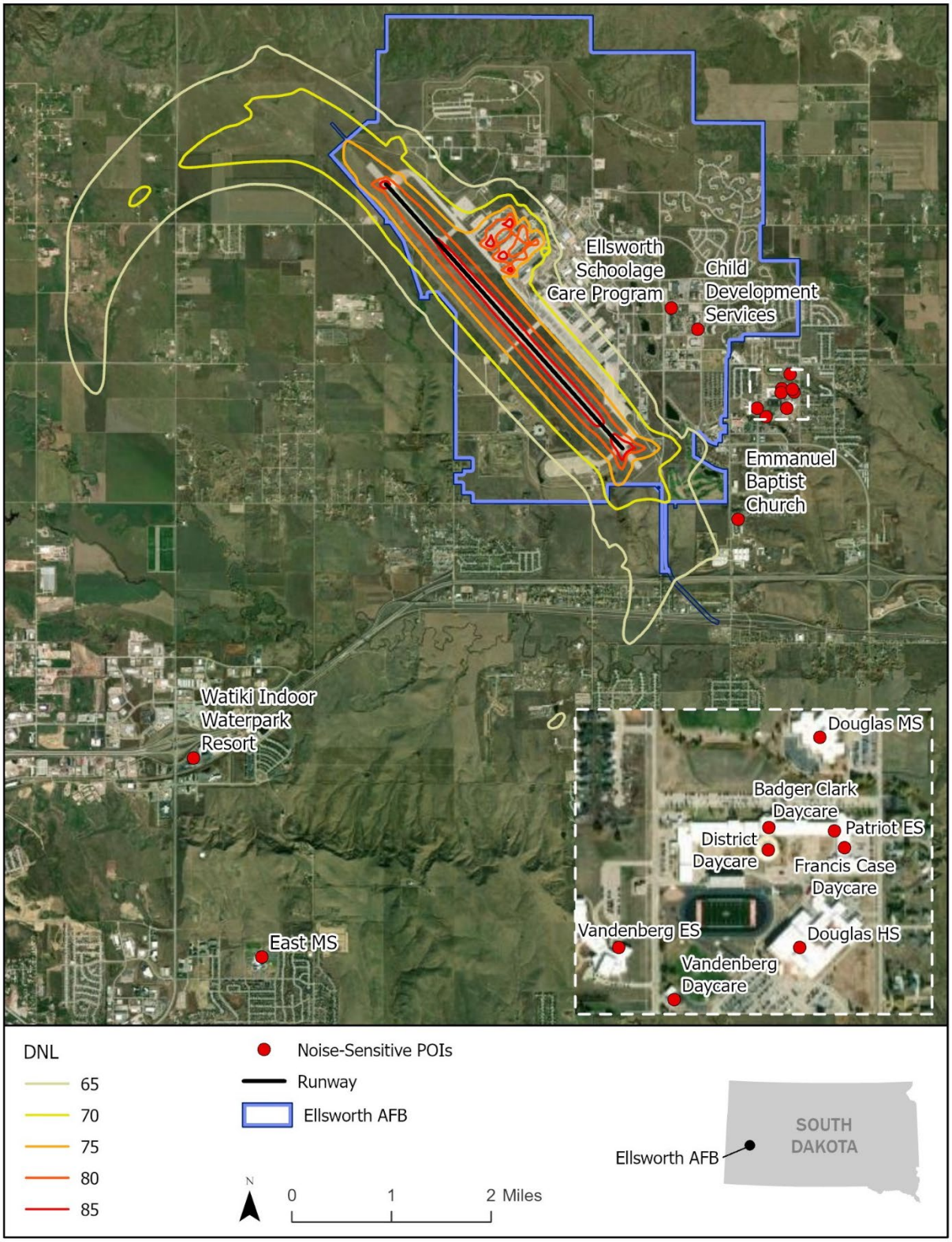

Figure 3.1-2 Existing DNL Contours and POIs in the Vicinity of Ellsworth AFB

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.

