Powder River

Powder River Training Complex
Ellsworth Air Force Base, South Dakota
Environmental Impact Statement

Draft

August 2010

Powder River Training Complex Ellsworth AFB, South Dakota EIS

Our goal is to give you a reader-friendly document that provides an in-depth, accurate analysis of potential environmental consequences. The organization of this Draft Environmental Impact Statement, or EIS, is shown below:

How to Use This Document

This Draft EIS is prepared to help the reader understand the environmental consequences of the Proposed Action to expand and enhance the Powder River airspace to become the Powder River Training Complex (PRTC). Please review Chapter 1.0 and 2.0 to learn the purpose and details of the Proposed Action and Alternatives.

Chapter 3.0 describes the baseline or existing condition within the geographic areas potentially affected by the alternatives described in Chapter 2.0.

Chapter 4.0 presents an assessment of the potential environmental consequences of implementing the proposed action and alternatives, including the No-Action Alternative.

The Appendices is provided in CD format only. Hard copies are available upon request by contacting the Ellsworth AFB Public Affairs Office at (605) 385-5056.

The box to the left summarizes the Draft EIS contents. The cover sheet provides the address where you can send written comments after you review this Draft EIS.

Acronyms and Abbreviations can be found on the last page of this document. A Glossary of terms used can be found in Chapter 8.0.

Cover Sheet

Draft Environmental Impact Statement for Powder River Training Complex

a. Responsible Agency: United States Air Force (Air Force)

b. Cooperating Agency: Federal Aviation Administration (FAA)

c. Proposals and Actions: This Draft Environmental Impact Statement (EIS) analyzes the potential environmental consequences of a proposal to improve airspace for training, primarily, B-1 aircrews at Ellsworth AFB, South Dakota, and B-52 aircrews at Minot AFB, North Dakota. The existing Powder River airspace no longer supports realistic training missions with the bombers' new target acquisition capabilities, communication and networking capabilities, laser targeting capabilities, optical target tracking capabilities, and smart weapons. The Powder River Training Complex (PRTC) provides for high and low training altitudes, employment of chaff and defensive flares, and simulation of realistic air-to-air and air-to-ground engagements. Realistic multiple aircrew training would occur once quarterly during one to three day large force exercises (LFEs) when approximately 20 aircraft of various types would train together as they fight. Supersonic training of B-1s above 20,000 feet mean sea level (MSL) and transient fighters above 10,000 feet above ground level (AGL) would only be authorized the 10 days of LFEs. Gap Military Operations Areas (MOAs) and Air Traffic Control Assigned Airspace (ATCAAs), would be activated for 4-hour periods daily during LFEs. The Draft EIS screens to three action alternatives and evaluates the Alternative A with Powder River 1A/1B (PR-1A/1B), PR-2 (approximately existing PR A and B MOAs), PR-3, PR-4, and 3 Gap MOA combinations, Alternative B with PR-2, PR-3, PR-4, and 2 Gap MOA combinations, and Alternative C with PR-1A/1B, PR-2, PR-3, and 2 Gap MOA combinations. ATCAAs would be part of all action alternatives. Under the No-Action Alternative, aircrews would continue limited training in existing airspace and commute to other airspaces for required training.

d. Inquiries: For further information on this Draft EIS, contact PRTC EIS Project Manager, Ms. Linda DeVine, PRTC EIS Project Manager, ACC/A7PS; 129 Andrews Street, Suite 337; Langley AFB, VA 23665-2701. This Draft EIS is released for public review and comment. All public comments will be incorporated into a Final EIS expected to be prepared in Spring 2011.

e. Designation: Draft Environmental Impact Statement

f. Abstract: This Draft EIS has been prepared in accordance with the National Environmental Policy Act. Public and agency comments during the Draft EIS scoping process identified concerns. Commentors were concerned that MOAs would permit low-altitude military aircraft to appear at any time. Air Force proposes a schedule to let persons know when a low-level aircraft could or could not be training in the airspace. Low-level overflights would not be expected under normal scheduling from Friday noon through Monday morning and weekdays from noon to 6:00 p.m. Locations could be overflown within one-quarter of a nautical mile by a military aircraft at or below 2,000 feet AGL an average of 6 to 9 times per year. Commentors were concerned about sonic booms at any time. The Air Force proposes to limit supersonic flight to 10 days of LFEs per year when an average of one sonic boom per LFE day would be experienced by persons anywhere under the airspace. LFEs dates would be published in advance. Commercial carriers were concerned about high-altitude flight schedules. The Air Force proposes Low, Medium, and High ATCAAs with most training below FL260 to reduce impacts upon commercial overflight. An LFE day would impact from 43 to 244 flights above FL180. High ATCAAs would be scheduled by FAA to reduce impacts to commercial carriers. Public concerns included emergency flights. The Air Force would continue to relocate training aircraft for life flight, firefighting, or other emergencies and to coordinate monitoring flights. Civilian pilots expressed concern about delays or flying VFR in an active MOA. Alternatives A, B, or C could respectively impact 129, 97, or 79 civil operations per weekday. The Air Force proposes Low and High MOAs in PR-1A, PR-3, and PR-4 to support access for IFR flights, such as for time-sensitive deliveries. Civilian pilots expressed concern about limited communication. Gap MOAs and other airspaces were adjusted to allow for limited communication. The Air Force recognizes the need to improve communication especially for the PR-3 and PR-4 MOAs. Concerns included socioeconomic impacts, such as to ranching, agriculture, mining, hunting, and recreation. The Air Force would continue to work with ranchers and others to establish temporary avoidance areas for times such as branding, and with mining to avoid impacts. Tall structures are mapped by FAA and overflown at safe altitudes. MOA schedules would let recreationalists, hunters, and others know when a low-altitude overflight could potentially occur. Tribal members expressed concern that low-altitude overflight could affect Tribal ceremonies or sensitive locations. The Air Force would adopt reasonable avoidance measures identified in consultation with affected Tribes. The Northern Cheyenne and Crow Reservations under PR-1A and PR-1B have the highest concentration of minority, low income, and children in the region. Even infrequent low-level overflights of these populations could result in disproportionate impacts. This Draft EIS addresses environmental consequences for airspace/air traffic, noise, safety, air quality, physical resources, biological resources, cultural resources, land use, socioeconomics, environmental justice, and discusses cumulative actions. The Air Force-preferred alternative, Alternative A, would provide the highest level of training to meet the purpose and need and allow aircrews to train in a realistic combat environment which would increase their overall combat capability and survivability.

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Draft

ENVIRONMENTAL IMPACT STATEMENT FOR THE POWDER RIVER TRAINING COMPLEX

ELLSWORTH AIR FORCE BASE, SOUTH DAKOTA

Public comments on this Draft EIS are requested pursuant to the National Environmental Policy Act, 42 United States Code 4321, *et seq.* All written comments received during the comment period will be made available to the public and considered during Final EIS preparation. The provision of private address information with your comment is voluntary. However, this information is used to compile the mailing list for Final EIS distribution and failure to provide such information will result in your name not being included on the list. Private address information will not be released for any other purpose unless required by law.

August 2010

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EXECUTIVE SUMMARY

PURPOSE AND NEED FOR THE PROPOSED ACTION AND ALTERNATIVES

The overarching purpose of any military force is to be able to successfully conduct combat operations. To accomplish this purpose, the military force must train often and realistically. A trained military force is essential to support national political and security objectives. Capabilities in the air and capabilities in space can rapidly provide the national command structure a full range of military options to meet national objectives and protect national interests. B-1 and B-52 aircraft have the range to reach and remain near a target area, the combat capability to carry a variety of munitions and sensors for specific targets, the responsiveness to be at the scene when needed, and the flexibility to relocate and respond to time sensitive targets. These capabilities make United States Air Force (Air Force) bombers flown by trained aircrews a key asset in national defense.

Aircrews need to train to become that key asset, and training requires airspace. Multiple changes to B-1 and B-52 missions are explained in EIS Section 1.2.3. These capability and mission changes make the current Powder River airspace inadequate to meet training requirements.

The Air Force needs to improve airspace assets for required training by B-1 aircrews stationed at Ellsworth Air Force Base (AFB), South Dakota and B-52 aircrews stationed at Minot AFB, North Dakota. The Air Force proposes the Powder River Training Complex (PRTC) to improve training through establishing new airspace and modifying existing airspace. PRTC would improve training through:

- establishing new airspace and modifying existing airspace in the region of Ellsworth AFB and Minot AFB;
- providing for complex multi-mission training in the new and modified airspace;
- permitting defensive training with chaff and flare countermeasures in the new and modified airspace;
- providing for realistic Large Force Exercises (LFEs) with approximately 20 aircraft of various types during 1 to 3 days per quarter, an expected total of 10 days per year;
- authorizing supersonic flight for the B-1s above 20,000 feet mean sea level (MSL) in the new and modified airspace to be scheduled only during the expected 10 days per year of LFEs; and
- authorizing other military units with fighters, primarily from the surrounding area, to conduct supersonic flight above 10,000 feet AGL in the new and modified airspaces to be scheduled only during the expected 10 days per year of LFEs.

The purpose of the proposed PRTC is to provide local airspace that would support primarily Ellsworth and Minot AFBs with the capability to adequately train aircrews and ensure their readiness to succeed and survive in combat. No bombing range is proposed for this action. Bomber technology, capabilities, and combat missions have changed and expanded in recent years. Aircraft and threat systems now have longer range and higher altitude capabilities. Fuel conservation necessitates shorter training flights while low-altitude training and new targeting pods require more diverse airspace. Combat experience requires complex multiple mission training, and the number of users has increased. This has all resulted in a requirement for bombers to take on multi-role taskings and very high utilization rates.

Identifying a location for improved training involved assessing airspace options throughout the Western United States (U.S.). Figure ES-1 summarizes the alternatives identification process described in the

Draft Environmental Impact Statement (EIS) Chapter 2.0. Airspaces such as the Tiger, Devils Lake, Hays, and Lake Andes Military Operations Areas (MOAs) were created and configured for Cold War era missions. They do not have the dimensions, altitude structure, or electronic capabilities to meet today or tomorrow's Overseas Contingency Operation training missions for bombers. Western airspaces such as the Mountain Home Range Complex (MHRC), Utah Test and Training Range (UTTR), and Nevada Test and Training Range (NTTR) are excellent ranges with updated electronic and target capabilities; however, these ranges are distant from B-1 and B-52 bases. In addition, the excellent training offered by these ranges leads to intensive use for both test and training missions by locally-based aircraft, severely limiting access for bomber training. This limited access, combined with the distance from B-1 and B-52 home bases, makes it difficult to conduct realistic training and maintain aircrew proficiency.

Since 9/11, the Air Force has evolved multiple new roles and responsibilities for the B-1, including support for Non-Traditional Intelligence, Surveillance, and Reconnaissance.

In combat, B-1s are often launched fully loaded and set up an orbit with a variety of munitions near the expected action. B-1s are the weapon of choice in combat where they can be called on to target everything from an enemy mobile SCUD missile minutes from launching to an enemy pinning down a Sea, Air, Land (SEAL) team on a hilltop to a weapons cache found by a Special Operations team. B-1 aircrews must be trained to be experts in every possible mission. Training the B-1 four-man aircrew to accomplish these multiple new and existing assignments, often on the same mission, requires dynamic, realistic training airspace. The expanded B-1 capabilities and the aircraft's performance mean that one or two B-1s require all the current Powder River airspace for a realistic training mission. The B-1 operational wing at Ellsworth AFB does not have adequate airspace to train aircrews for present and future training requirements. The B-52 operational aircraft at Minot AFB face comparable training limitations.

Airspace and ground assets must be integrated into a local training complex accessible to Ellsworth AFB and Minot AFB with the opportunity for multiple mission training. The capability to launch more local training flights would permit aircrews to fulfill requirements for combat readiness because a higher proportion of training time per flying hour would be spent in multi-mission training for today's and tomorrow's conflicts. B-1 aircrews cannot accomplish the array of expanded training requirements while commuting to remote training complexes, and these remote training complexes have limited availability. Commuting and availability further reduce flexibility and efficiency.

B-52 (pictured here) and B-1 bombers have historically used Ellsworth AFB scheduled Military Training Routes (MTRs) in Montana, North Dakota, South Dakota, and Wyoming for low-altitude penetration mission training.

B-52s from Minot AFB face the same training challenge. B-52 aircrews must fulfill a broad range of missions, with new missions for electronic suppression and smart weapons arising from the Overseas Contingency Operation. This varied array of missions include strategic attacks, counter land-and-air, and preparation for deployment with the Aerospace Expeditionary Forces (AEFs). Meeting these requirements demands efficient and effective use of limited available training hours. As with the B-1s, the B-52s must train in an airspace complex located and configured to provide a high proportion of training and minimal low-value commuting time. Such a complex would permit Minot AFB to generate quality local sorties and fulfill training requirements for combat readiness. Figure ES-2 presents an overview of the modular nature of the proposed PRTC and describes the airspace segments of the PRTC. The PRTC is designed to address nearly all the limitations of the existing Powder River airspace explained in Section 1.0 of the Draft EIS. These limitations and training deficiencies, summarized in Table ES-1, drive the need to implement the proposed PRTC. Table ES-2 summarizes the improved training capabilities that would fulfill the needs summarized in Table ES-1 should PRTC be implemented. The sections referenced in Table ES-2 are the Draft EIS sections where additional details are presented. Both distance and accessibility of remote airspace complexes described in Figure ES-1 result in inefficient and ineffective use of aircrew and aircraft flying hours. Commuting flight hours do not permit aircrews to generate sufficient sorties to meet expanded training requirements with new weapon systems. Limitations of aircraft maintenance personnel and time further reduce the ability of flight crews to achieve training requirements. Such limitations and deficiencies can preclude aircrews from achieving timely combat-ready status.

The existing Powder River airspace includes the Powder River Military Operations Areas (MOAs), associated Air Traffic Control Assigned Airspace (ATCAA), and an array of no-drop targets and electronic threats.

The proposed Powder River Training Complex (PRTC) builds upon the Powder River airspace and adds and reconfigures MOA and ATCAA assets to meet today's and tomorrow's training needs.

The Air Force proposes to establish PRTC to overcome the limitations and deficiencies listed in Table ES-1. The proposed PRTC modular nature would permit joining the airspace for once quarterly LFEs. An LFE is a highly sophisticated training exercise that simulates full-scale battlefield scenarios, and requires enough airspace to provide assembly, ingress, egress, and maneuver areas. Such training exercises employ a full range of combat tactics, equipment, and personnel.

The Air Force proposes to conduct LFEs a maximum of once per calendar quarter, lasting 1 to 3 days. LFEs would occur in a 2 to 4 hour block and may include approximately 20 aircraft, of various aircraft types training in simulated combat. Supersonic flight would only be authorized during the 10 days per year of LFEs to permit aircrews to use the full capabilities of their aircraft. At supersonic speeds, the timeframe during which aircrews are exposed to enemy threats tests crew reaction times, which may have been seconds, and become tenths of seconds. During LFEs, the B-1 would conduct supersonic flights above 20,000 feet MSL, and transient fighters would conduct supersonic flights above 10,000 feet AGL. LFEs would occupy all or substantial portions of the proposed PRTC.

Combat tactics are both offensive and defensive in nature and include use of defensive chaff and flares. Defensive training using chaff and flares permits aircrews to train to meet increasingly complex surface-to-air threats which require near instantaneous aircrew response to the threat. Chaff and flare deployment represent necessary

Aviation and Airspace Use Terminology

Above Ground Level (AGL): *Altitude expressed in feet measured above the ground surface.*

Mean Sea Level (MSL): *Altitude expressed in feet measured above average (mean) sea level.*

Flight Level (FL): *Manner in which altitudes at 18,000 feet MSL and above are expressed, as measured by a standard altimeter setting of 29.92.*

Visual Flight Rules (VFR): *A standard set of rules that all pilots, both civilian and military, must follow when not operating under instrument flight rules and in visual meteorological conditions. These rules require that pilots remain clear of clouds and avoid other aircraft.*

Instrument Flight Rules (IFR): *A standard set of rules that all pilots, civilian and military, must follow when operating under flight conditions that are more stringent than visual flight rules. These conditions include operating an aircraft in clouds, operating above certain altitudes prescribed by Federal Aviation Administration (FAA) regulations, and operating in some locations such as major civilian airports. Air Traffic Control (ATC) agencies ensure separation of all aircraft operating under IFR.*

Source: FAA Pilot/Controller Glossary 2010 combat operations which bomber aircrews cannot perform in the existing local airspace. Chaff creates a brief reflective cloud of fibers thinner than a human hair to confuse enemy radar. Flares create a heat source to decoy heat-seeking missiles away from the aircraft. These countermeasures defend aircraft against enemy threats and are extensively used in combat. Training to employ these countermeasures in an effective and timely manner is essential for aircrews conducting almost any mission. Chaff would not be deployed where it could interfere with airport radars and flares would be deployed above 2,000 feet AGL (flares burn out in 500 feet) or not be deployed in a MOA during extreme fire conditions.

Table ES-2 summarizes the improved training capabilities of the proposed PRTC depicted on Figure ES-2. A comparison of Tables ES-1 and ES-2 demonstrates that PRTC would provide bomber aircrews adequately sized, configured, and available airspace to train as they would fight during worldwide deployment. The long timeframe for any future bomber development places an even greater emphasis on B-1 capabilities and training. Bomber aircrews face reduced budgets, a reduced number of airframes, high aircraft utilization requirements, new multi-role taskings, and expanded capabilities to achieve U.S. military objectives. Bomber aircrews must train to be experts with their own weapons systems and to function as an integrated force package with other aircraft to leverage the capabilities of each weapon system and enhance survivability of the collective force. Expanding the existing Powder River airspace to form the PRTC would improve realistic combat training and increase flexibility and availability of limited resources and assets.

Table ES-3 summarizes the PRTC project elements for each alternative explained in the Draft EIS Chapter 2.0. Figure ES-3 presents the proposed PRTC airspace and identifies some of the geopolitical features of the potentially affected region and the communities under and on the periphery of the proposed airspace.

Table ES-1. Summary of Factors Which Establish the Need for Expanded Local Airspace

1. B-1 and B-52 missions, aircraft capabilities, and training requirements have increased and will continue to increase and the Powder River airspace cannot accommodate these requirements.
2. Commuting consumes limited available aircrew and aircraft flying hours without accomplishing essential training, and distant complexes that theoretically could provide needed training with long commutes have a limited accessibility because locally-based aircraft and other users have priority.
3. Flight hours spent commuting consumes excessive fuel and requires extensive on-ground maintenance hours for airframes to be ready for the next mission. Multiple hours with commuting missions force aircraft inspections and maintenance sooner than the same number of local mission training. This results in a reduction in available airframes for aircrew training.
4. Combat readiness requires complex multiple mission training, but the existing Powder River airspace accommodates approximately 46 percent of required B-1 aircrew training sorties and 31 percent of required B-52 aircrew training sorties.
5. The existing Powder River airspace does not permit certain required training activities essential to today's combat, such as supersonic flight, training in the deployment of defensive chaff and flares, diversified low-altitude training, or Large Force Exercises (LFEs).
6. The number of users has increased, but the Powder River airspace capacity does not provide for multiple or dissimilar aircraft training with current sensors and weapon capabilities.
7. The B-1 and B-52 aircrews currently face aircraft and threat systems with ranges far in excess of the existing Powder River airspace. Additionally, supersonic training is required for bomber aircrew proficiency as well as fighter tactical employment. Training must detect and react to such threats.
8. The existing Powder River airspace has inadequate space and diversity to accommodate necessary B-1 and B-52 training requirements for combat readiness.

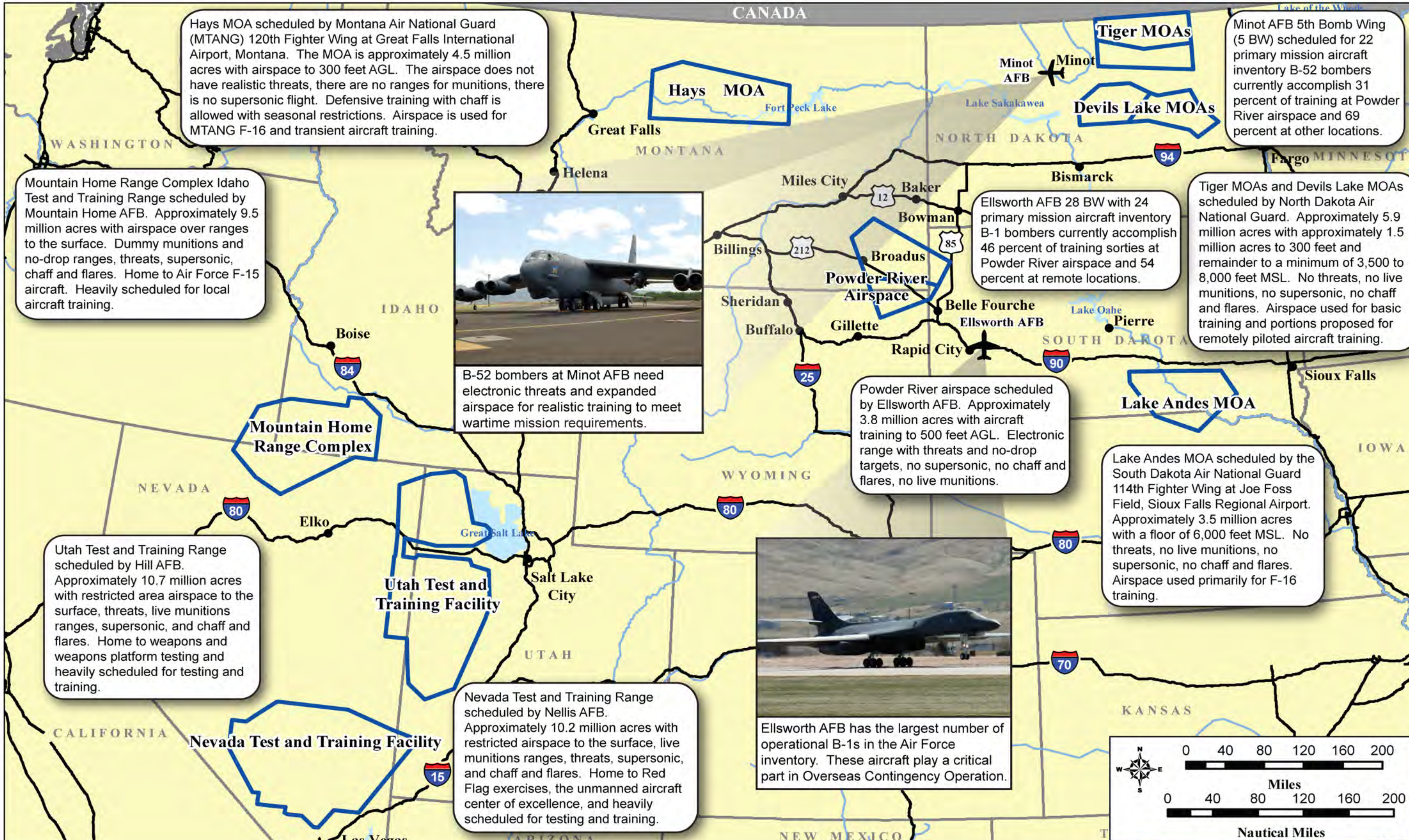

Figure ES-1. Regional Location of Powder River Airspace and Remote Training Airspaces and Ranges

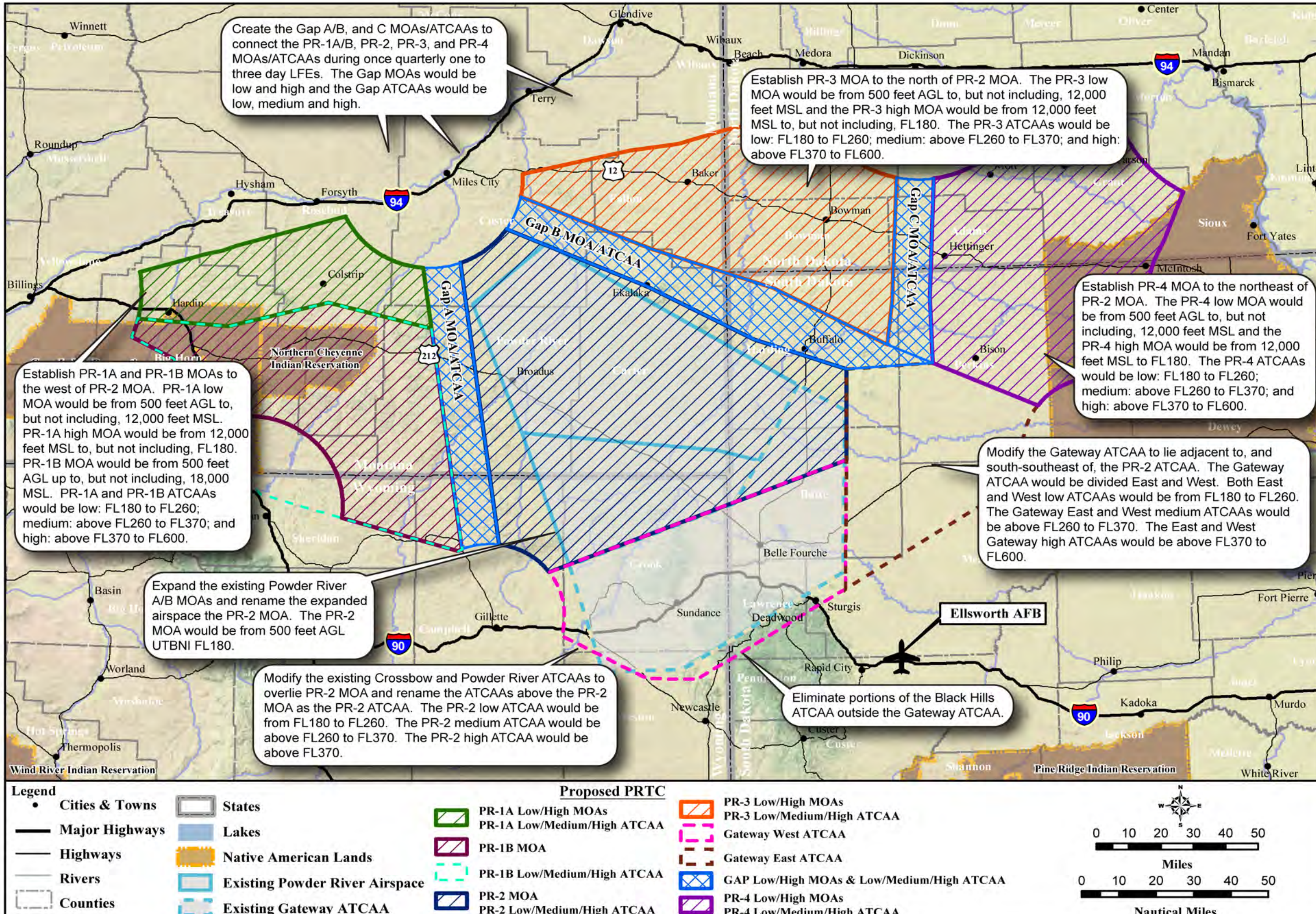

Figure ES-2. Overview of Ellsworth AFB, Minot AFB, and Proposed PRTC Airspace

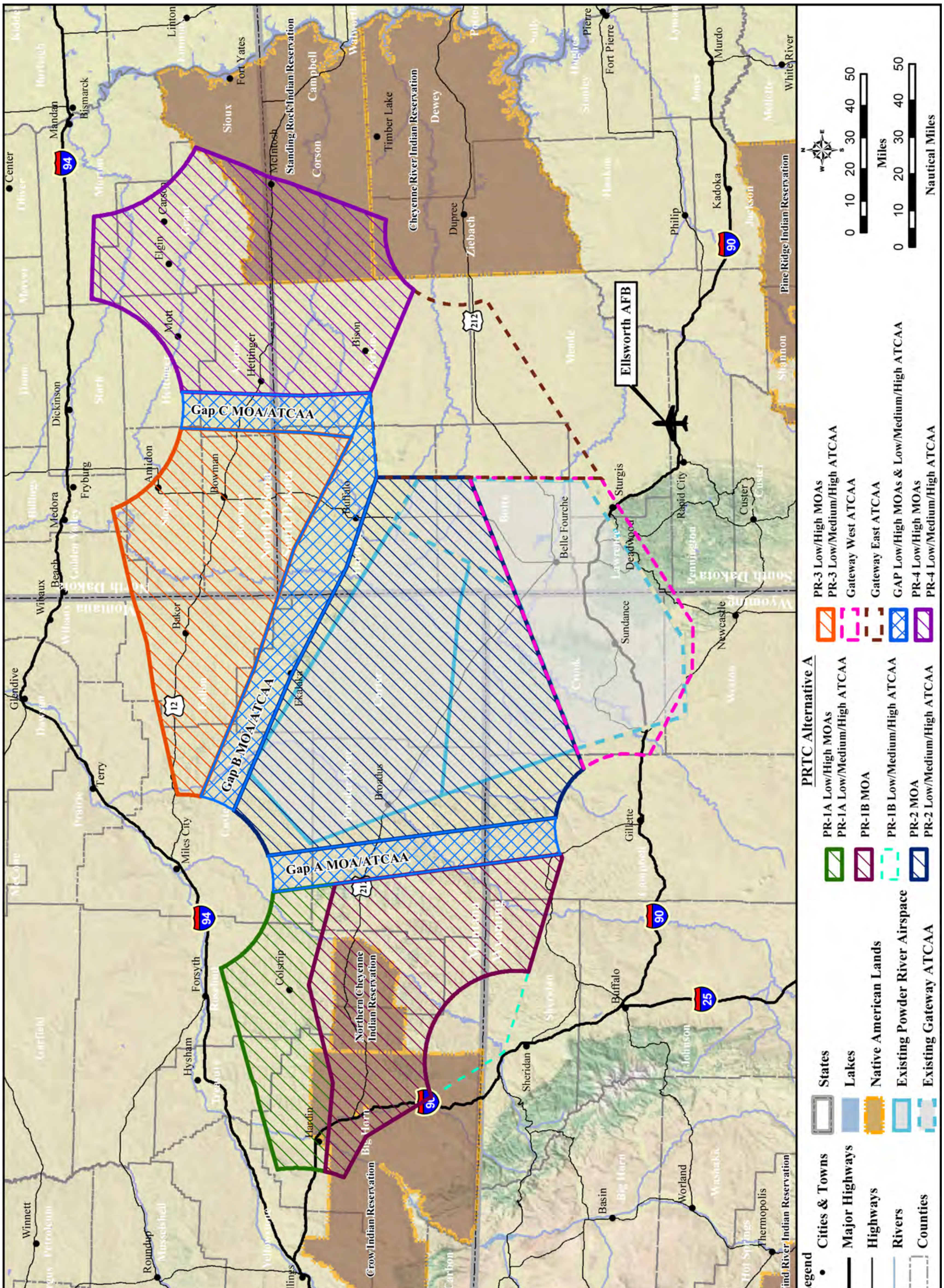

Figure ES-3. Extent of Proposed PRTC Airspace

Table ES–2. Summary of PRTC Purposes and Improved Training Capabilities

1. Provides for aircrew training to implement and employ technology upgrades and fulfill both current and anticipated future operational requirements (Section 2.2.1). ***Addresses Need Factors 1, 4, 5, 6, 7, and 8 in Table ES-1.***
2. Enables aircrews to conduct diverse training missions while dramatically reducing commuting hours and issues of accessibility to remote ranges (Section 2.2.1.1) and provides locally available airspace with scheduling priority for bombers (Section 2.2.1.3). ***Addresses Need Factors 2 and 3 in Table ES-1.***
3. Enables maintenance turnaround of the aircraft to generate adequate training sorties (Section 2.2.2.4) and provides more efficient use of fuel resulting in training time to improve both training quality and quantity. ***Addresses Need Factors 2 and 3 in Table ES-1.***
4. Accommodates approximately 85 percent of required aircrew complex multi-mission training sorties for both B-1 and B-52 aircrews (Section 1.2). ***Addresses Need Factors 1, 4, 5, 6, 7, and 8 in Table ES-1.***
5. Increases the proportion of training time for new and diversified training requirements, including defensive chaff and flares, supersonic maneuvers during LFEs, and diversified areas for low-altitude training (Sections 2.2.1 and 2.2.2). ***Addresses Need Factors 1, 4, 5, 6, 7, and 8 in Table ES-1.***
6. Improves integrated aircrew combat training operations by quarterly support of LFEs engaging in realistic tactics using various aircraft types and expanded network based operations training (Section 2.3.2.4). ***Addresses Need Factors 4, 5, 6, 7, and 8 in Table ES-1.***
7. Increases the availability of real world training for multiple, concurrent flights of aircraft from Ellsworth and Minot AFBs (Section 2.3.2.2). ***Addresses Need Factors 4, 5, 6, 7, and 8 in Table ES-1.***
8. Restructures and adds local airspace to meet the training needs for 28 BW and 5th Bomb Wing (5 BW) aircrews (Section 1.3). ***Addresses Need Factors 1, 2, 3, 6, 7, and 8 in Table ES-1.***

Table ES-3. Summary of Alternative Project Elements (Page 1 of 2)

Project Element	*Proposed Action Alternative A*	*Alternative B*	*Alternative C*	*No-Action Alternative*
Expand and reconfigure Powder River A and B MOAs to create the PR-2 MOA	Establish PR-2 MOA from 500 feet AGL to FL180 in place of Powder River A and B MOAs	Establish PR-2 MOA from 500 feet AGL to FL180 in place of Powder River A and B MOAs	Establish PR-2 MOA from 500 feet AGL to FL180 in place of Powder River A and B MOAs	Continued use of Powder River A and B MOAs for limited training
Establish the PR-1A and PR-1B and Gap A MOAs	Establish PR-1A and Gap A Low MOAs from 500 feet AGL to but not including 12,000 feet MSL and High MOA from 12,000 feet MSL to but not including FL180. Establish PR-1B MOA from 500 feet AGL to but not including FL180	No PR-1 A/B MOA or Gap A MOA	Establish PR-1A and Gap A Low MOAs from 500 feet AGL to but not including 12,000 feet MSL and High MOAs from 12,000 feet MSL to but not including FL180. Establish PR-1B MOA from 500 feet AGL to but not including FL180	No new MOAs or ATCAAs

Table ES-3. Summary of Alternative Project Elements (Page 2 of 2)

Project Element	*Proposed Action Alternative A*	*Alternative B*	*Alternative C*	*No-Action Alternative*
Establish the PR-3 and Gap B MOAs	Establish PR-3 and Gap B Low MOAs from 500 feet AGL to but not including 12,000 feet MSL and High MOA from 12,000 feet MSL to but not including FL180	Establish PR-3 and Gap B Low MOAs from 500 feet AGL to but not including 12,000 feet MSL and High MOAs from 12,000 feet MSL to but not including FL180	Establish PR-3 and Gap B Low MOAs from 500 feet AGL to but not including 12,000 feet MSL and High MOAs from 12,000 feet MSL to but not including FL180	No new MOAs or ATCAAs
Establish the PR-4 and Gap C MOAs	Establish PR-4 and Gap C MOAs Low from 500 feet AGL to but not including 12,000 feet MSL and High from 12,000 feet MSL to but not including FL180	Establish PR-4 and Gap C MOAs Low from 500 feet AGL to but not including 12,000 feet MSL and High MOA from 12,000 feet MSL to but not including FL180	No PR-4 MOA or Gap C MOA	No new MOAs or ATCAAs
Establish PRTC ATCAAs and Gap ATCAAs and expand Gateway ATCAA	Establish Low ATCAAs from FL180 to FL260, Medium ATCAAs above FL260 to FL370, and High ATCAAs above FL370 to FL600	Establish Low ATCAAs from FL180 to FL260, Medium ATCAAs above FL260 to FL370, and High ATCAAs above FL370 to FL600	Establish Low ATCAAs from FL180 to FL260, Medium ATCAAs above FL260 to FL370, and High ATCAAs above FL370 to FL600	Continued training in Powder River Gateway, Crossbow, and Black Hills ATCAAs
Chaff and flare defensive training	Chaff except near major airports or other radars; flares 2,000 feet AGL and discontinue use in MOA when extreme fire conditions exist	Chaff except near major airports or other radars; flares 2,000 feet AGL and discontinue use in MOA when extreme fire conditions exist	Chaff except near major airports or other radars; flares 2,000 feet AGL and discontinue use in MOA when extreme fire conditions exist	No defensive chaff and flare training; bombers commute to remote ranges for defensive training with chaff and flares
Supersonic training only during 10 days of LFEs per year	B-1 supersonic above 20,000 feet MSL; transient fighters supersonic above 10,000 feet AGL during LFEs only	B-1 supersonic above 20,000 feet MSL; transient fighters supersonic above 10,000 feet AGL during LFEs only	B-1 supersonic above 20,000 feet MSL; transient fighters supersonic above 10,000 feet AGL during LFEs only	No supersonic training; B-1s commute to remote ranges for supersonic training
LFE with approximately 20 aircraft of various aircraft types	Conduct LFE a maximum of once per quarter 4 hours daily for 1 to 3 days a total of approximately 10 days per year; Gap MOA/ATCAAs; PR-3 and PR-4 Medium ATCAAs and all High ATCAAs during LFEs only	Conduct LFE a maximum of once per quarter 4 hours daily for 1 to 3 days a total of approximately 10 days per year; Gap MOA/ATCAAs; PR-3 and PR-4 Medium ATCAAs and all High ATCAAs during LFEs only	Conduct LFE a maximum of once per quarter 4 hours daily for 1 to 3 days a total of approximately 10 days per year; Gap MOA/ATCAAs; PR-3 and PR-4 Medium ATCAAs and all High ATCAAs during LFEs only	No LFEs; limited dissimilar training in existing Powder River airspace

The Air Force would employ the following measures during regular training and LFEs to address impacts:

- Airspace scheduled times of use are specified in the Air Force's aeronautical proposal summarized in EIS Section 2.5.1, Tables 2-10 and 2-11, and are published online at http://sua.faa.gov/sua/Welcome.do
- Airspace scheduled outside of normal published times of use is disseminated via Notice to Airmen (NOTAMs), available at https://pilotweb.nas.faa.gov/.
- Low and High MOAs allow ATC to vector IFR traffic as soon as training is completed in an airspace.
- Airspace use and long term planning information on deconfliction, fire-fighting operations, and special events/cultural events is available during normal business hours 8:00 am-5:00 pm Monday through Friday from the Ellsworth AFB Airspace Management Office at (605) 385-1230.
- Information posted on flyers and posters can be found at public airports underlying the airspace and is updated annually by the Ellsworth AFB Flight Safety Office as part of the Mid-Air Collision Avoidance Program at (605) 385-4419.
- The Ellsworth AFB Public Affairs Office is available to answer inquiries and complaints at (605) 385-5056 8:00 am-5:00 pm Monday through Friday. In the event of any damage or injury associated with PRTC operations, descriptive documentation related to the Air Force Claims Program can be sent in to the Ellsworth AFB Public Affairs Office.
- The Air Force would establish reasonable temporary or seasonal avoidance areas for Tribal activities or could adopt other measures identified in consultation with affected Tribes to reduce intrusive impacts.
- The Air Force would extend the current practice of establishing reasonable temporary or seasonal avoidance areas in response to affected ranchers who call Ellsworth AFB Public Affairs Office to identify locations of ranch operations, such as calving, weaning, and branding.
- Where schedule changes require use of airspace outside of published times of use, the Air Force would inform Air Route Traffic Control Centers (ARTCCs) at least 2 hours in advance in order to facilitate issuance of a NOTAM.
- The Air Force would publish a notice at least one month in advance of LFEs to help civil aircraft pilots and the public plan for LFE airspace activation.
- The Air Force would establish procedures to avoid low altitude overflight of, and frequency interference with, known blasting operations.
- The Air Force would establish communication procedures to ensure the ability to recall the military aircraft from the low altitude MOAs in PR-1A, PR-3, and PR-4 to allow civil IFR departures and arrivals.
- The Air Force would establish communication procedures to ensure deconfliction with emergency flight operations within the proposed airspace.

The following sections summarize the EIS findings for each alternative. The environmental consequences are presented for each resource identified as important during the public scoping period and during scoping meetings held throughout the region in June and July of 2008. The referenced sections are Draft EIS sections.

Summary of Environmental Consequences

Airspace/Air Traffic (See Draft EIS Section 4.1)

The PRTC would establish new MOAs and ATCAAs as depicted on Figure ES-2. The type, size, and configuration of the airspace elements are designed to meet training needs while avoiding, to the extent possible, impacts to civil aviation. The Gap MOAs are existing Victor Airways which provide corridors for aviation traffic. The proposed schedule for MOA activation would be Monday through Thursday 7:30 am to 12:00 pm and 6:00 pm to 11:30 pm and from 7:30 am to 12:00 pm on Friday local time, other times by NOTAMs. The proposed Powder River 1A (PR-1A), Powder River 1B (PR-1B), Powder River 2 (PR-2), Powder River 3 (PR-3), and Powder River 4 (PR-4) MOAs would not have civilian Instrument Flight Rules (IFR) flights when the MOA was activated. Visual Flight Rules (VFR) traffic can fly see-and-avoid in an active MOA, weather permitting. PR-2 is essentially the existing Powder River A and B MOAs and currently does not have IFR traffic when the MOAs are activated. The PRTC is overflown by a series of jet routes where commercial and other jet aircraft are typically flying above Flight Level (FL) 260 and mostly above FL300.

Alternative A: Proposed Action (See Draft EIS Section 4.1.3.1)

Victor Airways and MOAs: Civil aircraft pilots in the region often rely upon Global Positioning System (GPS) for point-to-point travel and do not rely on IFR below FL180 in much of the area because radar and radio communication are limited below 12,000 feet MSL and in some areas are limited below FL180. Following public and agency scoping, the Air Force proposed PR-1A, PR-3, PR-4, and Gap MOAs to have Low and High MOAs to support Air Traffic Control directed IFR traffic. PRTC would impact IFR and VFR traffic within the PR-1A, PR-1B, PR-2, PR-3, and PR-4 MOAs through ground hold, flying VFR see-and-avoid in an active MOA, and/or diversion. An estimated 129 civil operations could be impacted when Alternative A MOAs are activated Monday through Thursday (approximately one-third of that number on Friday morning). PR-1A/1B MOAs and ATCAAs were adjusted in the revised Air Force proposal to avoid impacts to major public airports including Billings, Bismarck, and Dickinson. Public participants during scoping were concerned that the absence of navigable routes and limited radar and radio frequency coverage could impact civil aviation when PRTC MOA segments were activated for day-to-day training and would have greater impacts during LFEs when all the Victory Airways traversing the airspace would be unavailable.

Public Airports and Private Airfields: There are two public airports and no private airfields identified under PR-1A (and Gap A), no public and one private under PR-1B, two public and one private under PR-2 (existing airspace), four public and eight private under PR-3 (and Gap B), six public and two private under PR-4 (and Gap C). There are 12 public airports and 9 private airfields on the periphery of the proposed MOAs. There are 13 airports and airfields under the Gateway ATCAAs and three civilian airports and airfields on the periphery of the Gateway ATCAAs. The numbers of airports and airfields, especially under PR-3 and PR-4, combined with limited communication capabilities in the region, create what is perceived as an impact by airport operators and users. Aircraft from these public or private airports would not be able to fly IFR in an active MOA, although they could fly VFR using see-and-avoid in an active MOA, weather permitting. Proposed hours for MOA scheduling during Monday through Friday morning are designed to provide times when the MOA would not be activated to support civil aviation.

Jet Routes and ATCAAs: Following public and agency scoping inputs, the Air Force revised the Proposed Action to include Low, Medium, and High ATCAAs. B-1s would normally conduct missions in the Low ATCAAs, although B-52s could require Medium or High ATCAAs. The segmented ATCAAs permit the Air Force to avoid impacting commercial and other traffic using existing jet routes and Canadian (CAN) routes to avoid mid-West thunderstorms and congestion. An ATCAA to FL260 would provide for commercial and other jet traffic at higher altitudes while allowing 99 percent of B-1 training. B-52 training above FL260 and LFEs have the potential to significantly impact commercial traffic and would be scheduled by FAA. Depending on the 4-hour training periods, an LFE above FL260 could daily impact from 43 to 244 high altitude flights.

LFEs: During the estimated 10 days of LFEs, annually, approximately 20 aircraft of various types would perform combined training within the airspace. LFEs would activate MOAs and ATCAAs and impact civil aircraft traversing the region. Civil aircraft would be required to fly see-and-avoid in the airspace, weather permitting, ground-hold, divert to another airport for a period of 2 to 4 hours, or otherwise reschedule flights. Use of ATCAA airspace for LFE training would need careful scheduling to avoid significant impacts to en route commercial traffic typically above FL300. Commercial carriers or time-sensitive deliveries to provide personnel or equipment repair support to mining or agricultural activities would be unable to fly IFR in an activated MOA. If the pilots chose not to fly VFR, or could not due to weather, deliveries could be delayed by 2 to 4 hours. The LFEs could be viewed as a significant impact to airspace users.

Other Airspace Activities: Emergency access for firefighting, life flight, or other emergencies was identified as a concern during scoping. The Air Force would coordinate with Air Traffic Control (ATC) to relocate training aircraft from an area which needed emergency access, including during LFEs. This policy is currently applied to the Powder River A and B MOAs. Agricultural applications typically occur below 500 feet AGL, although aircraft may transit at higher altitudes. Aerial applications require calm conditions and are normally conducted in early morning hours. Aerial applicators fly at near gross weight with little maneuvering altitude and expressed serious concerns about random flight of low-altitude bombers. Applicators could face decisions as to whether they would fly in an activated MOA.

Weather modification and aerial mapping have special requirements, which include meteorological conditions and rapid access to accomplish mission-specific tasking. Gliding and skydiving under ATCAAs are not impacted. Additional communication would be required to coordinate with Air Force training missions so that these seasonal activities could be accomplished.

Alternative B (See Draft EIS Section 4.1.3.2)

Alternative B civilian aircraft flights below FL180 would be impacted in PR-2, PR-3, PR-4, and associated Gap MOAs as described for Alternative A. No PR-1A, PR-1B, or Gap A MOAs would be established beneath the ATCAA. An estimated 97 civil operations would be impacted Monday through Thursday (approximately one-third of that number on Friday morning) when the Alternative B MOAs are activated. Impacts would be a mix of ground delays, re-routing, or having to decide to fly VFR while the MOA is active. ATCAA impacts would be the same as described for Alternative A. Under Alternative B, low-altitude overflights would not occur below the PR-1A, PR-1B, or the Gap A ATCAAs. Aircraft and airports within the Billings-Miles City-Gillette triangle would not be impacted below FL180. LFE impacts for Alternative B would be as described for Alternative A, with the exception that Alternative B would not include military training overflights below FL180 in the Billings-Miles City-Gillette triangle.

Alternative C (See Draft EIS Section 4.1.3.3)

Alternative C impacts to the Victor Airways on the west side of the PRTC airspace would be comparable to those described for Alternative A. Airspace impacts could include delays, re-routing, or having to fly see-and-avoid in an active MOA. An estimated 79 civil operations would be impacted Monday through Thursday (approximately one-third of that number on Friday morning) when the Alternative C MOAs are active. The PR-4 ATCAA and associated Gap C ATCAA would not have MOAs below them. This means that Alternative C would not impact airports in the Bismarck-Dickinson-Rapid City triangle below FL180.

Traffic on V-491 between Dickinson and Rapid City would be able to transit the area IFR below FL180 even during an LFE. Impacts to airports and airfields under PR-1A, PR-1B, PR-2, PR-3, and associated Gap MOAs would be as described for Alternative A. Jet route and high-altitude impacts for Alternative C would be as described for Alternative A. Emergency and related services would be given priority as with Alternative A. Aerial applications and skydiver/glider impacts would be comparable to Alternative A except under the PR-4 ATCAA where no low-altitude military flights would occur. Information and scheduling would be required to reduce the potential for impacts.

No-Action Alternative (See Draft EIS Section 4.1.3.4)

The No-Action Alternative would have no change in projected baseline conditions. Projected baseline conditions with aircraft returned to Ellsworth and Minot AFBs from overseas activities would be expected to increase annual sortie operations in the existing Powder River airspace. B-1 and B-52 flight training would continue in the Powder River A and B MOAs, which constitute nearly all of the proposed PR-2 MOA. The estimated number of civilian aircraft impacted daily by not flying IFR, delay, re-routing, or having to fly see-and-avoid in an active MOA is seven. Flight training in Powder River airspace ATCAAs would continue as permitted under existing letters of agreement with the FAA. The structure and management of the Powder River airspace would continue to provide limited training to B-1 and B-52 aircrews.

Noise (See Draft EIS Section 4.2)

Public concerns for noise focused on startle effect, interference with rural activities and the natural quiet of the area, potential startle effect safety risks associated with ranching operations, potential damage to structures from supersonic events, and conflict with tribal ceremonies and culturally sensitive sites.

Three aspects of noise could cause environmental impacts: (1) increases in ambient noise levels, (2) low-level startle effects, and (3) sonic booms.

Alternative A: Proposed Action (See Draft EIS Section 4.2.3.1)

Day-Night Average Sound Levels: Public scoping commenters expressed an appreciation for the wide-open space and relative low noise levels within the region. Ambient noise conditions are typically in the Day-Night Average Sound Level (DNL) less than 45 decibel (dB) range except under Powder River A and B MOAs where noise levels are DNL 53 to 54 dB. Calculated DNL noise levels from aircraft overflight within the proposed PR-1A, PR-1B, PR-3, and PR-4 MOAs would be expected to be in the 40 to 47 dB range. The U.S. Environmental Protection Agency (USEPA) has identified DNL of 55 dB as a level protective of the public health and welfare. Increases in the DNL and individual noise events from an aircraft overflight would be noticed and could be perceived as a significant impact by residents under the airspace.

Low-Level Effects: Low-level overflight of a bomber below 2,000 feet AGL within one-quarter mile of the flight path would be expected to occur over approximately 2 to 4 percent of each MOA each training day or an average at any location of 6 to 9 low-level overflights per year. The random nature of B-1 and B-52 training means any specific location could be overflown at low altitude more or less than the average. The uncertainty of low-level overflight and the inability to anticipate when such an overflight could occur would contribute to the startle effect. The revised Air Force proposal has MOAs scheduled Monday through Thursday in the mornings and late afternoon/evenings and Friday mornings to somewhat reduce the uncertainty of when a low-altitude overflight could occur. During many low-level B-1 missions, the aircraft performs a rapid acceleration from below 2,000 feet AGL and climbs with afterburners, potentially creating a localized single event onset rate adjusted sound exposure level (SEL_r) of 133 dB. While operating at high speeds at 500 feet AGL and not climbing, B-1 aircraft generate SEL_r

noise levels of approximately 117 dB. B-52 aircraft typically generate an SEL_r of approximately 100 dB during overflight at 1,000 feet AGL, the lowest altitude at which B-52 aircraft would regularly fly in PRTC. Sudden onset sounds, such as the noise created by low-altitude high-speed aircraft, can be startling to humans and animals. In specific cases where ranching operations herd livestock for weaning and branding, low-level overflights have caused cattle to spook and resulted in damage to both the livestock and fencing. Within the Powder River A/B MOAs, ranchers have identified for the Air Force locations and seasonal times when low-level overflights have the potential to cause serious impacts. The Air Force has established temporary avoidance areas at these locations to reduce the potential for impacts from low-altitude overflights. During public scoping meetings, individuals expressed the opinion that such low-altitude overflights could be a significant impact.

Sonic Booms: Sonic booms are created by the movement of air in response to an aircraft traveling in excess of the speed of sound. Supersonic flights of B-1s above 20,000 feet MSL and fighters above 10,000 feet AGL during the 10 days of LFEs per year could result in an estimated average of approximately one sonic boom per LFE day at any given location on the ground. Areas under the PR-2, PR-3, and Gap B MOA/ATCAAs would be more likely to experience sonic booms than areas under other airspaces due to the flight pattern of training aircraft. Most sonic booms would be heard as thunder, although approximately 1,300 acres could experience sonic booms of 4 pounds per square foot (psf) and a smaller acreage could experience a higher focus boom. Glass, plaster, and other structural elements, normally in good condition, would not be expected to fail as a result of overpressures of 4 psf or greater, but failure would be possible. Infrequent, but sudden sonic booms can impact wildlife and ranch animals similarly to the impacts described for low-level overflights. Training aircraft do not have the ability to direct a sonic boom away from a specific area. Should a sonic boom occur during a hunting or ranching activity, it could result in a reaction on the part of domestic or wild animals. It is not likely that these reactions would significantly impact the species, but, at the very least, such impacts could be an annoyance to persons on the ground.

Alternative B (See Draft EIS Section 4.2.3.2)

Alternative B effects would be the same as Alternative A in nearly all respects except that low-level overflight would not occur under the PR-1A, PR-1B, or Gap A ATCAAs. Noise under these areas would be close to ambient conditions. Noise under PR-2, PR-3, PR-4, and Gap MOAs and ATCAAs would be as described for Alternative A. Infrequent sonic booms during LFEs and 6 to 9 low-altitude overflight effects would be as described for Alternative A for all areas except those under the PR-1A, PR-1B, or Gap A ATCAAS.

Alternative C (See Draft EIS Section 4.2.3.3)

Alternative C effects would be the same as Alternative A except that low-level overflight would not occur under the PR-4 or Gap C ATCAAs. Noise under these areas would be comparable to ambient conditions. Noise under PR-1A, PR-1B, PR-2, PR-3, and Gap MOAs and ATCAAs would be as described for Alternative A. Infrequent sonic booms during LFEs and 6 to 9 low-altitude overflight effects would be approximately as described for Alternative A for all areas except those under the PR-4 or Gap C ATCAAs.

No-Action Alternative (See Draft EIS Section 4.2.3.4)

Noise under the existing Powder River airspace would be at projected baseline conditions as the base returns to the peacetime operational tempo. Low-altitude startle effects would be experienced but supersonic flight would not be scheduled.

Safety (See Draft EIS Section 4.3)

Safety concerns expressed during scoping meetings dealt with the impacts of limited communication, flight safety, low-altitude military training flights, wake vortices, electronic emissions, potential for accidents, and use of chaff and flares.

Alternative A (See Draft EIS Section 4.3.3.1)

Communication: Limited communication and radar coverage impact safe civil aircraft operations at airports and for flights below 12,000 feet MSL in much of the proposed airspace and below FL180 in some areas. Communication limits are greatest in PR-3, the western portion of PR-4, the existing PR A/B (PR-2), and the eastern portion of PR-1A and PR-1B MOAs.

There is no proposal for increased radio frequency coverage or radar coverage for the PRTC airspace where current coverage is limited. General aviation pilots could receive status updates prior to flight by reviewing NOTAMs or could call the Ellsworth AFB airspace management office to determine the status of the MOAs. General aviation pilots accustomed to flying through the airspace with GPS coordinates perceived limited communication as an impact to their ability to transit the airspace.

Flight Safety: FAA has noted that agreements comparable to those for existing Powder River airspaces must be in place to restrict timing and altitude use of the PRTC ATCAAs. This would avoid the potential for significant flight safety impacts to commercial and other aircraft transiting the airspace especially above FL300. During LFEs, the use of ATCAA airspace above FL260 could require re-routing of 43 to 244 commercial and other high-altitude aircraft to avoid safety impacts.

The Air Force's revised aeronautical proposal reduces impacts to air traffic at large commercial airports such as the Billings and Bismarck airports. Potential impacts identified by the FAA include safety risks to civil aircraft unable to communicate while flying IFR on Victor Airways located in the GAP MOAs. The revised Air Force aeronautical proposal has Low and High MOAs in PR-1A, PR-3, PR-4, and Gap MOAs to reduce impacts to IFR traffic. Supersonic aircraft during the 10 days of annual LFEs would not be expected to impact civil aircraft flight safety.

Class A mishap and bird strike risks are expected to be proportional to the amount of training time in the proposed airspace and not expected to be significant. Based upon experience with current training in the Powder River airspace, the estimated annual bird strikes in the proposed PRTC would be 3 to 6 per year. Bird strikes could be higher in the PR-3 and PR-4 Low MOAs where migratory bird flyways converge.

Chaff and Flares: Chaff and flare use in the proposed PRTC would not be expected to result in significant impacts. Chaff are very fine (thinner than a human hair) strands of silica coated with aluminum to reflect radar. Specific types of chaff configured to reduce interference with FAA radar would be permitted for use within the PRTC. Flares would be restricted in release altitude to above 2,000 feet AGL and not deployed in a MOA during extreme fire conditions. Flares burn out in approximately 500 vertical feet, or a minimum of 1,500 feet above the ground. There would be a very slight potential for increased fire risk if flares were accidentally deployed substantially below authorized altitudes.

A dud flare is a flare which does not ignite and falls to the surface of the ground. Based on scheduled flare usage, one dud flare every 3 years is estimated fall to the ground under the entire proposed PRTC airspace. The likelihood of a person finding a dud flare is very low. It would take a hot fire to ignite the flare, although a dud flare could be ignited by a strike with a power saw or a bullet. Should a dud flare be encountered, the public should not touch it but should notify a public safety authority of its location.

When defensive chaff or flares are deployed, plastic and felt pieces, typically of 1 to 2 inches by 1/4 inch, and aluminum coated wrapping which could be 5 by 11 inches, fall to the ground. The surface area of the chaff or flare residual material is such that the largest plastic piece would fall with an impact of a large hailstone or a Bic-type lighter. Chaff or flare residual materials are not expected to result in a safety impact, although, if a rancher or recreationist were to find such a piece of chaff or flare material on the ground and identify the piece of plastic or aluminum-coated duct tape-type wrapping material as having come from a deployed chaff or flare, the individual could be annoyed.

Ground Safety: Startle effects from low-altitude overflight or sonic booms during LFEs could impact the safety of recreationists and/or ranch workers. The low-level training activity could occur anywhere within a proposed MOA such as PR-1A, PR-1B, PR-2, PR-3, or PR-4 during weekday scheduled training or under the Gap MOAs during LFEs. The MOA land areas and training time were used to calculate the average annual number of times any specific location would be directly overflown within one quarter of a mile by a bomber flying 2,000 feet AGL or below. Any area under a MOA would have a low-level overflight an average of 6 to 9 times a year. This is an annual average and the number of actual overflights experienced by a location could be more or less. Should an unexpected low overflight occur, the resulting safety impacts to a recreationist on a horse which could be spooked or a rancher working cattle in open range could be seen as significant by the individual experiencing the low-level overflight. Temporary or long-term avoidance areas would be established to reduce the potential for safety impacts associated with low-level training overflight. Communication regarding seasonal ranching operations, combined with implementing avoidance areas, could reduce impacts to ranching.

Sonic booms cannot be directed and avoidance areas could not be established to prevent sonic booms in a particular area. Supersonic overpressures could impact physical items beneath the airspace. Fighter aircraft are proposed to be supersonic at or above 10,000 feet AGL and B-1s at or above 20,000 feet MSL. A calculated average of approximately one sonic boom could occur per 10 days of LFEs per year anywhere under the airspace. Most sonic booms would be experienced as thunder, although localized sonic booms could be 4 psf or greater. Bric-a-brac balanced on shelf edges, such as on mantles or book cases, could be vibrated off and fall and break. Depending upon the sonic boom pressure at a specific location, windows could be damaged. If a person were inside or near such damaged or falling objects, the person could be injured. The random nature of training flights and the infrequent quarterly LFE supersonic events would not be expected to cause frequent safety impacts. Scoping concerns included the desire for fair compensation for property damage. In the event of damage, there is an established procedure for claims which begins by contacting Ellsworth AFB Public Affairs.

Wake Vortices: Large aircraft can create an air disturbance called a wake vortex of air turbulence at the wing tips. The FAA has restrictions on aircraft flying through a wake vortex which dissipates close to the ground but may persist for a minute or more at altitude. FAA regulations dictate safe following distances and procedures to avoid wake turbulence both in flight and during landing or takeoff. Additionally, air traffic control at airports will typically sequence aircraft using time or distance for departures or arrivals to avoid wake vortices. Most wake vortices decay and dissipate quickly, although the existence of wake vortices could be seen as a potential impact by crop dusters or other light aircraft.

Rare, rapid turns or a pull-up maneuver by a B-1 or B-52 flying between 500 and 1,000 feet AGL can result in wing vortex wind velocities greater than 27 mph at 22 feet AGL. These infrequent high-energy wing vortices, although extremely improbable, could damage a stock watering windmill structure. Structures, objects, persons, wildlife, and livestock in the area underlying the proposed airspace are frequently subject to average winds and wind gusts that match potential wing vortex wind speeds. There have been no recorded cases of wing vortex wind impacts to stock watering windmills or any other structure under the existing Powder River A or B MOAs.

Safety procedures associated with the use of explosives for mining are designed to prevent an inadvertent explosion caused by vibrations or electronic emissions. Significant impacts could result from training aircraft radio frequencies inadvertently or prematurely setting off mining or construction explosives or otherwise impacting such operations. No current procedures are in place for the Air Force to communicate with mining operators to determine whether training could interfere with radio frequencies used for mining operations. Safety impacts from mining operations could be significant without establishing and implementing such procedures.

Alternative B (See Draft EIS Section 4.3.3.2)

Alternative B includes communication, flight safety, and ground safety impacts under PR-2, PR-3, PR-4, associated Gap MOAs, and ATCAAs as explained for Alternative A. Under the PR-1A/1B ATCAAs and the Gap A ATCAA underlying MOAs would not be created and there would be few environmental impacts other than very infrequent sonic booms and chaff and flare residual materials. No mining impacts would be expected under PR-1A or PR-1B ATCAAs.

Alternative C (See Draft EIS Section 4.3.3.3)

Alternative C includes communication, flight safety, and ground safety impacts under PR-1A, PR-1B, PR-2, PR-3, associated Gap MOAs, and ATCAAs as explained for Alternative A. There would be few impacts under the PR-4 ATCAA or the Gap C ATCAA because underlying MOAs would not be created. Under the PR-4 ATCAA and the Gap C ATCAA, there would be very few environmental impacts other than the infrequent sonic booms and chaff and flare residual materials. Mining impacts would be as described for Alternative A.

No-Action Alternative (See Draft EIS Section 4.3.3.4)

No changes to training airspace would occur. Low-level overflights would continue in the Powder River A and B MOAs, and communication would continue to be required to identify seasonal avoidance areas and reduce impacts from low-level overflight to ranching or recreational activities.

Air Quality (See Draft EIS Section 4.4)

Air quality is generally in attainment throughout the four-state region encompassed by the proposed PRTC. Alternatives A, B, C. or No-Action would not result in annual emissions in excess of any of the applicable PM_{10} general conformity *de minimis* threshold of 100 tons per year or in excess of any other general conformity *de minimis* threshold.

Alternative A: Proposed Action (See Draft EIS Section 4.4.3.1)

Alternative A would not be expected to result in significant air quality impacts within the region. The majority of the airspace is located in areas in attainment for all NAAQS. The only areas which had been in nonattainment are the Lame Deer, MT and Sheridan, WY nonattainment areas where particulate matter less than 10 microns in diameter (PM_{10}) standards have been exceeded. B-1 and B-52 aircraft would contribute approximately 1.65 tons of PM_{10} per year within the Lame Deer nonattainment area and 0.02 tons of PM_{10} per year within the Sheridan nonattainment area. This amount of annual emissions would not be expected to increase the number of days when the PM_{10} air quality standard is exceeded, as the aircraft emissions are intermittent, occur well above ground level, and are dispersed over a large area. Defensive flare emissions are insignificant. B-1 and B-52 training aircraft would not produce enough emissions to affect air quality or visibility. Alternative A would not affect the air quality of the nearest PSD Class I area (Wind Caves National Park and Badland National Park) or the Northern Cheyenne Reservation. National greenhouse gas (GHG) emissions would not change from the No-Action Alternative because B-1 and B-52 aircraft would continue to fly essentially the same amount of time to achieve lesser quality training.

Alternative B (See Draft EIS Section 4.4.3.2)

There would be no anticipated significant air quality impacts with Alternative B. There would be no low level overflight of the Lame Deer or Sheridan areas. Aircraft training operations would not fly over any Federal PSD Class I areas; therefore, Alternative B would produce less than significant air quality impacts to the potentially affected Class I areas. National greenhouse gas (GHG) emissions would not substantially change from the No-Action Alternative under which B-1 and B-52 aircraft would continue to fly essentially the same amount of time to achieve lesser quality training.

Alternative C (See Draft EIS Section 4.4.3.3)

Alternative C effects would be the same as described for Alternative A. Alternative C includes the PR-1A MOA, which is the only area with the potential for nonattainment. B-1 and B-52 aircraft training operations emissions would not be expected to increase the number of days when the PM_{10} air quality standard is exceeded in the Lame Deer and Sheridan nonattainment areas, as the emissions are intermittent, occur well above ground level, and are dispersed over a large area. There would be no change in national GHG emissions. No impacts would be expected to Class 1 areas as described in Alternative A.

No-Action Alternative (See Draft EIS Section 4.4.3.4)

No-Action would result in continued overflight below 3,000 AGL within the Powder River A/B MOAs. No-Action does not impact air quality.

Physical Sciences and Hazardous Materials (See Draft EIS Section 4.5)

Physical sciences include soils and water resources under the proposed PRTC airspace.

Alternative A: Proposed Action (See Draft EIS Section 4.5.3.1)

Soils and water bodies under the PRTC are neutral to slightly alkaline in pH. This pH is outside the range necessary to degrade aluminum coating on chaff particles. Chaff particles on the surface would be chemically stable and subject to mechanical degradation. Chaff or flare residual plastic pieces or wrappers would be inert and not in sufficient quantities to impact physical resources. No impact to soils or water bodies would be expected.

Alternative B (See Draft EIS Section 4.5.3.3)

Physical effects would be the same as those described for Alternative A. No significant impacts to physical resources are anticipated.

Alternative C (See Draft EIS Section 4.5.3.3)

Alternative C effects would be the same as those described for Alternative A. No significant impacts to physical resources are anticipated.

No-Action Alternative (See Draft EIS Section 4.5.3.4)

No-Action would not affect physical resources under the Powder River airspace.

Biological Sciences (See Draft EIS Section 4.6)

Biological sciences consider legal, commercial, recreational, ecological, and important biological species under the proposed PRTC airspace. Impacts are considered in terms of context and intensity. Potential impact sources would be chaff and flare use, overflight, and sonic booms.

Alternative A: Proposed Action (See Draft EIS Section 4.6.3.1)

Chaff and Flares: Chaff and flare materials have not been found to affect wildlife or domestic animals through ingestion, inhalation, or direct body contact. The average deposition of chaff and flare residual plastic or wrapping material would be approximately one piece per approximately 115 acres annually. Chaff deposition would be estimated at 0.0049 ounces per acre annually. There is no evidence of chaff affecting vegetation or biological species. Chaff or flare residual plastic or wrapper pieces are not expected to produce chemical effects on biological resources. There is a low concentration of chaff or flare residual materials; chaff and flare releases would have minimal effect on biological species.

Aircraft Overflight Noise and Sonic Booms: Low-level overflight and infrequent supersonic events create noise and potentially startle species on the ground. Studies addressing the effects of overflight noise and sonic booms on wildlife suggest that impacts vary, depending on the species and a number of other factors, including duration, frequency of flights, type of aircraft, and proximity to the species. Individual animal responses to a given noise event can vary widely. Noises that are close, loud, and sudden and that are combined with a visual stimulus produce the most intense reaction. Rotary-winged aircraft (helicopters) generally induce a more frequent startle effect than fixed-wing aircraft. Most species within the areas under the proposed PRTC already occupy comparable environments under the Powder River A and B MOAs (approximately proposed PR-2) where low-level overflights occur. Animals under the proposed PR-1A, PR-1B, PR-3, PR-4, and associated Gap MOAs are expected to be temporarily more sensitive to noise due to lower previous exposure. Sound exposure levels (SEL) above 40dB are associated with a number of behaviors such as retreat from the sound, freezing, or a strong startle response. The estimated average of one sonic boom per LFE day, and the average of 6 to 9 low-level overflights per year would not be expected to impact any specific populations although individuals could be startled. Many studies of animal behavior found that animals exhibited continually decreasing responses to noise exposure. This suggests habituation.

Species of Special Concern: Threatened, endangered, and other special status species include rare migrants, such as the piping plover, least tern, whooping crane, and yellow-billed cuckoo. The greater sage-grouse is of recent concern in Western states because the species have demonstrated historic decline and it is a popular game bird. Sage-grouse have been found to avoid areas of increasing human activity, such as drilling rigs and producing wells. Startle effects from noise, low-level overflights and supersonic events are distributed randomly across the airspace and are expected to be infrequent. Many studies have shown that wildlife have the ability to habituate to noise and become tolerant to overflight. Any impact to sensitive species would likely be short-term and unlikely to significantly affect the population.

Bird-aircraft strike data from 1999 through 2007 indicate that Ellsworth AFB-based aircraft experienced 11 bird strikes in the Powder River A/B MOAs during that period, for an average of one to two per year. The proposed PR-3 and PR-4 Low MOAs are where migratory flyways converge and the potential for bird-aircraft strikes would be the greatest in these MOAs. Low-altitude training within the PRTC could result in an average of three to six bird-aircraft strikes per year. If a migratory bird species were involved in bird aircraft strike, it would be considered an incidental taking during military training and would be exempt from any permitting requirement. An infrequent special status bird aircraft strike would not be expected to adversely affect any populations.

The risk of a flare-caused fire is very low; however, any increased fire risk in the area has the potential to impact species and natural vegetation. Vegetation types such as grasslands can quickly recover from fire. Woodlands and shrubland communities recover over a longer time period. The potential for wildland fire as a result of Air Force activity is minimal and not considered a significant risk to wildlife habitat quality or quantity under the proposed PRTC.

Alternative B (See Draft EIS Section 4.6.3.2)

Alternative B would have the same effects as those described for Alternative A, with the exception that the more environmentally diversified area and higher terrain under the proposed PR-1A and PR-1B ATCAAs would not be subject to low-level overflights. This would result in no expected impact to species in those areas. Alternative B would be expected to produce slightly lower effects to wildlife and sensitive species when compared to Alternative A. Infrequent sonic booms and chaff and flare use would continue to affect all areas under the ATCAAs.

Alternative C (See Draft EIS Section 4.6.3.3)

Alternative C would have the same effects as those described for Alternative A, with the exception that the more agricultural area under the proposed PR-4 ATCAA would not be subject to low-level overflight. This would result in no expected impact to species in those areas. Because the more diversified environmental under the PR-1A/PR-1B MOAs would be included in Alternative C, the biological effects of Alternative C would be somewhat less than Alternative A but somewhat greater than Alternative B. Infrequent sonic booms and chaff and flare use would continue to affect all areas under the ATCAAs.

No-Action Alternative (See Draft EIS Section 4.6.3.4)

Low-level overflight of the Powder River A/B MOAs would continue. Existing biological conditions would continue.

Cultural and Historic (See Draft EIS Section 4.7)

Adverse impacts to cultural resources could occur if direct impacts physically altered, damaged, or destroyed a cultural resource eligible for listing on the National Register of Historic Places (NRHP) or a resource with traditional significance for Native American groups.

Alternative A: Proposed Action (See Draft EIS Section 4.7.3.1)

Overflights and Sonic Booms: Impacts to cultural resources could occur from either subsonic or supersonic noise. Low-level overflights would have a startle effect. Most sonic booms would be experienced as distant thunder although random areas could experience overpressure in the 4 pounds per square foot or greater range. As of spring 2010, there were 239 NRHP properties under the Alternative A airspace. Historic standing structures within the land beneath the affected airspace consist primarily of wood or log building, with no window glass, and/or some adobe or earth block structures. The infrequent and random nature of sonic booms suggests that structural damage to historic buildings would not be expected. Bric-a-brac could be vibrated off shelves, but this would not be expected to result in structural damage to historic properties. Locations such as Devils Tower, Bear Butte, and Deadwood would not be overflown at altitudes below 18,000 feet MSL and should not be impacted except by an infrequent thunder-like sonic boom.

Visual intrusions can include overflight of a Tribal ceremony. During Government-to-Government consultations, Tribal members regularly cited their concerns that low-level overflights with both noise and visual effects would intrude upon their ceremonies and quests. Air Force representatives assured the Tribal members that, when told of a specific location to avoid, the Air Force would establish reasonable avoidance areas to protect the privacy of participants. Typical avoidance areas have a specified distance and altitude above the sensitive location. The residual materials from chaff and flares can be a visual intrusion. Such materials fall to the ground in a dispersed fashion and do not collect in quantities great enough to adversely affect the NRHP status of archaeological or architectural resources or to affect the appreciation or use of traditional cultural resources.

Even infrequent sonic booms at historic landmarks, such as Bear Butte, national monuments, such as Devils Tower or the Little Bighorn Battlefield, or locations such as the Deadwood Historic District could be seen as intrusions. Two of the sites within the Little Bighorn Battlefield have overflight restrictions below 2,000 feet AGL. An estimated 6 to 9 low level overflights per year could occur at any location under a MOA. Infrequent overflights above 2,000 feet AGL would not be expected to be perceived as a significant intrusion to a national monument.

Tribal Reservations: The change in setting created by increased noise from low-altitude overflights and even infrequent sonic booms could have an adverse impact upon Traditional Cultural Properties (TCPs) and cultural landscapes.

During consultations, Native Americans from the four directly impacted reservations explained that low-level overflights and intrusive noise would be detrimental to their cultural practices. The change in setting created by increased noise and low level training overflights could be seen as having a significant impact to Native American Reservations. Amish and Hutterite settlements under the proposed PR-1B MOA could be similarly impacted. The Air Force would establish reasonable temporary or seasonal avoidance areas or could adopt other measures identified in Government-to-Government consultation with affected Tribes to reduce intrusive impacts.

Alternative B (See Draft EIS Section 4.7.3.2)

Alternative B would have impacts similar to those described for Alternative A with the exception that there would be reduced impacts on the Crow and Northern Cheyenne Native American Reservations under the PR-1A and PR-1B ATCAAs when compared with Alternative A. Alternative B has 202 NHRP properties under the airspace with impacts comparable to those described for Alternative A. There would be no low-level overflight over the Crow or Northern Cheyenne Reservations, the Little Bighorn Battlefield National Monument, or the Tongue River Cultural Landscape. Intrusions to other sites under the PR-1A and PR-1B ATCAAs would be those from infrequent sonic booms and residual chaff and flare materials and not from low-level overflights. Effects to Devils Tower, Bear Butte, the Deadwood Historic District, and other historic locations could occur as under Alternative A. Portions of the Standing Rock and Cheyenne River Native American Reservation would be affected by low altitude overflights and sonic booms. Significant impacts to cultural resources would be as described for Alternative A.

Alternative C (See Draft EIS Section 4.7.3.3)

Alternative C would have impacts similar to those described for Alternative A with the exception that Alternative C would not have low altitude training over the Standing Rock and Cheyenne River Reservations. Alternative C has 208 NHRP properties under the airspace with impacts comparable to those described for Alternative A. Impacts from Alternative C on the Standing Rock and Cheyenne River Native American Reservations would be reduced when compared with Alternative A. Impacts from infrequent sonic booms and low-level overflights would generally be comparable to those described for Alternative A, including impacts to the Little Bighorn Battlefield and Traditional Cultural Places under the PR-1A and PR-1B MOAs. Portions of the Crow and all of the Northern Cheyenne Native American Reservations would be affected by low-altitude overflights and infrequent sonic booms. Significant impacts to cultural resources would be as described for Alternative A.

No-Action Alternative (See Draft EIS Section 4.7.3.4)

There would be no change to overflight of historic properties within the Powder River airspace. PR-A and PR-B MOAs do not overly Native American Reservations. Powder River training aircraft wouldn’t overfly Devils Tower, Bear Butte, and fly adjacent to Deadwood at altitudes above 18,000 feet MSL.

Land Use (See Draft EIS Section 4.8)

Land use issues of concern included ranching activities, recreational activities, and the ability to access the airspace. Public concerns at scoping included the effect of sonic booms and low-level overflight on their use of the land. Airspace access impacts are presented under the Airspace/Air Traffic discussion above.

Alternative A: Proposed Action (See Draft EIS Section 4.8.3.1)

Overflight: Land uses under the existing Powder River airspace have been overflown by a variety of military aircraft for approximately twenty years. Much of the area covered by the PRTC Proposal has been overflown by low altitude military aircraft during the Cold War era on Military Training Routes. The primary concerns expressed at scoping meetings regarding land use under the proposed PRTC airspace included the potential for impacts from noise, low-level overflight, or supersonic events. Supersonic training would be scheduled only during LFEs and an estimated average of one sonic boom per LFE day could be experienced at any given location under the airspace. Low-level overflight activity could cause individual annoyance and could result in sleep disturbance or temporarily interfere with personal communication. Approximately 2 to 4 percent of the MOAs would be overflown by a military training aircraft at 2,000 feet AGL or below during scheduled weekdays. The random nature of the aircraft overflight could result in any location under a MOA being overflown an average of approximately 6 to 9 times per year although any given location could be overflown more or less frequently during a year. Such overflight frequency is not expected to impact overall land use although some individuals could become annoyed. The Air Force proposes scheduled times of MOA activation Monday through Friday to provide information about when low-level overflights would not be experienced. Low-level overflight impacts to ranching land uses could be reduced through communication with Air Force schedulers to identify temporary avoidance areas. Such avoidance areas would reduce the potential for impacts to ranching operations, such as weaning and branding. Supersonic training would be during LFEs although sonic booms cannot be directed to avoid a particular area. Hunting and other recreational pursuits may be disturbed by low-level military flights although no military training would generally be scheduled from noon Friday through Monday morning. The extent of overflight and the random nature of the overflight could result in a hunter or recreationist never experiencing an overflight or sonic boom or experiencing more than one overflight or sonic boom. Many people recreate on weekends when military training would generally not occur. This would somewhat reduce the potential for significant impacts upon recreationists.

Life flight, firefighting, fire observation, and other emergency-related activities would be avoided by military training aircraft. Should an emergency occur, ATC would notify the training aircraft of the emergency, and the military aircraft would avoid the affected area, move to another active airspace or return to base in accordance with agreed-to procedures.

Energy Development: Land uses currently under the Powder River airspace within Wyoming, South Dakota, and Montana are comparable to those in other portions of the area proposed for the PRTC airspace. Energy development land uses within the PRTC are not expected to be significantly impacted by low-level overflight or sonic booms. Safety aspects are described in the Safety discussion above.

Chaff and Flares: Chaff and flare use would not be expected to produce impacts upon land use. Chaff or flares would not affect ranching operations. Chaff or flare residual materials, which consist of small plastic pieces or wrapping material, would not be expected to affect land uses but could cause annoyance if found.