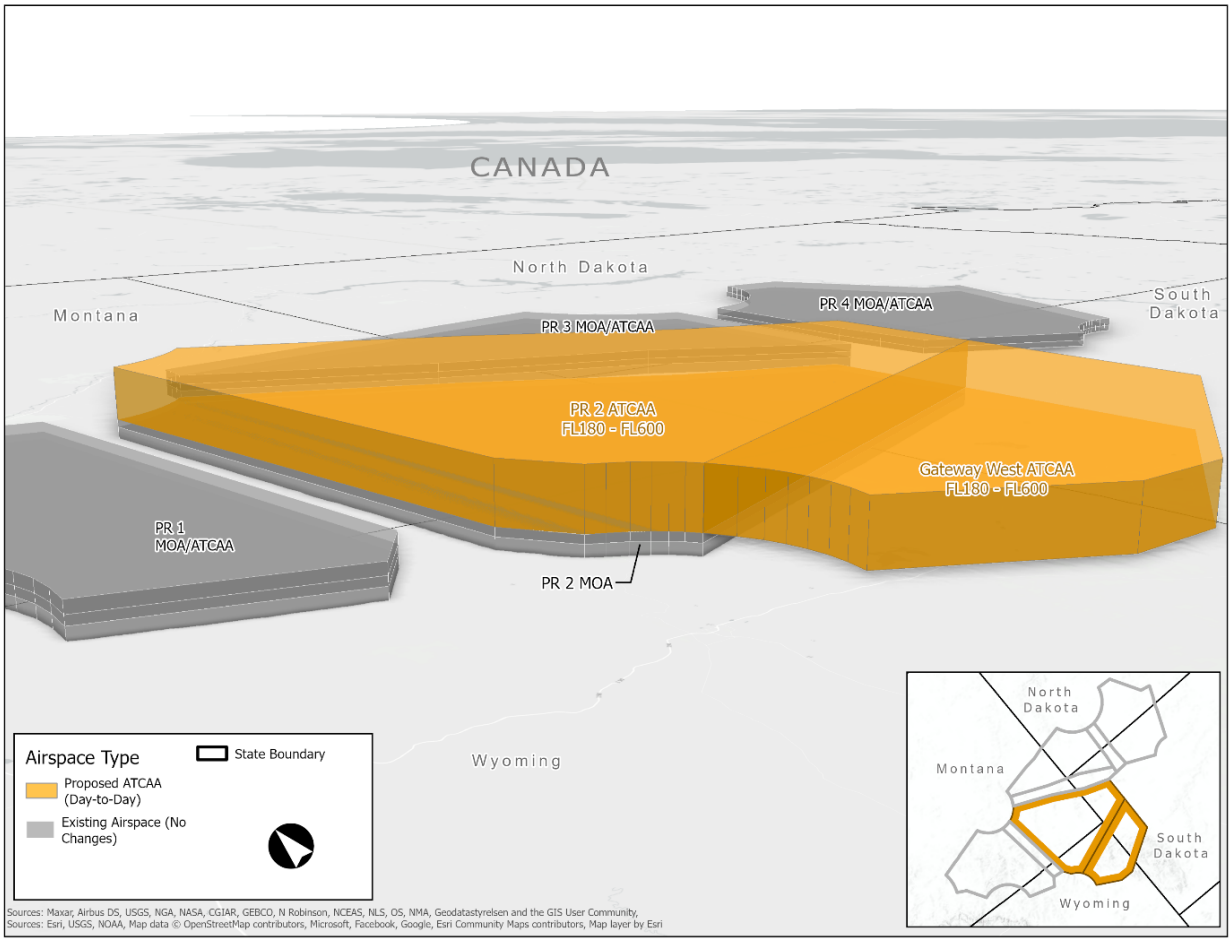

Figure 4.0-1 Alternative 1 Proposed Changes for Day-to-Day Operations

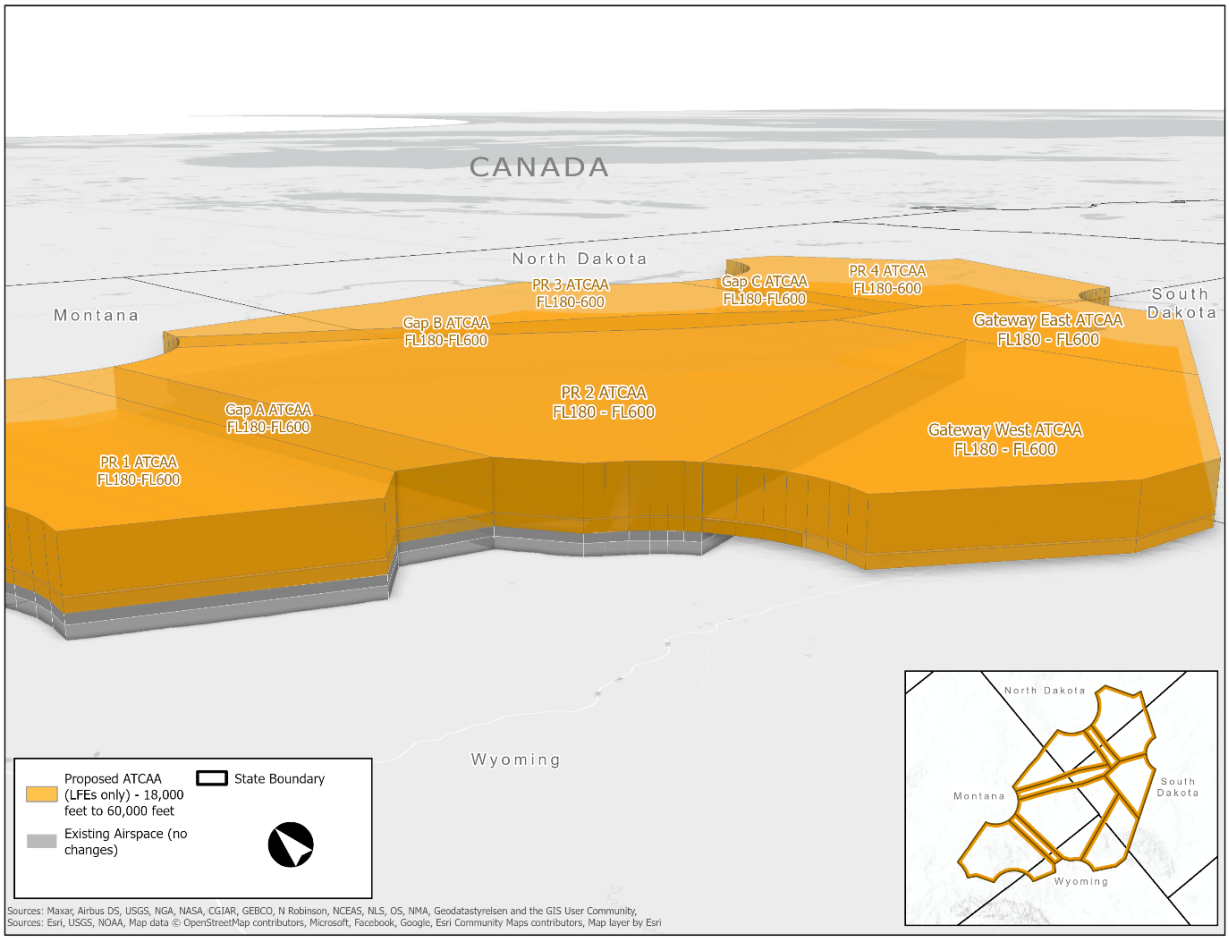

Figure 4.0-2 Alternative 1 Proposed Changes for LFEs

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

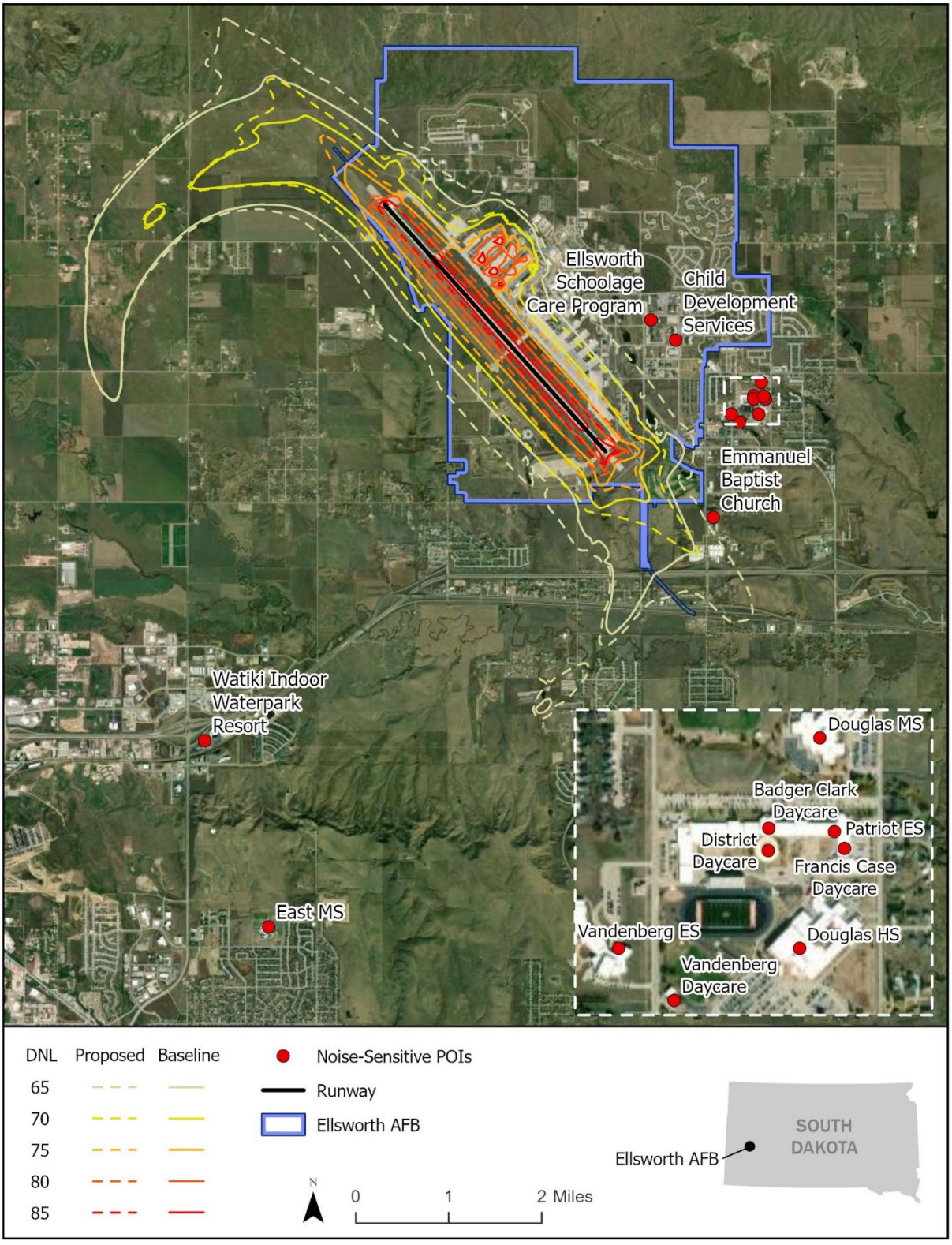

Figure 4.1-1 Comparison of Alternative 1 and No Action DNL Noise Contours and POIs in the Vicinity of Ellsworth AFB

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.