Alternative B (See Draft EIS Section 4.8.3.2)

Alternative B would have similar effects to land use as those described for Alternative A. Areas under the PR-1A and PR-1B ATCAAs and associated Gap A ATCAA would not be subject to low-level overflight. This means that civil aircraft flight access below FL180 would occur as under existing conditions. Land uses, which include ranching and recreational activities, would not be affected by low-level overflight in these areas. The remainder of the airspace would be subject to low-level overflight an average of approximately 6 to 9 times per year. Areas under the center of the airspace would be subject to an estimate of one sonic boom per LFE day. These events would not be expected to impact land use although this could be seen as an annoyance to persons using the land.

Alternative C (See Draft EIS Section 4.8.3.3)

Alternative C would have similar effects to land use as those described for Alternative A. Areas under the PR-4 ATCAA and associated Gap C ATCAA would not be subject to low-level overflight. Civil aircraft flight access below FL180 would occur as under existing conditions. Land uses, which include ranching and recreational activities, would not be affected by low-level overflight in these areas. The remainder of the MOA airspace would be subject to low-level overflight and all areas under the ATCAAs could experience intermittent sonic booms as described for Alternative A. An estimated annual average of 6 to 9 low level events would be experienced by residents living under the low MOAs. This could be seen as an annoyance to persons using the land.

No-Action Alternative (See Draft EIS Section 4.8.3.4)

No-Action would not change effects upon land use under the existing Powder River airspace.

Socioeconomics (See Draft EIS Section 4.9)

Socioeconomics evaluates the potential effects of the proposed airspace modifications and associated military training activities upon the social and economic resources associated with the proposed PRTC.

Alternative A: Proposed Action (See Draft EIS Section 4.9.3.1)

Civil Aviation in ATCAAs: Alternative A could affect commercial aviation in the ATCAAs, particularly above FL260. FAA data demonstrate that commercial traffic above FL260 is heaviest after 12:00 noon. Hours from 4:00 a.m. through 10:00 a.m. would have less impact to civil aviation in the ATCAAs than other times. During an LFE day, depending upon when a four-hour exercise was conducted, between 43 and 244 commercial and other high-altitude civil aircraft could be impacted along with 76 civil operations in the MOAs. FAA has stated there would be limited access above FL300 to avoid significant impacts upon air carrier economics and regional and national air traffic.

Civil Aviation in MOAs: Alternative A would affect civil aviation in the proposed MOAs. MOAs would have a posted morning and late afternoon/evening schedule Monday through Thursday, Friday mornings, and otherwise be activated by NOTAM. Civil aviation would not be able to fly IFR in an activated MOA. VFR flight could use see-and-avoid rules in an active MOA, weather permitting. During scoping, civilian pilots expressed concern that the perceived risk of flying VFR in an active MOA would impact their use of the airspace. Public airports would have avoidance areas established over them. However, communication throughout the area is limited. Radar tracking is unavailable through much of the area, and radio frequencies cannot provide adequate communication below 12,000 feet MSL in many of the proposed MOAs and below FL180 in some areas.

Public airports and private airfields under the proposed airspace would be impacted by reduced ability to fly IFR and uncertainty regarding VFR flight in an active MOA. An estimated 129 civilian aircraft under the airspace Monday through Thursday (approximately one-third of that number on Friday morning) could be impacted. The impact could be delay, re-routing, seeking to fly VFR in an active MOA, or not being able to fly IFR. During LFEs, the entire airspace would be unavailable for IFR or overflight traffic for a period of up to 2 to 4 hours a day for one to three days a quarter. Delays could be 2 to 4 hours and could be seen as an economic impact especially in the case of time sensitive replacement parts or personnel for such businesses as mining or agriculture.

Aerial applications are performed below 500 feet AGL and aircraft typically fly fully loaded well under 2,000 feet AGL. Applications normally occur in the early morning hours to avoid wind dispersion of the material. The inability of an aerial applicator to know where and at what altitude a training bomber could fly over the area could impact business decisions and economics.

Property Values: Property value concerns were mentioned at scoping meetings. Review of assessor procedures and state laws have shown that the existence of a MOA is not considered in the valuation of property under the Powder River A or B MOAs and is not a requirement for disclosure under Montana, North Dakota, South Dakota, or Wyoming state laws. No quantifiable property value impacts would be anticipated.

Energy Resources: Establishing the airspace and use of the MOAs for overflight would not be expected to impact most energy resource development. Altitude overflight restrictions would be established over tall structures, such as tall construction cranes, power plant stacks, and wind farms. Coordination would be required between mine operators and the Air Force to ensure that radio frequencies used for mining are not used by Air Force aircraft during training. The potential for aircraft frequencies to result in a triggering of explosives used in mining could have significant impacts upon mine operations. Additional communication procedures and avoidance areas may be required for locations where existing and potential mining or major construction operations could occur.

During public scoping meetings, several participants expressed concern that low-level overflights and/or supersonic activity could impact their lives. Alternative A DNL increases in PR-1A, PR-1B, PR-3, and PR-4 change from an estimated less than 45 dB DNL to an aircraft calculated DNL of 40 to 47 dB. This change could be noticeable and may be perceived as an impact although calculated DNL would be below the USEPA-identified DNL of 55 dB which is a level protective of the public health and welfare.

Ranching and Other Activities: Low-level overflights could impact ranching operations, especially during times when range stock are penned, such as during weaning and branding. Within the Powder River A/B MOAs, ranchers have coordinated with the Air Force to identify temporary avoidance areas so that the potential for low-altitude overflight impact could be reduced. Approximately 2 to 4 percent of each MOA would be overflown by a B-1 or B-52 at 2,000 feet AGL or below on the Monday through Friday schedule. This means that, on average, a location could experience 6 to 9 low-level overflights per year. The random nature of the aircraft overflights could result in some areas experiencing no overflights and other areas experiencing more than average. Anywhere under the airspace could experience an average of one sonic boom per LFE day. The sonic boom would typically be experienced as thunder, but approximately 1,300 acres could experience an overpressure of four psf or greater which have the potential for window or other damage. Public commentors at scoping expressed the opinion that the sudden onset noise of a low-level overflight or a sonic boom would be considered a significant impact. During scoping, the estimated number of low-level overflights or sonic booms per year had not yet been calculated.

Chaff and flare usage would result in an estimated deposition of 0.0049 ounces of chaff per acre per year with approximately one piece of plastic or wrapping residual material from a deployed chaff or flare being deposited on an average of approximately 115 acres per year. Flare release altitudes of 2,000 feet above ground level, or discontinued in a MOA during extreme fire conditions, would not be expected to contribute to increase fire risk. Chaff and flare impacts would not be expected, although an individual finding a piece of chaff or flare residual material, such as a two inch by one inch by 1/4 inch piece of plastic, could be annoyed.

Emergency flight operations such as firefighting and air ambulance would continue under ATC emergency flight procedures. The Air Force would immediately move training activities outside the required airspace to meet emergency needs.

Alternative B (See Draft EIS Section 4.9.3.2)

Alternative B impacts would be comparable to those described for Alternative A. The primary difference is that Alternative B does not have airspace below FL180 under the PR-1A, PR-1B, and Gap A ATCAAs. This means that existing or proposed mining operations under the PR-1A, PR-1B, or Gap A ATCAAs would not experience low-altitude overflights. Activities under the PR-1A or PR-1B ATCAAs, such as ranching, Tribal, and recreational activities, would also be unaffected by low-level overflights. LFE daily civil aviation impacts would include 43 to 244 civil operations above FL180 plus 76 civil operations in the MOAs.

Alternative B would have an estimated average of 97 daily civil aircraft operations impacted Monday through Thursday (approximately one-third of that number on Friday morning) as described for Alternative A.

Alternative C (See Draft EIS Section 4.9.3.3)

Alternative C impacts would be comparable to those described for Alternative A. The difference is that Alternative C does not have airspace below FL180 under the PR-4 and Gap C ATCAAs. This means that ranching, recreational, and other activities within this area would be unaffected by low-altitude overflights. The number of civil aircraft operations daily impacted by Alternative C is estimated at 79 Monday through Thursday (approximately one-third of that number on Friday morning). Impacts would be as described for Alternative A. Impacts to mining, recreation, and other activities within the PR-1A and PR-1B MOAs would be as described for Alternative A. LFE daily civil aviation impacts would include 43 to 244 civil operations above FL180 plus 48 civil operations in the MOAs.

No-Action Alternative (See Draft EIS Section 4.9.3.4)

The Air Force would continue to use the existing Powder River airspace for training. Low-level overflights would continue throughout Powder River A/B MOAs. There would be no change in socioeconomic effects. An estimated 7 civil operations are impacted daily with impacts as described for Alternative A.

Environmental Justice and Protection of Children (See Draft EIS Section 4.10)

Environmental justice applies to potential adverse environmental impacts disproportionately felt by minorities or low income population. Environmental justice includes the protection of children from health and safety risks if the potential for such risks are driven by an environmental impact.

Alternative A: Proposed Action (See Draft EIS Section 4.10.3.1)

Under the airspace proposed for Alternative A, the affected population is 84,420 persons including affected populations on four Native American reservations: Crow, Northern Cheyenne, Standing Rock, and Cheyenne River. The affected minority population is 12,661 and 13,831 persons live below the poverty line.

The primary minority and low income populations under Alternative A reside on portions of the Crow Reservation and the entire Northern Cheyenne Native American Reservation under the proposed PR-1A and PR-1B MOAs. The total population under these MOAs is 16,746 of whom 9,717 are minority, 4,734 live below the poverty level, and 6,074 are children. These population estimates include the populations on the Crow and Northern Cheyenne Reservations. Under the PR-2, PR-3, and PR-4 MOAs, which would be subject to low-level overflights, the affected population is 20,122 persons of which 558 are minority, 2,932 persons live below the poverty level, and 5,016 are children, including the affected populations within the Standing Rock and Cheyenne River Reservations. The PR-4 MOA on the eastern side of the airspace would not have training aircraft overfly population concentrations of the Cheyenne River or Standing Rock Reservations. All four Tribes have sacred sites for spiritual ceremonies and vision quests. Because these sites are located on or near reservations and the ceremonies are conducted by Native Americans, the potential for adverse impacts to these cultural resources would be disproportionate for the four reservations located beneath the proposed PRTC. During Government-to-Government consultations, the Air Force has sought to identify sacred sites and specific times of the year when avoidance areas could be established to reduce the potential disruptions from aircraft noise and visual disturbances. Coordinating flight schedules establishing altitude restriction, and identifying avoidance areas could reduce the potential for impacts to tribal lands although significant impacts would be anticipated, particularly to tribal lands under PR-1B.

Youth populations in the affected counties are generally proportional to the state levels. Reaction to infrequent low level overflight or sonic booms could temporarily disrupt classrooms but no long term learning or health impact upon children would be expected. The primary exception is under the proposed PR-1B MOA where a concentration of youth exists. The Northern Cheyenne and Crow Reservations have greater proportions of minority, low income, and children than any other areas beneath the proposed airspace. These reservations have the potential for adverse impacts which would be disproportionate to the affected populations on the Northern Cheyenne and Crow Reservations.

Alternative B (See Draft EIS Section 4.10.3.2)

Alternative B would not establish PR-1B and would not overfly the Crow or Northern Cheyenne Reservations below FL180 although it does have the potential to impact the Standing Rock and Cheyenne River Reservations located beneath the proposed PR-4 MOA. Minority, low income, and impacts to children are substantially less for Alternative B than for Alternative A or Alternative C. The potential for disproportionate adverse impact on the cultural resources of Native American Reservations under PR-4 is less than for Alternative A or Alternative C. Effects on youth populations would generally be less than described for Alternative A. Coordinating flight schedules establishing altitude restriction and identifying avoidance areas could reduce the potential for impacts to tribal lands although significant impacts could still be anticipated.

Alternative C (See Draft EIS Section 4.10.3.3)

Alternative C would have the potential to impact portions of the Crow Reservation and all of the Northern Cheyenne Reservation located beneath the proposed PR-1B MOA. Alternative C does not include low-level overflights of the Standing Rock and Cheyenne River Reservations. There would be the potential for disproportionate adverse impact on the Crow and Northern Cheyenne Native American Reservations. Coordinating flight schedules establishing altitude restriction, and identifying avoidance areas could reduce the potential for impacts to tribal lands although significant impacts, particularly under PR-1B, could be expected. Effects on youth populations would be generally as described for Alternative A. There is a higher proportion on youth impacted under the PR-1B MOA than under any other proposed airspace.

No-Action Alternative (See Draft EIS Section 4.10.3.4)

No Tribal lands are located under the existing Powder River airspace. There is no disproportionate impact upon environmental justice population associated with the existing Powder River airspace.

Cumulative (See Draft EIS Chapter 5.0)

Cumulative effects consider the potential environmental impacts resulting from the incremental impacts of the PRTC action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions.

Other Projects and Uses: A variety of past, present, and reasonably foreseeable actions are proposed or planned under the extensive airspace overflown by the proposed PRTC. These projects range from additional energy development to mining operations to new rail lines for coal shipment to expanded wind farms. Potential cumulative projects in the ROI include plans and permits to develop mineral reserves, including oil, gas, and coal reserves, and transportation of excavated resources. The energy exploration and development has been a stimulus to economic activity within the region. Other cumulative projects include the beddown of an additional B-52 squadron at Minot AFB, airspace actions in North Dakota and Utah, and the potential for additional threat emitters and simulated targets comparable to those used for existing Powder River airspace to add realism to PRTC aircrew training. A number of the projects are BLM management actions. The general trend in the region has been one of creation of larger farming operations, growth in larger communities, and decline of smaller communities. Recreational uses have historically continued to grow, with many hunters and fisherman coming to the region in search of game.

Cumulative Effects: **Airspace, Noise, and Safety.** The additional B-52 squadron has been included throughout the EIS as a baseline condition. Cumulative potential effects upon other airspace users or potential users have been included throughout this EIS. These effects include impacts to airspace access and impacts to time-sensitive deliveries as a result of the inability to fly IFR through an active MOA. Approximately 2 to 4 hour delays or re- routing could impact time-sensitive deliveries to existing or proposed mining development, transportation projects, industrial development, or agricultural operations. Limited communication and radar coverage which impact safe civil aircraft operations and airports would continue below 12,000 feet MSL in much of the proposed airspace. The B-1 or B-52 would randomly overfly at levels of 2,000 feet AGL or below approximately 2 to 4 percent of each MOA during any training workday. This level of overflight and potential startle effect is not expected to significantly alter or cumulatively affect any development plan or resources within the region. Infrequent sonic booms during LFEs would not be expected to interfere or cumulatively affect other ongoing or proposed activities. Aircraft training overflights would be random and would not cumulatively interact with construction sites. Coordination and communication with mining or other blasting related activities, such as new rail lines, would be required for safety to avoid significant cumulative impacts. No cumulative effects to noise or safety from PRTC would be expected in conjunction with other projects in the ROI.

Cumulative Effects: **Physical Resources and Air Quality.** Mineral excavation, transportation line construction, and industrial operations could potentially impact large amounts of soil and water resources and could contribute to air quality impacts. Separate environmental analyses, prepared for the projects, will document impacts and mitigations. Potential construction of emitter sites would not be expected to have an impact on soils, water, or air quality resource. Any threat emitters on 15-acre sites would be subject to environmental review. Siting criteria would include being near power for electricity to run the threat emitters, so no air quality effects from generators would be anticipated. Aircraft overflights do not produce an amount of emissions which could contribute to cumulative air quality impacts or result in discernible contributions to present or future nonattainment areas. No cumulative effects are anticipated to physical resources or air quality as a result of the proposed PRTC.

Cumulative Effects: **Natural and Cultural Resources.** Mineral excavation and transportation line construction could impact natural and cultural resources. Construction and other ground-disturbing projects could impact Tribal lands and cultural resources. Separate environmental documentation would assess direct and indirect impacts of these projects. Cultural resources on Tribal lands experiencing construction or other ground-disturbing effects could be impacted directly as a result of other projects in the ROI. Some cumulative effects could occur from infrequent low-level overflights in conjunction with extensive planned mineral operations on and near Tribal lands. Potential construction of emitter sites would not be expected to have a cumulative impact in conjunction with large scale mining projects based on the relatively small size of the emitter sites and the need for sites to be on an open rise where they could project out as far as possible. Emitters would be located to avoid environmentally sensitive areas and would not be expected to cumulatively contribute to disturbance of natural or cultural resources.

Cumulative Effects: **Land Use, Socioeconomics, and Environmental Justice.** Substantial construction projects in the ROI would alter employment patterns in industrial areas of mineral development or transportation projects. Construction projects and additional large-scale mining would contribute to regional employment while changing the nature of the economy. Agreements regarding construction and operation jobs for Tribal members could improve economic opportunities for minority and low income populations. Temporary avoidance areas would be established over construction sites where tall cranes or helicopters would be used in the construction. Permanent avoidance areas would be mapped for tall structures such as smokestacks or wind generation machines. Cumulative impacts from overflight in conjunction with mining operations would not be anticipated. Low-level overflight and associated hunting and other recreation continue throughout the area overlain by the existing Powder River A/B MOAs. The fact that recreation occurs in areas of current low-level overflights suggests that the actual military aircraft overflight impacts could be less than the uncertainty of an average of 6 to 9 low-level overflights per year. Civilian air operations and cultural resources would be individually and cumulatively impacted. For all other environmental resources, the establishment of the PRTC in combination with any other ongoing activities by federal or other agencies or enterprises would not be expected to have incremental impacts when added to other past, present, and reasonably foreseeable future actions.

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1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION AND ALTERNATIVES

The overarching purpose of any military force is to be able to successfully conduct combat operations. To accomplish this purpose, the military force must train often and realistically. A trained military force is essential to support national policy and security objectives. Capabilities in the air and capabilities in space can rapidly provide the national command structure a full range of military options to meet national objectives and protect national interests. B-1 and B-52 aircraft have the range to reach and remain near a target area, the combat capability to carry a variety of munitions and sensors for specific targets, the responsiveness to be at the scene when needed, and the flexibility to relocate and respond to time sensitive targets. These capabilities make United States Air Force (Air Force) bombers flown by trained aircrews a key asset in national defense.

1.1 Overview

Aircrews need to train to become that key asset, and training requires airspace. Historically, the two B-1 squadrons at Ellsworth Air Force Base (AFB) and the two B-52 squadrons at Minot AFB have used the Powder River Military Operations Area (MOA) to train to meet national defense requirements. Due to several factors explained in Section 1.2, the current airspace is inadequate for mission needs. The purpose of the Proposed Action is to establish and configure airspace for B-1 and B-52 training. B-1 and B-52 aircraft have substantial system upgrades which necessitate training airspace with certain size and contour characteristics. Airspace is needed to accommodate aircraft and threat systems which now have longer range and higher altitude capabilities, fuel conservation which has become increasingly important and necessitates shorter sortie durations, low-altitude training and targeting sensor training which require more diverse airspace, an increase in the number of users, and complex multi-mission training required as a result of combat experience.

The Air Force needs to improve airspace assets for required training primarily by B-1 aircrews stationed at Ellsworth AFB, South Dakota (SD), and B-52 aircrews stationed at Minot AFB, North Dakota (ND). The existing Powder River airspace can no longer support realistic training missions for two B-1 squadrons at Ellsworth AFB and two B-52 squadrons at Minot AFB. Transient users of the airspace assets include three B-52 squadrons at Barksdale AFB, one RC-135 squadron at Offutt AFB, as well as many other military units in a surrounding area. The proposed training airspace improvements are collectively named the Powder River Training Complex (PRTC). The proposed PRTC would increase the amount and quality of local airspace available as training assets primarily for B-1 and B-52 aircrews. PRTC would improve training through:

- establishing new airspace and modifying existing airspace in the region of Ellsworth AFB and Minot AFB;
- providing for complex multi-mission training in the new and modified airspace;
- permitting defensive training with chaff and flare countermeasures in the new and modified airspace;
- providing for realistic Large Force Exercises (LFEs) with various aircraft types during 1 to 3 days per quarter, an expected total of 10 days per year;
- authorizing supersonic flight for the B-1s above 20,000 feet mean sea level (MSL) in the new and modified airspace to be scheduled only during the expected 10 days per year of LFEs; and

- authorizing other military units with fighters, primarily from the surrounding area, to conduct supersonic flight above 10,000 feet above ground level (AGL) in the new and modified airspaces to be scheduled only during the expected 10 days per year of LFEs.

Figure 1-1 describes the bases, training, and range assets which were considered for B-1 and B-52 training and summarizes some of the key considerations used in the alternatives identification process described in Chapter 2.0. Airspaces such as the Tiger, Devils Lake, Hays, and Lake Andes MOAs were created and configured for Cold War era missions. They do not have the dimensions, altitude structure, or electronic capabilities to meet today's or tomorrow's warfighting requirements for training to meet on-going and future Overseas Contingency Operations such as those in Afghanistan. Airspaces such as the Mountain Home Range Complex (MHRC), Utah Test and Training Range (UTTR), and Nevada Test and Training Range (NTTR) are excellent ranges with updated electronic and target capabilities; however, they are distant from B-1 and B-52 bases. In addition, the realistic training offered by these ranges leads to intensive use for both test and training missions by locally-based aircraft, severely limiting access for bomber training. This limited access, combined with the distance from B-1 and B-52 home bases, makes it difficult to conduct realistic training and maintain bomber aircrew proficiency.

Existing training airspace and range assets are inadequately configured, excessively distant, and/or inconsistently available to support the needs of the B-1s and B-52s from Ellsworth AFB and Minot AFBs, respectively. The proposed PRTC would provide appropriately configured local airspace which would be consistently available and alleviate most of the constraints on realistic B-1 and B-52 training.

1.2 PURPOSE OF THE PROPOSED ACTION

The purpose of the proposed PRTC is to provide local airspace that would support primarily Ellsworth and Minot AFBs with the capability to adequately train aircrews and ensure their readiness to succeed and survive in combat. No bombing range is proposed for this action. The purpose of the Proposed Action is to provide adequate airspace to provide capabilities necessitated by the following factors.

Since 9/11, the Air Force has evolved multiple new roles and responsibilities for the B-1, including support for Non-Traditional Intelligence, Surveillance, and Reconnaissance.

The B-1 and B-52 capabilities and combat missions have changed and expanded in recent years. Technological upgrades to B-1s have resulted in the need for responsive, improved training. These upgrades include new target acquisition capabilities, new communication and networking capabilities, new laser targeting capabilities, new optical target tracking capabilities, and new smart weapons. All these capabilities and missions require aircrew training time. Expanded local airspace would permit aircrews to use their flight time in productive training rather than on unproductive commuting to distant training ranges. The B-1 is the only aircraft in the United States (U.S.) with the ability to remain over targets for an extended period and rapidly respond to precisely employ any of a broad array of munitions on multiple separate targets spread across a large area. Missions and tactics assigned to the B-1 include Close Air Support, Time-Sensitive Targeting, distant target identification, and networking with multiple aircraft and ground assets. The B-1 continues to have a role as the only U.S. bomber capable of high speed, low-level penetrations for a breadth of worldwide missions.

The number of users has increased. Minot AFB, a frequent user of the current Powder River airspace, has added a B-52 squadron. Minot's Operations Group commander estimated that their training airspace needs would increase by 70 to 80 percent. Expanding the Powder River airspace into several airspace sections will permit simultaneous airspace use by Minot's squadrons, as well as Ellsworth AFB B-1 squadrons.

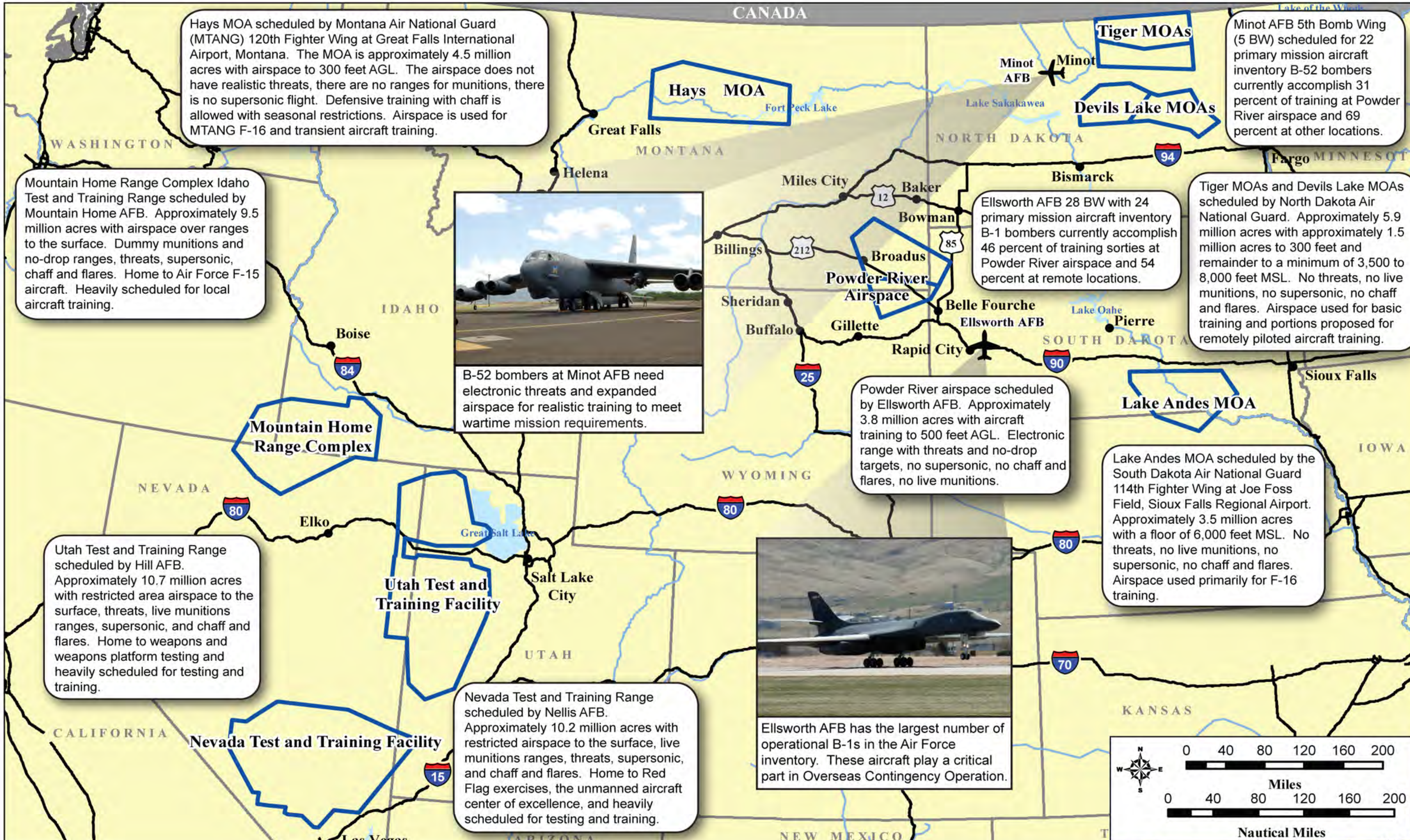


Figure 1-1. Regional Location of Existing Powder River Airspace and Remote Training Airspaces and Ranges

Training must mirror combat to the greatest extent possible, and airspace and range training needs to provide the opportunity for realistic, effective training operations. As noted in Figure 1-1, the existing local and remote airspace and range assets available to the B-1s from Ellsworth AFB and B-52s from Minot AFB are either not configured for current B-1 or B-52 mission training or, if configured for current training, the airspaces are distant from Ellsworth or Minot and heavily scheduled for training locally based aircraft. For bomber training, these airspace assets suffer from substantial limitations and/or deficiencies.

Several range improvements under the existing Powder River airspace include a simulated urban area, and the addition of an improvised explosive device simulation area. As a result of these ongoing and planned upgrades, the 28th Operations Group Commander anticipates aircraft with high-fidelity targeting sensors containing substantially expanded video and electronic targeting capabilities, such as F-15Es, F-16s, B-52s, and B-1s, to increase their use of the training airspace. Additionally, RC-135 squadrons have expressed interest in increasing their use of Powder River assets. Expansion of the airspace would allow all of these units access to these improved training aids.

Aircraft and threat systems now have longer range and higher altitude capabilities. The current Powder River airspace was designed when ground threats had ranges of 25 nautical miles (NM) or less and air-to-air radars had ranges of less than 35 NM. Today, ground threats have ranges that exceed 100 NM and air-to-air radar ranges have more than doubled. Due to these advances in threat systems and aircraft capabilities, bomber aircraft have current mission requirements to employ at altitudes as high as Flight Level (FL) 500. Fighter altitude requirements are now as high as FL600. Training scenarios using modern threats in Powder River's current airspace do not have areas for aircraft marshalling or organizing while preparing to exercise battlefield tactics outside of simulated threat ranges. To train against these threats and to integrate better with modern aircraft requires more airspace.

The current Powder River airspace supports training from the surface up to FL450 and provides opportunities for aircrews to maintain limited proficiency with simulated attack and ground-based defense systems. Aircrews simulating air-to-surface attacks within the existing airspace cannot train with defensive chaff and flares and cannot train with maneuvers which could break the sound barrier. Training with chaff, flares, or supersonic operations is not authorized in the existing airspace. Current fighter and bomber engagements cannot be realistic because the aircrews must break off the simulated fight rather than momentarily exceed the sound barrier, since supersonic flight is not authorized in the existing training airspace.

The proposed airspace would permit aircraft preparing to exercise battlefield tactics to include supersonic speeds during LFEs and provide enough space for realistic and modern training scenarios. The proposed airspace would provide adequate airspace and altitude ceilings for multiple simultaneous training areas—many flights could conduct training using required safe separation criteria. The proposed airspace configuration provides for high and low training altitudes, employment of chaff and flares, and improved electronic combat simulation. More importantly, the airspace size allows multiple aircraft types to conduct full air-to-air and air-to-ground engagements with simulated deployment of air-to-air or air-to-ground munitions. Airspace expansion would allow aircrews to train in a realistic combat environment, which would increase their overall combat capability and survivability. Realistic multiple aircrew training would especially occur during once quarterly, 1 to 3 day LFEs when various aircraft types would train as they fight.

Fuel conservation necessitating shorter sortie durations has become increasingly important. Fuel is one of the Air Force's biggest expenses. Expanding and improving Powder River airspace would increase Ellsworth AFB 28th Bomb Wing (28 BW) B-1 local training from the current levels of 50 percent to approximately 85 percent. Training at other locations will still be needed in order to accomplish training requirements that are not part of this proposal such as dropping ordnance on ranges. This increase in local training would greatly reduce the need to use airspace further from the base and result in significant fuel savings which would be used to improve both training quality and quantity and thereby achieve greater efficiency.

Low-altitude training and targeting sensor training requires more diverse airspace. Current combat operations in Iraq and Afghanistan require low-altitude training and targeting sensor use for B-1 and fighter aircraft. Additionally, B-52 aircraft recently received advanced targeting sensors and began training with them. The Powder River airspace requires expansion and modification to meet these diverse training needs.

The B-1 was designed as a low-altitude all-weather day and night bomber. Low-altitude flight remains a requirement to support show-of-force and show-of-presence passes in current combat operations. These passes have proven effective in disrupting enemy operations. Additionally, the B-1 still requires proficiency in low-altitude unguided munitions employment, low-altitude ingress and egress, and terrain following procedures to 500 feet AGL. Aircrew proficiency remains a critical aspect of low-altitude operations and low-altitude employment proficiency continues to constitute a significant portion of required B-1 training. However, after a few years of using the existing Powder River MOAs for low-altitude training, aircrews become overly familiar with the terrain. Training becomes memorized. Expanding the airspace would provide varied and different terrain for training which in turn would permit more challenging scenarios. Sectioning the proposed airspace simulates the sector control airspace measures currently used in combat operations which would also add to training realism. The current Powder River airspace cannot support these required training missions.

Some B-52 units also have requirements for low-altitude proficiency. They maintain proficiency in low-altitude, counter-sea, and mine-laying operations. B-52 low-altitude training is currently limited to no lower than 1,000 feet AGL.

Advanced targeting sensor training requires increased airspace. Current combat operations require aircraft to use the targeting sensor to search for improvised explosive devices, to escort ground convoys, and to gather intelligence. Similar to low-altitude training, “sensor targets” become memorized over time. The proposed airspace expansion would permit a three-fold increase in targeting sensor training opportunities with additional “ground space” to find and track new targets. Both the B-1 and B-52 require a wide range of practice targets to remain proficient in targeting sensor operations.

Combat readiness has demonstrated a requirement for complex multiple mission training. In combat, B-1s are often launched fully loaded and set up to orbit a battlefield area with a variety of munitions near the expected action. B-1s are the weapon of choice in combat where they can be called on to target everything from an enemy mobile SCUD missile minutes from launching to an enemy pinning down a Sea, Air, Land team on a hilltop to a weapons cache found by a Special Operations team. B-1 aircrews must be trained to be experts in every possible mission. Training the B-1 four-man aircrew to accomplish these multiple new and existing assignments, often on the same mission, requires dynamic, realistic training airspace. The expanded B-1 capabilities and the aircraft’s performance mean that one or two B-1s require all the current Powder River for a realistic training mission. The B-1 operational wing at Ellsworth AFB does not have adequate airspace to train aircrews for present and future training requirements. The B-52 operational aircraft at Minot AFB face comparable training limitations.

Airspace and ground assets must be integrated into a local training complex accessible to Ellsworth AFB and Minot AFB with the opportunity for multiple missions training. The capability to launch more local training flights would permit aircrews to fulfill requirements for combat readiness because a higher proportion of training time per flying hour would be spent in multi-mission training for today’s and tomorrow’s conflicts. B-1 aircrews cannot accomplish the array of expanded training requirements while commuting to remote training complexes, and these remote training complexes have limited availability. Commuting and availability further reduce flexibility and efficiency.

B-52s from Minot AFB face the same training challenge. B-52 aircrews must fulfill a broad range of missions, with new missions for electronic suppression and smart weapons arising from the Overseas Contingency Operation. This varied array of missions include strategic attacks, counter land-and-air, and preparation for deployment with the Aerospace Expeditionary Forces. Meeting these requirements demands efficient and effective use of limited available training hours. As with the B-1s, the B-52s must train in an airspace complex located and configured to provide a high proportion of training and minimal low-value commuting time. Such a complex would permit Minot AFB to generate quality local sorties and fulfill training requirements for combat readiness.

1.3 Need for the Proposed Action

The Air Force needs to overcome the limitations and deficiencies described in Section 1.2. The bombers' new capabilities and 21st century missions need extended horizontal airspace size, vertical extent, and capacity to adequately support necessary B-1 and B-52 training. Expanded local airspace would allow aircrews to fulfill needed training.

Figure 1-2 presents an overview of the modular nature of the proposed PRTC and describes the airspace segments of the PRTC. The summary of factors which drive the need to implement the Proposed Action is presented in Table 1-1.

> *The existing Powder River airspace includes the Powder River Military Operations Areas (MOAs), associated Air Traffic Control Assigned Airspace (ATCAA), and an array of electronic threats and simulated targets.*
>
> *The proposed Powder River Training Complex (PRTC) builds upon the existing Powder River airspace and adds and reconfigures MOA and ATCAA assets to meet today's and tomorrow's training needs.*

Table 1-1. Summary of Factors Which Establish the Need for Expanded Local Airspace

1. B-1 and B-52 missions, aircraft advanced technology capabilities, and training requirements have increased and will continue to increase and the existing Powder River airspace cannot accommodate these requirements.
2. Commuting consumes limited available aircrew and aircraft flying hours without accomplishing essential training, and distant complexes that theoretically could provide needed training with long commutes have a limited accessibility because locally-based aircraft and other users have priority.
3. Flight hours spent commuting consumes excessive fuel and require extensive on-ground maintenance hours for airframes to be ready for the next mission. Commuting long hours to training missions force aircraft inspections and maintenance sooner than the same number of local mission training. This results in a reduction in available airframes for aircrew training.
4. Combat readiness requires complex multiple mission training, but the existing Powder River airspace accommodates approximately 46 percent of required B-1 aircrew training sorties and 31 percent of required B-52 aircrew training sorties.
5. The existing Powder River airspace does not permit certain required training activities essential to today's combat, such as supersonic flight, training in the deployment of defensive chaff and flares, diversified low-altitude training, or LFEs.
6. The number of users has increased, but the capacity of the existing Powder River airspace does not provide for multiple or dissimilar aircraft training with current sensors and weapon capabilities.
7. The B-1 and B-52 aircrews currently face aircraft and threat systems with ranges far in excess of the existing Powder River airspace. Additionally, supersonic training is required for bomber proficiency as well as fighter tactical employment. Training must detect and react to such threats.
8. The existing Powder River airspace has inadequate space and diversity to accommodate necessary B-1 and B-52 training requirements for combat readiness.

Table 1-2 summarizes the improved training capabilities of the proposed PRTC depicted on Figure 1-2. Each capability includes the section where the need is addressed in this Environmental Impact Statement (EIS). Figure 1-3 provides an overview of the existing Powder River airspace. A comparison of Tables 1-1 and 1-2 demonstrates that PRTC would provide bomber aircrews adequately sized, configured, and available airspace to train as they would fight during worldwide deployment. The long timeframe for any future bomber development places an even greater emphasis on B-1 capabilities and training. Bomber aircrews face reduced budgets, a reduced number of airframes, high aircraft utilization requirements, new multi-role taskings, and expanded capabilities to achieve U.S. military objectives. Bomber aircrews must train to be experts with their own weapons systems and to function as an integrated force package with other aircraft to leverage the capabilities of each weapon system and enhance survivability of the collective force. Expanding the existing Powder River airspace to form the PRTC would improve realistic combat training and increase flexibility and availability of limited resources and assets.