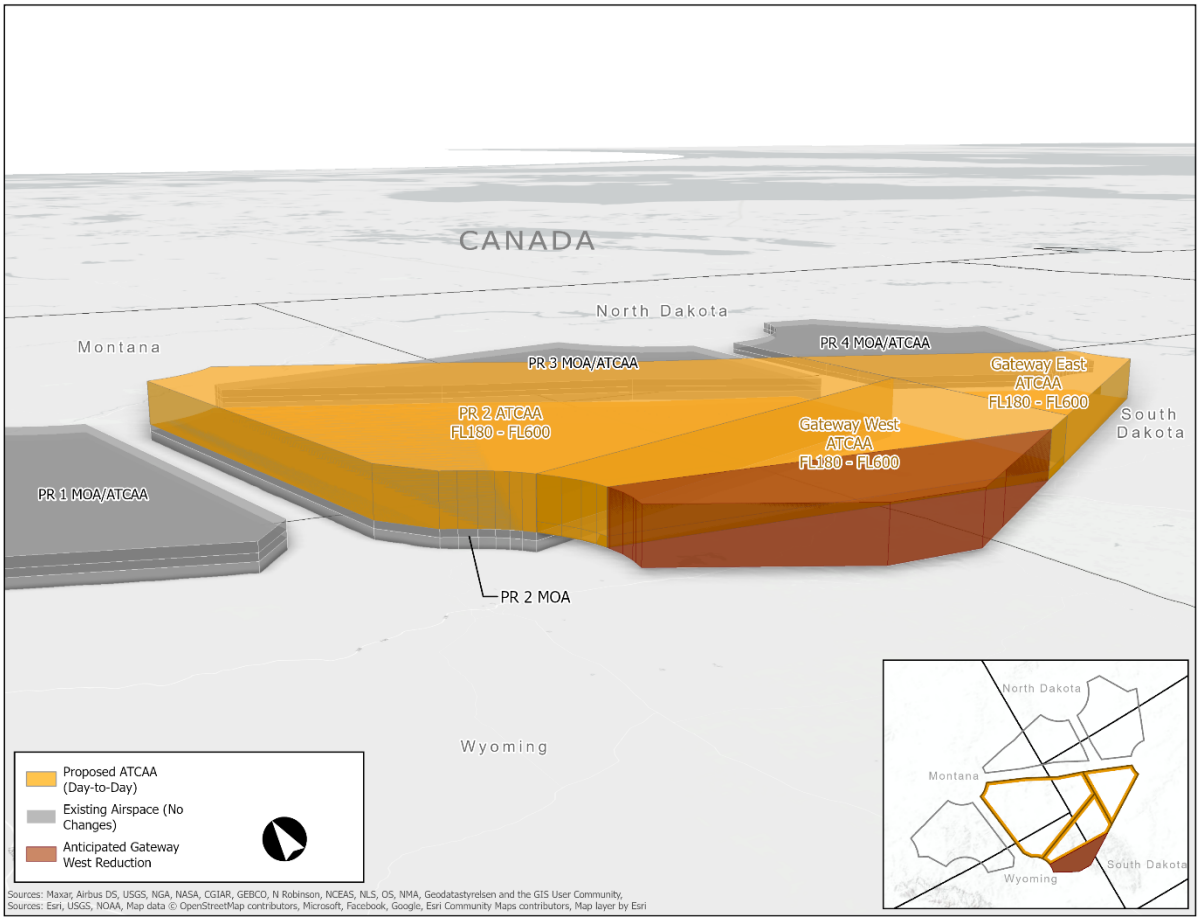

Figure 5.0-1 Alternative 2 Proposed Changes for Day-to-Day Operations

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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TABLE OF CONTENTS

TABLES

FIGURES

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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.