Table 1-2. Summary of PRTC Purposes and Improved Training Capabilities

1. Provides for aircrew training to implement and employ technology upgrades and fulfill both current and anticipated future operational requirements (Section 2.2.1). ***Addresses Need Factors 1, 4, 5, 6, 7, and 8 in Table 1-1.***
2. Enables aircrews to conduct diverse training missions while dramatically reducing commuting hours and issues of accessibility to remote ranges (Section 2.2.1.1) and provides locally available airspace with scheduling priority for bombers (Section 2.2.1.3.3). ***Addresses Need Factors 2 and 3 in Table 1-1.***
3. Enables maintenance turnaround of the aircraft to generate adequate training sorties (Section 2.2.2.4) and provides more efficient use of fuel resulting in realistic training to improve both training quality and quantity. ***Addresses Need Factors 2 and 3 in Table 1-1.***
4. Accommodates approximately 85 percent of required aircrew complex multi-mission training sorties for both B-1 and B-52 aircrews (Section 1.2). ***Addresses Need Factors 1, 4, 5, 6, 7, and 8 in Table 1-1.***
5. Increases the proportion of training time for new and diversified training requirements, including defensive chaff and flares, supersonic maneuvers, during LFEs, and diversified areas for low-altitude training (Sections 2.2.1 and 2.2.2). ***Addresses Need Factors 1, 4, 5, 6, 7, and 8 in Table 1-1.***
6. Improves integrated aircrew combat training operations by quarterly support of realistic tactics using various aircraft types and expanded network based operations training (Section 2.3.2.4). ***Addresses Need Factors 4, 5, 6, 7, and 8 in Table 1-1.***
7. Increases the availability of real world training at realistic distances for multiple, concurrent flights of aircraft from Ellsworth and Minot AFBs (Section 2.3.2.2). ***Addresses Need Factors 4, 5, 6, 7, and 8 in Table 1-1.***
8. Restructures and adds local airspace and capabilities to meet the training needs for 28 BW and Minot AFB 5th Bomb Wing (5 BW) aircrews (Section 1.3). ***Addresses Need Factors 1, 2, 3, 4, 5, 6, 7, and 8 in Table 1-1.***

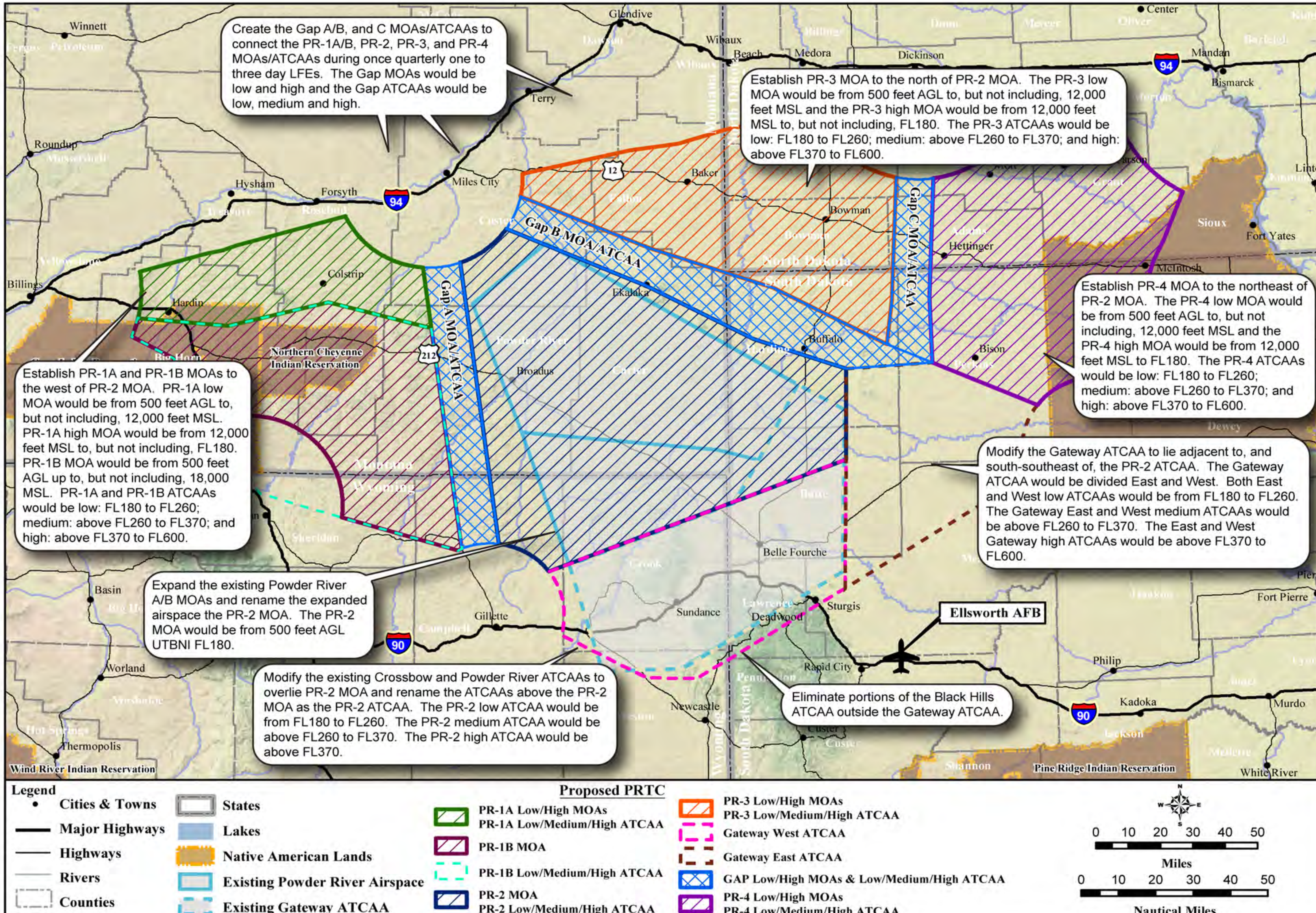
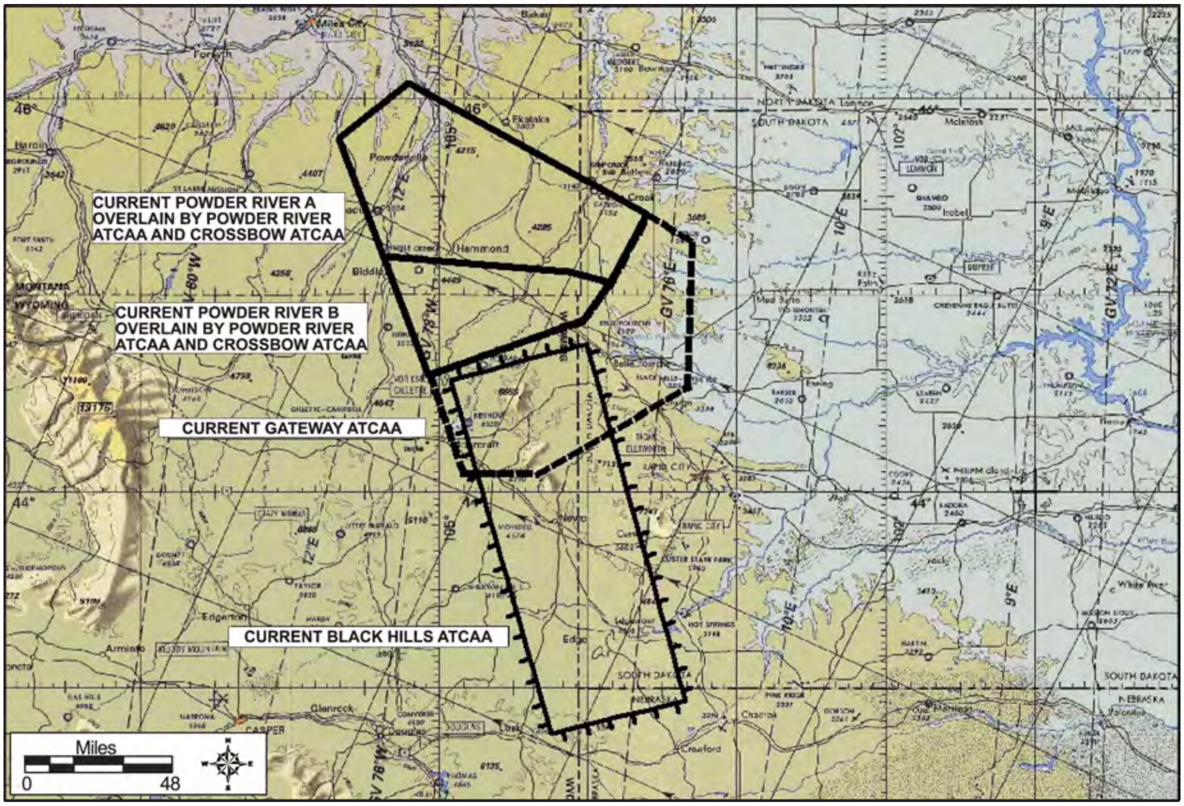
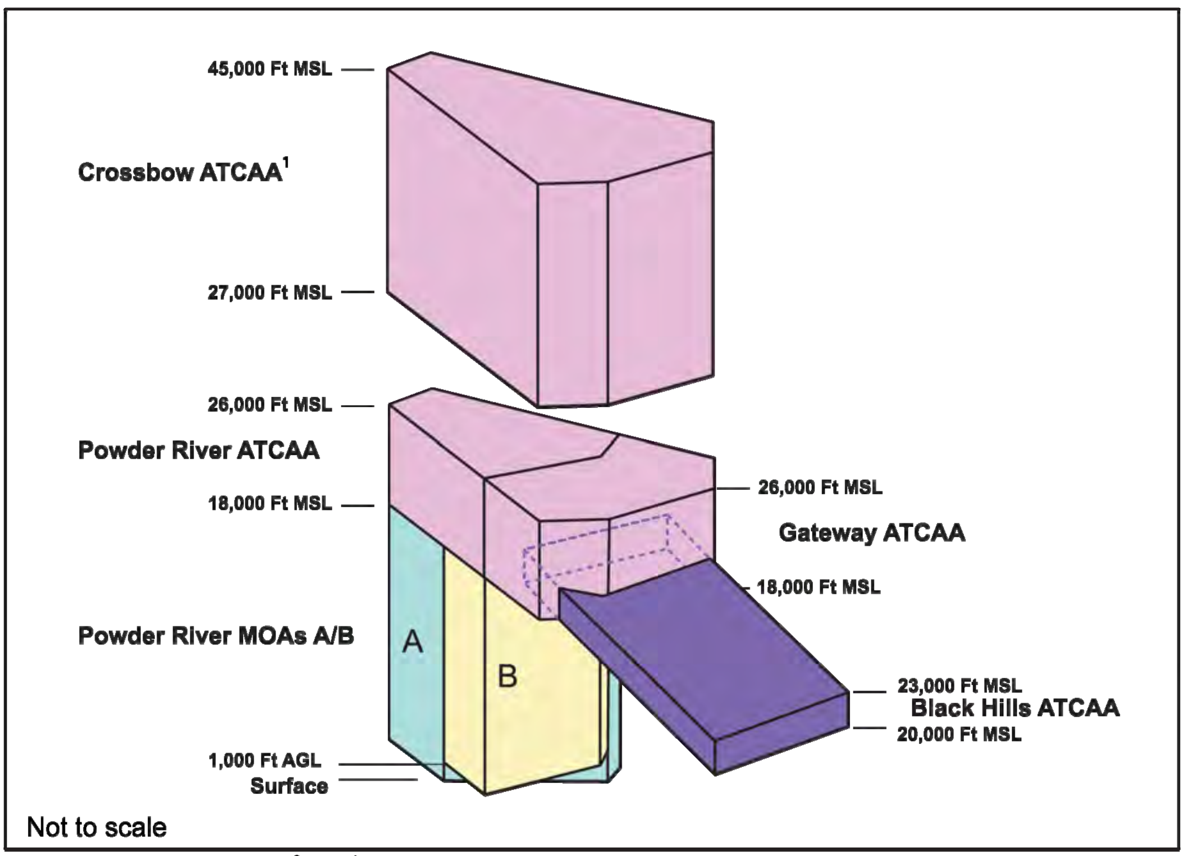


Figure 1-2. Overview of Ellsworth AFB, Minot AFB, and Proposed PRTC Airspace





Note: 1. Per LOA, not part of Powder River Airspace.

Figure 1-3. Existing Powder River Airspace

1.4 Organization of this EIS

This EIS is organized into the following chapters and appendices: Chapter 1.0 describes the purpose and need of the proposal. A detailed description of the Proposed Action, alternatives to the Proposed Action, and the No-Action Alternative is provided in Chapter 2.0. Chapter 2.0 describes the alternatives identification process, discusses the alternatives considered but not carried forward, and describes the proposed airspace expansion, and alternatives. The overall National Environmental Policy Act (NEPA) process is described in Section 2.10. Finally, Chapter 2.0 provides a comparative summary of the effects of the Proposed Action and alternatives with respect to the various environmental resources.

Chapter 3.0 describes the existing conditions of environmental resources that could be affected by the Proposed Action or an alternative. Chapter 4.0 addresses the environmental consequences to those resources that could result from implementing the Proposed Action or an alternative, including the No-Action Alternative. Chapter 5.0 addresses the cumulative effects of the Proposed Action, as well as other recent past, current, and future actions that may be implemented in the region of influence (ROI) for the Proposed Action or alternatives. Chapter 5.0 also presents the relationship between short-term uses and long-term productivity identified for the resources affected, and the irreversible and irretrievable commitment of resources if the Proposed Action or an action alternative were selected. Chapter 6.0 contains references cited in the EIS and lists the individuals and organizations contacted during the preparation of the EIS. A list of the document preparers is included in Chapter 7.0. Chapter 8.0 is a glossary of frequently used terms.

PRTC EIS

A list of frequently used acronyms and abbreviations can be found in the back of this EIS. In addition to the main text, the following appendices are included in this document: Appendix A, Federal Aviation Administration (FAA) Procedures for Processing Airspace Changes; Appendix B, Potential Transient Aircraft; Appendix C, Characteristics of Chaff; Appendix D, Characteristics of Flares; Appendix E, Public Involvement and Agency Correspondence; Appendix F, Relevant Statutes, Regulations, and Guidelines; Appendix G, Reserved; Appendix H, Noise; Appendix I, Obstruction Marking and Lighting; Appendix J, Air Quality; Appendix K, Special-Status Plant and Animal Species and Scientific Names; Appendix L, Letter of Agreement; and Appendix M, Section 106 Correspondence.

1.5 Lead and Cooperating Agencies

The Air Force is the proponent for the PRTC proposal and is the lead agency for the preparation of the EIS. The FAA is a cooperating agency. As defined in 40 Code of Federal Regulations (CFR) §1508.5, a cooperating agency…

> *means any Federal agency other than a lead agency which has jurisdiction by law over, or special expertise with respect to any environmental impact involved in, a proposal (or a reasonable alternative) for legislation or other major Federal action significantly affecting the quality of the human environment.*

Congress has charged the FAA with administering all navigable airspace in the public interest as necessary to ensure the safety of aircraft and the efficient use of such airspace. The FAA is the agency with jurisdiction by law and special expertise with respect to those portions of the PRTC proposal regarding changes in the configuration of the airspace and establishment of new airspace. The FAA is participating as a cooperating agency in this EIS. As a cooperating agency, FAA has participated in public scoping and preparation of this Draft EIS. FAA's input has been critical in developing the Proposed Action. Table 1-3 presents a list of relevant correspondence between the Air Force and the FAA (Appendix L).

Table 1-3. Correspondence with the FAA

From	*To*	*Letter Date*	*Subject*
Air Force	FAA	28 September 2007	Request for participation with FAA as a cooperating agency
FAA	Air Force	10 October 2007	Acceptance of participation as a cooperating agency

No charted airspace decision has been made or will be made prior to complete environmental review. The PRTC aeronautical proposal has been submitted by the Air Force to the FAA (see Appendix L). After receipt of the public and agency comments on this Draft EIS, the Air Force will work with the FAA on preparation of the Final EIS. The Air Force's decision on the proposed PRTC will be documented in an Air Force Record of Decision (ROD). The Air Force will request FAA action on the airspace modifications and establishment of new airspace as recorded in the Final EIS and ROD.

FAA will review the aeronautical proposal submitted by the Air Force in accordance with FAA policies and procedures. According to FAA environmental policies and procedures, including Order 1050.1(E) and in accordance with 40 CFR 1506.3, the FAA can adopt the PRTC Final EIS in whole or in part as an official environmental analysis supporting decisions on the aeronautical proposal. If the FAA adopts the PRTC Final EIS, it must still issue its own Record of Decision and notify the U.S. Environmental Protection Agency (USEPA) of the adoption.

Charting of any airspace modification would be performed by the FAA. The Air Force's goal in its cooperative effort with the FAA is for this EIS to fulfill the NEPA requirements of both agencies.

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2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

This chapter describes the United States Air Force's (Air Force) proposal to expand and enhance the Powder River airspace to become the Powder River Training Complex (PRTC). Establishing the PRTC would address the training deficiencies and limitations described in Chapter 1.0. Section 2.1 provides a background for the proposed Powder River airspace action. This background explains the existing Powder River airspace and the B-1 and B-52 training requirements. Section 2.2 describes the training requirements and limitations and constraints of current training opportunities. Section 2.3 defines the process used to identify reasonable alternatives which meet the purpose and need presented in Chapter 1.0. Section 2.4 presents an overview of the proposed action including elements common to all action alternatives. Sections 2.5 through 2.7 describe three action alternatives, Alternative A, Alternative B, and Alternative C, which differ materially from each other. The Air Force's Proposed Action is Alternative A. Section 2.8 presents the No-Action Alternative that reflects no changes to the existing Powder River airspace.

2.1 Background for the Proposed Action

2.1.1 Bases

Ellsworth Air Force Base (AFB) covers approximately 5,400 acres of rolling plains about 12 miles east of Rapid City, South Dakota (SD). What is now Ellsworth AFB was established as an Army Air Corps Base in 1942 and served as a training base for various bomber and fighter aircraft during World War II. Since its transfer to the Air Force in 1947, Ellsworth AFB has been the home of the 28th Bomb Wing (28 BW) and a succession of bomber aircraft including B-29s, B-52s, and the current complement of B-1s.

Ellsworth AFB's 28 BW supports 24 primary mission aircraft inventory B-1s divided into two squadrons of 12 aircraft each. B-1s from Ellsworth AFB have been deployed and remain heavily involved in combat missions, especially in Afghanistan. Multiple new missions have evolved during these deployments, particularly Close Air Support and Time-Sensitive Targeting.

Minot AFB covers approximately 5,000 acres of land in the north central part of North Dakota (ND), and is located 13 miles north of the city of Minot. Minot AFB was activated in 1957 in response to the Cold War need for northern tier defenses. Starting as an Air Defense Command Base with F-106 interceptor aircraft and tankers, Minot AFB quickly evolved into a home for B-52s by the early 1960s. About that same time, Minot AFB became the base for the 455th Strategic Missile Wing operating arrays of Minuteman Intercontinental Ballistic Missiles. Conversion of the F-106s to F-15s occurred in the mid-1980s. After the F-15 fighter squadron was deactivated in 1988, Minot AFB focused on supporting B-52s and Minuteman Missiles. Currently, Minot AFB supports the 5 BW with two squadrons of B-52 bombers.

Section 2.3 describes the alternative selection process. The results of applying the selection criteria demonstrate the Powder River airspace and the surrounding area represents the only location with existing airspace that meets the purpose and need from Chapter 1. Table 2-7 summarizes the application of these selection criteria to locations in Section 2.3.2 and includes the alternatives considered but not carried forward from Section 2.3.3 below. As noted in Section 2.2.2, the existing Powder River airspace can support only one formation of aircraft (two B-1 aircraft with new technologies) at any given time. The proposed PRTC would provide up to four appropriately-sized airspace blocks that could support four formations of training aircraft. PRTC would provide airspace of sufficient size and volume, to enable use by bombers, maximize training time, have Large Force Exercise (LFE) capability, reduce the potential for conflict with civil aviation, and include steps to limit safety and environmental conflicts. The proposed PRTC, with management and mitigations, would meet the selection criteria identified.

2.1.2 Airspace

The existing Powder River airspace consists of two Military Operations Areas (MOAs), four Air Traffic Control Assigned Airspace (ATCAA) units, the Belle Fourche Electronic Scoring Site (ESS), and associated electronic threat emitter and simulated target locations. Figure 2-1 presents the existing Powder River airspace, including associated MOAs and ATCAAs. The Crossbow ATCAA is identified on this figure and in this Environmental Impact Statement (EIS) as training airspace used in conjunction with the Powder River MOAs and ATCAAs. In accordance with a 10 December 2006 Letter of Agreement between Denver, Salt Lake City, and Ellsworth, the Crossbow ATCAA is not part of the Powder River airspace. The Crossbow ATCAA is not usable at and above Flight Level (FL) 270 daily between 8:00 am-11:00 am local and between 2:30 pm-4:30 pm local. The Crossbow ATCAA is given in block altitudes of 1,000 feet per aircraft. In addition, three Military Training Routes (MTRs) are in the vicinity and aerial refueling typically occurs within the ATCAAs. Figure 2-2 describes the types of training airspace and the way they interact.

Aviation and Airspace Use Terminology

Above Ground Level (AGL): *Altitude expressed in feet measured above the ground surface.*

Mean Sea Level (MSL): *Altitude expressed in feet measured above average (mean) sea level.*

Flight Level (FL): *Manner in which altitudes at 18,000 feet MSL and above are expressed, as measured by a standard altimeter setting of 29.92.*

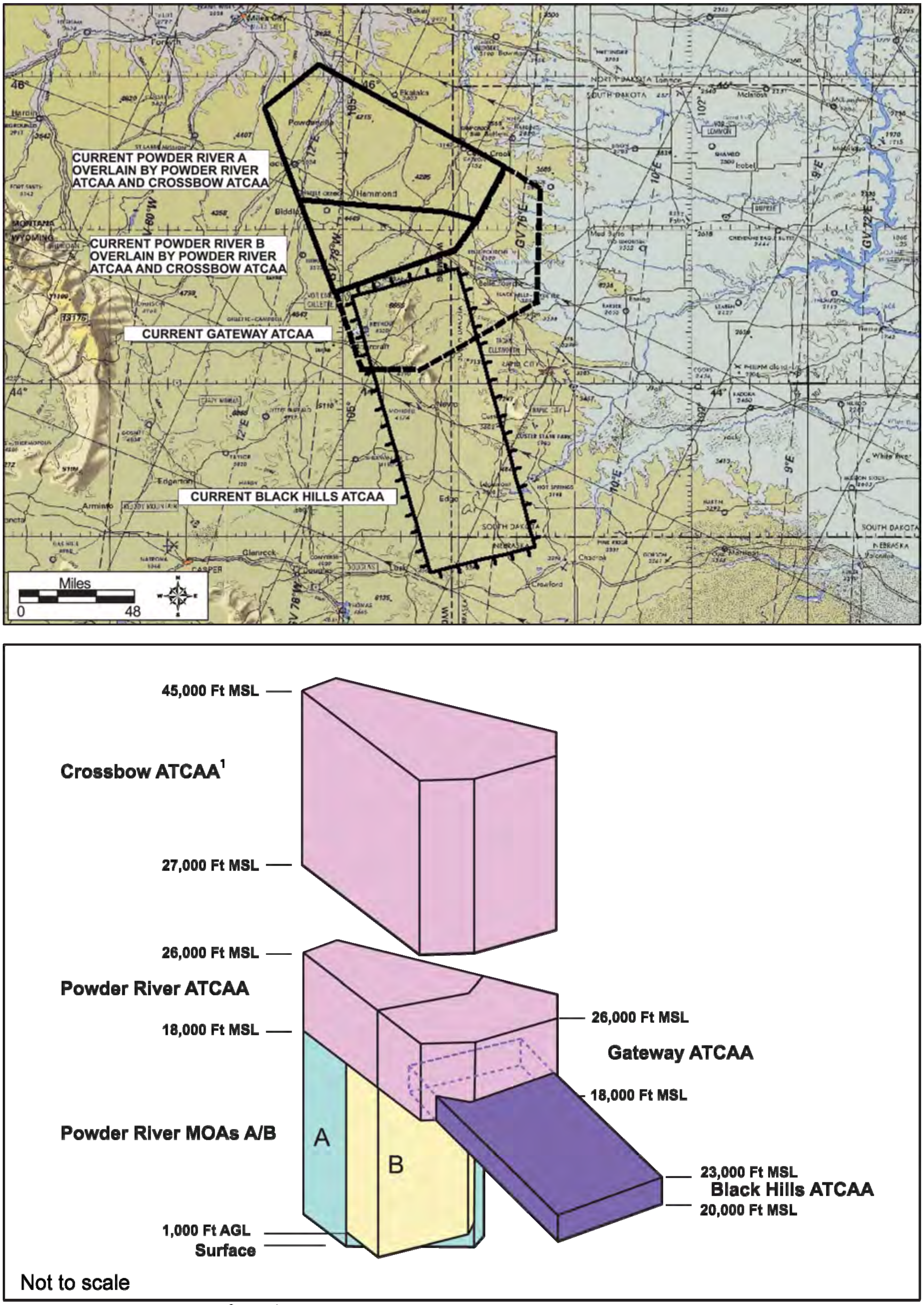
Visual Flight Rules (VFR): *A standard set of rules that all pilots, both civilian and military, must follow when not operating under instrument flight rules and in visual meteorological conditions (conditions with sufficient conditions to maintain visual separation from terrain and aircraft). These rules require that pilots remain clear of clouds and avoid other aircraft.*

Instrument Flight Rules (IFR): *A standard set of rules that all pilots, civilian and military, must follow when operating under flight conditions that are more stringent than visual flight rules. These conditions include operating an aircraft in clouds, operating above certain altitudes prescribed by Federal Aviation Administration (FAA) regulations, and operating in some locations such as major civilian airports. Air Traffic Control (ATC) agencies ensure separation of all aircraft operating under IFR.*

Source: FAA Pilot/Controller Glossary 2010

The Powder River airspace lies about 70 nautical miles (NM) northwest of Ellsworth AFB and about 200 NM southwest of Minot AFB and serves as the primary training airspace for the B-1s from Ellsworth AFB and the preferred training airspace for B-52s from Minot AFB. The existing Powder River airspace, including associated MOAs and ATCAAs (Figure 2-1), overlies an area of 10,235 square NM in portions of SD, Wyoming (WY), and Montana (MT). Linked to the Belle Fourche ESS, the Powder River airspace has provided simulated electronic combat and simulated weapons release since the mid-1980s. The Belle Fourche current electronic threats and associated sites are presented in Figure 2-3. The Air Force created the Powder River MOAs in 1987 to permit dissimilar training with fighter intercepts of bombers training for Cold War era low-level penetration missions. Portions of the training airspace which now constitute the Powder River airspace have been used for military aircraft training since World War II.

Primary current users of the Powder River airspace consist of B-1s from the 28 BW, Ellsworth AFB, and B-52s from the 5th Bomb Wing (5 BW), Minot AFB. Transient (occasional) users of the training areas include: B-1s and B-52s from other bases; B-2s from the 509th Bomb Wing, Whiteman AFB, Missouri; RC-135s from the 55th Wing, Offutt AFB, Nebraska; F-15s, F-16s, and other fighters, tankers, and other aircraft from various bases typically from the surrounding area.



Note: 1. Per LOA, not part of Powder River Airspace.

Figure 2-1. Existing Powder River Airspace

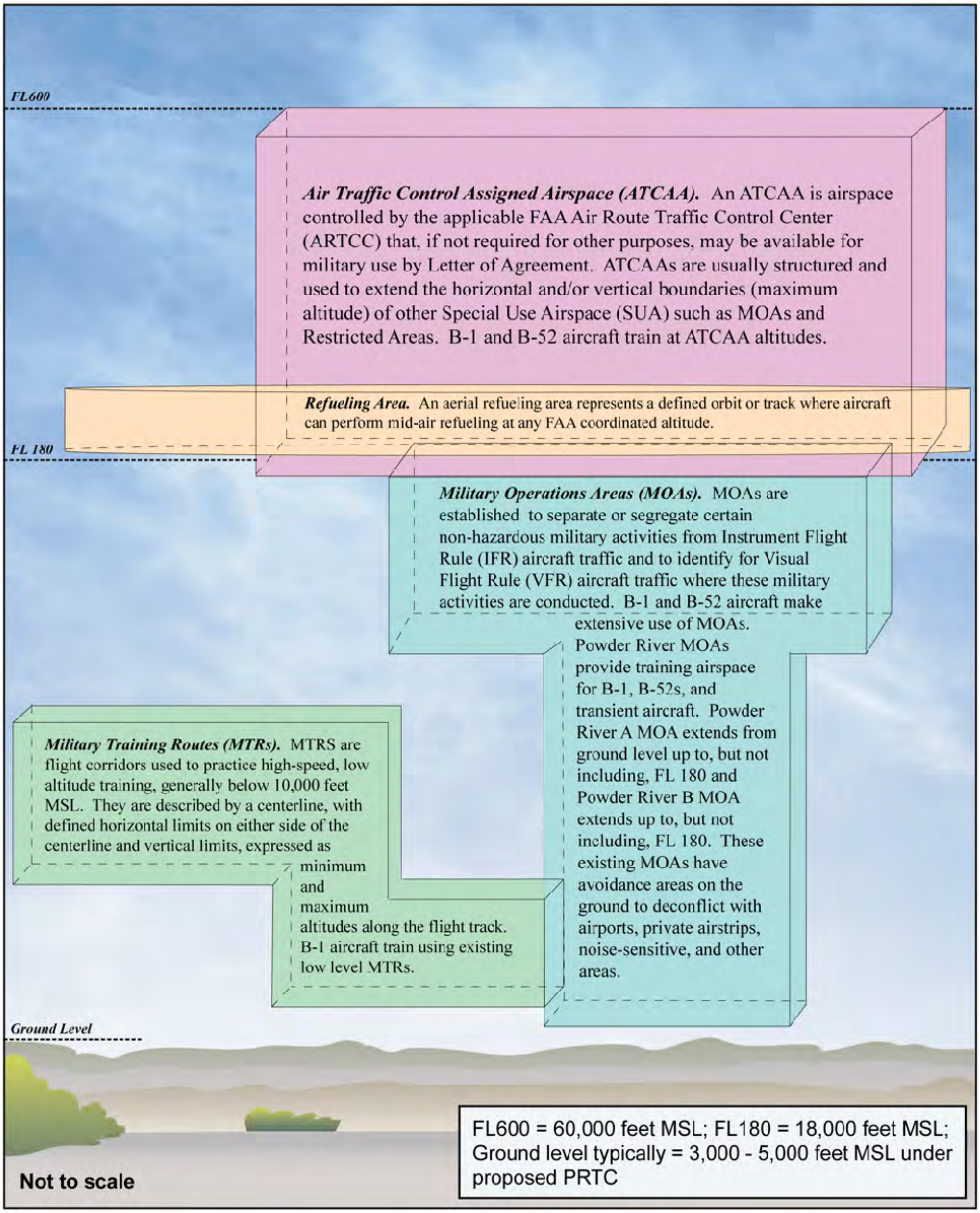


Figure 2-2. Explanation of Types of Training Airspace

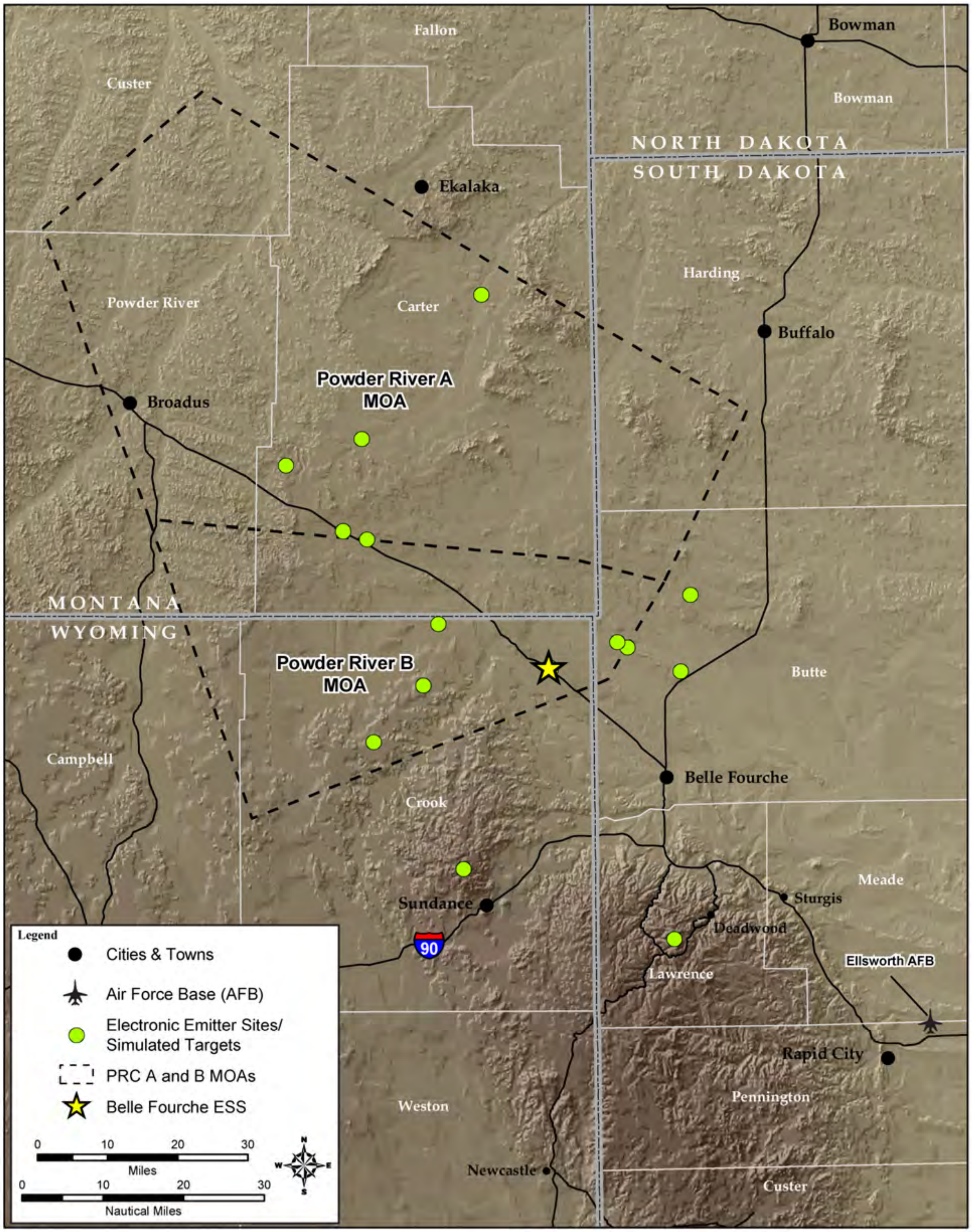


Figure 2-3. Powder River MOAs, Belle Fourche Electronic Threats, and Associated Sites

2.1.3 Electronic Scoring Site and Ground-Based Assets

Aircrews need to train to avoid and, frequently, to suppress ground-based threats. The Belle Fourche ESS provides electronic training with a series of ground-based electronic threat assets, many of them located on former Minuteman Missile sites in SD, MT, and WY. These threat asset locations are depicted in Figure 2-3. The main ESS is located on Highway 212 in WY, 24 miles northwest of Belle Fourche, SD.

The Belle Fourche ESS, as seen from Highway 212, provides high fidelity surface-to-air threat signals as well as a variety of no-drop targets for aircrews training within the Powder River airspace.

The ESS sites typically consist of a threat emitter which can simulate enemy radar and a visual target such as a mock-up of surface-to-air missiles or a mobile rocket launcher. Section 2.2.1 describes the interaction of these threat emitters and targets with bomber training missions.

These ground-based assets under the airspace provide invaluable training to aircrews as they experience combat conditions. The Belle Fourche ESS provides high fidelity threat signals to aircrews and maintains the flexibility to meet individual crew training requirements. The ESS threats cannot be met with a realistic immediate response to deploy defensive chaff and flares and rapidly maneuver at supersonic speeds to avoid the threat because chaff and flares and supersonic flight cannot now be conducted in the Powder River airspace.

During the Cold War era, the primary combat mission of B-1, B-52, and now retired FB-111 bombers, was long-range, nuclear attack by penetrating deep into enemy territory at low-altitudes below radars. As enemy defensive and offensive capabilities improved, bomber training was made more realistic to keep up with threats. Threat emitters to simulate enemy surface-to-air threats were added at retired Minuteman sites, and the Powder River MOAs were added for fighter interceptors to attack the bombers and to create realistic maneuvering airspace for the bombers.

This training with dissimilar aircraft and tactics enabled aircrews to train as they would fight Cold War era missions. Ellsworth AFB and associated training airspace provided an array of low-altitude MTRs that merged over ground-based threat simulators and into the Powder River MOA. Ground and air defenses, including fighter aircraft, defended simulated target areas against the bombers on their final bomb runs.

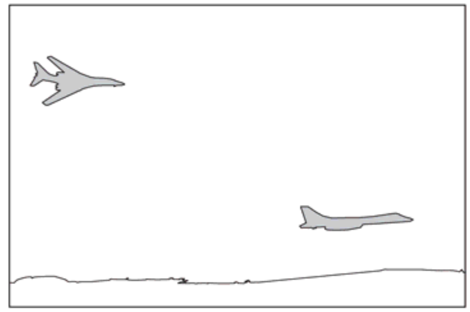
The roles of aircraft in combat have changed and their missions have changed. Changes in missions, shifts in force structure, and new long-range sensor and targeting technologies have affected the use of the Powder River airspace. Deployments, training needs, maintenance capabilities, and aircraft inventory affect sortie-operations in the Powder River airspace.

A sortie-operation is the use of one training airspace by one aircraft. This means that two B-1s flying in both Powder River A and B MOAs would generate 2 aircraft x 2 airspaces = 4 sortie operations. Annual sortie-operations in the Powder River MOAs for the period between Fiscal Years (FY) 1995 and 2004 varied between 675 and 1,888 for Powder River A MOA, and 659 and 2,020 for Powder River B MOA. On average, training aircraft conduct slightly more than 2,500 annual sortie-operations in the Powder River airspace.

Near continuous deployment of one-half of the B-1 aircraft from Ellsworth AFB to fight the Overseas Contingency Operation in Iraq and Afghanistan has reduced training activity by approximately one-third during the war. Bombers traditionally dominated training flights in the Powder River airspace and accounted for approximately 95 percent of the annual baseline sortie-operations. Transient fighter aircraft have accounted for approximately 5 percent of baseline activity. The B-1 is a large aircraft with fighter-like performance. Two B-1 training aircraft typically schedule both Powder River MOAs and "use up" all the MOA airspace in training maneuvers. Use of overlying and associated ATCAAs tended to mirror operations in the MOAs. B-52s conduct most of their current training in ATCAAs above the MOAs.

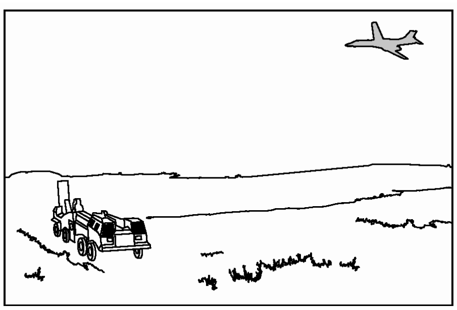
2.1.4 B-1 and B-52 Missions

During the Cold War era, the primary combat mission of the B-52 and B-1 bombers was long-range, nuclear attack using low-level penetration tactics. Their secondary mission was an array of conventional operations that included bombing enemy transportation systems, troop concentrations, airfields, air defense facilities, and other similar large defined targets. Today, the bombers' primary role has changed. The B-1 and B-52 primary mission is worldwide, rapid-response and sustained operations with a variety of new sensors and diverse munitions. The training requirements to ensure bomber aircrew readiness have multiplied. Now aircrews must train to be proficient in a vast and growing array of combat missions that employ a diverse array of weapon systems, and face increasingly sophisticated threats.



A typical training mission in the Powder River airspace consists of two B-1 aircraft. The ESS threat capabilities, B-1 speeds, and target identification capabilities of the B-1 results in two training aircraft requiring all the current Powder River airspace for a realistic training mission.

Bombers now have a wide range of responsibilities, and any mission could involve different targets, weapons, defense situations, altitudes, and flight profiles. These missions range from interdiction to Close Air Support to Show of Force. Table 2-1 describes today's missions and associated tactics. Tomorrow's missions will involve more sensors and accurate munitions against substantially improved defensive systems.



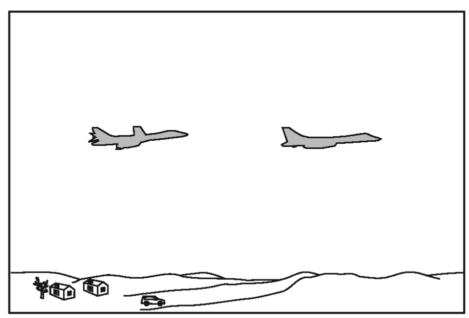
Close Air Support is a new B-1 mission which requires identification of targets and close coordination with ground forces. Time- Sensitive Targeting is another new mission which requires the B-1 to find, fix, track, identify, and destroy a target.

One example of a new mission which requires both independent aircrew training and training with other aircraft is Non-Traditional Intelligence, Surveillance, and Reconnaissance. Non-Traditional Intelligence, Surveillance, and Reconnaissance requires integrated capabilities to collect, possess, exploit, and disseminate accurate and timely information. This information provides the battlespace awareness necessary to plan and conduct operations. Non-Traditional Intelligence, Surveillance, and Reconnaissance is performed by bombers and other aircraft which have new sensor equipment to accomplish this role. This role can be conducted by bombers orbiting a battlefield area. The processed sensor information expands the battlespace information traditionally collected by satellites and/or RC-135 information and communications aircraft. In actual combat and in realistic training, a B-1 Non-Traditional Intelligence, Surveillance, and Reconnaissance mission could quickly become a B-1 Time-Sensitive Targeting mission.