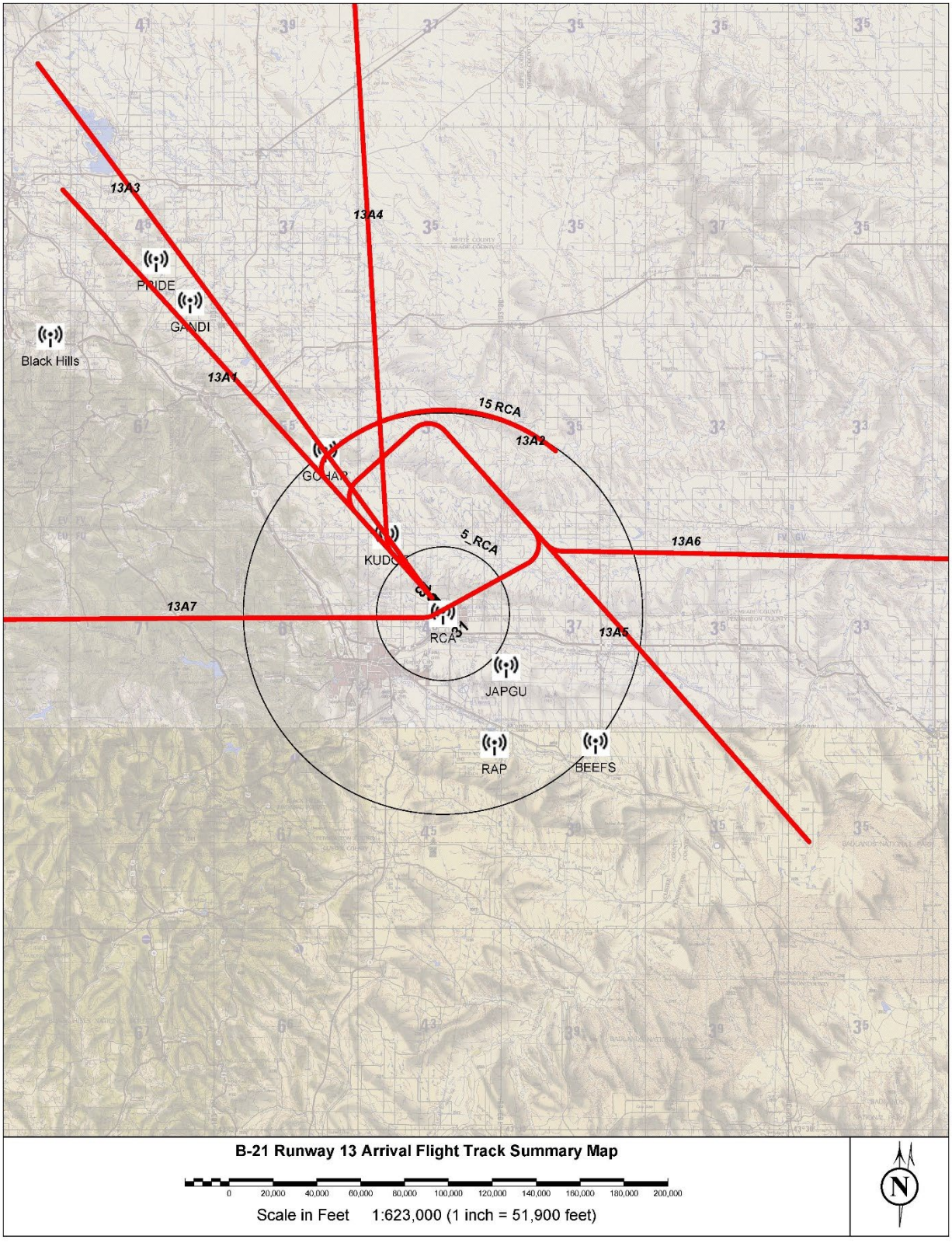

Figure 4-1 B-21 Runway 13 Arrivals

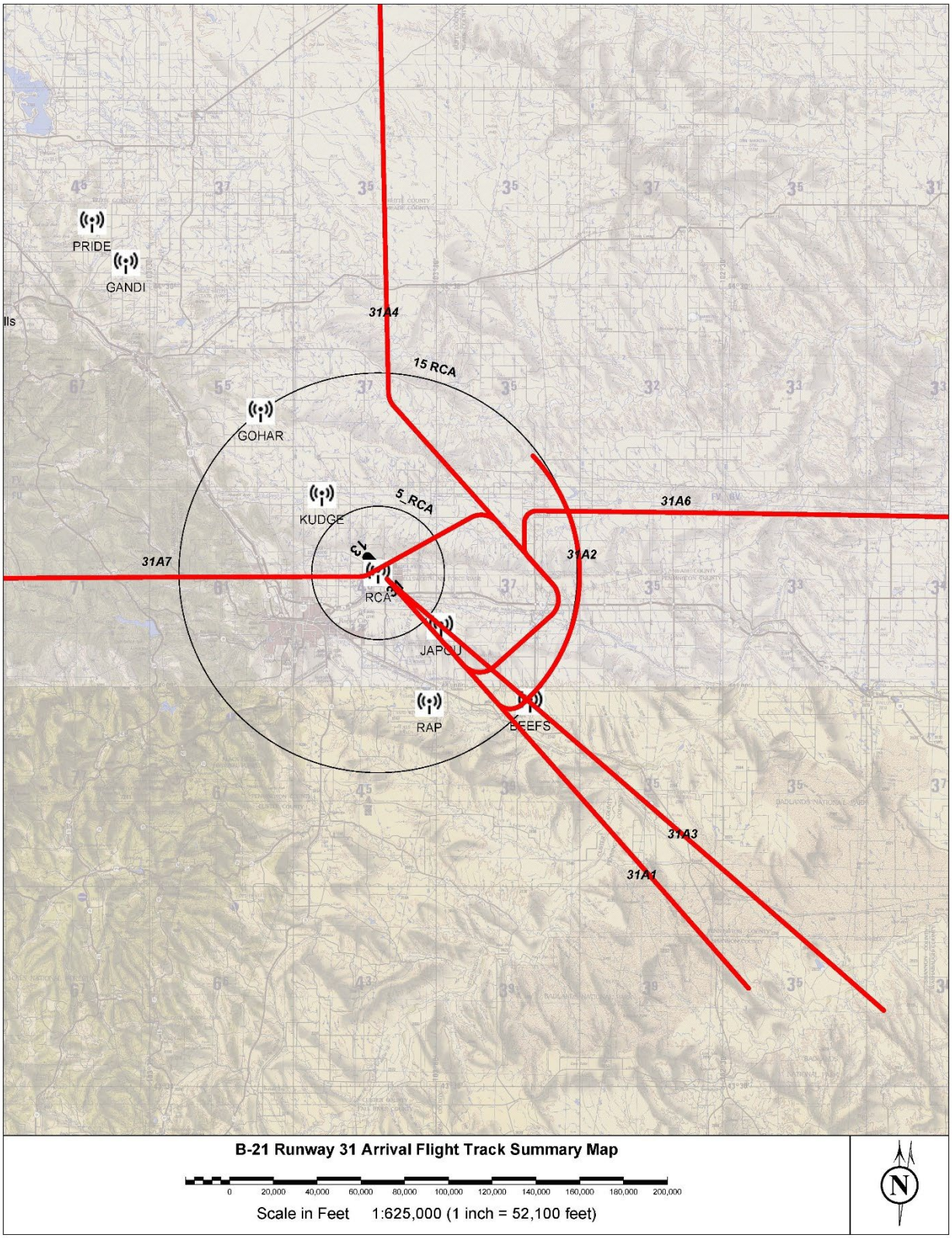

Figure 4-2 B-21 Runway 31 Arrivals

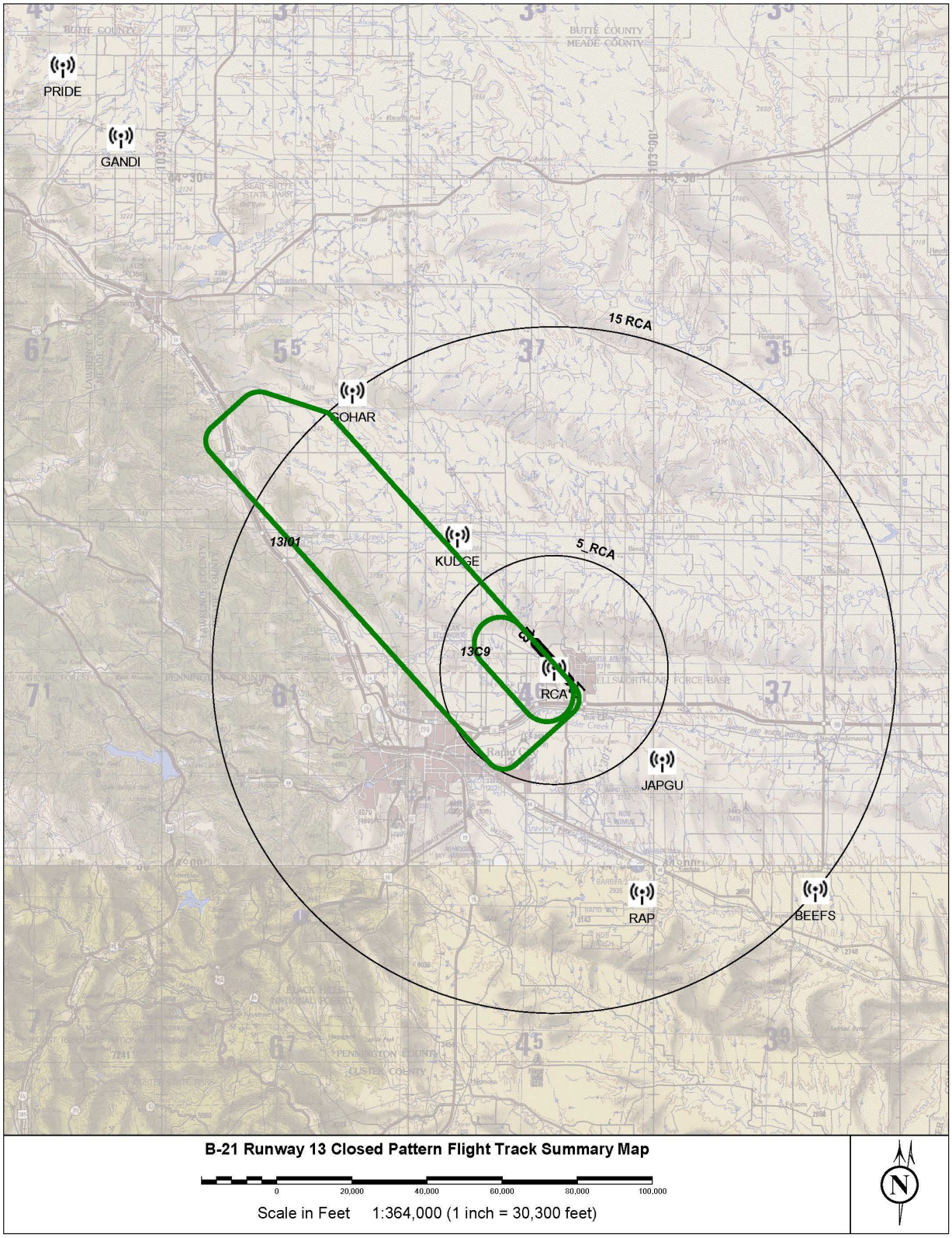

Figure 4-3 B-21 Runway 13 Closed Patterns

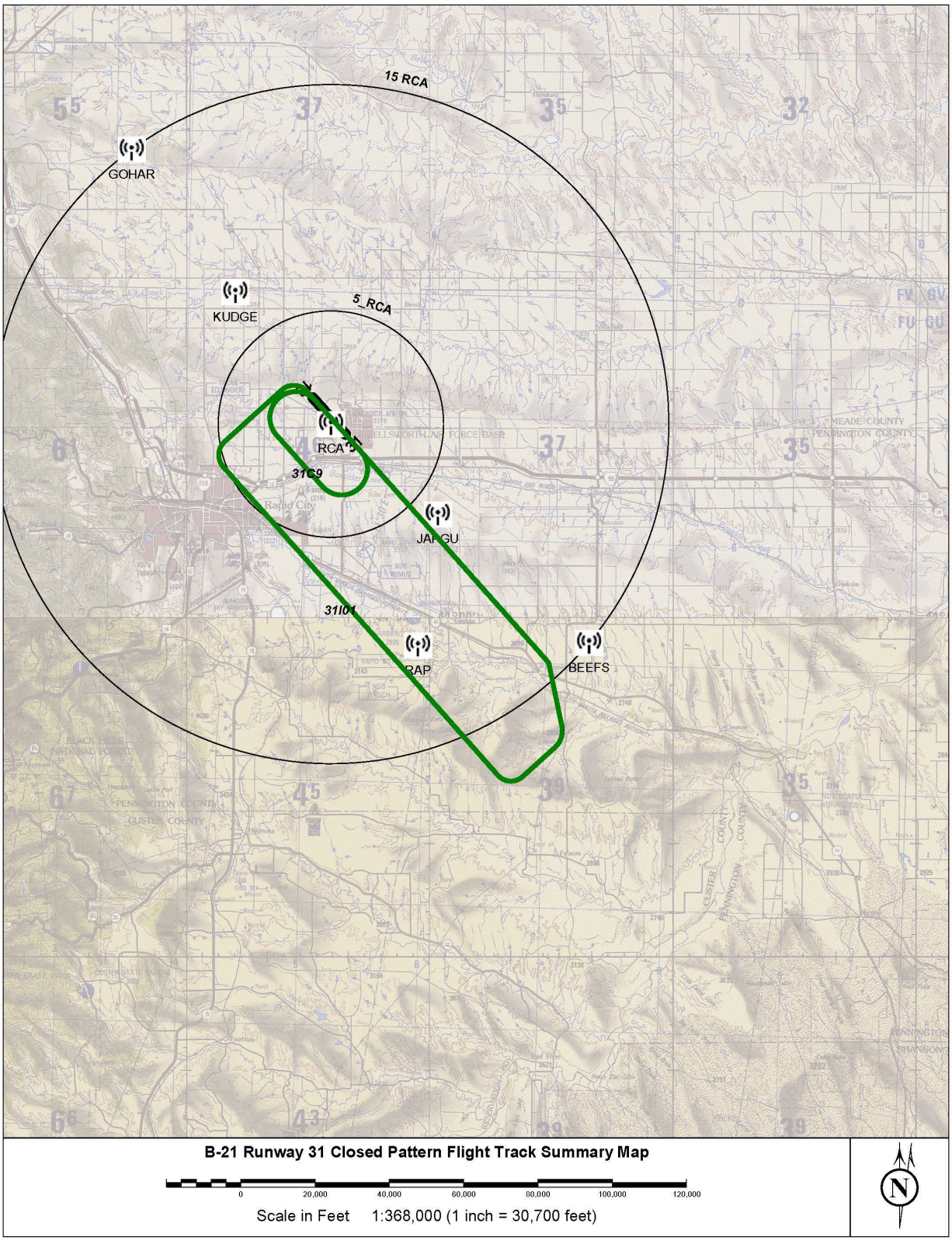

Figure 4-4 B-21 Runway 31 Closed Patterns

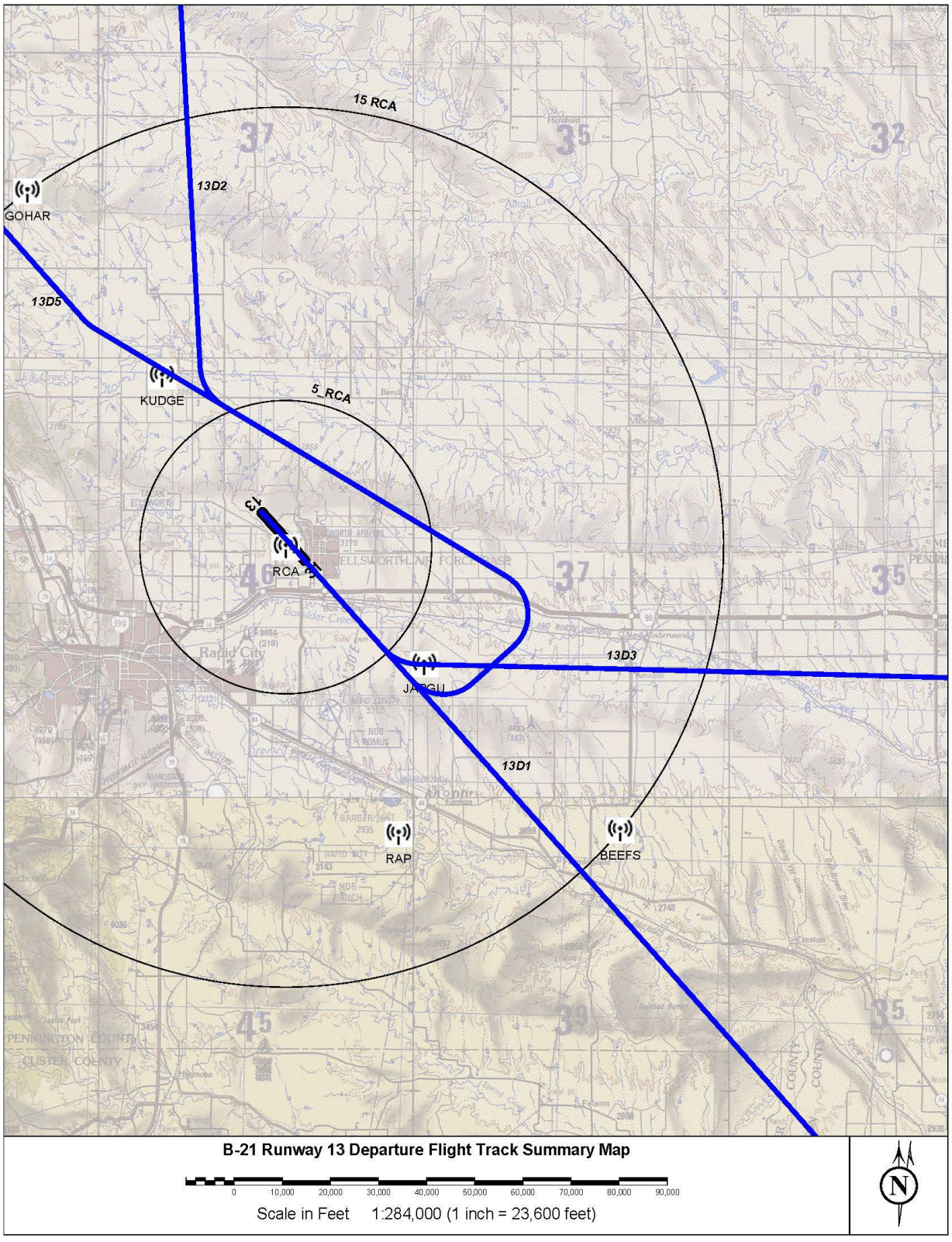