Table 2-1. Combat Missions for B-1 and B-52 Aircrews

Mission	*Definition*
Interdiction and Airborne Alert Interdiction	Interdiction missions involve air-to-ground ordnance delivery against strategic or tactical targets away from the battlefield. In a traditional interdiction mission, a force package of multiple aircraft proceeds to the target area and each performs a different role (e.g., attack/bombing, anti-missile, air-to-air). Target defenses can be anti-aircraft surface-to-air and/or defending fighter aircraft. Bombers on airborne alert can be directed to a primary target to deploy a variety of weapons.
Close Air Support and On-call Close Air Support	Close Air Support represents a new primary bomber mission where aircraft provide coverage of a predefined areas (or target box) in which allied and enemy ground forces are operating. Through close coordination with ground troops, aircraft strike the opposing forces with air-to-ground ordnance.
Show of Force	For the bombers, a Show of Force mission functions like a Close Air Support operation without employing weapons. By flying a low- or medium-altitude pass over the enemy on the ground, the size of the bomber aircraft, the sound it generates, and the speed of the attack combine to demoralize and disperse the enemy.
Time-Sensitive Targeting	Although similar to Close Air Support, this mission involves no coordination with a ground controller. Rather, bombers fly predetermined orbits for 2 to 4 hours awaiting target information and attack authorization. Target information may come from ground, air, or command level sources. When authorized, the bombers deliver ordnance on the target coordinates.
Counter Sea	Both B-1s and B-52s employ mines on land and sea. Performed from a range of altitudes, this mission resembles interdiction.
Non-Traditional Intelligence, Surveillance, and Reconnaissance	The B-1 and B-52 bombers above a combat or non-combat area can employ new on-board or pod-based sensors to collect critically important intelligence information and communicate that information through an interface with coalition assets. Performed from a range of altitudes, the mission can become Time-Sensitive Targeting to implement ordnance employment or other decisions.

Primary missions for the B-1s and the B-52s have a few differences. The B-1s conduct conventional (non-nuclear) attacks only, whereas the B-52s have responsibility to train for a nuclear attack, conventional strategic attack, and counter air/land. B-1s are the only bomber in the United States (U.S.) inventory with low-level terrain following and terrain avoidance capability optimized for 2,000 feet above ground level (AGL) or below. B-52s no longer perform low-altitude attack missions, but still must fly at low altitude (1,000 feet AGL) for proficiency training. B-1s can achieve supersonic speeds, and B-52s are subsonic aircraft.



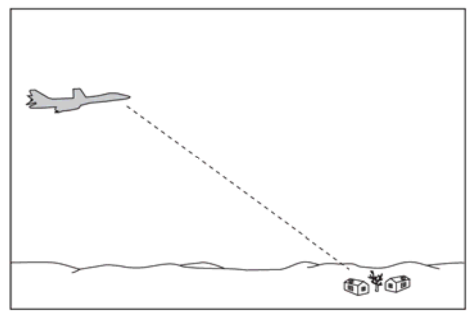
Show of Force constitutes a B-1 flying over an enemy position at high speed to let them know "we are watching." This disorients the enemy and has successfully suppressed enemy fire in areas where both combatants and non-combatants are intermingled.

Bomber aircrews must perform all their missions using teamwork to penetrate air defense systems, fly the aircraft into the proper position for sensor or ordnance employment, interface with coalition assets, and maintain the aircraft's geographic position and timing to stay in formation with other aircraft. Table 2-2 lists the responsibilities of B-1 and B-52 aircrew and reflects the complexity of interactions among the crew. Difficult decisions must be made in split seconds to determine if a maneuver will move the bomber out of position to accomplish its mission or put the aircraft within range of enemy missiles or guns. Training is essential for these decisions. Combat, such as is now being waged in Afghanistan, produces an array of threats which often come from unexpected locations. Added challenges include complicated missions occurring at night, under bad weather conditions, in mountainous terrain, or involving complex sensor or data link challenges. To survive combat, aircrews must train as they will fight and simulate these situations to the greatest degree possible. Not only must aircrews within individual aircraft train to work together in a closely coordinated manner, they must also train as part of an LFE typically composed of approximately 20 aircraft of various types, each with a specific mission component and each with a separate chain of command. All of this requires time and access to realistic training airspace assets for quality aircrew training.

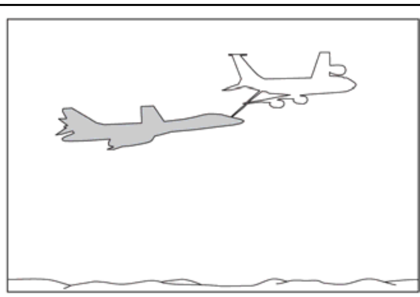
Table 2-2. Bomber Aircrew Duties

Position	*Duties*
B-1 CREW	
Aircraft Commander	Mission commander: command, control, and crew coordination
Pilot	Assists Aircraft Commander: communications and aircraft control
Weapons System Officer/Offensive	Manages sensors, navigation, and systems
Weapons System Officer/Defensive	Primary for electronic warfare and threat avoidance
B-52 CREW	
Aircraft Commander	Mission commander: command, control, and crew coordination
Pilot	Assists Aircraft Commander: communications and aircraft control
Radar Navigator	Primary for munitions launches, target timing
Navigator	Navigates high level, assists Radar Navigator
Electronic Warfare Officer	Primary for electronic warfare and threat avoidance

When aircrews fly combat missions, they risk their lives. To reduce that risk and increase the chance for a successful mission, bomber aircrews need the most realistic training possible. Recent situations in Iraq and, especially, Afghanistan further expanded the role and expectations for bomber aircraft, especially B-1s and B-52s. Targets in these combat zones can occur anywhere and rarely consist of traditional defenses, industrial sites, or massed enemy troops. Rather, the targets comprise a single structure shielded by dwellings of non-combatants, a single vehicle or small group of vehicles, or a band of insurgents attacking a patrol of allied soldiers. Effective neutralization of such targets requires that the bombers respond immediately to locate, identify, and destroy the target while avoiding damage to friendly forces, civilians, and infrastructure. During the combat mission, precise timing must be coordinated with other aircraft, ground troops, or remotely piloted aircraft systems to provide real-time targeting data, rapid response, and pinpoint accuracy.



New B-1 capabilities include the optical ability to visually track, identify, and then engage small targets.

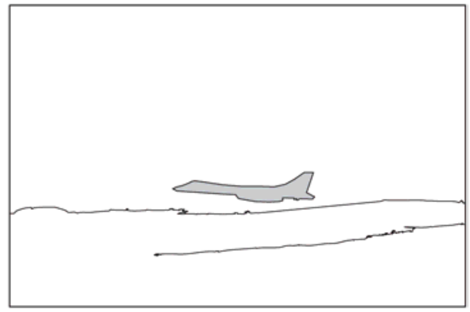


Training includes air-to-air refueling which is currently performed on air refueling routes around the Powder River airspace and in ATCAAs.

B-1 and B-52 combat missions involve a range of additional activities, including aerial refueling, high-altitude flight to the combat theater, the full breadth of command, communication, and control, entry into enemy territory, avoidance of enemy threats, employing sensors, delivering ordnance, and returning safely to base. These activities require a variety of altitudes, depending upon the mission. Aircrews must be trained to accomplish the mission with degraded or partial system functionality.

In its simplest terms, combat is about defeating the enemy and preventing harm to U.S. and allied forces. Bombers have deployed to fly combat missions for Operation Southern Watch, Operation Allied

Force, Operation Iraqi Freedom, and Operation Enduring Freedom. Bombers are repeatedly in hostile airspace as the aircraft of choice to support allied operations.



The B-1 low-altitude penetration capability is optimized for 2,000 feet AGL and below and needs topographic relief for realistic training.

While bomber aircrews must emphasize missions driven by current conflicts and threats, they also must remain prepared to effectively execute all the missions identified by the President and Secretary of Defense for that type of aircraft. Because conflicts with insurgent forces now dominate current tactics, aircrews cannot ignore the need to be ready for deep interdiction attacks or other formerly traditional combat missions. This requirement means that, at any time, aircrews could be tasked to perform any tactics or maneuvers within the possible breadth of combat missions. Figure 2-4 describes one training example for a representative Time-Sensitive Targeting combat mission within the Powder River airspace. New aircraft capabilities, the airspace size, and lack of available ESS facilities in eastern airspaces on Figure 1-1 limit the amount of local quality training available to Ellsworth and Minot AFBs based aircraft.

Site MM-9 is typical of the ground targets under the existing Powder River airspace. There is an outer barbed-wire fence and an inner chain link fence which formerly enclosed an Intercontinental Ballistic Missile silo. The visual target is located to the left of the chain link fence.

The visual target at MM-9 is a simulated SCUD highly mobile transporter-erector launcher. "SCUD" applies to any of a series of mobile ballistic missiles originally of Soviet design. During training, a B-1 aircrew would spot the SCUD, maneuver to attack it, and deploy simulated weapons to destroy the SCUD launcher. In actual combat, they would seek to attack before the SCUD could launch.

Meanwhile, a few air miles away, the B-1 attacking the SCUD could be threatened itself by the simulated surface-to-air missile launches at Site MM-8. In combat, the aircrew would be required to take evasive actions, deploy countermeasures such as chaff and flares, and/or use weapons to suppress the surface-to-air missile site. Most of these critical defensive reactions have to be simulated in the Powder River airspace.

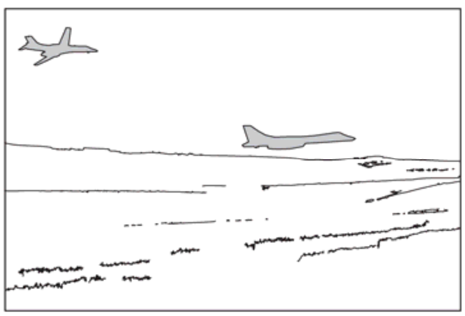
Figure 2-4. Representative Targets Relating to Mission Combat Training in the Powder River Airspace

The types of bomber missions and tactics vary with changes in world situations, increases in enemy capabilities, and advances in Air Force aircraft and weapons. Air Force personnel must consistently adapt and train to meet the challenge of these changes. Such changes can influence the altitude at which aircraft fly, the types of ordnance used, the tactics used in attacking targets and avoiding threats, and other aspects of combat missions. Aspects of aircrew training can vary with time or deployment cycles as the Air Force responds to such changes. Preparing for these varied missions means that aircrews must have flexibility in training to respond to evolving global situations.

2.2 Training Requirements and Limitations

2.2.1 Bomber Combat Roles Define Training Requirements

Bomber combat missions vary day-to-day as enemy locations, targets, air defenses, and objectives change. For one mission, a bomber aircrew could be tasked to perform high-altitude bombing of an enemy's fuel depot; the next mission could involve a low-altitude Close Air Support attack on enemy troop concentrations combined with a Time-Sensitive Targeting mission. Every interdiction combat mission involves a number of different aircraft performing a precisely timed and planned sequence of events. Failure by a single aircraft to achieve the necessary timing, coordination, and positioning could jeopardize an entire mission. Each combat mission involves a variety of actions, so aircrews must be fully trained to accomplish a wide variety of tasks. Table 2-3 correlates a combat mission to training requirements demonstrating an example of the substantial number of activities that must be mastered for just one type of mission. By adding in the need for each of the B-1 four, or B-52 five, crew members to be skilled in executing their part in every event, and by multiplying this requirement by the array of missions assigned to the B-1s and B-52s, the demands placed on obtaining sufficient training become enormous.



High- and low-altitude training and training for coordinated attacks by multiple aircraft are typically performed during each training mission.

2.2.1.1 Aircrew Training Requirements

Section 2.1.4 describes the complex missions of the B-1 or B-52 bomber. The aircraft and weapons systems require coordination among multiple crew members and can only successfully accomplish a mission when all members of the crew are working together. Extensive integrated aircrew training requires the team to perform the events and activities in sequence and with the speed and pace of combat. Technologically advanced flight simulators are used to train crews to work together and to cope with various flight assignments and challenges. These flight simulators are applied to the extent possible to support actual flight training. Simulators help with training, but they cannot reproduce all the experiences of actual in-flight training. Integrated, realistic training requires a combination of airspace and ground-based assets that are linked and arranged to provide a sequence of events which replicate combat. The Air Force training structure is a multi-level process to achieve combat readiness. Training addresses each aircrew's roles and actions for every aspect of every mission described in Section 2.1.1. Training demands correct reactions and team interactions in split-seconds, particularly when aircrews have limited response time to address targets. Aircrews must train to a "zero fault" standard to avoid endangering neutral or friendly elements and to protect their aircraft and themselves.

Realistic, integrated team training ensures that bomber aircrews possess the skills and readiness for combat. This training 1) mirrors combat events, 2) links a realistic sequence of training activities into a cohesive mission, and 3) hones aircrew teamwork. Each training sortie (whether an individual aircraft, two aircraft, or part of a larger exercise) requires realistic, linked, and sequenced activities that equate to combat events.

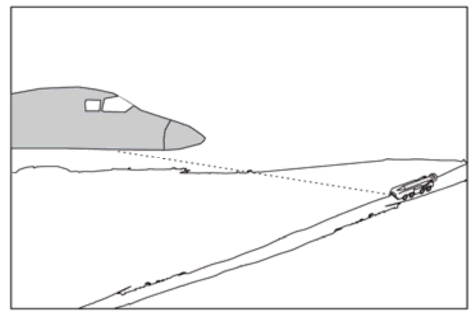
Table 2-3. Correlation of Combat Events and Training Requirements for a Typical Airborne Alert Interdiction Mission

Event Sequence	*Combat Event Descriptions*[1]	*Training Requirements*
Event No. 1	Fly high altitude to combat airspace or to a refueling rendezvous; locate and join tanker aircraft; refuel and fly to airborne alert location	Navigation and communication In-flight rendezvous with tanker aircraft Aerial refueling along established track Flight management and formation flying
Event No. 2	Enter combat airspace; coordinate with command and control (e.g., Airborne Warning and Control Systems); receive direction; join other aircraft in strike package conducting mission	High- and/or low-altitude navigation Defensive tactics against airborne and ground threats -Aircraft maneuvering -Terrain following/terrain avoidance -Navigate and downlink systems management -Electronic countermeasures employment -Defensive countermeasures employment -Course deviations (lateral and vertical) -Airspeed changes -Communication Flight management and formation flying
Event No. 3	Fly to initial point of attack; avoid ground-based threats; attack target and deliver ordnance (i.e., bombs or missiles) or simulate delivery of ordnance	Defensive tactics against airborne and ground threats -Aircraft maneuvering -Terrain following/terrain avoidance -Electronic countermeasures employment -Defensive countermeasures employment -Course deviations -Navigation and system management -Sensor employment -Airspeed changes -Communication -Ordnance delivery -High/low-altitude delivery (actual or simulated) Flight management and formation flying
Event No. 4	Avoid ground- or air-based threats; exit target area; reestablish airborne alert station or rejoin returning strike package	Navigation and communication Defensive tactics against airborne and ground threats -Aircraft maneuvering -Airspeed changes -Terrain following/terrain avoidance -Electronic countermeasures employment -Defensive countermeasures employment -Mission assessment and reporting -Course deviations Flight management and formation flying
Event No. 5	Exit combat airspace and return to base	Navigation and communication In-flight rendezvous with tanker aircraft Aerial refueling along established track Flight management and formation flying

Note: 1. Assumes a takeoff and landing as part of the overall mission.

The bomber aircrews from Ellsworth AFB and Minot AFB need to train as they will fight to ensure readiness for the full range of combat missions. All training to fulfill these goals derives from directives, training syllabi, and well-established programs. For the B-1s and B-52s, these training regimes as outlined in Air Force Instruction (AFI) 11-2B-1, *B-1 Aircrew Training,* December 2006, and AFI 11-2B-52, *B-52 Aircrew Training*, November 2006 include:

- **Mission Qualification Training.** Mission Qualification Training is designed to attain basic mission readiness status so crews meet the requirements to support combat taskings. The Mission Qualification Training syllabi for the base squadrons detail this information and requirements.



Mission Qualification Training and Ready Aircrew Program training for laser targeting is a new requirement for B-1 aircrews.

- **Ready Aircrew Program.** The Air Force established the Ready Aircrew Program to ensure that aircrews maintain combat mission readiness proficiency for all combat mission taskings. Ready Aircrew Program requirements can lag behind mission realities due to the rapid pace of mission changes. The Ready Aircrew Program Tasking Message, 11-2B-1 Volume 1, defines these requirements.

- **Weapons Instructor Course.** For B-1s and B-52s, the Weapons Instructor Course comprises a 6-month course created to develop advanced instructors for the combat air forces. This course requires advanced levels of integration with other aircraft and assets, as well as advanced maneuvering and tactics which require extensive airspace. Syllabi for the B-1 and B-52 Weapons Instructor Course programs present the specific training requirements.

- **Other Requirements.** The Mission Qualification Training, Ready Aircrew Program, and Weapons Instructor Course programs generate other training requirements including the use of defensive countermeasures (chaff and flares), conducting supersonic flight (B-1s only), employing advanced technology sensors, targeting systems, and performing actual munitions delivery employing both inert and live ordnance. The PRTC does not propose a live or inert range.

Table 2-4 lists some of the training events required under Mission Qualification Training and Ready Aircrew Program for B-1 aircrews. These events must be accomplished regularly for each aircrew to maintain combat-ready status. Some events need to occur on each sortie, while the aircrews may need to perform other events a few times per quarter or year. Nevertheless, each event needs to be undertaken consistent with a host of standards (e.g., speed, altitude, angle, duration, time of day). Failure to demonstrate minimum proficiency prior to currency date results in de-certification. Such a loss of combat-ready status prevents a highly trained individual from applying the training in the nation's interests.

Table 2-4. Ready Aircrew Program and Mission Qualification Training Mission Events (Page 1 of 2)

	IN POWDER RIVER AIRSPACE				IN PROPOSED PRTC			
Event	Actual for 1-2 Aircraft	Simulated for 1-2 Aircraft	Actual for 4-8 Aircraft	Simulated for 4-8 Aircraft	Actual for 1-2 Aircraft	Simulated for 1-2 Aircraft	Actual for 4-8 Aircraft	Simulated for 4-8 Aircraft
Weapon Delivery (no drop)	X				X		X	
High Altitude Weapon Delivery (no drop)	X				X		X	
Low Altitude Weapon Delivery (no drop)	X				X		X	
Formation Weapon Delivery (no drop)	X				X		X	
Unguided Ground Moving Target Indicator Weapon Delivery	X				X		X	
Guided Ground Moving Target Indicator Weapon Delivery (no drop)	X				X		X	
Unguided Mini-munitions/Radar Targeting	X				X		X	
Guided Mini-munitions/Radar Targeting	X				X		X	
Target Reassignment Exercise	X				X		X	
Time Sensitive Targeting	X				X		X	
Close Air Support Targeting Exercise With Ground Forward Air Controller/Forward Air Controller Airborne	X				X		X	
Actual Weapons Release		X				X		X
High Altitude Actual Weapon Release		X				X		X
Conventional Rotary Launcher (CRL) Heavy-Weight Actual Weapon Release		X				X		X
Actual Full Scale Weapons Delivery		X				X		X
Simultaneous Guided/Unguided Weapon Delivery		X				X		X
Joint Direct Attack Munitions High Altitude Bomb Run	X				X		X	
WCMD High Altitude Weapon Delivery (no drop)	X				X		X	
Joint Air-To-Surface Standoff Missile Delivery	X				X		X	
Actual Joint Direct Attack Munitions Release		X				X		X
Guided Full Bay Weapon Delivery		X				X		X
Guided Multiple Bay Weapon Delivery		X				X		X
Guided Multiple Target Weapon Delivery		X				X		X
Guided Weapon Reassignment	X				X		X	
Threat Activity	X				X		X	
Electronic Combat (A/S)	X				X		X	
Electronic Combat (A/A)	X				X		X	
Formation EA	X				X		X	
Supersonic Flight During LFE					X		X	
Flare Event					X		X	
Chaff Event					X		X	
Dissimilar Aircraft Tactics		X			X		X	
Terrain Following		X			X		X	
Visual Contour		X			X		X	

Table 2-4. Ready Aircrew Program and Mission Qualification Training Mission Events (Page 2 of 2)

	In Powder River airspace				*In Proposed PRTC*			
Event	***Actual for 1-2 Aircraft***	***Simulated for 1-2 Aircraft***	***Actual for 4-8 Aircraft***	***Simulated for 4-8 Aircraft***	***Actual for 1-2 Aircraft***	***Simulated for 1-2 Aircraft***	***Actual for 4-8 Aircraft***	***Simulated for 4-8 Aircraft***
Terrain Following Night/Instrument Meteorological Conditions (IMC)		***X***			***X***		***X***	
Terrain Following Mountainous		***X***			***X***		***X***	
Low Altitude Navigation	***X***				***X***		***X***	
Low Altitude Stream Formation	***X***				***X***		***X***	
Secure Voice	***X***				***X***		***X***	
In flight Secure Voice System Loading	***X***				***X***		***X***	
Secure Voice Satellite Communications	***X***				***X***		***X***	
Digital Communications Improvement (DCI)	***X***				***X***		***X***	
Have Quick Radio	***X***				***X***		***X***	
SAE/BLOS	***X***				***X***		***X***	
Anchor Refueling	***X***				***X***		***X***	
Night Vision Goggle (NVG) Aided Rendezvous	***X***				***X***		***X***	

2.2.1.2 Supersonic Training

Aircrew training must be realistic to be effective. A B-1 bomber aircrew is called upon to use the supersonic capability of their aircraft in a combat situation to defeat an enemy threat or in a defensive manner to avoid destruction. During an LFE, threat aircraft can achieve supersonic speeds and B-1 maneuvers could also achieve supersonic speeds. Supersonic speeds compress an engagement, affect aircraft handling characteristics, and drastically shorten reaction times. Supersonic speed is one part of aggregate maneuvers that may be employed in combat. Training at supersonic speed must be practiced by the aircrew as a whole to ensure they can adequately perform this realistic and challenging response required in combat. It is not enough for a crew to "feel" they can effectively execute the maneuvers; they must "demonstrate" supersonic maneuvers and be evaluated on the maneuvers. Aircrews must demonstrate the proper execution of supersonic maneuvers, such as reaction to threats, to be evaluated. Their performance and evaluation of that performance establishes a minimum standard required before an aircrew is allowed to proceed into a combat environment.

Bomber aircrews need to train for combat conditions, where both blue (friendly) and red (enemy) aircraft can be occupying the same airspace. Bomber aircrews need to practice reacting to engagements with fighter aircraft attacking at supersonic speeds at least down to 20,000 feet MSL. Without B-1 supersonic training, and using only subsonic engagements, a maneuver is a completely different event; a life or death engagement is a rapid chain of events, and a small difference at one key point can have a dramatic effect on the overall outcome. The capability to train during an LFE at realistic supersonic speeds can make the training experience relevant and of use for combat. Training to react realistically, utilizing supersonic speeds, increases the chances of aircrew survival in real combat. The supersonic LFE floor for B-1 aircraft would be 20,000 feet MSL. Fighters training with or against bombers need supersonic flight to simulate missile engagements. Fighters, such as F-16s, do not orbit/hold above

FL300. In practice they hold much lower, from 10,000 to 20,000 feet MSL. The minimum supersonic altitude becomes critical when they transition from hold/orbit to engagement. If an F-16 is scrambled from its orbit to engage a hostile aircraft, either bomber or other fighter, the fighter needs to quickly attain altitude and speed. The LFE floor for supersonic fighter maneuvers would be 10,000 feet AGL. In combat, the fighter uses supersonic speed to achieve optimum engagement altitude and speed. The fighter needs to be able to efficiently and quickly accelerate from lower altitudes.

2.2.1.3 Representative Bomber Flight Training Day

Section 2.1.4 describes the combat mission required for bombers and Section 2.2 describes the training needed for aircrews to be equipped for combat. Section 2.2.1.3 puts the training requirements in the overall context of the bomber mission and describes a representative bomber flight training day. Multiple scheduling considerations must be accommodated to fly one bomber training sortie. This example assumes no aircrew illness, weather delays, or aircraft mechanical cancellations.

The scheduling of flight crew, aircraft, and training airspace requires many planning hours by many people, days, weeks, or even months before the flight. All of these factors influence the need for the proposed PRTC.

Ellsworth AFB and Minot AFB both establish a long-term scheduling plan to allocate aircraft, support, and aircrews termed the “annual contract”. The annual contract is the first step to plan aircraft availability, aircraft maintenance, and aircrew training. Each base develops the manpower, the base’s flying window, airfield operations, and other scheduling factors (e.g., holidays). The Monthly Operations Plan is derived from and refines the annual contract to include numbers of sorties per day. The Monthly Operations Plan schedules the month’s contracted sorties around overall wing commitments for that month. The weekly flying schedule breaks down the Monthly Operations Plan and compiles daily flying schedules that specifically assign aircrew names, aircraft tail numbers, aircraft configurations, takeoff and landing times, missions, and other elements.

The base develops the flow of a bomber’s training day within the context of the scheduling process by coordinating multiple crew members, differences in aircraft modifications, and maintenance availability.

2.2.1.3.1 SCHEDULING AN AIRCREW

All aircrews do not have the same training or experience levels.

The first input to scheduling is aircrew proficiency training. The B-1 requires four crew members. The aircraft commander is a pilot. Pilots can be qualified as Evaluators, Instructors, Mission Ready, or Non-Mission Ready. Pilots can fly the aircraft unsupervised from either the right or left seat based on their qualifications. The Defensive Systems Officers and Offensive Systems Officers both function as Weapon Systems Officers; each must achieve qualification levels similar to Pilots: Evaluators, Instructors, Mission Ready, and Non-Mission Ready. The Weapon System Officers train to fly as both Offensive Systems Officers and Defensive Systems Officers, and although there are training events which can be accomplished from either seat position, there are also events which are seat position specific.

Each crew member must perform specific training requirements depending on their position and qualification level which drive the training events scheduled for each sortie. Commonly, each time a B-1 or B-52 takes off in a training flight; it consists of a unique crew. Even if the aircrew fly together repeatedly (which is rare in training), the requirements for individual crew members differ with each flight. Existing Powder River airspace assets cannot provide sufficient flexibility to accommodate the vast array of aircrew training requirements. Remote range complexes limit the capability to meet required training since so much flight time is absorbed in low-value commuting or transit time. Lack of consistent accessibility to remote ranges constrains the training aircrews can perform on any given day.

2.2.1.3.2 Scheduling an Aircraft

All B-1s and B-52s are not scheduled the same.

Aircraft modifications constrain the ability to schedule and fulfill training requirements. Like most aircraft, the B-1 continues to be upgraded with new hardware and software, with many of these modifications conducted during the past decade. Major modifications involve a long, incremental process to update the entire fleet. Some Ellsworth AFB aircraft available for training have updated modifications, and some await modifications. Aircrew training mirrors this incremental upgrade process by having some aircrew qualified in the new system, while others are still being trained and remain proficient on the old system. Combat theater commanders know about the upgrades and want aircraft and aircrews trained to be combat ready with the upgraded capabilities. If insufficient aircrews are qualified in the modified aircraft, achievement of combat objectives becomes difficult.

Balancing aircrew and aircraft upgrades is just the beginning of the scheduling process. Aircraft availability due to maintenance requirements comprises another factor, and even more so during an upgrade. For instance, theater commanders may request deployment of an updated aircraft, which means only aircrew qualified in a modified aircraft, can be deployed. Additionally, corresponding aircrew training would have to be accomplished in an updated aircraft, limiting which aircraft on station they have available to fly. If all the modified aircraft require maintenance, training cannot be accomplished. Routine maintenance of the aircraft requires many man-hours, and flight safety is first priority. Inspections also keep aircraft out of the training schedule and limit availability.

2.2.1.3.3 Scheduling a Training Airspace and a Range

All airspaces and ranges do not provide the same training.

The missions, the individual and collective aircrew training requirements, the aircraft capabilities with upgrades, and the availability of maintenance capabilities define the requirements for a training airspace. The scheduler reviews all the factors above and seeks out an airspace and range which could accommodate the required training. Any shortfall in one airspace requires that an additional mission or missions be scheduled to achieve aircrew proficiency. The scheduler takes into consideration the airspace and range capabilities in the airspaces identified on Figure 1-1. Is the airspace large enough to accommodate B-1 performance capabilities? Are there altitude restrictions which would preclude low-level training below 2,000 feet AGL? Are these simulated threats to create realistic training scenarios? Is there a capability for visual targets? Will the aircrew be able to practice real defensive maneuvers such as deploying chaff and flares or accelerating to supersonic speeds? Are there ranges where inert or live munitions could be deployed? Are there dissimilar aircraft to train against or with as there would be in combat?

Additionally, other questions must be answered regarding range condition, weather, target types, etc. Once all of these questions are answered and airspace and range are identified, other scheduling considerations include: who has priority? When can the aircrew train? Typically there is a narrow scheduling window on highly desired and highly used ranges, such as Nevada Test and Training Range (NTTR) or Utah Test and Training Range (UTTR), which could be accomplished for realistic bomber training. The scheduler obtains or negotiates the required range window and everything is finally set. Until there is a 30 minute delay due to a minor aircraft malfunction, or developing weather, and resolving these problems delays the crew beyond their limited scheduled range time. Then the mission planning and scheduling starts all over again.

2.2.1.3.4 Executing a Training Mission

This section assumes all the aircrew, airframe, and airspace scheduling requirements described in Sections 2.2.1.3.1, 2.2.1.3.2, and 2.2.1.3.3 are met and the mission can be executed. The mission actually requires 2 days.

Day 1 – Aircrew Mission Planning: After the squadron implements the monthly and weekly scheduling process, the aircrew scheduled to fly must mission plan the scheduled events. Mission planning begins in the morning with a squadron briefing that includes intelligence/threats, emergency procedures, and operations notes. Then, crew mission planning begins. The designated mission lead conducts detailed briefings on the training mission, airspace, and aircraft load. The crew researches air-defenses, studies campaign operations, analyzes targets, and develops a plan to mitigate threats while achieving mission objectives. Each aircrew plans to accomplish the maximum training events needed and possible within the scheduled parameters. Mission planning concludes with a series of detailed briefings, including a briefing of avoidance areas. Once mission planning is complete, the crew begins a mandatory 12-hour crew rest period which includes the opportunity for at least 8 hours of uninterrupted rest prior to flight.

Day 2 – Bomber Sortie: The actual flight period begins with the aircrew arriving at the squadron approximately 4 hours prior to scheduled takeoff. For a daytime mission, this generally occurs around 5:00 a.m. At the squadron, the crew checks out life support equipment, receives a weather briefing, reads Notices to Airmen (NOTAMs), reviews and signs off the Flight Crew Information File and Operations Notes, and files a flight plan. The aircrew then proceeds to the aircraft and accomplish pre-flight checklist items. Engine start, taxi, and take-off ensue, with winter operations extending this period for snow removal and/or aircraft de-icing activities.

After take-off, at 9:00 a.m. in our example, the flight proceeds to the scheduled airspace. During the time in the airspace, the aircrew executes the pre-planned profile designed to accomplish the maximum amount of training required by the aircrew. To replicate real combat conditions, the aircrew is often assigned new and unplanned tasks to test the aircrew's ability to adapt to mission changes and real-time developments. Typical training includes navigation, threat identification and reactions, combat maneuvering, aerial refueling, and simulated bombing, at both high and low altitude. New training elements include laser targeting, detailed target identification and tracking, and the recent combat requirement for networked and multi-spectral sensor targeting. Training can be accomplished as a single aircraft or as a formation of two aircraft. If two aircraft are scheduled to train together and one aircraft experiences ground-related aircraft maintenance or aircrew delays, then formation training elements can be negatively affected. Each bomber sortie has unique requirements which determine the amount of time in the planned airspace that will be needed to accomplish desired aircrew training. This description of the scheduling, planning, and executing of a training mission demonstrates the myriad of factors that must be considered to accomplish one aircrew training sortie.

The existing Powder River airspace poses limitations on executing such a training mission for more than one to two aircraft at a time. The existing Powder River airspace is too small to alleviate the problems, and use of the more distant complexes affects scheduling and training quality. The proposed PRTC is designed to meet as many training requirements as possible so that each sortie could accomplish the maximum possible aircrew training events for B-1 squadrons based at Ellsworth AFB and B-52 squadrons based at Minot AFB.

2.2.2 Limitations and Constraints of Current Training Opportunities

B-1s from Ellsworth AFB and B-52s from Minot AFB conduct training at Powder River airspace and at remote ranges and airspace throughout the west and portions of the Midwest (refer to Figure 1-1). Several limitations affect training for bombers from Ellsworth AFB and Minot AFB. The size and capabilities of the existing Powder River airspace prevent it from providing adequate training airspace for today's modified aircraft and new missions. These limitations drive the requirements for expanded local airspace capabilities. As a result of these limitations and constraints, current aircrew training requirements at Ellsworth AFB and Minot AFB are not being met in a timely or efficient manner. The limitations are discussed in this section.

2.2.2.1 Size of the Existing Powder River airspace

The size of the existing Powder River airspace (maximum 85 by 50 NM) constrains the amount and nature of training activities conducted with sensors and electronic capabilities. A mission of one or two bombers training to accomplish the range of mission requirements (see Section 2.2.1.1) effectively uses up the Powder River airspaces. Ellsworth AFB has a requirement to allow up to four missions of one to two aircraft each to launch and train at the same time. As a result, training activities which must occur at remote ranges use up aircrew and airframe training time with inefficient and unrealistic commuting. Recent conflicts and worldwide operations along with improvements in aircraft, munitions sensors, and tactics have increased the need for larger airspace and more realistic training within that airspace. New aircraft capabilities include the ability to address targets at distances in excess of 100 NM. Next generation surface-to-air missiles currently being marketed have a combat radius of 100 NM or more and can threaten all but the stealthiest aircraft.

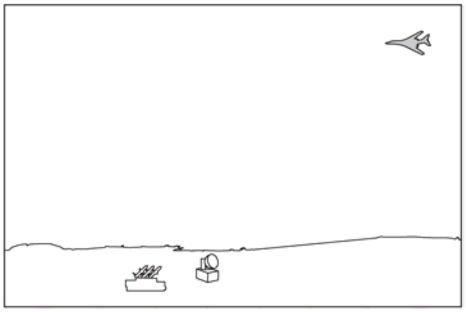
The horizontal dimensions of the existing Powder River airspace prohibit adequate and realistic distance separation of multiple aircraft in the same airspace in order to support typical adversarial airborne engagements. The airspace is neither large enough for current radar system technology nor sufficient in size to allow the training aircrew to react appropriately.

The existing Powder River airspace can support limited training for one mission of up to two B-1 aircraft because:

- Sensor distances have increased and "enemy" air-to-air and ground-to-air tracking capabilities exceed the dimensions of the Powder River airspace.
- Air-to-ground capabilities with new smart weapons involve distances which cannot be simulated in the existing Powder River airspace.
- Training activities of different aircrews cannot occur simultaneously and different formations cannot be segmented within the confines of the Powder River airspace.
- Maneuver (supersonic) and defensive (chaff and flare) training cannot be accomplished to realistically train aircrews to instantaneously react to threats.
- Dissimilar aircraft training with current threat and targeting capabilities cannot be accomplished within the Powder River airspace dimensions.

2.2.2.2 Training Restrictions within the Powder River Airspace

The current operating procedures for the Powder River airspace preclude the use of defensive countermeasures (chaff and flares) for all aircraft and prohibit supersonic flight by all aircraft. Increasingly complex surface-to-air threats require near instantaneous aircrew response to a threat by immediately deploying countermeasures. The ability to use B-1 supersonic flight as a defensive tactic and the ability to respond to supersonic attacks by fighters are essential to modern combat. Supersonic flight for the B-1s forms an integral combat tactic, particularly when egressing from a target, avoiding ground threats, and escaping enemy aircraft during LFE dissimilar aircraft training.

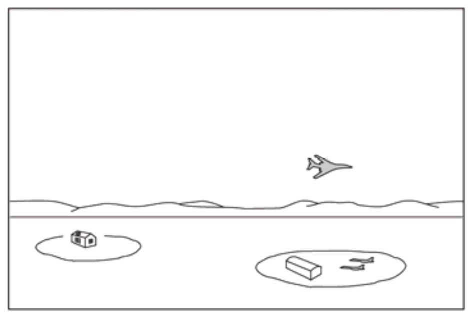


The inability to train with chaff and flares to neutralize threats and the inability to use supersonic speeds to escape opposing threats and/or during dissimilar aircraft training are serious restrictions to realistic training within the Powder River airspace.

Chaff and flare deployment represent necessary combat operations which bomber aircrews cannot perform in the local airspace. Chaff creates a brief electronic cloud of fibers thinner than a human hair to confuse enemy radar. Flares create a heat source to decoy heat-seeking missiles away from the aircraft. These countermeasures defend aircraft against enemy threats and are extensively used in combat. Training to employ these countermeasures in an effective and timely manner is essential for aircrews conducting almost any mission.

2.2.2.3 Avoidance Areas within the Powder River Airspace

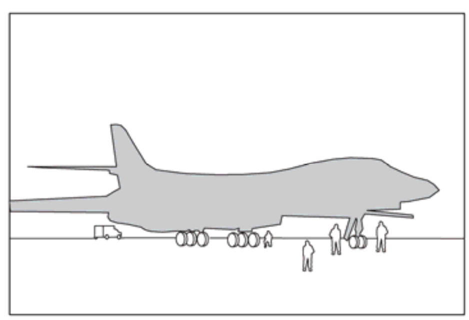
Ellsworth AFB has established avoidance areas under the Powder River MOAs to reduce noise and overflights above communities, ranches, or other noise-sensitive locations. The number and location of noise avoidance areas limit defensive reaction maneuvering in low-altitude training and create patterns that constrain diversity in some training. Avoidance areas force more training to higher altitudes. Avoidance areas establish and produce redundant training with reduced training quality. Avoidance areas would be designated for the proposed PRTC expanded airspace in accordance with the base's ongoing efforts to be a "good neighbor." Increased available airspace with different avoidance areas create the realistic, varied situations needed for quality training.



Numerous low-altitude avoidance areas require training aircraft to weave between the avoidance areas and/or climb over the areas while remaining 2,000 feet AGL and below.

2.2.2.4 Limitations on Sortie Generation

The current capability of the aircraft maintenance programs to generate sorties is limited by several factors. First, Air Force budget and personnel reductions have eliminated 200 aircraft maintenance personnel and decreased the average skill level of the maintenance personnel at Ellsworth AFB. Second, the longer an aircraft is flying, the more time is needed to perform mandated maintenance. In the long run, multiple 5-hour sorties will force 50-hour, 100-hour, and later inspections and maintenance more frequently than the same number of 3-hour sorties. This means that long commutes to remote ranges for training requires extended maintenance time and reduces the number of aircraft available for training on a daily basis.



B-1 ERCCs are crew changes with the engines running. The ERCCs are required to accomplish maintenance with available personnel and train for in-theater missions.

For aircraft sortie generation planning purposes, maintenance of a B-1 requires a minimum of 3.25 hours to prepare an aircraft after a morning sortie for an afternoon/evening sortie, assuming engines are shut off and restarted and no weapons loading is required. With training weapons loaded, that time increases to a minimum of 5 hours. These minimum maintenance hours are frequently exceeded to ensure a safe aircraft. The current airfield duty day is 17.5 hours, opening at 7 a.m. and closing at 12:30 a.m.