Figure 4-5 B-21 Runway 13 Departures

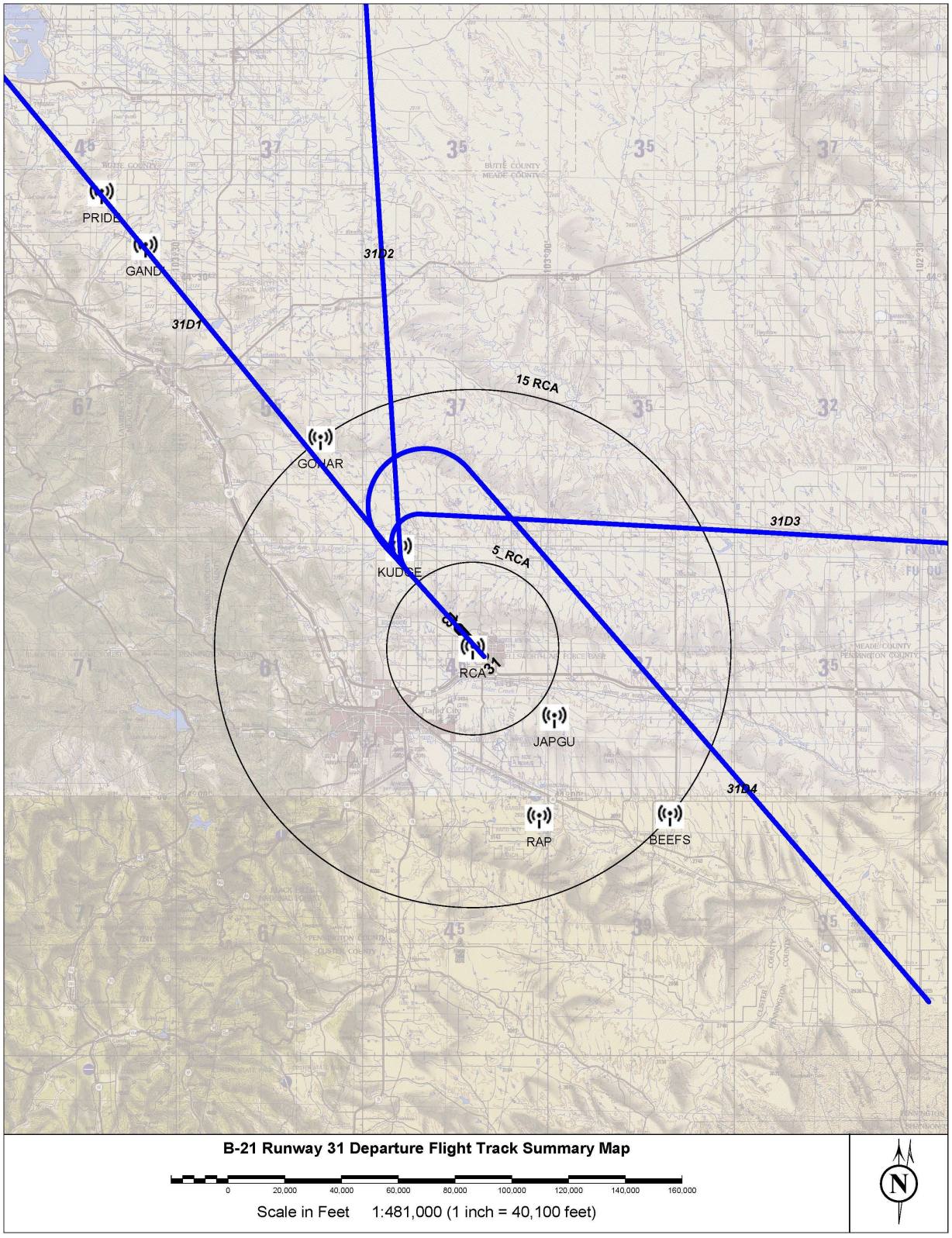

Figure 4-6 B-21 Runway 31 Departures

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

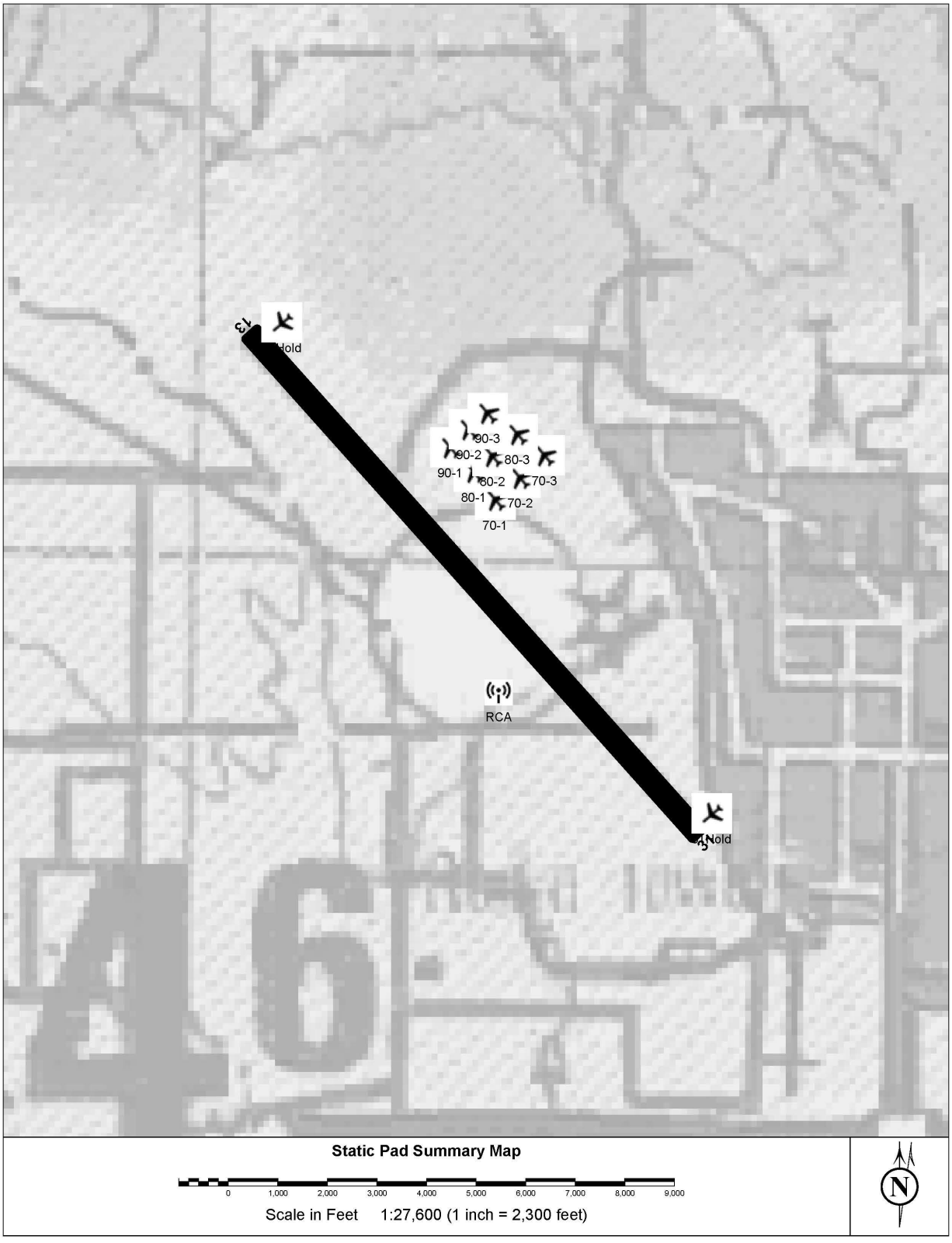

Figure 4-7 B-21 Maintenance and Pre-Flight Operation Location

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.