Maintenance requirements and aircraft turnaround time is a major factor in generating training sorties. As described in Section 2.2.1.3, a crew, aircraft, and airspace all are needed to achieve a successful training mission. When an aircraft returns from one training mission, a second crew can use that aircraft to train after maintenance is performed.

Several elements combine to make local airspace crucial to reduce maintenance time and enable more required training sorties.

1. When the aircraft lands and the engines are shut down, there is mandatory maintenance which takes 3.25 hours.
2. If the engines are not shut down, there can be an Engine Running Crew Change, and the aircraft can quickly be launched with a new crew for another training mission in local airspace. Ellsworth AFB currently schedules approximately 25 percent ERCCs

More local training airspace would permit a B-1 to land, keep engines running, exchange crew (refueling is not performed with engines running at Ellsworth AFB), take off with a lighter fuel load, and accomplish multiple training events with the new aircrew. If maintenance problems required an engine shutdown, the aircraft could still be maintained and be available for a local training mission within the 3.25 hour window. Adequate local airspace would improve training and reduce the ripple effect on aircrews that are unable to access an aircraft for training missions.

Certain elements can reduce the access to aircraft for an Engine Running Crew Change.

1. When equipment problems delay or cancel the first mission, the follow-on mission cannot occur and the ripple effect impacts the entire training plan.
2. The complexity of the aircraft systems means that small mechanical problems can occur and the risk of cancellation of a follow-on Engine Running Crew Change sortie is higher than a stand-alone mission.
3. If pre-flight checklist performance is needed to exercise full aircrew training, an engine shut-down and an engine start would be required for the full pre-flight checklist.

The additional training airspace permits the matching of aircrew who need training in specific qualification levels to appropriately upgraded aircraft and to fly those upgraded aircraft the training time needed in local airspace. The upgraded aircraft can quickly be available for other crewmembers needing the training. Adequate local training airspace substantially reduces conflicts with the entire training program and schedule.

2.2.2.5 Flying Hour Limitations

The amount of time for training is based on flying hours, with annual Air Force flying hours determined through the federal budgeting process. Available flying hours require aircrews to accomplish efficient, realistic training for each mission. Traveling longer distances to obtain required training only available in remote training airspace or departing the local area due to operational or scheduling conflicts with other aircraft decreases the time available to engage in realistic combat training. The efficiency of combat training depends upon three related factors: 1) the time required to depart from a base, conduct a sortie that includes all the integrated training activities needed for a specific mission, and return to base; 2) the distance and flight time to and among the training assets (airspace and ranges) needed for that mission; and 3) the quality and quantity of the training accomplished. The longer the commute or transit time, the less time can be used for quality training. Transit or commute time provides limited training value.

Currently, aircrews from Ellsworth and Minot AFBs must fly a substantial portion (54 and 69 percent, respectively) of their training sorties at remote ranges and airspace like NTTR, UTTR, and the Mountain Home Range Complex (MHRC) (see Figure 1-1). The focus of quality training is on airspaces in Figure 1-1 which provide airspace altitudes, defensive countermeasures, supersonic maneuvers, threat emitters, and other realistic capabilities to meet B-1 and B-52 aircrew training requirements. Table 2-5 defines distances and approximate flight times (one-way) to the Powder River airspace and to remote training areas. A remote round-trip training mission expends more than twice as many flying hours as a local mission. For example, a B-1 flight to NTTR would expend 3.5 (2 x 1.75 hours) hours just to fly to the training complex and return to Ellsworth AFB.

Table 2-5. Flight Distances (NM) and Transit Times (HR) to the Powder River Airspace and Remote Ranges/Airspace

	From Ellsworth AFB		From Minot AFB	
Range/Airspace	*One-Way Distance (NM)*	*Time (HR)*	*One-Way Distance (NM)*	*Time (HR)*
Powder River Airspace	57	0.2	200	0.75
UTTR, Utah	484	1.25	675	2.00
NTTR, Nevada	614	1.75	825	2.60
MHRC, Idaho	535	1.5	765	2.25

Table 2-6 compares the actual B-1 aircrew training time at local and remote ranges. Examination of average sortie duration in Table 2-6 demonstrates the problem with a high proportion of use of quality remote training areas. For example, the average sortie duration for the B-1s from Ellsworth AFB to the Powder River airspace at 3.2 hours effectively achieves the same amount of mission training as the 5.1-hour average sortie duration to the remote training airspace. Aircrews expend a higher proportion of limited training hours in transit time to the remote complexes than to the local Powder River airspace. When B-1 aircrews must fly 54 percent of their sorties to remote locations, the amount of commute, or transit, time consumes between 2.5 and 3.5 times the number of flying hours required to have the same amount of training at the Powder River airspace. Similar factors apply to B-52 sorties out of Minot AFB, with training time at the remote complexes amounting to less than 50 percent of the average sortie duration. Combine this with the complexities of new weapons systems, increased aircrew training requirements, limited airframe availability, and remote range scheduling and it is clear that specific aircrew training and actual total training time would be greatly benefitted by quality local training airspace.

Table 2-6. Comparison of Bomber Transit Time and Training Time for Powder River Airspace and Remote Ranges/Airspace

Range/Airspace	*Aircraft/Base*	*Average Sortie Duration (HR)*	*Transit Time (HR)*	*Training Time (HR)*	*Percent Training Time[1]*
Powder River Airspace	B-1/Ellsworth	3.2	1.0	2.2	68%
	B-52/Minot	5.7	1.5	4.2	74%
UTTR, Utah	B-1/Ellsworth[2]	5.1	2.5	2.6	51%
	B-52/Minot	7.5	4.0	3.5	47%
NTTR, Nevada	B-1/Ellsworth[2]	5.1	3.5	1.6	31%
	B-52/Minot	7.9	5.2	2.7	34%
MHRC, Idaho	B-1/Ellsworth[2]	5.1	3.0	2.1	41%
	B-52/Minot	7.7	4.5	3.2	42%

Note: 1. Assumes no refueling.
2. Ellsworth used a remote range average sortie duration of 5.1.

2.2.2.6 Limits on Accessibility/Availability

Remote complexes give priority for aircraft from nearby bases and not to transients such as the B-1s and B-52s. The size and training restrictions of the existing Powder River airspace force 54 percent of the B-1 sorties and 69 percent of B-52 sorties to remote training locations to accomplish required training defined in the Mission Qualification Training, Ready Aircrew Program, and Weapons Instructor Course. Scheduling time at these complexes proves problematic and lacks flexibility to accommodate contingencies such as aircraft delays described in Section 2.2. A delay in launch of a B-1 at Ellsworth AFB or a B-52 at Minot AFB or a weather delay en route may miss the training window at a remote range and not have access to any quality training for that mission. These limits on accessibility further reduce the ability of the B-1s and B-52s to achieve readiness requirements.

2.2.2.7 Electronic Attack Assets

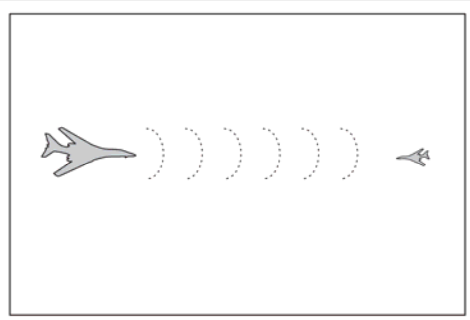
The Belle Fourche ESS and the associated sites for threat emitters were established to meet Cold War era training requirements. The electronic attack assets of the Powder River airspace lack realism and flexibility for current and future conflicts. The emitter sites are located mostly along old Strategic Air Command MTRs near the Powder River airspace and in its southern limits (see Figure 2-3). The threat emitters do not present the newest systems nor can they pose realistic threats to more than one to two aircraft training for the new B-1 or B-52 missions. In real conflicts, an enemy relocates threats to destroy U.S. aircraft. The existing threat emitters offer limited flexibility to relocate as changing threats or to reflect realistic combat conditions. The existing electronic attack assets provide for some needed training and are being upgraded, but airspace distances limit maneuver options and drive training scenarios that become repetitive. The resulting aircrew familiarity and habituation does not provide realistic combat challenges. In combat, mobile threats regularly change locations to challenge and defeat aircrews. With expanded airspace the electronic attack assets could be addressed from greater, more realistic distances and aircrews could address the threats from different locations.

2.2.2.8 Target and Ordnance Delivery Constraints

The Powder River airspace includes several simulated targets, although none provide Close Air Support capabilities or urban mockups required for today's missions. Close Air Support training often needs to occur in an urban setting and a mock-up of an urban setting is frequently constructed with shipping containers for simulated training. No portion of the Powder River airspace permits live or inert munitions delivery. The proposed PRTC does not include live or inert weapons delivery and aircrews would continue to fly to remote ranges to accomplish required weapons delivery training.

2.2.2.9 Effects of Technology Upgrades

As described in Section 2.2.1.3, all aircrews, all bombers, and all training airspaces are not equal. The B-1s and B-52s have received, are undergoing, or will receive multiple technology upgrades that increase targeting effectiveness, communications and coordination, and functionality in large force operations. The upgrades include new guided munitions, laser targeting capability, direct satellite communication and data download, and new radar. Each of these incremental changes expands the training requirements and increases the size of the training airspace needed to accomplish the requirements. These upgrades



New B-1 capabilities include the ability to identify potential threats and targets at substantially greater distances than previously. This capability effectively reduces the number of aircraft which can train in the existing Powder River airspace.

affect airframe availability, sortie generation, and the ability of individual aircrew to meet qualifications. For example, the Sniper Advanced Targeting Pod currently being used by the B-1 fleet is in extremely limited supply. For B-1 aircrew training with the Sniper Pod sensors, clear view of the ground is required. With only a limited amount of airspace to conduct training, as is the case within current Powder River A/B airspace, weather can often times not be avoided and training is degraded. This limitation also occurs with all other upgrades. Access to bombers with the needed technology upgrades is substantially improved if those aircraft are training locally and not expending hours commuting to remote ranges.

2.2.2.10 Summary of Limitations and Constraints

This suite of limitations and constraints, described in Sections 2.2.2.1 through 2.2.2.9, make it difficult for B-1s from Ellsworth AFB and B-52s from Minot AFB to maintain aircrew readiness for combat. Since these bombers play an essential role in national defense and Overseas Contingency Operation execution, there is a need to rectify the limitations. The Air Force needs to add to and reconfigure local airspace to accommodate the training requirements. Establishing the proposed PRTC would fulfill this need and reduce almost all of these limitations and constraints.

2.3 ALTERNATIVE IDENTIFICATION PROCESS

The alternative identification process specified needed criteria and applied those criteria to currently available training assets. Chapter 1.0 presents a summary of current training airspace assets in Figure 1-1. Locally available Powder River airspace imposes numerous limitations on the Air Force's ability to support realistic training for bomber aircrews as explained in Section 2.2.2. One to two bombers training to use the current sensors and technologies the aircrews face in real world conflicts effectively use up the existing Powder River airspace. The existing Powder River airspace does not provide practical training for realistic coordination and deconfliction situations, provides no opportunities for training with defensive countermeasures or supersonic flight, and results in excessive commuting to non-local training as bomber aircrews fly to remote complexes to achieve a majority of their training requirements. The single mission structure and limited mission task training of the Powder River airspace cannot provide the sequenced and diverse training needed by combat aircrews.

The Air Force developed criteria to address training deficiencies and limitations and define a set of reasonable alternatives which could support required training. The Air Force determined that a reasonable alternative should meet the following criteria. The sections in parentheses identify where, in this EIS, each criterion is addressed.

- Utilize existing training airspace and ground-based assets to the extent possible while meeting training requirements (AFI 13-201) (Sections 2.3.1.1 and 2.3.2.1);
- Provide airspace of sufficient size and volume to support the concurrent training needs of multiple B-1s and B-52s (Sections 2.3.1.2 and 2.3.2.2);
- Maximize training time and sortie generation capability for diverse new missions through the use of finite flying hours and access for the B-1s and B-52s (Sections 2.3.1.3 and 2.3.2.3);
- Provide connected airspace, (a maximum of once per quarter), to support realistic LFE training with approximately 20 aircraft of various aircraft types (Sections 2.3.1.4 and 2.3.2.4);
- Avoid or limit, to the extent possible, potential conflicts with civilian air traffic (Sections 2.3.1.5 and 2.3.2.5); and
- Avoid or limit, to the extent possible, safety and environmental concerns (Sections 2.3.1.6 and 2.3.2.6).

2.3.1 Explanation of Alternative Identification Criteria

2.3.1.1 Existing Military Airspace

Airspace comprises a valuable and finite national resource which is the responsibility of the Federal Aviation Administration (FAA). The FAA seeks to balance the different needs of airspace users. The Air Force seeks to use existing military airspace to the extent possible to meet the purpose and need. The Air Force evaluated the size, structure, and location of existing MOAs, ATCAAs, and MTRs to maximize their utility.

2.3.1.2 Airspace Size and Volume

The airspace must be of adequate size and volume to allow bomber aircrews to conduct a full range of tactics and maneuvers while employing almost all capabilities of the aircraft except actual munitions delivery. Any candidate airspace must have the capability to simultaneously support three to four two-ship training missions incorporating the full suite of B-1 and B-52 missions. To meet the defined needs, the horizontal and vertical extent of the airspace must allow for realistic engagement distances with hostile threats, especially with regard to new targeting and sensor identification technology. Each airspace unit for the three to four two-ship training missions would need to measure approximately 75 by 75 NM and have the ability for airspace from 500 feet AGL regularly to FL260 and potentially to FL600 for LFEs.

The B-1 has a requirement to exercise terrain following radar capabilities. It would be highly desirable for the airspace to include the capability for mountainous terrain following training. Mountainous terrain following requires that an aircrew employ B-1 mountainous terrain following capabilities over terrain which varies more than 1,000 feet in elevation within 10 NM (AFI 11-2B-1V1).

2.3.1.3 Maximize Training Time and Sortie Generation

Effective and efficient training requires aircrews to expend flying time performing realistic training with the upgraded B-1 and B-52 aircraft on real world missions described in Section 2.1.1. Local airspace increases the proportion of training time per sortie, maintains realistic training with a lower average sortie duration, reduces transit time, maximizes upgraded aircraft utilization, and provides for the myriad of new mission training now required of aircrews. The airspace must avoid lost training missions at remote training complexes due to scheduling priorities of these training complexes. All training missions must also be accomplished within an average of 240 flying days per year.

Sortie generation and sortie effectiveness are critical elements in readiness. Factors which influence sortie generation include maintenance, crew qualifications, and aircraft modifications. Restrictive range schedules reduce the effectiveness of sorties and preclude a base's ability to respond to contingencies. Sortie effectiveness is reduced because:

- Range schedule inflexibility requires the aircrew to be ready with a mission, the needed airframe be readied, and the airspace to be available. Inflexible training airspace schedules require a set launch time and eliminate the ability of maintenance operations to perform steps to ready an aircraft in advance for a mission at a later time. Heavily used high quality remote ranges have inflexible schedules.
- Weather changes often dictate real-time mission changes. A restricted and fixed time for training in airspace hundreds of miles away results in the loss of dozens of sorties per year and impacts aircrew readiness.
- Flexible scheduling is needed to meet real world training requirements. Remedial mission accomplishment is required if a student fails a mission. Developments in a war zone may require a

squadron to perform their training mid-week. Equipment failures occur, emergencies beneath the airspace may preclude training, and sickness or family emergencies may result in personnel mission shifts. Sortie generation and training need flexibility to respond to such contingencies.

- There is a limited number of B-1s and an even more limited number of B-1s with continually updated weapons and sensor systems needed for the specific training described in Chapter 1.0. Using these airframes to commute to distant ranges with restricted schedules makes them unavailable for realistic training to meet wartime requirements.

The proposed military training airspace must be near enough to allow flexibility in launching sorties and be scheduled for the bombers that need it. The proposed airspace needs to permit multiple daily sorties of mission capable aircraft to address both realistic combat scenarios and limitations on maintenance capabilities.

2.3.1.4 Provide for Connective Airspace

In combat conditions, a bomber does not operate alone or only with one other bomber. A bomber aircrew is one element in a composite whole during an LFE which includes different types of aircraft with sensors and weapon systems. An F-16 may be performing ground attack to support a coalition ground force and be running short of fuel while simultaneously a B-1 may be vectored to continue the attack. Meanwhile, an F-15 or F-22 flying top cover may have to defend the bomber from enemy fighters and a B-52 may be suppressing enemy defenses. Opposing surface-to-air and air-to-air threats, at speeds including supersonic, require rapid defensive response training, sometimes at supersonic speeds. Training as a single force is the only way such integrated communications and choreography can be accomplished. With today’s and tomorrow’s sensors and weapon capabilities, such LFEs require extensive airspace. The training airspace needs the provision to combine, a maximum of once per quarter, smaller airspace units into an overall training airspace with the capability to support an LFE of approximately 20 aircraft of various aircraft types.

2.3.1.5 Reduce or Limit Conflicts with Civil Aviation

The U.S. government has exclusive sovereignty over the nation’s airspace (49 U.S.C. Sec. 40103(a)(1). The FAA plans, manages, and controls the structure and use of airspace to make it as useful as possible for all types of aircraft. The Air Force, in working with the FAA, recognized that proposed airspace should limit or reduce the potential for conflicts with the structure and use of the airspace system by civil aviation. Avoidance of conflicts with airports, jet routes, federal airways, and other airspace units represents a priority for identifying a viable alternative.

2.3.1.6 Limit Safety and Environmental Conflicts

As conscientious users of the National Airspace System and good neighbors, the Air Force considers safety and environmental factors in any proposal. Provisions need to be in place to identify certain locations as flight avoidance or noise sensitive areas. Some examples of potential areas include civilian airports, populated areas, power plants, recreation areas, and Native American cultural sites. Flight activity also needs to allow for seasonal, altitude, and location avoidance, such as for specific outdoor activities, emergencies such as fire fighting and life flights, and certain wildlife species during specific times of the year. Training aircrews would be briefed to avoid these areas as applicable. Avoidance procedures reduce the potential for safety or environmental impacts. The airspace needs to offer multiple segments to allow training in one area while applying avoidance restrictions in another.

2.3.2 Application of Criteria to Develop the Proposed Action and Alternatives

The criteria described in Section 2.3.1 were applied to define a proposed action and alternatives which could meet training requirements. The selection criteria were applied to identify the location and configuration of required training airspace.

2.3.2.1 Existing Military Airspace

The Air Force seeks to use existing military airspace to the extent possible. Existing military airspace presented in Figure 1-1 was reviewed to determine what existing airspace could be the focal point for expanded airspace to meet the purpose and need for bomber training with new technologies, sensors, and missions. The western ranges at MHRC, UTTR, and NTTR are existing ranges with all training capabilities needed for bombers. These ranges are distant and require extensive commute time. Northern and eastern MOAs including the Lake Andes MOA, the Tiger and Devils Lake MOAs, and the Hays MOA do not provide training capabilities for current bomber systems and generally do not have low-level training capabilities with the dimensions needed for high-speed bomber training.

The need to maximize sortie generation, the need for training time with new weapon systems, and the need to combine bomber aircrew, airframe, expanded mission training all identified the existing Powder River MOAs and ATCAAs as a focal point for any proposed action or alternatives. The current Powder River airspace MOAs and ATCAAs comprise the only existing airspace managed and controlled by Ellsworth AFB where both B-1 and B-52 bombers receive priority access. Situated between the two bases, 57 NM northwest of Ellsworth AFB and 200 NM southwest of Minot AFB, the Powder River airspace permits ready access for training. The Powder River airspace best meets the requirement for existing airspace which could be used as a focal point for airspace modifications to meet the purpose and need.

2.3.2.2 Airspace Size and Volume

Airspace configuration defines the size and volume of the airspace. Infrastructure under the airspace needed to support realistic training missions is also included in this criterion. Configuration consists of four attributes: structure, horizontal size, vertical size, and shape. Each of these attributes must adhere to the criteria and support fulfillment of the purpose and need.

- **Structure**: The airspace must include the capacity to link a MOA and overlying ATCAA. Alone, neither a MOA nor an ATCAA would provide the vertical extent needed for training. MOAs extend to but not including FL180 and ATCAAs extend from FL180 and above. B-1s and, especially B-52s, use higher altitudes extensively in combat and training. Linking the MOAs and ATCAAs vertically permits continuous maneuvering and promotes realism. Ellsworth AFB has a history of working closely with Air Route Traffic Control Centers (ARTCCs) to schedule and use the Powder River MOA/ATCAA combinations needed for a specific training mission. Based on the need for training three to four bomber formations, the airspace structure needs to include three to four sets of MOAs and ATCAAs. Individual MOAs and ATCAAs could be used to increase training opportunities and flexibility. Horizontal linkage of MOAs and ATCAAs for an LFE during an estimated 10 days per year for 1 to 3 days per quarter expands the training area size to accommodate more complex training activities with various aircraft types. To accomplish this linkage, the structure would need bridges or Gap MOAs and ATCAAs. Linking selective airspace segments would allow the Air Force to work with ARTCCs to configure the airspace for mission training requirements while reducing impacts to non-military users. Linking multiple airspaces or the entire airspace would permit aircrews to conduct LFE engagements of approximately 20 aircraft of various types training together in simulated combat and at realistic distances for new aircraft sensors.

- **Horizontal Size**: Each MOA and ATCAA needs to offer sufficient size to accommodate a minimum of two B-1s conducting training simultaneously. As a large aircraft with advanced long range multi-spectral sensors and supersonic capabilities, the B-1 requires a large maneuvering area. Although all four MOA/ATCAA combinations need not be exactly the same size, each should measure approximately 75 NM for both its length and width. Existing radars and targeting equipment in fighters and bombers allow detection of aircraft at distances in excess of 100 NM. Proposed LFEs use long-range air-to-air activities and need a combined airspace of approximately 150 by 300 NM.
- **Vertical Size**: B-1s and B-52s must conduct missions that transit and operate at altitudes from below 2,000 feet AGL to altitudes above FL450. B-1 training is primarily below FL260. Low-altitude terrain following and avoidance is an important B-1 mission. The B-1 terrain following and terrain avoidance system performs optimally at 500 to 2,000 feet AGL. The B-52s train primarily at high altitudes (above 20,000 feet MSL). Aircraft which could participate in a maximum of once per quarter LFE training would use altitudes up to 60,000 feet MSL. The vertical extent of the airspace must have the potential to extend from 500 feet AGL to 60,000 feet MSL for LFEs.
- **Shape**: The shape of the airspace reflects both operational requirements and avoidance of conflicts with civil aviation. Individually and collectively, the MOAs/ATCAAs must be configured to permit the repertoire of maneuvers performed by the bombers. They need not be uniform in shape, but should provide for both offensive and defensive maneuvering and multi-aircraft engagements. In addition, the Air Force considered potential conflicts with major airports and airspace used for civil aviation in order to define the shape of the airspace.

AFI-11-2B-1 Vol 1 and AFI 11-2B-52 Vol 1 give training information for Mission Commander Sortie, Composite Force Training, Joint Force Training (B-1), Composite Force Training, and Joint/Composite Training Sortie (B-52). These instructions form the basis for the LFE requirement. LFE training a maximum of once per quarter could only be accomplished in airspace sized for today's sensors which have the capability to acquire targets at distances in excess of 100 miles.

Infrastructure includes ground-based assets to replicate threats and create a realistic training environment. As noted in Section 2.1, Powder River airspace contains a substantial investment in threat emitters and no-drop targets to replicate real-world conditions. Distant western ranges are in high demand because they have the airspace size, volume, and infrastructure attributes. Eastern airspaces do not include the attributes or infrastructure needed for bomber real-world training. The proposed expansion of Powder River airspace to become PRTC would achieve the airspace attributes, use existing infrastructure, allow for new and redistributed infrastructure assets, and create varied threat scenarios to challenge training aircrews.

2.3.2.3 Maximize Training Time and Sortie Generation

Existing airspace meeting the needs of the bombers must minimize the flying hours expended for low-value commute or transit time. Figure 1-1 describes other ranges and existing MOAs within the general region of Ellsworth and Minot AFBs. Western ranges are 484 to 614 NM from Ellsworth AFB and 675 to 825 NM from Minot AFB (Table 2-5). The distance to these ranges maximizes commute time rather than training time. The Hays MOA in northern MT is approximately 380 NM from Ellsworth AFB and 280 NM from Minot AFB. The MT Air National Guard (ANG) controls, schedules, and uses the Hays

MOA. MT ANG aircraft receive scheduling priority. Other MOAs in the region include the Devil's Lake MOAs and Tiger MOAs in ND. The Devil's Lake and Tiger MOAs are 225 to 275 NM from Ellsworth AFB and 40 NM from Minot AFB. These MOAs do not have airspace volume or infrastructure to maximize training times for B-1 aircrews. B-52 aircrews can, and do, receive a limited level of training in these airspaces without realistic threats.

The Powder River airspace is located between Ellsworth AFB and Minot AFB (see Figure 1-1). Expanding the Powder River airspace would reduce transit time to realistic training locations for both bomber bases. As noted in Section 2.2.2.5, 68 percent of an average B-1 sortie to the Powder River airspace consists of training time. Sorties to more remote complexes (e.g., UTTR) achieve 51 percent or less mission training time because the longer sorties (5.1 v. 3.2 hours) require extensive commuting. No existing airspace occurs within a distance that would permit reduction of commute time. Powder River airspace would serve as a suitable anchor for the proposed PRTC due to its proximity to the bases. Expanding Powder River airspace would maximize training and allow more sorties to conduct training locally, with an average sortie duration of 3.2 hours instead of 5.1 hours (see Section 2.2.2.5).

Maximizing sortie generation and Engine Running Crew Change can only be accomplished with local airspace. The further the bombers fly, the less they have the capability to "turn" sorties. Distance limits all the factors that would permit increased sortie generation. The Powder River airspace is the only airspace as a focal point which would maximize training time and sortie generation.

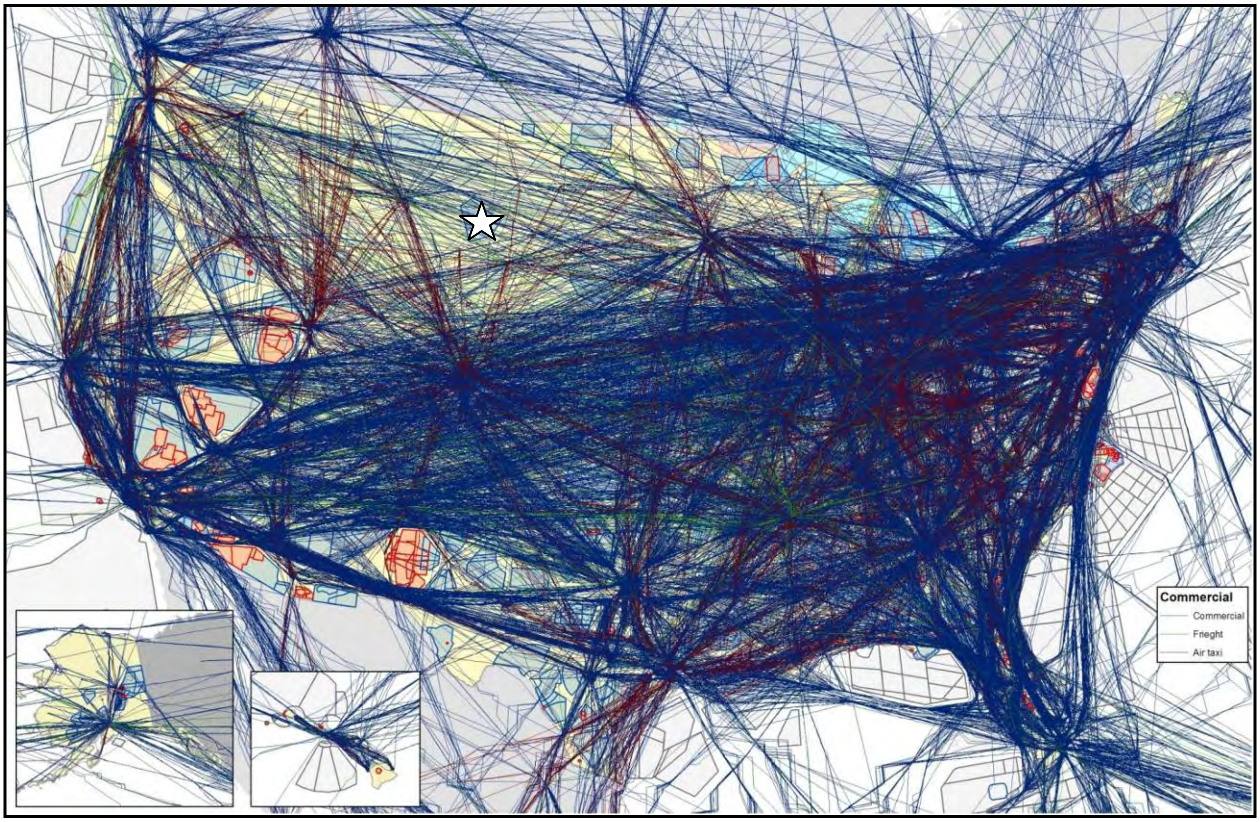
2.3.2.4 Provide for Connected Airspace

Proposed airspace improvements need to have the ability to perform realistic training with LFEs. The western ranges provide such capabilities and are heavily scheduled for such exercises as Red Flag at NTTR and for testing weapon systems such as the Joint Direct Attack Munition at UTTR or missiles at White Sands Missile Range. The northern and eastern MOAs lack existing infrastructure and volume for current training and do not have the ability for connected airspace which would permit realistic LFE training.

Powder River airspace can be transformed into the PRTC with the ability to incorporate Gap MOA/ATCAAs to connect the airspace units, with FAA scheduling, to provide for approximately 10 days per year of LFEs scheduled 1 to 3 days per quarter. The LFE would be scheduled by NOTAM and the estimate of expected LFE use would be 4 hours per LFE day. The local airspace LFE would permit realistic training for approximately 20 aircraft of various types operating at speeds up to, and including, supersonic flight. The local rapid turn-around of B-1 and B-52 aircraft would provide the needed real-world training for aircrews before they entered combat.

2.3.2.5 Reduce or Limit Conflicts with Civil Aviation

Proposed airspace improvements need to reduce or limit conflicts with civil aviation. Ellsworth AFB conducted preliminary review to identify potential conflicts with other elements of the National Airspace System. Figure 2-5 presents a U.S. commercial airspace flow map for a 12-hour period on a representative day. This level of information was used for screening of alternatives. More details on FAA traffic are presented in Section 3.1 of this EIS. Airspace south of the Powder River airspace is heavily traveled by commercial aircraft that dominate the available space. Areas north, west, and northeast of the Powder River airspace have capability to support military training aircraft while reducing the potential for schedule impacts to civil aviation.



Source: FAA, Commercial Transponder Tracks: 0800-1800 on 19 October 2006.

Figure 2-5. Commercial Air Traffic Constraints on Powder River Airspace

As presented in Figure 2-5, there is commercial traffic through and above the existing Powder River airspace and the proposed PRTC. The current Powder River and Gateway ATCAAs are normally used up to FL260, and the Black Hills ATCAA extends to FL230. The majority of the commercial aircraft which overfly the existing Powder River airspace are high altitude flights above FL300.

The scoping process conducted in 2008 gathered public and agency input on the proposal. More information on the scoping process is described in Section 2.9. Concern was expressed during the scoping process that the PRTC would require extensive and costly rerouting of commercial traffic. Ellsworth AFB operates with a Letter of Agreement in the Crossbow ATCAA and has demonstrated the ability to work with ARTCCs to schedule airspace as required for training. The Air Force proposes to work with ARTCCs under similar day-to-day scheduling in the expanded PRTC airspace. The higher altitudes with continuous airspace would be primarily focused on the maximum once quarterly LFEs of 1 to 3 days.

Neither the B-1s nor the B-52s train at altitudes up to FL600, although fighters which would participate in LFEs operate to FL600. B-52 profiles normally require an approximate 2,000 foot altitude block in the high FL300s and low FL400s. B-1s do not operate tactically at those altitudes. During primarily B-52 training, vertical blocks would typically be requested in heavy commercial traffic altitude sectors above FL300. Since B-52s are Reduced Vertical Separation Minimum non-compliant, ARTCCs allocates 6,000 feet above FL290 to have a B-52 2,000-foot training block with 2,000 feet above and below the 2,000-foot training block. B-1s are also Reduced Vertical Separation Minimum non-compliant, so any operations above FL290 would require a similar buffer from non-participating traffic. As experienced with Powder River airspace and briefed to the FAA and commercial airlines, the B-1 is expected to train below FL260 an estimated 99 percent of the time (see Section 2.7.2). ARTCCs would be contacted and ATCAA airspace would be requested for B-1 or B-52 training in ATCAAs, especially above FL260.

2.3.2.6 Reduce or Limit Safety or Environmental Conflicts

With any airspace proposal, the Air Force would identify certain noise sensitive and safety-related locations as permanent or seasonal avoidance areas. Airports are avoided by specified altitudes for safety, and altitude limitations on seasonal overflight of migratory areas are done to avoid safety and environmental conflicts. The Air Force would establish temporary or seasonal avoidance areas or could adopt other measures identified in consultation with affected Tribes to reduce intrusive impacts. Safety also includes making training airspace available for emergencies. In cases of emergency, such as firefighting, air ambulance, law enforcement, or in-flight emergencies in an active MOA, the Air Force would immediately respond to Air Traffic Control (ATC) direction and relocate bomber aircraft to another airspace away from the emergency. In extreme cases, the Air Force would cancel a training mission and return to base to support ATC emergency requirements.

Avoidance areas and emergency procedures would apply to any airspace considered for expanded training. The availability of nearby or adjacent airspace elements where a training mission could be directed would serve to protect safety and permit completion of the aircrew training mission. Existing northern and eastern MOAs do not have the ability to expand and would require that the training mission be cancelled. The proposed PRTC would allow for emergencies and provide flexible airspace to achieve training objectives.

Ground and general aviation safety would apply to any airspace. During scoping meetings, public and agency concerns were expressed about potential safety and environmental conflicts. Such conflicts could include the startle effect of low-level B-1 training and sonic booms. B-1 or B-52 training at altitudes 2,000 feet AGL and below could result in startle effects. Additionally, sonic booms from B-1 supersonic flight above 20,000 feet MSL and fighter supersonic flights above 10,000 feet AGL, both limited to 10 days per year of LFEs, could also result in startle effects upon residents or visitors to the areas under a training airspace. The Air Force training requires airspace use 2,000 feet AGL and below as noted in Section 2.1.1. A B-1 could train 2,000 feet AGL and below approximately 15 to 20 minutes during any individual training sortie, and that low-level training could occur anywhere within an active MOA. The Air Force includes in the Proposed Action and action alternatives the requirement for notification to the appropriate ATC whenever the military aircraft enter or exit the MOA. Notification that the military aircraft have completed low-level training would allow ATC to inactivate MOA altitude segments and direct IFR traffic through the altitude segment even if military aircraft are still utilizing other MOA altitude segments. This would permit civil aircraft pilots or others with access to ATC information to be able to learn the active or inactive status of a MOA.

Safety includes airspace stand-off distances around airports and Federal (Victor) airways. Public airports under any airspace alternative would be avoided by a 3 NM diameter circle with an altitude of 1,500 feet AGL. The avoidance areas would be mapped on FAA aeronautical charts and noted in pilot briefings. The proposed PRTC has Gap MOAs and ATCAAs which would be activated for LFEs a maximum of once a quarter. The proposed Gap MOAs/ATCAAs have been adjusted in dimensions at FAA's request to reflect communication capabilities in the region. The Gap MOAs/ATCAAs are proposed to provide for Victor Airway corridors for civil aviation during normal military training. During scoping, the FAA expressed concern that some proposed MOAs could interfere with the safety of Billings, Bismarck, and Dickinson airports. The Air Force has revised the PRTC aeronautical proposal to address FAA's concerns and reduce the potential for conflicts.

2.3.2.7 Summary Application of Selection Criteria

The Powder River airspace and surrounding area represent the only location with existing airspace that meets the need for the proposal and the selection criteria. Table 2-7 summarizes the application of these selection criteria to locations in Section 2.3.2 and includes the alternatives considered but not carried forward from Section 2.3.3 below. As noted in Section 2.2.2, the existing Powder River airspace can support only one formation of aircraft (one to two B-1 aircraft with new technologies) at any given time. The proposed PRTC would provide up to four appropriately-sized airspace blocks that could support four formations of training aircraft. PRTC would provide airspace of sufficient size and volume, allow for use by the bombers, maximize training time, have LFE capability, reduce the potential for conflict with civil aviation, and include steps to limit safety and environmental conflicts. The proposed PRTC, with management and mitigations, would meet the selection criteria identified.

Table 2-7. Summary of Application Criteria to Alternative Selection (Page 1 of 3)

Selection Criteria							
Alternative Considered	***Existing Airspace***	***Size and Volume***	***Training Time and Sortie Generation***	***Provides for LFE***	***Avoids Civil Air Conflicts***	***Avoids Safety or Environmental Conflicts***	***Carried Forward for Analysis***
Powder River airspace expanded to PRTC Alternative A	Yes	Meets realistic training requirements for 4 to 8 aircraft; provides topography for training	Yes	Yes	Some: Schedules specific activation in 4 MOAs	Establishes avoidance areas in 4 MOAs, increases flexibility for avoidance	Yes
Powder River airspace expanded to PRTC Alternative B	Yes	Meets some requirements with limited terrain following	Yes with some flexibility	Yes	Some: Schedules activation in 3 MOAs	Establishes avoidance areas in 3 MOAs, limited flexibility for avoidance	Yes
Powder River airspace expanded to PRTC Alternative C	Yes	Meets many requirements , provides terrain following	Yes with some flexibility	Yes	Some: Schedules activation in 3 MOAs	Establishes avoidance areas in 3 MOAs, limited flexibility for avoidance	Yes

Table 2-7. Summary of Application Criteria to Alternative Selection (Page 2 of 3)

SELECTION CRITERIA							
Alternative Considered	***Existing Airspace***	***Size and Volume***	***Training Time and Sortie Generation***	***Provides for LFE***	***Avoids Civil Air Conflicts***	***Avoids Safety or Environmental Conflicts***	***Carried Forward for Analysis***
Powder River airspace expanded to PR-1A/1B MOAs and ATCAAs, PR-2 MOA and ATCAA, and Gap A MOA and ATCAA	Yes	Does not meet size or volume for three to four two-ship training; provides topography for terrain following training	Limited flexibility for realistic training	No, does not provide realistic LFE training distances with current weapon systems	Some: Schedules activation in 2 MOAs	Establishes avoidance areas in 2 MOAs, limited flexibility for avoidance areas; concentration of new flights over reservations	No: Limited size and volume, does not meet training purpose and need, limited flexibility for impact avoidance
Powder River airspace expanded with additional PR-3 MOAs and ATCAAs	Yes	Does not meet size and volume for three to four two-ship training	Limited flexibility for realistic training	No, does not provide realistic LFE training distances with current weapon systems	Some: Schedules activation in 2 MOAs	Establishes avoidance areas in 2 MOAs, limited flexibility for avoidance	No: Limited size and volume, does not meet training purpose and need
MHRC	Yes	Yes, limited topography for terrain following training	No	Schedule and access constraints	Yes	Yes	No: Requires extensive commute; inadequate training time
UTTR	Yes	Yes	No	Schedule and access constraints	Yes	Yes	No: Requires extensive commute; inadequate training time
NTTR	Yes	Yes	No	Schedule and access constraints	Yes	Yes	No: Requires extensive commute; inadequate training time
Lake Andes MOA	Yes	No	No	No	Some	Some	No: Inadequate volume
Tiger/Devils Lake MOAs	Yes	No	No	No	Some	Some	No: Inadequate volume; distant
Hays MOA	Yes	No	No	No	Some	Some	No: Inadequate volume; distant
PRTC with Bombing Range	No[1]	Yes	Yes	Yes	Some	No	No: Specific training can use existing ranges
Increase Funding for Commuting	Yes	Yes	No	Schedule and access constraints	Yes	Yes	No: Requires extensive commute; inadequate training time

Table 2-7. Summary of Application Criteria to Alternative Selection (Page 3 of 3)

	Selection Criteria						
Alternative Considered	***Existing Airspace***	***Size and Volume***	***Training Time and Sortie Generation***	***Provides for LFE***	***Avoids Civil Air Conflicts***	***Avoids Safety or Environmental Conflicts***	***Carried Forward for Analysis***
Expand Simulation	Yes	No	No	No	Yes	Yes	No: Does not provided required training
Relocate Aircraft	Some: Capacity limited	Some: Capacity limited	Some: Capacity limited	Some: Capacity limited	Yes	Yes	No: Does not meet purpose and need
B-1 and fighter supersonic to 10,000 feet AGL	Yes	Yes	Yes	Yes	Some	No: B-1 size creates excessive overpressure from supersonic flight at 10,000 feet AGL	No: Creates excessive overpressure
All PRTC MOAs Designated Low and High	Yes	No; does not permit needed maneuvers unless MOAs scheduled together	Yes	Yes	PR-1A, PR-3, PR-4 and Gap Low and High MOAs avoid some conflicts	Reduces some potential conflicts unless MOAs scheduled together	Partially: All MOAs designated Low and High does not meet training operational requirements; PR-1A, PR-3, PR-4, and Gap Low and High MOAs carried forward

Note: 1. No Restricted Area for a bombing range

2.3.3 Alternatives Considered But Not Carried Forward

Application of the alternative identification methodology resulted in the screening of potential alternatives and a focus on the Powder River airspace. Additional potential alternatives, including concepts raised during scoping, were evaluated but did not meet the fundamental purpose and need or were otherwise determined to not be reasonable alternatives. The following describes application of the screening criteria and why each of these concepts was not carried forward for detailed analysis in this EIS.