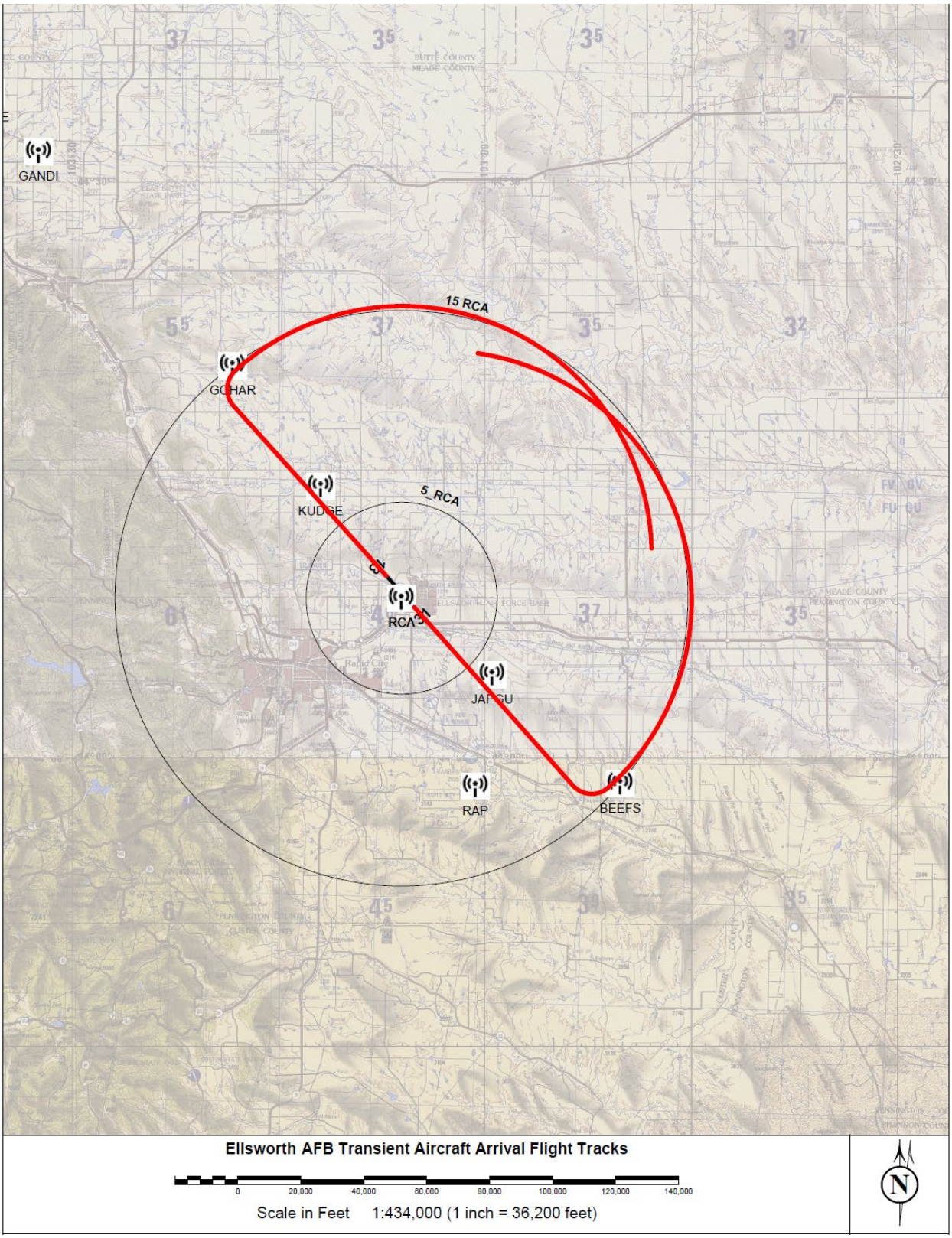

Figure 5-1 Transient Aircraft Arrival Flight Tracks at Ellsworth AFB

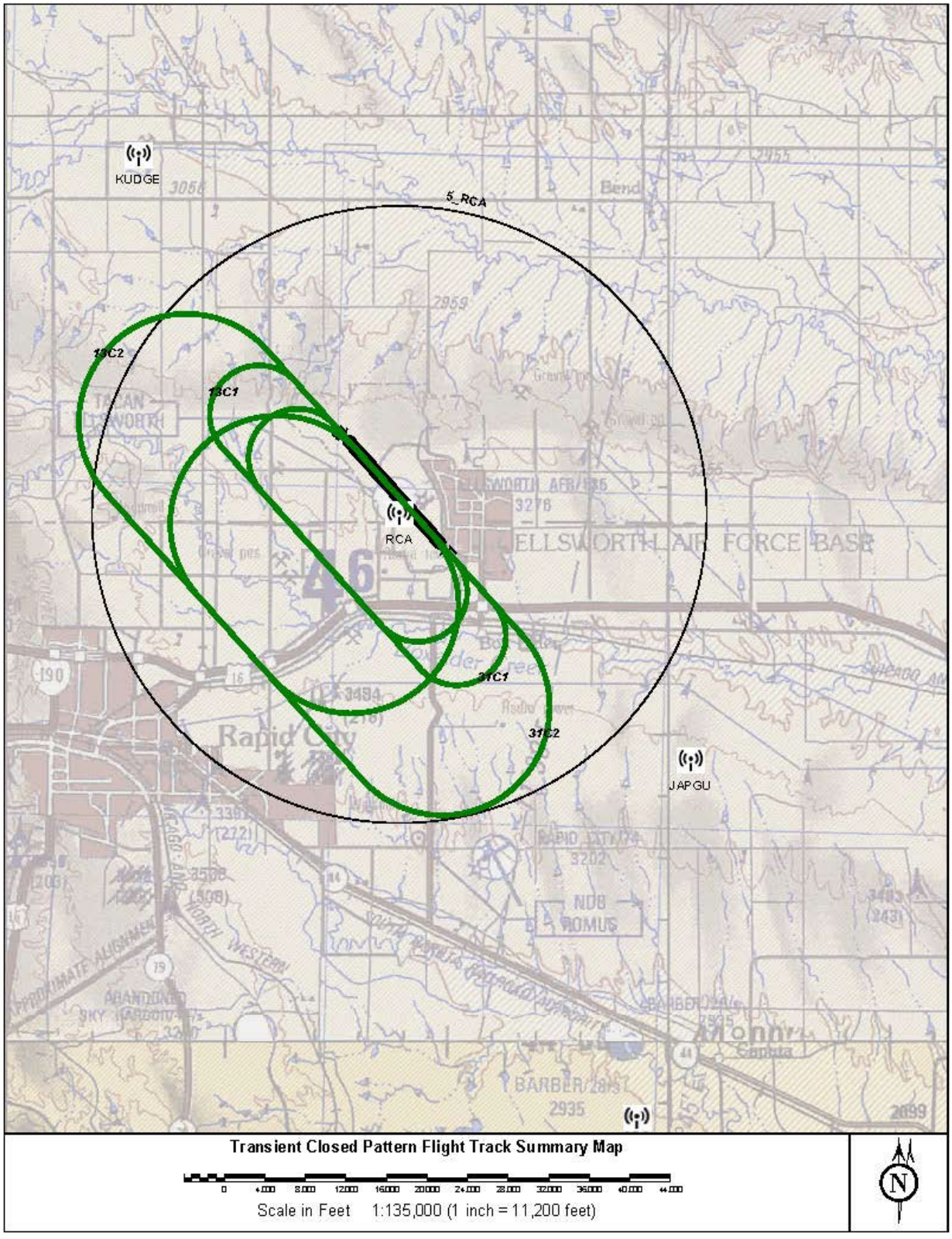

Figure 5-2 Transient Aircraft Closed Pattern Flight Tracks at Ellsworth AFB

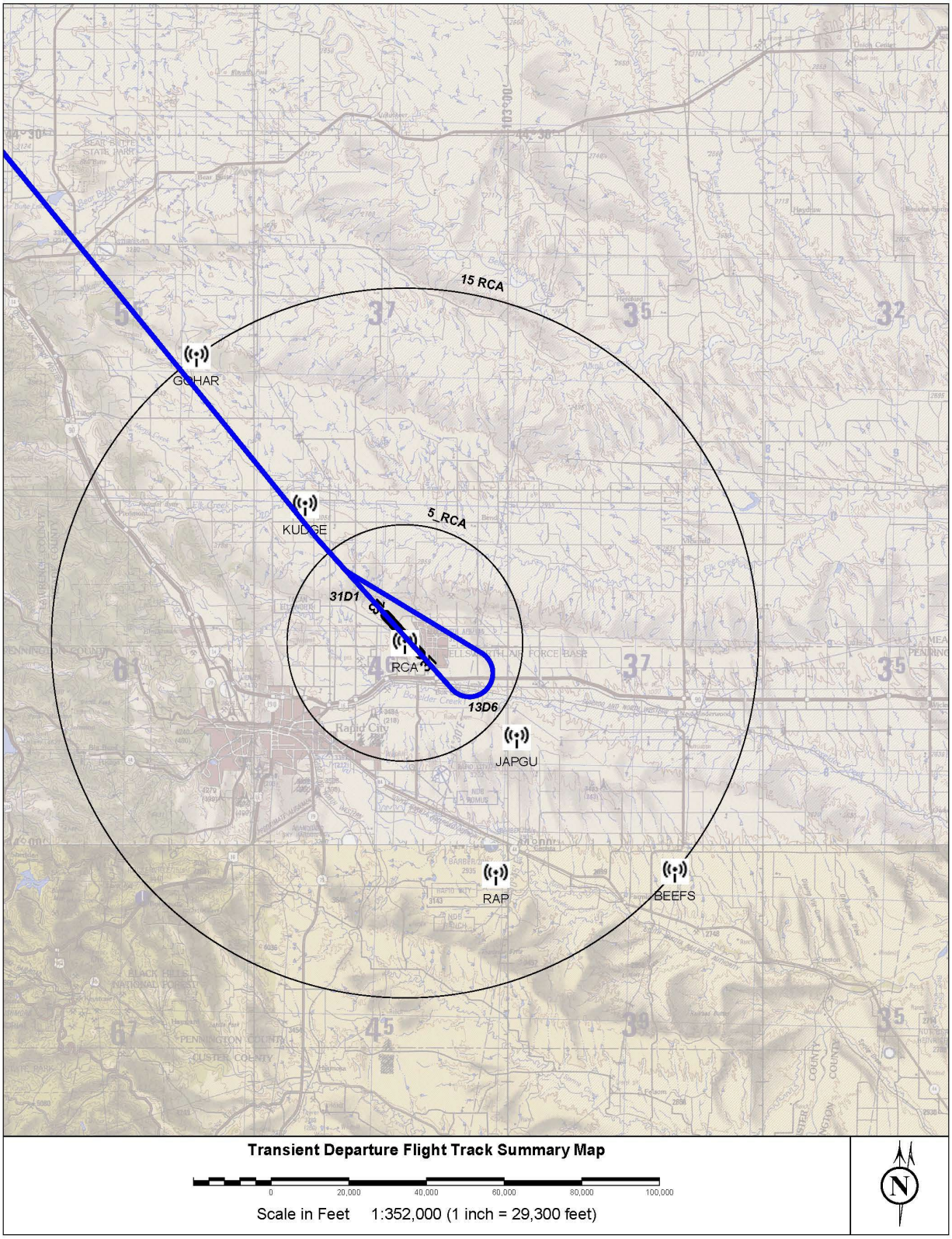

Figure 5-3 Transient Aircraft Departure Flight Tracks at Ellsworth AFB

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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