2.3.3.1 Establishment of an Inert or Live Bombing Range in Conjunction with a PRTC Proposal

The B-1 and B-52 combat missions include deployment of a wide variety of live munitions. Aircrews and ground personnel need training to be proficient for wartime engagements. Live munitions require substantial range areas to provide for Air Force and public safety. Inert munitions that do not carry an explosive charge, but may contain a shotgun shell-sized marking device, provide for some level of ordnance delivery training, but safety footprints are also large for inert munitions. Existing ranges can support a limited number of missions for training and munitions delivery. The sophistication of highly accurate, and therefore expensive, munitions is increasing the use of simulated weapons deployment for mission training. Limited access to existing ranges for munitions delivery is possible, and the increased cost of sophisticated new weapons is increasing the use of electronic ranges. There are potential long-term environmental consequences of a bombing range, and the cost of obtaining and maintaining a new range make this alternative problematic. An inert or live bombing range in conjunction with the PRTC was an alternative considered but not carried forward in this EIS.

2.3.3.2 Increase Funding for Commuting

Increased funding for more commuting flight hours would not permit aircrews to train for all the complex missions required for modern warfighting. Long average sortie durations would use extensive aircrew and airframe time without contributing to training with sophisticated weapons and sensors. Additional funding cannot compensate for limited upgraded airframe availability. Longer duration flights would increase aircraft maintenance and associated costs. Maintenance activities are phased according to hours of use and type of airframe. Longer average sortie durations would require phased maintenance more frequently relative to the combat training time achieved during the sorties. Aircrew availability decreases with longer average sortie durations and sortie generation decreases. The alternative of increased funding to support more aircrew commute time with increased airframe use and increased maintenance was considered but not carried forward in this EIS.

2.3.3.3 Expanded Use of Simulators

Simulators have improved over the years and represent a valuable training aid. To the maximum extent possible, B-1 crews will continue to receive training on sophisticated simulators. Even the best simulators lack the realism of actual flying and aircrews do not receive the same physical training challenges in simulators as those which occur in actual flight. Simulators cannot replicate the problems and teamwork associated with real world flying with other aircraft. Aircrew combat mission readiness status requires many tasks, including maneuvers, low-altitude flight, and defensive tactics, to be performed in actual flight. Using simulators excludes other parts of the Air Force team essential in completing actual missions, such as maintenance, supply, and real time weather analysis. Expanded use of simulators does not produce the type of training needed to meet the purpose and need. Expanding the use of simulators in place of the proposed PRTC was an alternative considered but not carried forward for further analysis.

2.3.3.4 Relocate Aircraft

Scoping commenters asked whether it would be possible to relocate the bombers from Ellsworth and Minot AFBs to other bases nearer to assets that have capacity to meet all training needs. As explained in Chapter 1.0, training airspace limits the potential for quality training at other bases, and those bases with excellent airspace face capacity limits. Adding aircraft from Ellsworth AFB and/or Minot AFB to these bases would exceed the capacity of the local training airspace and exceed the existing base support infrastructure. This would result in reduced training capabilities for all aircraft using the airspace. On August 26, 2005, the nine-member BRAC commission voted 8-1 to retain Ellsworth AFB and, thereby, continue to base and train B-1 bombers. The summary of the Chairman was that there would be no savings from moving the B-1 from one very good base to another very good, essentially equal base (Defense Base Closure and Realignment Commission Final Deliberations, August 2005).

2.3.3.5 Supersonic Flight at Lower Altitude or During Regular Training in Conjunction with a PRTC Alternative

During scoping presentations, the Air Force considered supersonic flight for all aircraft, including B-1s, down to an altitude of 10,000 feet AGL during day-to-day and LFE training activity. Scoping comments expressed concern that this aspect of the PRTC proposal could impact activities under the airspace with very high sonic boom overpressure. In addition, the public expressed concern that a sonic boom at any time could be disruptive to the region. As a result, the Air Force examined the effects of supersonic B-1 flight and those of transient fighter flights that could intermittently use the airspace.

The sonic boom overpressures presented in Figure 2-6 provide a general picture of overpressures resulting from B-1 supersonic flight and includes representative fighter aircraft which could train during a quarterly LFE. Actual overpressure would vary based on maneuvers (climb/descent, turns, acceleration/deceleration) and specific weather conditions (winds, vertical temperature/pressure profile). As the overpressures increase, the potential for damage and other impacts also grows. Section 2.4.5 presents the estimated supersonic flights in minutes per year during LFEs.

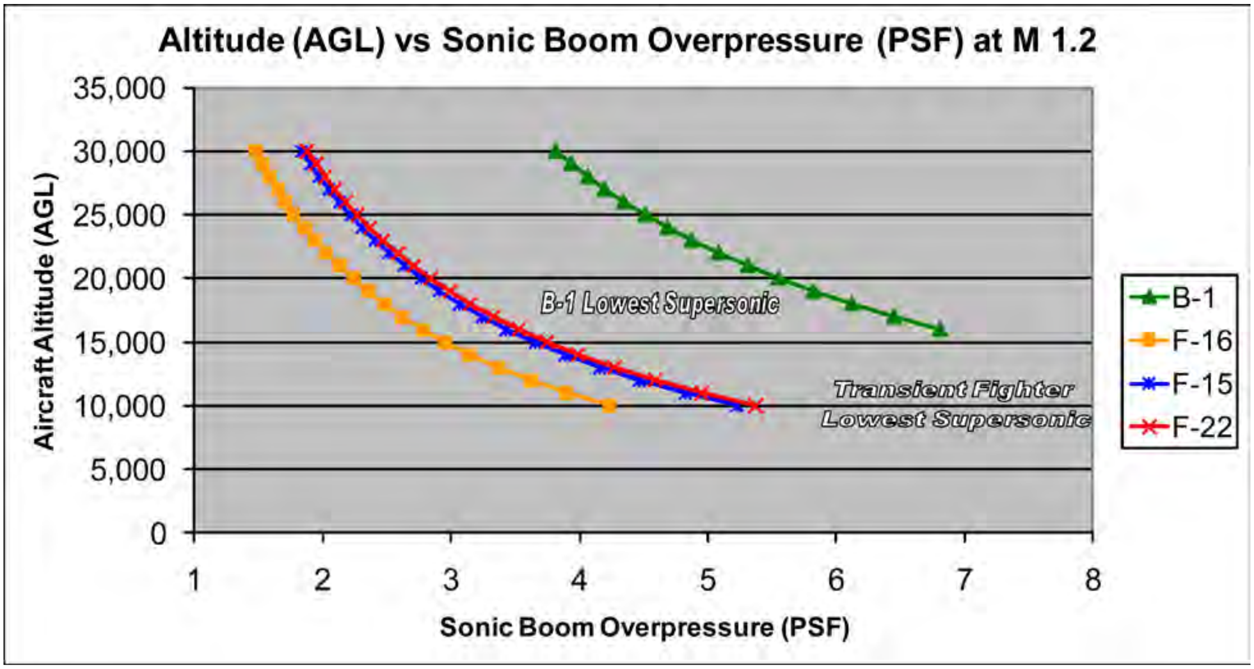


Figure 2-6. Altitude vs. Sonic Boom Overpressure

As a result of scoping comments and additional review, the PRTC proposal was changed to only schedule supersonic training during approximately 10 days of LFE training per year. During LFEs, the proposed minimum altitude for B-1 supersonic flight has been raised from the 10,000 feet AGL presented in scoping to 20,000 feet MSL. Fighters could conduct supersonic training down to 10,000 feet AGL only during LFEs. B-1 supersonic flight to an altitude of 10,000 feet AGL and supersonic training at any time was an alternative considered but not carried forward for further analysis in this EIS.

2.3.3.6 Powder River Airspace Expanded with Additional PR-1A/1B and Gap A MOAs and ATCAAs

This alternative would include the following elements (as illustrated and described in Figure 1-2): (1) expanding and modifying the existing Powder River A/B MOAs and the Crossbow and Powder River ATCAAs into the PR-2 MOA and associated ATCAAs; (2) establishing new PR-1A and PR-1B MOAs and associated ATCAAs to the west of the PR-2 MOA and ATCAAs; and (3) establishing the Gap A MOAs and ATCAAs. This would be an extension of existing airspace into an area that would provide topography for terrain following training. The expanded airspace would improve distances for existing B-1 weapon capabilities, but it would not be of sufficient size to permit realistic LFE training. There would be a reduced impact to civil aviation compared to the proposed PRTC airspace (see Figure 1-2). Under this alternative, the additional training airspace would be concentrated in areas overlying populated portions of the Northern Cheyenne and Crow Reservations. The PR-1A/1B MOAs in combination with the PR-2 MOA would not provide airspace flexibility to adequately avoid seasonal noise-sensitive locations under the airspaces. The addition of the PR-1A, PR-1B, and Gap A MOAs and ATCAAs would not meet the purpose and need for three to four simultaneous training flights, would not provide for realistic distance or LFE training, and would not have adequate training airspace to mitigate impacts by avoidance.

2.3.3.7 Powder River Airspace Expanded with Additional PR-3 and Gap B MOAs and ATCAAs

This alternative would include the following elements (as illustrated and described in Figure 1-2): (1) expanding and modifying the existing Powder River A/B MOAs and the Crossbow and Powder River ATCAAs into the PR-2 MOA and ATCAAs; (2) establishing new PR-3 MOAs and ATCAAs to the north of the PR-2 MOA and ATCAAs; and (3) establishing the Gap B MOAs and ATCAAs. This alternative would not provide extensive topography for terrain following training. The addition of the PR-3 MOAs would provide some additional distances for existing B-1 weapon capabilities but would not be of sufficient size to permit realistic LFE training. The PR-3 MOAs/ATCAAs would have some benefit to B-52 access, although ATCAAs in this area are heavily used by commercial carriers. There would be a reduced impact to civil aviation compared to the proposed PRTC airspace (see Figure 1-2). Training would be concentrated in areas overlying ranching and agricultural activities, and the additional PR-3 MOAs would not provide flexibility to adequately avoid seasonal noise-sensitive locations within the airspace by scheduling other airspaces. The addition of the PR-3 and Gap B MOAs and ATCAAs would not meet the purpose and need for three to four simultaneous training flights, would not provide for realistic distance or LFE training, and would not provide adequate training airspace to mitigate impacts by avoidance.

2.3.3.8 Develop/Establish a New Airspace Complex

Establishment of a new airspace complex would require locating a suitable area with attributes as described in Section 2.3.2.2. Areas south and east of Ellsworth AFB would be unsuitable because of the amount of commercial air traffic (see Figure 2-5). Ground-based electronic combat training facilities are critical to this proposed action and the only existing facilities in the local area are within the Powder River airspace, Belle Fourche ESS. No other areas in the vicinity of Ellsworth AFB or Minot AFB present the combat training facilities necessary to establish a new airspace complex. Relocating the existing Belle Fourche ESS is not feasible or desirable. Extended ranges for threats and for addressing threats require training aircraft to address the threats from greater distances. Enemy forces have developed capabilities to threaten targets from greater distances and varied locations. Expanding airspace in conjunction with existing capabilities efficiently uses and builds upon existing infrastructure. Additionally, AFI 13-201 encourages the use of existing suitable airspace in lieu of establishing new airspace. Developing or establishing a separate new airspace complex was an alternative considered but not carried forward.

2.3.3.9 Utilization of Other Existing Airspace Complexes

In accordance with AFI 13-201, *Airspace Management*, paragraph 1.2.3.6, Headquarters Air Combat Command (ACC) has validated the justification for additional airspace capability to support Ellsworth AFB. All existing Special Use Airspace (SUA) in the vicinity of Ellsworth AFB and Minot AFB was reviewed and determined to be unsuitable for this proposed action prior to selecting the Powder River airspace as the best location. Existing military airspace presented in Figure 1-1 and Table 2-7 was reviewed to determine what existing airspace could be the focal point for expanded airspace to meet the purpose and need for bomber training with new technologies, sensors, and missions. The Lake Andes MOA, the

Tiger and Devils Lake MOAs, and the Hays MOA were considered but do not provide training capabilities for current bomber systems and generally do not have low-level training capabilities with the dimensions needed for high-speed bomber training. Therefore, these MOAs were not carried forward for further consideration.

2.4 OVERVIEW OF THE PROPOSED PRTC

The proposed PRTC action would provide airspace and ground assets to conduct local realistic training for Ellsworth and Minot AFBs. This EIS evaluates three alternatives which could fulfill the purpose and need defined in Chapter 1.0 and the No-Action Alternative which would not fulfill training requirements. Alternative A best meets the purpose and need by providing four combinations of MOA/ATCAA airspaces with improved training capability. Alternatives B and C do not provide the same level of low-altitude training capability with each providing three combinations of MOA/ATCAA airspaces rather than the four with Alternative A. Alternative C does not provide the training capability of Alternative A but is superior to Alternative B because Alternative C includes the Powder River 1A (PR-1A) and Power River 1B (PR-1B) MOAs. PR-1A and PR-1B are the only proposed airspaces containing 1,000 feet terrain elevation variations within 10 NM to meet B-1 terrain following training requirements (see Section 2.3.1.2).

The current Powder River airspace is essentially used up by one or two B-1 aircraft training together with new technologies, sensors, and weapon systems. The Proposed Action would modify and add to the existing Powder River airspace to establish the PRTC with improved training opportunities. The PRTC would permit four to eight B-1s to be efficiently launched and trained in local, high quality airspace. The Proposed Action would restructure and reconfigure the existing Powder River MOAs and associated ATCAAs, establish up to three additional MOA/ATCAA combinations, and include Gap MOAs and ATCAAs which could be used a maximum of once per quarter for 1 to 3 days, estimated for 10 days per year, to link up to four MOA/ATCAA airspaces to create a versatile, realistic training complex for LFEs. LFEs would permit approximately 20 aircraft of various types to train as the comprehensive team they must be in combat.

Proposed changes to the airspace would permit increased training flights dispersed throughout the MOAs and ATCAAs. PRTC would allow for almost a full range of required combat training missions, including LFEs with various aircraft types. The proposed PRTC would also support use of defensive countermeasure (chaff and flares) above 2,000 feet AGL and, during LFEs, supersonic flight above 20,000 feet MSL for B-1s and above 10,000 feet AGL for fighter aircraft. Fighter aircraft training up to, and including supersonic speeds, would train with the bombers during LFEs.

The Powder River airspace currently provides B-1s with 46 percent of required training sorties and B-52s with 31 percent of required training sorties. The Air Force estimates that the PRTC airspace as proposed would provide for approximately 85 percent of 33 training sortie requirements for these aircrews. The Proposed Action would increase training efficiency and expend finite flying hours on high quality training with new capabilities and missions rather than low-value commuting to remote locations. PRTC would not include any air-to-ground inert or live ordnance range. This means both the B-1s and B-52s would continue to fly to remote training locations such as NTTR, UTTR, and the MHRC to complete approximately 15 percent of their required training sorties.

Alternative A, the Air Force Proposed Action, provides the greatest amount of training airspace by restructuring the Powder River airspace and creating three new MOA/ATCAA combinations for bomber training and associated Gap MOA/ATCAAs for LFEs. Alternatives B and C, while different, each includes restructuring the Powder River airspace and creating two new MOA combinations and ATCAAs for bomber training and associated Gap MOA/ATCAAs for LFEs. Alternative A best meets the purpose and need described in Chapter 1.0. Alternative B meets many of the identified needs and provides approximately 76 percent of B-1 and B-52 training sortie requirements locally with some reduced quality B-1 training when compared with Alternative A. Alternative C provides approximately 76 percent B-1 and B-52 required training sorties locally with some higher quality training for B-1 aircrews than Alternative B because training topography is included under PR-1A and PR-1B. The No-Action Alternative retains the structure and use of the existing Powder River airspace. Bombers from Ellsworth AFB and Minot AFB would continue to search for new ways to obtain combat mission capability.

All three PRTC action alternatives would involve the same basic elements and all would build from the existing Powder River airspace. Differences among the alternatives would derive from the number and configuration of MOA and ATCAA combinations, as well as associated numbers of training sortie-operations and their altitude distributions. The Air Force considers the Proposed Action, Alternative A, to be the preferred alternative, in accordance with Council on Environmental Quality (CEQ) Regulations, 40 Code of Federal Regulations (CFR) 1502.14(e).

2.4.1 Elements Common to the Three Action Alternatives

The elements common to the three action alternatives are: airspace structure, flight operations, LFEs, supersonic flights during LFEs, defensive countermeasures, and ground-based training assets. Should a decision be made to proceed with one of the action alternatives, the Air Force estimates FAA establishment and charting of the airspace within three years of the Record of Decision (ROD) on this EIS.

2.4.2 Airspace Structure

Each of the three action alternatives includes proposed changes to existing airspace. The Air Force has proposed airspace modifications and has the responsibility under the National Environmental Policy Act (NEPA) for analyzing the potential environmental consequences of each alternative. The FAA is a cooperating agency in the NEPA analysis and is responsible for evaluating, processing, and charting airspace changes. FAA Order 7400.2G, excerpts of which are provided in Appendix A and is available in its entirety online at www.faa.gov, presents the FAA's procedures for processing airspace changes. Each action alternative includes four categories of changes to airspace structure.

- **Establishment:** This category of change refers to instances where the FAA would establish new MOA or ATCAA airspace. MOAs are established through FAA non-rule making action. ATCAAs are established through Letters of Agreement (LOA) with FAA. Each of the three action alternatives includes the proposed establishment of new airspace, such as MOAs and ATCAAs not overlapping with the existing Powder River A/B MOAs.
- **Modification:** This category applies to existing airspace that would be incorporated into and/or re-designated as part of a proposed MOA/ATCAA. The proposed PRTC is built around and incorporates most of the existing Powder River airspace.
- **Expansion**: This category applies to existing airspace units which would be increased in volume and incorporated into and/or re-designated as part of a proposed MOA/ATCAA. The existing Powder River A (PR-A) and PR-B MOAs would be somewhat expanded and renamed the PR-2 MOA.

Victor Airways are essentially highways in the sky from 1,200 feet AGL to FL180 in Class E airspace. Many powered aircraft follow these routes. The routes connect radio navigation beacons called "very high frequency omni-directional range" or VOR stations that radiate a signal in all directions. These stations are usually located at or near airfields. The width of these airways depends on the distance from the navigational aids. There are separation distances for aircraft flying within the Victor Airway (internal separation) and separation distances for aircraft outside the airway (external separation).

- **Elimination***:* This category applies to the portion of the Black Hills ATCAA not subsumed into the Gateway ATCAA. This portion would be eliminated and no longer comprise an ATCAA. The existing Powder River A MOA floor would be raised from surface to 500 feet AGL. Below 500 feet AGL would be eliminated as a part of the MOA.

All three action alternatives share several features. The proposed PRTC MOA and ATCAA boundaries would avoid most civil aviation Victor Airways by at least 5 NM internal and 4 NM external separation. The MOA/ATCAA boundaries would avoid major Victor Airway intersections by more than 20 NM. PRTC ATCAAs would include Low FL180 to FL260, Medium above FL260 to FL370, and High above FL370 to FL600 ATCAAs above all MOAs as well as the Gateway East and West ATCAAs. ATCAAs for LFEs would be scheduled by NOTAM and the estimated LFE use would be 4 hours per day, estimated to be 10 days per year, and approximately 1 to 3 days in any one quarter. These MOA/ATCAAs would be activated by the FAA to support LFEs and scheduled to avoid high use periods by civil aviation to the extent possible.

Figure 2-7 is the proposed PRTC airspace with communities, reservations, highways, and other points of interest. Each individual alternative, described in Sections 2.5 through 2.7, would be comprised of all or portions of the MOA/ATCAAs shown on Figure 2-7. Figure 2-8 is a three dimensional representation of the proposed PRTC showing the individual stacked MOAs and ATCAAs. The proposed PR-1A, PR-3, and PR-4, as well as the proposed Gap MOAs have Low, 500 feet AGL to, but not including, 12,000 feet MSL, and High, 12,000 feet MSL to, but not including, FL180. PR-1B and PR-2 MOAs are from 500 feet AGL to, but not including, FL180. Operations within the proposed PR-1A, PR-1B, PR-2, PR-3, and PR-4 MOA airspaces would be scheduled by Ellsworth AFB and coordinated with the FAA to reduce conflict and ensure safe use by military and civil aircraft.

Each action alternative supports aerial refueling. Aerial refueling involves the act of receiving fuel efficiently and safely while in flight. Almost every aircraft in the Air Force inventory is aerial refueling capable. To optimize fuel and flight time, aerial refueling takes place as close to combat as possible, given enemy air defense threats. For training, the Air Force performs refueling operations within designated aerial refueling areas (also known as “tracks” or “anchors”) or within FAA approved airspace. Designated aerial refueling tracks/anchors are described within Department of Defense (DoD) Area Planning documents, and have established coordinates and altitudes which the Air Force has coordinated with the FAA. During scoping meetings, maps were displayed showing notional locations where aerial refueling could be planned for quarterly LFEs. No specific aerial refueling tracks/anchors are proposed to be established as part of PRTC, and those notional locations are not included in this EIS. Refueling can occur anywhere such activity is approved by ATC. For the PRTC action alternatives, the Air Force proposes to perform refueling as needed and approved by the ATC.

The geographic area encompassed by this airspace proposal lies within the controlling region of three FAA ARTCCs as described in Section 3.1.3.2.2. The FAA is a cooperating agency in this EIS and data for this EIS are being provided by the Salt Lake City ARTCC, Denver ARTCC, and Minneapolis ARTCC.

2.4.3 Airspace Operations

Increased numbers, frequency, and variety of sortie-operations would occur under all of the action alternatives.

A sortie-operation comprises the use of one airspace unit, a MOA or ATCAA, by one aircraft. Each alternative would have a variation of operations depending upon the airspace units in that alternative. Specific details about flight operations are included in Sections 2.5 through 2.7. Normal day-to-day training operations involve operating in an individual MOA/ATCAA for approximately 2 hours, with approximately 15 to 20 minutes of training activity below 2,000 feet AGL for those missions that require low altitude training. Each action alternative would involve substantial use of the airspace for sortie-operations by B-1s and B-52s.

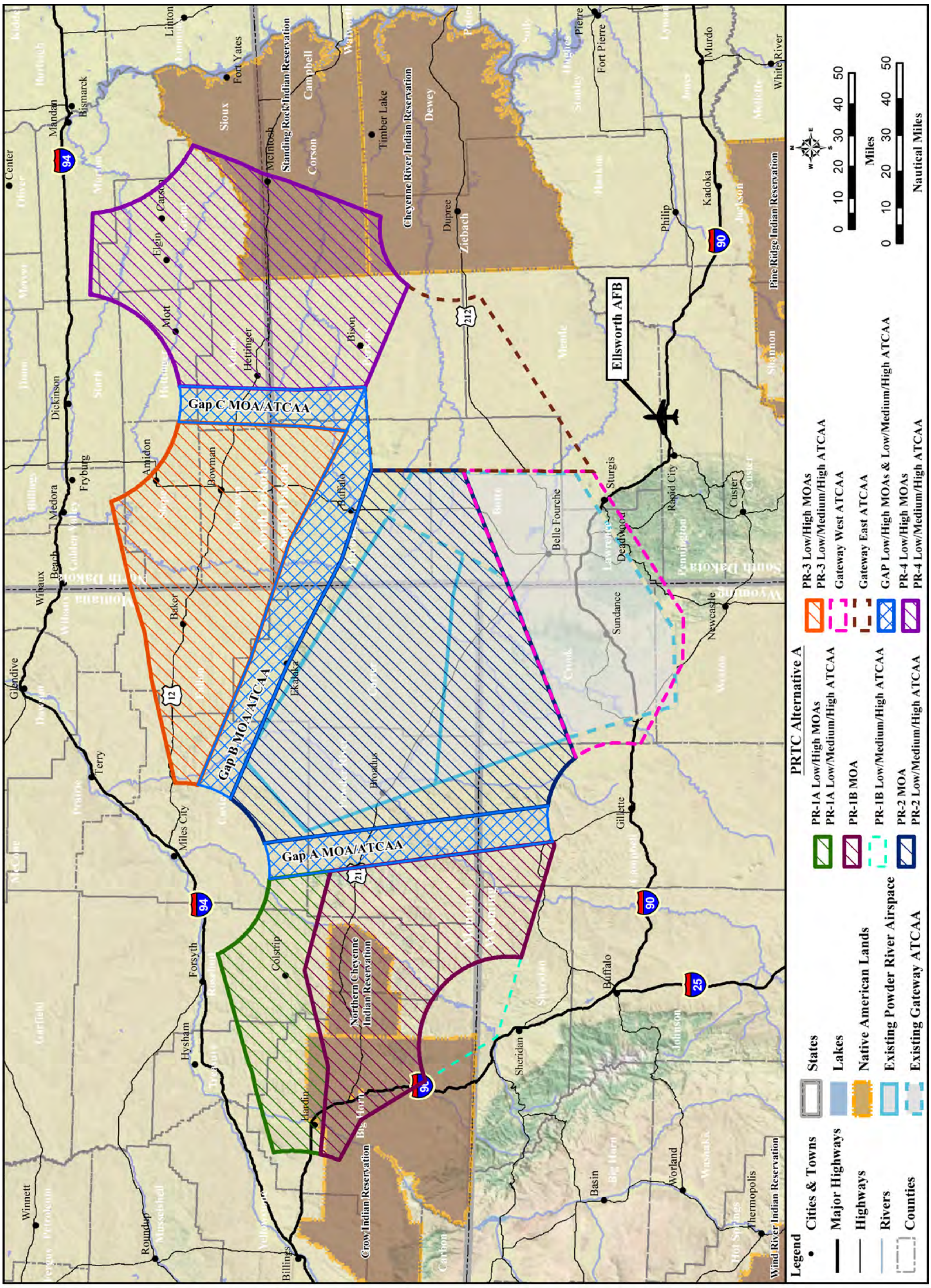


Figure 2-7. Extent of Proposed PRTC Airspace

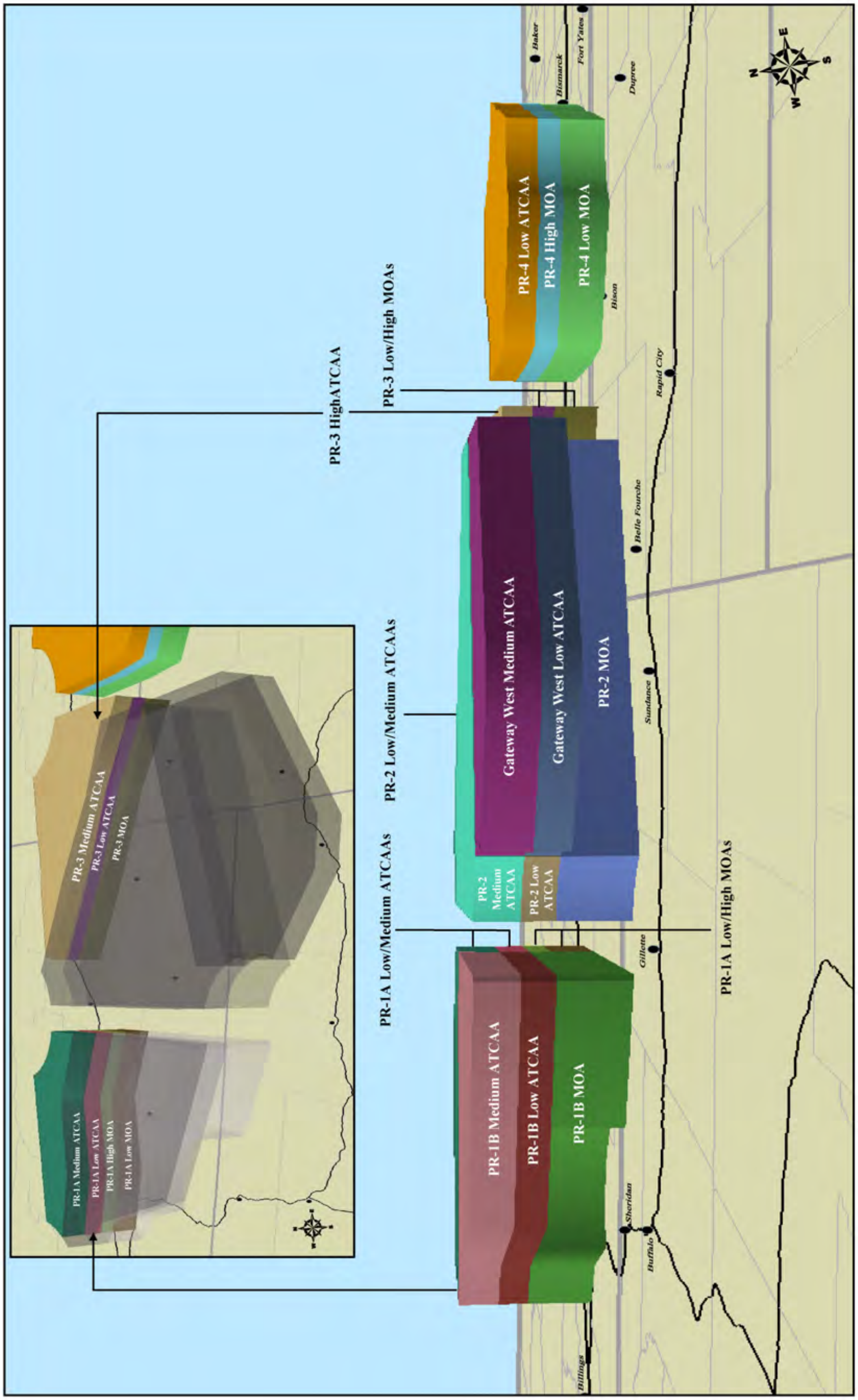


Figure 2-8. Proposed PRTC with MOAs and ATCAAs

2.4.4 Large Force Exercises

Realistic, stressful, and challenging operational training is the primary means to ensure readiness and prepare the Air Force to apply personnel and assets to meet national policies. Training consists of a careful progression of activities and threat complexity, including a balance of programs directed at individuals, crews, and larger organizational units through performance assessments. Whether an individual-level mission activity, a two-ship mission, or a larger LFE, realistic training is critical to maintaining military proficiency. LFEs are essential to modern combat training and provide B-1 and B-52 aircrews the opportunity to practice training as part of a combined force with different aircraft prior to combat.

An LFE is a highly sophisticated training exercise that simulates battlefield scenarios, and requires enough airspace to provide assembly, transition, ingress, egress, and maneuver areas. Such training exercises employ a full range of combat tactics, equipment, and personnel. Combat tactics are both offensive and defensive in nature and include flying at supersonic speed, use of defensive chaff and flares with restrictions, and simulated launching of weapons. At supersonic speeds, the timeframe during which aircrews are exposed to enemy threats is minimal and crew reaction times, which may have been seconds, become tenths of seconds.

Today a multi-force strike mission could involve almost any type of combat aircraft in the Air Force inventory. The weapons and sensors employed today by potential adversaries include a wide range of dispersed, camouflaged, and hardened radar- and visual-directed anti-aircraft artillery sites, as well as both ground- and air-launched radar-directed and heat-seeking missiles. For a mission to succeed, the Air Force must identify and defeat all these threats by simultaneously employing the entire range of available weapons, aircraft, and sensors. An LFE requires bomber aircrews to develop capabilities which cannot be learned in other training venues.

New and improved airspace would provide increased opportunities for transient fighters to conduct training, particularly during quarterly LFEs when the bombers could train with red air (opponents) and/or blue air (friendlies). Transient aircraft which could use the proposed PRTC include current fighters such as F-16s, F-15s, F-22s, or other military aircraft authorized to operate in U.S. airspace, such as C-130s (see Appendix B).

The Air Force proposes to conduct LFEs an estimated 10 days per year a maximum of once per calendar quarter, lasting typically from 1 to 3 days. LFEs would occur in a 4 hour time period per day and could include approximately 20 aircraft of various types training in simulated combat. LFEs would occupy all or substantial portions of the proposed PRTC.

The Air Force would employ the following measures during both regular training and LFEs to aid with civil aviation deconfliction.

1. All airspace scheduled times would continue to be published and are online at http://sua.faa.gov/sua/Welcome.do
2. Airspace scheduled outside of normal published times of use is disseminated via NOTAMs, available at https://pilotweb.nas.faa.gov/
3. Airspace use and long-term planning information on deconfliction, firefighting operations, and special/cultural events would continue to be available during business hours from the Ellsworth AFB Airspace Management Office at (605) 385-1230.

4. Information posted on flyers and posters will be provided to local airports annually through the Ellsworth AFB Flight Safety Office as part of the Mid-Air Collision Avoidance Program at (605) 385-4419.
5. The Ellsworth AFB Public Affairs Office is available to answer inquiries and complaints at (605) 385-5056.

2.4.5 Supersonic Activity

Fighter and B-1 aircraft participating in an LFE would employ supersonic speeds to simulate realistic engagements. The LFEs once per quarter with a maximum duration of 1-3 days are the only time supersonic maneuvers would be scheduled for training in the PRTC proposed airspace.

The Air Force would authorize supersonic flights within the PRTC airspace only during the estimated 10 days per year when LFEs are proposed to be conducted. Supersonic training is not authorized in existing Powder River airspace. The Air Force proposes supersonic flight training in all PRTC airspace units for air combat, air-to-air engagements, and other tactics. The most accurate training environment would have no restriction on speed, and the conduct of any mission would be dictated by mission needs and the aircraft capabilities. Airspace would be used in a variety of ways as every training mission has unique requirements. The B-1 bomber has supersonic capabilities and would be a source of sonic booms. The fighter presence in PRTC would normally be associated with LFEs, with an occasional transient fighter specific training mission. Keeping the design of the airspace simple is an important characteristic for airspace utility. Multiple altitude floors within an airspace detract from mission focus as aircrews strive to stay within the bounds. Ten thousand feet AGL is proposed as the supersonic floor for all fighters during LFEs only, and 20,000 feet MSL is proposed as the floor for B-1 supersonic flight only during LFEs.

Table 2-8 provides the aircraft types, number of sortie-operations, and total estimated time at or above supersonic speeds. While B-1s use supersonic speeds during missions, B-52s cannot fly at supersonic speeds. All B-1 supersonic activities would occur above 20,000 feet MSL. Transient fighter supersonic events would occur above 10,000 feet AGL. The B-1 duration of a supersonic event would average about 30 seconds. Transient fighter activity would vary by aircraft type and training. Approximately 70 percent of transient fighter supersonic flight activity would occur above 30,000 feet MSL. Supersonic activity would be randomly distributed within the MOA/ATCAAs proportionate to the patterning and distribution of sortie-operations by aircraft types.

Table 2–8. Estimated Supersonic Time Spent in Airspace (in minutes per year)

Aircraft	Estimated Annual Supersonic Flights	MOA (MINUTES/YEAR)	ATCAA (MINUTES/YEAR)	
		10,000 AGL to 17,999 MSL	*18,000 to 29,999 MSL*	*30,000 to 60,000 MSL*
B-1	60	15.0	15.0	0.0
F-16	60	1.4	9.0	18.4
F-15	20	.8	1.0	7.8
F-22	10	0	1.0	3.8
Other Fighters[1]	10	.2	1.0	3.6

Note: 1. Other fighters could include any fighter training in an LFE and are included as transients in airspace use tables in this EIS.

2.4.6 Defensive Countermeasures

Aircrews use chaff and flares as self-protection defensive countermeasures against radar-directed anti-aircraft artillery and radar-guided and heat-seeking missiles. When aircrews detect threats from these systems, they must respond instantly and instinctively deploy appropriate countermeasures. The PRTC action alternatives would permit defensive countermeasure training with chaff and flares. The Powder River airspace does not permit this needed training and aircrews are required to conduct chaff and flare training when they fly to remote range complexes.

The inability of aircrews to regularly train with defensive countermeasures results in the loss of critical response time in combat. The time aircrews take to counter threats can determine their survivability. Aircrews who train without actually deploying chaff and flares do not instinctively respond to a threat targeted at their aircraft. This pause to think becomes more critical with realistic single-ship or two-ship flight training where an aircrew is required to place the aircraft in a vulnerable position to accomplish the mission.

Within the PRTC airspace, chaff and flare training would be proportional to the number of sortie-operations conducted by each aircraft type in the specific airspace units. Each alternative presents this specific information. Figure 2-9 depicts the life cycle following release of chaff and flare countermeasures.

2.4.6.1 Chaff

Modern chaff (known as “angel hair” chaff) is thinner than a fine human hair and normally ranges in length from 0.3 to 1.0 inch. The chaff length determines the frequency range of the radio wave most effectively reflected by that particular fiber. Chaff fibers are cut to varying lengths to make chaff effective against the wide array of enemy radar systems that may be encountered during combat. A bundle of chaff weighs approximately 3.35 ounces and consists of approximately 5.0 to 5.6 million chaff fibers that, when dispensed from an aircraft, form an electronic “cloud” that confuses the radar by providing additional target(s) and temporarily hides the maneuvering aircraft from radar tracking.

During scoping meetings, participants were surprised to learn that dispersed individual chaff strands are almost invisible to the eye. Modern chaff is not like the aluminum strand chaff used from World War II through the Vietnam War. Chaff is made as small and light as possible so that it will disperse quickly and remain in the air long enough to confuse enemy radar. The chaff proposed for use in the PRTC airspace contains fibers configured to reduce interference with radars operated by the FAA throughout the National Airspace System. New FAA radars are sensitive enough to detect chaff so communication of when and where aircraft are training with chaff permits the FAA to identify and differentiate chaff from natural events.

Table 2-9 provides the estimated bundles of chaff and flares projected to be used annually by proposed PRTC airspace. Flare use is discussed in Section 2.4.6.2. The annual chaff and flare usage includes normal training and LFEs. An estimated 15 percent of the chaff and flares in Table 2-9 would be deployed by transients and 85 percent by B-1 or B-52 training aircraft.

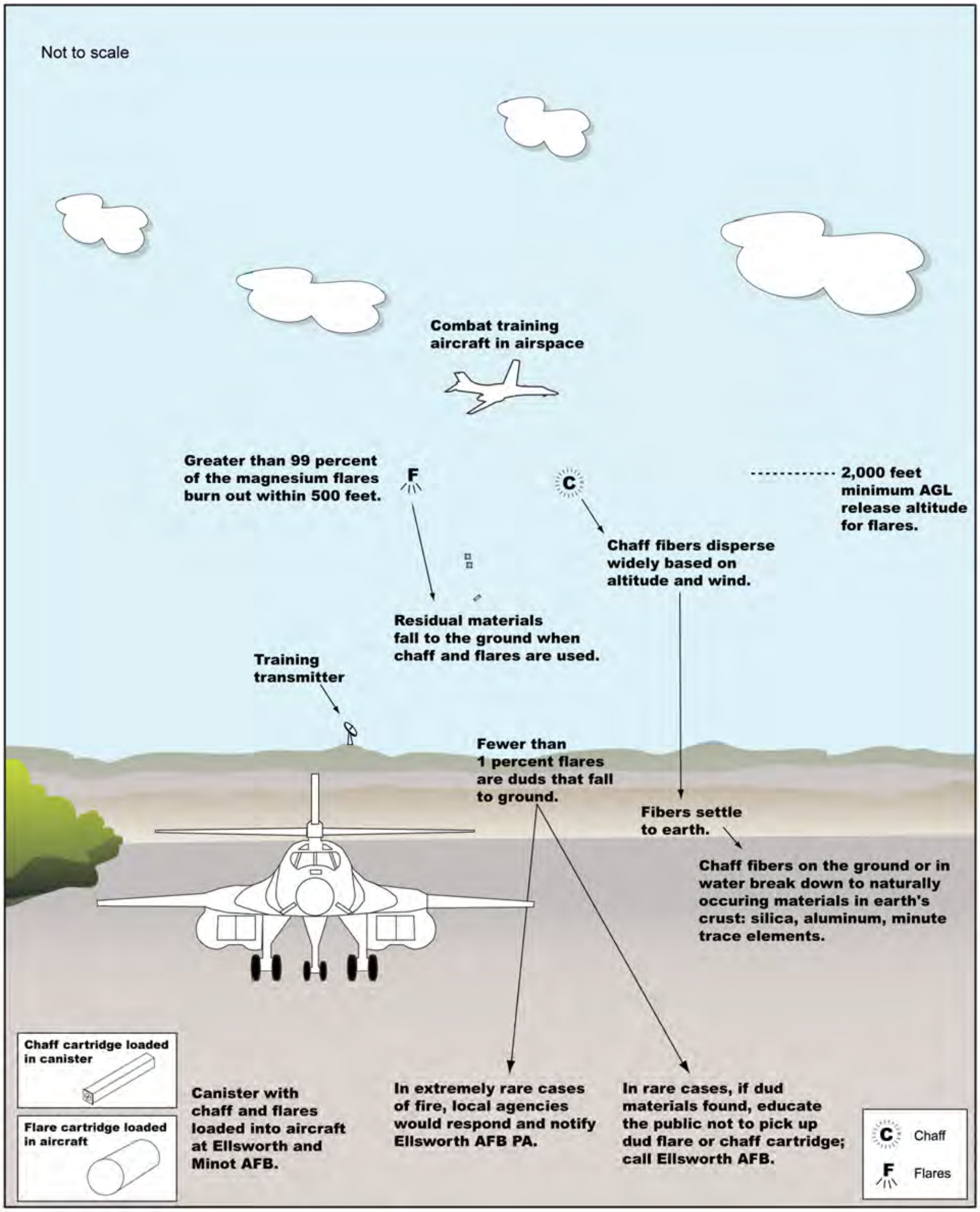


Figure 2-9. The Life Cycle of Dispensing Chaff and Flares

Table 2-9. Projected Annual Chaff and Flare Use by Airspace Unit

	Alternative A		Alternative B[1]		Alternative C[2]	
Airspace Unit	***Chaff***	***Flares***	***Chaff***	***Flares***	***Chaff***	***Flares***
PR-1A/B MOAs/ATCAAs	8,300	820	4,000	400	6,000	600
PR-2 MOA/ATCAAs	11,000	1,100	11,500	1,150	11,500	1,500
PR-3 MOA/ATCAAs	4,200	420	4,600	460	4,600	450
PR-4 MOA/ATCAAs	5,500	550	5,850	600	4,000	400
Gap A MOAs/ATCAAs	200	20	130	10	200	20
Gap B MOAs/ATCAAs	260	30	300	30	300	30
Gap C MOAs/ATCAAs	140	10	150	20	90	10
Gateway East/West ATCAAs	3,400	350	3,500	350	3,500	350
Total	33,000	3,300	30,030	3,020	30,190	3,360

Notes: 1. PR-1A/1B MOA and Gap A MOA not part of Alternative B.
2. PR-4 MOA and Gap C MOA not part of Alternative C.

Dispersed chaff briefly reflects radar signals and forms an image on a radar screen. The aircrew must act together to detect a radar threat, deploy chaff, and maneuver the aircraft to escape the threat when the aircraft is masked by the chaff cloud. Chaff itself is not explosive; however, it is ejected from the aircraft pyrotechnically using a small explosive charge that is part of the ejection system. The chaff dispenser remains in the aircraft. Each individual chaff fiber has a silica core, is coated with aluminum, and then is coated with an animal fat material so that it does not clump together. As explained in Appendix C, silica and aluminum are the most common elements of the earth's crust. Two 1-inch square by 1/8-inch thick pieces of plastic and a felt spacer are ejected with the chaff. On rare occasions, deployed chaff may not wholly separate and may fall to earth as a clump of fibers (refer to Appendix C for more detailed information on chaff).

Under the action alternatives, chaff use would adhere to the following management practices:

- The chaff cloud can be detected by improved FAA radars, so to ensure that no chaff cloud interferes with ATC, chaff would not be deployed within 60 NM of airport approach radars.
- Chaff comparable to that described in this EIS, RR-188 chaff or equivalent, could be used for training. Any other chaff types would require separate environmental analysis.

2.4.6.2 Flares

Defensive flares are not explosive, they are magnesium pellets that, when ignited, burn for a short period (approximately 5 seconds) at approximately 1,202 degrees Fahrenheit (°F). B-1 flares are ejected upward and drop behind the aircraft. Other aircraft flares are ejected to the rear and downward. Flares burn out after falling approximately 500 feet (see Appendix D). The burn temperature is hotter than the exhaust of an aircraft engine and therefore attracts and decoys heat-seeking weapons and sensors targeted on the aircraft.

Table 2-9 includes estimated total defensive flare usage by B-1 and B-52 aircraft during normal training and all aircraft during LFEs. The magnesium flare used by B-1 aircraft is wrapped with aluminum-filament reinforced tape and inserted into an aluminum case which is closed with a felt spacer and a plastic end cap. The base of the case has a pyrotechnic impulse cartridge that is activated electrically to produce hot gasses that push one 3-inch diameter by 1/4-inch thick plastic cap and the flare material out of the flare dispenser mounted in the aircraft. The flare ignites as it is ejected from the dispenser. Each deployed flare results in the deposition on the ground of a 3-inch diameter end cap, a similarly sized plastic piston, up to four felt spacers, a plastic safe and initiation device approximately 1/2 inch by 1/2 inch by 2 inches, and a piece of aluminum coated wrapping material (similar to dried duct tape) that could measure up to approximately 5 inches by 20 inches, for a total of up to eight pieces of residual material per flare. Flares from transient aircraft, such as fighters, can produce up to six similar pieces of residual materials. On extremely rare occasions, a flare may not ignite and could fall to the earth as a dud flare (refer to Appendix D for more information about flares).

Use of flares within the PRTC would incorporate the following management practices:

- Flare release altitude for this proposal would not be below 2,000 feet AGL (flares burn out by the time they fall approximately 500 feet).
- Flare release would be discontinued in a MOA when fire danger is rated extreme under the National Fire Danger Rating System.
- The Air Force would continue to cooperate with local fire agencies for mutual aid response to wildland fires.
- The Air Force would work with local fire departments underlying the airspace to educate them on flare deployment and use. This education would include distributing flyers to fire departments describing flare residual materials and dud flares.

The extremely rare case of a dud flare falling to the ground could constitute a safety risk. Range clean-up activities at existing ranges in Utah and Arizona have resulted in an estimated on-the-ground dud rate of 0.01 percent of flares deployed. Based on Table 2-9, an estimated average of one dud flare per three years would fall to the surface somewhere under the proposed airspace. Although the risk of combustion of such a dud is low, it could be ignited by a hot fire or by friction from a strike with something like a power saw or a bullet. On a military range, a dud flare is treated as unexploded ordnance.

The Air Force would establish and maintain a procedure whereby chaff or flare materials found on public or private property can be identified for safety risk and removed to ensure safety. Air Force personnel will cooperate with local agencies for mutual aid response to fires, and develop an education program for fire departments beneath the airspace to include information on flares. The basic rule for the public to follow if encountering a dud flare is to identify its location, do not touch it or experiment with it, and notify a local safety authority of its location. The authority, in turn, will notify Ellsworth AFB which has the personnel and facilities to handle dud flares, should they be encountered. Any damage claim against the Air Force would start by contacting the Ellsworth AFB Public Affairs Office with as many details about the damage, time, and aircraft as possible.

2.4.6.3 Chaff and Flare Residual Materials

Each deployed bundle of chaff results in two 1-inch by 1-inch pieces of plastic and a felt spacer for bombers, for a total of four pieces of residual materials plus the deployed chaff. The F-22 chaff bundles have six 1/2-inch by 1-inch pieces (four plastic; two felt) and up to six pieces of 2-inch by 3-inch pieces of parchment paper, for a total of 12 pieces of residual materials per fighter chaff bundle. Each deployed flare results in a 3-inch diameter end cap, a similarly sized plastic piston, up to four felt spacers, a 1/2-inch by 1/2-inch by 2-inch plastic safe and initiation device and a piece of aluminum-coated wrapping material up to 5 inches by 20 inches in size, for a total of eight pieces of residual materials per bomber flare. Fighter flares result in five pieces of residual materials of similar shape to bomber flares.

Section 2.4.6.1 explains that each chaff bundle contains approximately 3.35 ounces of chaff. From Table 2-9, there would be an estimated 33,000 bundles of chaff released annually in defensive training. The total proposed PRTC area overflown (from Table 2-12) is approximately 35,200 square miles. The volume of chaff particles per acre would be approximately (3.35 x 33,000)/(35,200 x 640) = 0.00491 ounces per acre, or approximately 0.139 grams of chaff per acre.

The 33,000 chaff bundles are estimated to produce approximately (0.85 x 33,000 x 4) + (0.15 x 33,000 x 12) = 171,600 pieces of chaff plastic, felt, or paper residual materials. Flares would result in approximately (0.85 x 3,300 x 8) + (0.15 x 3,300 x 5) = 24,915 pieces of flare plastic or wrapping materials. The total annual distribution of chaff and flare residual materials would be approximately (171,600 + 24,915)/(35,200 x 640) = 0.0087231 pieces per acre. This is an average of one piece per approximately 115 acres per year under the proposed PRTC. This is an average, as chaff and flare usage would vary by airspace unit (see Table 2-9).

Winds at the deployment altitude of chaff and flares and through which chaff and flare residual materials travel to the ground would affect the drift and ultimate deposition of residual materials. In actual practice, winds at one altitude could blow light chaff fibers out of the airspace and winds at another altitude could blow them back into the airspace. For purposes of this evaluation, all chaff and flare residual materials are assumed to fall to the ground under the training airspace.

2.4.7 Ground-Based Training Assets

A realistic training environment requires both an array of simulated threats, as well as a means to determine how well aircrews respond to and defeat those threats while simulating on-target ordnance delivery. These assets must also be linked to reflect the kinds of situations aircrews might encounter in actual combat. The existing electronic range complex consists of the Belle Fourche ESS and numerous emitter and/or simulated threat sites underlying existing MOA and ATCAA airspace. These sites provide training opportunities within the existing Powder River airspace and would continue to support training in the proposed PRTC.

Should a decision be made to pursue additional emitter and/or simulated target sites under PRTC, the Air Force would undertake NEPA analysis tiered to this EIS. The Air Force would also conduct the required real estate and National Historic Preservation Act (NHPA) process for all sites. Ellsworth AFB formerly performed a Minuteman Intercontinental Ballistic Missiles mission that included a number of 15-acre remote sites dispersed under the area of the proposed PRTC airspace. Such sites would be expected to receive initial consideration as possible threat emitter or simulated target locations. The construction of additional emitter and/or simulated target sites is considered a potential cumulative action and is discussed in Chapter 5.0.

2.5 Proposed Action: Alternative A

Alternative A, the Air Force Proposed Action, would expand and enhance the existing Powder River airspace to become PRTC. The enhanced airspace would provide realistic, integrated B-1 bomber training close to Ellsworth AFB to maximize training in local airspace and minimize long-distance commute time to remote training assets. The expanded training complex would support continued, and enhanced, B-52 training for aircraft from Minot AFB. Alternative A is based on B-1 and B-52 training needs, which in turn dictate the airspace structure and number and type of airspace operations that occur within the proposed PRTC airspace units. Transient aircraft and others who have used the Powder River airspace would continue to use this enhanced PRTC airspace. Alternative A would include the common elements described in Section 2.4.

2.5.1 Airspace Structure

Under Alternative A, the proposed PRTC would modify the existing Powder River airspace, add three additional MOAs and ATCAAs, and establish Gap MOAs/ATCAAs to link the airspace. Portions of the Black Hills ATCAA would be subsumed into the new structure and portions outside the proposed new structure would be eliminated. The proposed PRTC includes changes and expansion of the Powder River MOAs and ATCAAs as depicted on Figure 2-7.

Tables 2-10 and 2-11 present a description of airspace use associated with the alternatives. The tables include the proposed MOAs (Table 2-10) and ATCAAs (Table 2-11), their designated altitudes, time and daily hours of use, and expected days per year when the airspace would be scheduled.

Alternative A includes the greatest amount of new airspace (by volume) among the action alternatives. It would include four MOA combinations. Alternatives B or C each has three MOA combinations as described in Sections 2.6 and 2.7. Table 2-12 presents the estimated square miles under the airspace for the action alternatives. Table 2-31 in Section 2.8 presents the area in square miles under the existing Powder River airspace. The FL180 MOA area overflown is different for the three action alternatives although the above FL180 ATCAA area overflown would be the same for the three action alternatives.

The current Letter of Agreement between Ellsworth AFB and FAA has Powder River ATCAA defined as FL180 to FL260 inclusive and the Crossbow ATCAA as FL270 to FL450 inclusive. Although this appears to create a 1,000 foot break, the FAA manages the airspace to not produce a gap between the ATCAAs. For the purpose of this EIS, and to make clear that the airspaces are continuous, this EIS describes the airspace as Low ATCAA FL180 to, but not including FL260, Medium ATCAA above FL260 to, but not including FL370, and High ATCAA FL370 to FL600.

Table 2-10. MOA Description for Alternatives (Page 1 of 3)

MOA	*Alternative A*	*Alternative B*	*Alternative C*	*No Action*	*Designated Altitudes*	*Time of Use*	*Expected Daily Use*	*Estimated Days/Year*	*Controlling Agency*
PR-1A Low	X		X		500 feet AGL up to, but not including, 12,000 feet MSL	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L Other times by NOTAM	3 hours/day	240	Salt Lake City ARTCC
PR-1A High	X		X		12,000 feet MSL up to, but not including, FL180	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L Other times by NOTAM	3 hours/day	240	Salt Lake City ARTCC
PR-1B	X		X		500 feet AGL up to, but not including, FL180	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L Other times by NOTAM	3 hours/day	240	Salt Lake City ARTCC
PR-2	X	X	X	X[1]	500 feet AGL up to, but not including, FL180	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L Other times by NOTAM	6 hours/day	240	Denver ARTCC
PR-3 Low	X	X	X		500 feet AGL up to, but not including, 12,000 feet MSL	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L Other times by NOTAM	3 hours/day	240	Salt Lake City ARTCC

Table 2-10. MOA Description for Alternatives (Page 2 of 3)

MOA	Alternative A	Alternative B	Alternative C	No Action	Designated Altitudes	Time of Use	Expected Daily Use	Estimated Days/Year	Controlling Agency
PR-3 High	X	X	X		12,000 feet MSL up to, but not including, FL180	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L Other times by NOTAM	3 hours/day	240	Salt Lake City ARTCC
PR-4 Low	X	X			500 feet AGL up to, but not including, 12,000 feet MSL	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L Other times by NOTAM	3 hours/day	240	Minneapolis ARTCC
PR-4 High	X	X			12,000 feet MSL up to, but not including, FL180	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L Other times by NOTAM	3 hours/day	240	Minneapolis ARTCC
Gap A Low	X		X		500 feet AGL up to, but not including, 12,000 feet MSL	By NOTAM (Large Force Exercise Only)	4 hours/day	10	Denver ARTCC
Gap A High	X		X		12,000 feet MSL up to, but not including, FL180	By NOTAM (Large Force Exercise Only)	4 hours/day	10	Denver ARTCC

Table 2-10. MOA Description for Alternatives (Page 3 of 3)

MOA	*Alternative A*	*Alternative B*	*Alternative C*	*No Action*	*Designated Altitudes*	*Time of Use*	*Expected Daily Use*	*Estimated Days/Year*	*Controlling Agency*
Gap B Low	X	X	X		500 feet AGL up to, but not including, 12,000 feet MSL	By NOTAM (Large Force Exercise Only)	4 hours/day	10	Denver ARTCC
Gap B High	X	X	X		12,000 feet MSL up to, but not including, FL180	By NOTAM (Large Force Exercise Only)	4 hours/day	10	Denver ARTCC
Gap C Low	X	X	X		500 feet AGL up to, but not including, 12,000 feet MSL	By NOTAM (Large Force Exercise Only)	4 hours/day	10	Minneapolis ARTCC
Gap C High	X	X	X		12,000 feet MSL up to, but not including, FL180	By NOTAM (Large Force Exercise Only)	4 hours/day	10	Minneapolis ARTCC

Note: 1. The existing Powder River A/B MOAs extend over much of the same area considered for PR-2.
L = Local

Table 2-11. ATCAA Description for Alternatives (Page 1 of 3)

ATCAA	*Alternative A*	*Alternative B*	*Alternative C*	*No Action*	*Designated Altitudes*	*Time of Use*	*Expected Daily Use*	*Estimated Days/Year*	*Controlling Agency*
PR-1A Low	X	X	X		FL180 to FL260	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L	4 hours/day	240	--
PR-1A Medium	X	X	X		Above FL260 to FL370	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L	4 hours/day	240	--
PR-1A High	X	X	X		Above FL370 to FL600	Large Force Exercise Only	4 hours/day	10	--
PR-1B Low	X	X	X		FL180 to FL260	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L	4 hours/day	240	--
PR-1B Medium	X	X	X		Above FL260 to FL370	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L	4 hours/day	240	--
PR-1B High	X	X	X		Above FL370 to FL600	Large Force Exercise Only	4 hours/day	10	--
PR-2 Low	X	X	X	X[1]	FL180 to FL260	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L	10 hours/day	240	--
PR-2 Medium	X	X	X	X[1]	Above FL260 to FL370	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L	10 hours/day	240	--
PR-2 High	X	X	X	X[1]	Above FL370 to FL600	Large Force Exercise Only	4 hours/day	10	--

Table 2-11. ATCAA Description for Alternatives (Page 2 of 3)

ATCAA	Alternative A	Alternative B	Alternative C	No Action	Designated Altitudes	Time of Use	Expected Daily Use	Estimated Days/Year	Controlling Agency
PR-3 Low	X	X	X		FL180 to FL260	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L	4 hours/day	240	--
PR-3 Medium	X	X	X		Above FL260 to FL370	Large Force Exercise Only	4 hours/day	10	--
PR-3 High	X	X	X		Above FL370 to FL600	Large Force Exercise Only	4 hours/day	10	--
PR-4 Low	X	X	X		FL180 to FL260	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L	4 hours/day	240	--
PR-4 Medium	X	X	X		Above FL260 to FL370	Large Force Exercise Only	4 hours/day	10	--
PR-4 High	X	X	X		Above FL370 to FL600	Large Force Exercise Only	4 hours/day	10	--
Gateway West Low	X	X	X		FL180 to FL260	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L	4 hours/day	240	--
Gateway West Medium	X	X	X		Above FL260 to FL370	Monday-Thursday 0730-1200 L and 1800-2330 L Friday 0730-1200 L	4 hours/day	240	--
Gateway West High	X	X	X		Above FL370 to FL600	Large Force Exercise Only	4 hours/day	10	--
Gateway East Low	X	X	X		FL180 to FL260	Large Force Exercise Only	4 hours/day	10	--
Gateway East Medium	X	X	X		Above FL260 to FL370	Large Force Exercise Only	4 hours/day	10	--

Table 2-11. ATCAA Description for Alternatives (Page 3 of 3)

ATCAA	Alternative A	Alternative B	Alternative C	No Action	Designated Altitudes	Time of Use	Expected Daily Use	Estimated Days/Year	Controlling Agency
Gateway East High	X	X	X		Above FL370 to FL600	Large Force Exercise Only	4 hours/day	10	--
Gap A Low	X	X	X		FL180 to FL260	Large Force Exercise Only	4 hours/day	10	--
Gap A Medium	X	X	X		Above FL260 to FL370	Large Force Exercise Only	4 hours/day	10	--
Gap A High	X	X	X		Above FL370 to FL600	Large Force Exercise Only	4 hours/day	10	--
Gap B Low	X	X	X		FL180 to FL260	Large Force Exercise Only	4 hours/day	10	--
Gap B Medium	X	X	X		Above FL260 to FL370	Large Force Exercise Only	4 hours/day	10	--
Gap B High	X	X	X		Above FL370 to FL600	Large Force Exercise Only	4 hours/day	10	--
Gap C Low	X	X	X		FL180 to FL260	Large Force Exercise Only	4 hours/day	10	--
Gap C Medium	X	X	X		Above FL260 to FL370	Large Force Exercise Only	4 hours/day	10	--
Gap C High	X	X	X		Above FL370 to FL600	Large Force Exercise Only	4 hours/day	10	--

Note: 1. The Powder River ATCAA extends over much of the same area considered for PR-2.
L = Local

Table 2-12. Surface Overflown by Proposed PRTC Action Alternatives

Airspace Type	Airspace Unit	Overflown Area in Square Miles		
		Alternative A	Alternative B	Alternative C
MOA	PR-1A	2,011	0.00	2,011
	PR-1B	4,083	0.00	4,083
	Gap A	1,049	0.00	1,049
	PR-2[1]	8,231	8,231	8,231
	Gap B	1,693	1,693	1,693
	PR-3	4,542	4,542	4,542
	Gap C	670	670	0.00
	PR-4	5,511	5,511	0.00
TOTAL MOA		27,790	20,647	21,609
ATCAA	PR-1A	2,011	2,011	2,011
	PR-1B	4,830	4,830	4,830
	Gap A	1,049	1,049	1,049
	PR-2[1]	8,231	8,231	8,231
	Gap B	1,693	1,693	1,693
	PR-3	4,542	4,542	4,542
	Gap C	670	670	670
	PR-4	5,511	5,511	5,511
	Gateway East	2,841	2,841	2,841
	Gateway West	3,822	3,822	3,822
TOTAL ATCAA		35,200	35,200	35,200

Note: 1. Approximate Powder River airspace currently overflown

2.5.2 Airspace Operations

Under Alternative A, the primary users of the enhanced PRTC would be B-1s from Ellsworth AFB and B-52s from Minot AFB. Other users would be bombers and tankers from other bases and transient fighters, mostly from the surrounding area. The increased size and availability of local training airspace would allow an increase in the number of sorties available to meet aircrew training needs for both B-1 and B-52 aircraft. Alternative A would increase local training sorties from the current B-1 use of Powder River airspace from 46 percent of training sorties and B-52 use of Powder River airspace from 31 percent of training sorties to 85 percent local training sorties for each.

Training in remote areas such as UTTR, NTTR, and MHRC would account for the other 15 percent of training and would permit aircrews to continue to conduct actual ordnance delivery training in locations where inert or live bombs can be deployed. Table 2-13 presents the baseline number of sorties to local and remote training areas compared to proposed sorties with Alternative A. The table demonstrates the proportional increase in local training time. As indicated in Section 2.3.2, the PRTC would substantially reduce low-value transit or commute time and increase realistic combat training time.

Table 2-13. Annual Sortie Comparison Between Baseline and Alternative A

Sortie	Baseline				Alternative A				Change		Total B-1 and B-52
	B-1	%	B-52	%	B-1	%	B-52	%	B-1	B-52	
Local	1,000	46%	300	31%	2,160	85%	808	85%	+1,160	+508	+1,668
Remote	1,160	54%	650	69%	380	15%	142	15%	-780	-508	-1,288

Currently, B-1s operate within all airspace units associated with the existing Powder River airspace, while most B-52 Powder River airspace operations occur within the Crossbow ATCAA with occasional use of Powder River MOAs. Under Alternative A, B-52s would operate primarily within all ATCAA airspace with occasional sorties in the new MOAs. B-1 use would be spread throughout the PRTC airspace. B-1s and B-52s historically have trained for the low-level penetration mission on Instrument Routes (IRs) which traverse the area leading to the Belle Fourche electronic range. Three IRs, IR-473, IR-485, and IR-492, are intermittently used by training aircraft (see Section 3.1.3.2.3). Low-level navigation on IRs is expected to continue at its current level of intermittent activity. Secondary users, such as tankers, would conduct aerial refueling in ATCAAs as needed and scheduled with the FAA. Transient aircraft are projected to increase their training from baseline and that training is included in the PRTC airspace use.

Table 2-14 presents baseline and projected sortie-operations in MOA and ATCAA airspace. All B-1 and B-52 sortie-operations training in the MOAs would also train in the overlying ATCAAs during the same mission. Some training missions would occur only in the ATCAAs.

Table 2-14. Alternative A MOA and ATCAA Annual Sortie-Operations Comparison

	AIRCRAFT				
	B-1	*B-52*	*Transient*[1]	*Tankers*	*Total*
Baseline					
MOA	500	0	60	0	560
ATCAA	1,250	1,500	90	0	2,840
Projected					
MOA	1,680	438	419	0	2,252
ATCAA	5,890	1,713	1,215	602	9,419
Increase					
MOA	1,180	438	359	0	1,692
ATCAA	4,640	213	1,125	602	6,579

Note: 1. Includes F-16, F-15, and F-22 fighter aircraft and others (see Appendix B).

Aircraft capabilities and missions are constantly changing to reflect real world combat experiences and expected missions. Table 2-15 presents estimated annual training activity for each airspace unit for each type of aircraft for day-to-day training. Table 2-16 presents the Alternative A LFE airspace training usage by airspace, altitude, and training aircraft type. Table 2-17 combines the day-to-day training and the LFE training to present a projected total airspace usage under Alternative A. Table 2-17 details the estimated Alternative A time and altitude distribution for all training aircraft. Times and altitude distributions are presented in estimated hours over an average year and represent a best estimate of training activity based upon the day-to-day and LFE training requirements presented in Chapter 1.0. As capabilities and threats change and aircrews receive new training missions, the distribution of annual hours would be expected to vary.

2.5.3 Large Force Exercises

Alternative A would support LFEs for mission training in simulated combat engagements as described in Section 2.4.4. For the purpose of this EIS, approximately 20 aircraft of various types are assumed for a maximum of once quarterly LFEs scheduled for 1 to 3 days for a total of approximately 10 days per year. Airspace would be activated an estimated 4 hours per LFE day. During an LFE, the corridors designated as Gap A, B, C MOAs/ATCAAs; Gateway East ATCAA; and Gateway West ATCAA could be activated in any number of configurations to accommodate the larger numbers of aircraft. The projected LFE time and altitude distributions are included in the aircraft by airspace distribution in Table 2-16.

Table 2-15. Estimated Annual Day-to-Day Time and Altitude Distribution, Alternative A (Page 1 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 – 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
PR-1A/B MOAs/ATCAAs	**B-1**	614/126	370	18.50	41.63	18.50	9.25	4.63	274.73	2.78	0.00
	B-52	350/19	225	0.00	41.40	7.25	1.04	2.07	1.74	171.50	0.00
	Tanker	9/2	11	0.00	0.00	0.00	0.00	0.00	8.25	2.75	0.00
	Transient	6/2	3	0.16	0.16	0.00	0.00	0.58	0.61	1.49	0.00
PR-2 MOA/ATCAA	**B-1**	1410/290	681.25	34.06	76.64	34.06	17.03	8.52	505.83	5.11	0.00
	B-52	570/30	225	0.00	41.40	7.25	1.04	2.07	1.74	171.51	0.00
	Tanker	1/1	1	0.00	0.00	0.00	0.00	0.00	0.75	0.25	0.00
	Transient	6/2	3	0.16	0.16	0.00	0.00	0.58	0.61	1.49	0.00
PR-3 MOA/ATCAA	**B-1**	614/126	370	18.50	41.63	18.50	9.25	4.63	277.50	0.00	0.00
	B-52	59/3	12.5	0.00	2.30	0.40	0.06	0.12	9.61	0.01	0.00
	Tanker	1/1	1	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
	Transient	6/2	3	0.16	0.16	0.00	0.00	0.58	2.10	0.00	0.00
PR-4 MOA/ATCAA	**B-1**	614/126	370	18.50	41.63	18.50	9.25	4.63	274.73	2.78	0.00
	B-52	350/19	137.5	0.00	25.30	4.43	0.63	1.27	1.06	104.82	0.00
	Tanker	9/2	11	0.00	0.00	0.00	0.00	0.00	8.25	2.75	0.00
	Transient	6/2	3	0.16	0.16	0.00	0.00	0.58	0.61	1.49	0.00
Gap A MOA/ATCAA	**B-1**	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gap B MOA/ATCAA	**B-1**	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 2-15. Estimated Annual Day-to-Day Time and Altitude Distribution, Alternative A (Page 2 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 - 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
Gap C MOA/ATCAA	**B-1**	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gateway East ATCAA	**B-1**	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gateway West ATCAA	**B-1**	375/75	168.75	0.00	0.00	0.00	0.00	0.00	167.06	1.69	0.00
	B-52	285/15	75	0.00	0.00	0.00	0.00	0.00	0.75	74.25	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	1/1	1	0.00	0.00	0.00	0.00	0.00	0.29	0.71	0.00
Totals Alternative A	**B-1**	3627/743	1960	89.56	201.52	89.56	44.78	22.39	1499.84	12.34	0.00
	B-52	1614/86	675	0.00	110.40	19.32	2.77	5.53	14.90	522.09	0.00
	Tanker	20/6	24	0.00	0.00	0.00	0.00	0.00	18.25	5.76	0.00
	Transient	25/9	13	0.65	0.65	0.00	0.00	2.30	4.22	5.18	0.00

Table 2-16. Estimated Annual LFE Time and Altitude Distribution, Alternative A (Page 1 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 – 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
PR-1A/B MOAs/ATCAAs	**B-1**	200/200	88.85	4.44	10.00	4.44	2.22	1.11	53.31	13.33	0.00
	B-52	25/25	20.68	0.00	0.00	0.00	0.00	0.00	0.20	20.28	0.20
	Tanker	32/32	57.6	0.00	0.00	0.00	0.00	0.00	43.20	14.40	0.00
	Transient	100/100	33.32	1.80	1.80	0.00	0.00	6.40	8.16	12.83	2.33
PR-2 MOA/ATCAA	**B-1**	200/200	98.4	4.92	11.07	4.92	2.46	1.23	59.04	14.76	0.00
	B-52	25/25	22.3	0.00	0.00	0.00	0.00	0.00	0.22	21.86	0.22
	Tanker	32/32	4.58	0.00	0.00	0.00	0.00	0.00	3.44	1.15	0.00
	Transient	100/100	36.9	1.99	1.99	0.00	0.00	7.08	9.04	14.21	2.58
PR-3 MOA/ATCAA	**B-1**	200/200	58.88	2.94	6.62	2.94	1.47	0.74	35.33	8.83	0.00
	B-52	25/25	13.34	0.00	0.00	0.00	0.00	0.00	0.14	13.06	0.14
	Tanker	32/32	2.74	0.00	0.00	0.00	0.00	0.00	2.06	0.69	0.00
	Transient	100/100	22.08	1.19	1.19	0.00	0.00	4.24	5.41	8.50	1.55
PR-4 MOA/ATCAA	**B-1**	200/200	75.24	3.76	8.46	3.76	1.88	0.94	45.14	11.29	0.00
	B-52	25/25	17.05	0.00	0.00	0.00	0.00	0.00	0.18	16.69	0.18
	Tanker	32/32	57.6	0.00	0.00	0.00	0.00	0.00	43.20	14.40	0.00
	Transient	100/100	28.22	1.52	1.52	0.00	0.00	5.42	6.91	10.86	1.98
Gap A MOA/ATCAA	**B-1**	200/200	12.96	0.65	1.46	0.65	0.32	0.16	7.78	1.94	0.00
	B-52	25/25	2.94	0.00	0.00	0.00	0.00	0.00	0.02	2.90	0.02
	Tanker	32/32	0.6	0.00	0.00	0.00	0.00	0.00	0.45	0.15	0.00
	Transient	100/100	4.86	0.26	0.26	0.00	0.00	0.93	1.19	1.87	0.34
Gap B MOA/ATCAA	**B-1**	200/200	17.64	0.88	1.98	0.88	0.44	0.22	10.58	2.65	0.00
	B-52	25/25	4	0.00	0.00	0.00	0.00	0.00	0.04	3.92	0.04
	Tanker	32/32	0.82	0.00	0.00	0.00	0.00	0.00	0.62	0.21	0.00
	Transient	100/100	6.62	0.36	0.36	0.00	0.00	1.27	1.62	2.55	0.46

Table 2-16. Estimated Annual LFE Time and Altitude Distribution, Alternative A (Page 2 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 - 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
Gap C MOA/ATCAA	**B-1**	200/200	9.1	0.46	1.02	0.46	0.23	0.11	5.46	1.37	0.00
	B-52	25/25	2.06	0.00	0.00	0.00	0.00	0.00	0.02	2.02	0.02
	Tanker	32/32	0.42	0.00	0.00	0.00	0.00	0.00	0.32	0.11	0.00
	Transient	100/100	3.4	0.18	0.18	0.00	0.00	0.65	0.83	1.31	0.24
Gateway East ATCAA	**B-1**	100/100	3.21	0.00	0.00	0.00	0.00	0.00	2.57	0.64	0.00
	B-52	25/25	1.46	0.00	0.00	0.00	0.00	0.00	0.02	1.42	0.02
	Tanker	32/32	0.3	0.00	0.00	0.00	0.00	0.00	0.23	0.08	0.00
	Transient	50/50	1.2	0.00	0.00	0.00	0.00	0.00	0.42	0.66	0.12
Gateway West ATCAA	**B-1**	100/100	35.71	0.00	0.00	0.00	0.00	0.00	28.57	7.14	0.00
	B-52	25/25	16.18	0.00	0.00	0.00	0.00	0.00	0.16	15.86	0.16
	Tanker	32/32	3.33	0.00	0.00	0.00	0.00	0.00	2.50	0.83	0.00
	Transient	50/50	13.39	0.00	0.00	0.00	0.00	0.00	4.69	7.36	1.34
Totals Alternative A	**B-1**	1600/1600	399.99	18.05	40.62	18.05	9.03	4.51	247.78	61.94	0.00
	B-52	225/225	100.01	0.00	0.00	0.00	0.00	0.00	1.00	98.01	1.00
	Tanker	288/288	127.99	0.00	0.00	0.00	0.00	0.00	95.99	32.00	0.00
	Transient	800/800	149.99	7.31	7.31	0.00	0.00	26.00	38.28	60.15	10.94

Table 2-17. Estimated Annual Combined Use LFEs and Day-to-Day Time and Altitude Distribution, Alternative A (Page 1 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 – 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
PR-1A/B MOAs/ATCAAs	**B-1**	814/326	458.85	22.94	51.62	22.94	11.47	5.74	328.04	16.10	0.00
	B-52	375/44	245.68	0.00	41.40	7.25	1.04	2.07	1.94	191.78	0.20
	Tanker	41/34	68.6	0.00	0.00	0.00	0.00	0.00	51.45	17.15	0.00
	Transient	106/102	36.32	1.96	1.96	0.00	0.00	6.97	8.77	14.32	2.33
PR-2 MOA/ATCAA	**B-1**	1610/490	779.65	38.98	87.71	38.98	19.49	9.75	564.87	19.87	0.00
	B-52	595/55	247.3	0.00	41.40	7.25	1.04	2.07	1.96	193.37	0.22
	Tanker	33/33	5.58	0.00	0.00	0.00	0.00	0.00	4.19	1.40	0.00
	Transient	106/102	39.9	2.15	2.15	0.00	0.00	7.66	9.65	15.70	2.58
PR-3 MOA/ATCAA	**B-1**	814/326	428.88	21.44	48.25	21.44	10.72	5.36	312.83	8.83	0.00
	B-52	84/28	25.84	0.00	2.30	0.40	0.06	0.12	9.75	13.07	0.14
	Tanker	33/33	3.74	0.00	0.00	0.00	0.00	0.00	3.05	0.69	0.00
	Transient	106/102	25.08	1.35	1.35	0.00	0.00	4.82	7.51	8.50	1.55
PR-4 MOA/ATCAA	**B-1**	814/326	445.24	22.26	50.09	22.26	11.13	5.57	322.64	11.29	0.00
	B-52	375/44	92.05	0.00	13.80	2.42	0.35	0.69	57.91	16.70	0.18
	Tanker	41/34	68.6	0.00	0.00	0.00	0.00	0.00	54.20	14.40	0.00
	Transient	106/102	31.22	1.69	1.69	0.00	0.00	5.99	9.01	10.87	1.98
Gap A MOA/ATCAA	**B-1**	200/200	12.96	0.65	1.46	0.65	0.32	0.16	7.78	1.94	0.00
	B-52	25/25	2.94	0.00	0.00	0.00	0.00	0.00	0.02	2.90	0.02
	Tanker	32/32	0.6	0.00	0.00	0.00	0.00	0.00	0.45	0.15	0.00
	Transient	100/100	4.86	0.26	0.26	0.00	0.00	0.93	1.19	1.87	0.34
Gap B MOA/ATCAA	**B-1**	200/200	17.64	0.88	1.98	0.88	0.44	0.22	10.58	2.65	0.00
	B-52	25/25	4	0.00	0.00	0.00	0.00	0.00	0.04	3.92	0.04
	Tanker	32/32	0.82	0.00	0.00	0.00	0.00	0.00	0.62	0.21	0.00
	Transient	100/100	6.62	0.36	0.36	0.00	0.00	1.27	1.62	2.55	0.46

Table 2-17. Estimated Annual Combined Use LFEs and Day-to-Day Time and Altitude Distribution, Alternative A (Page 2 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 - 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
Gap C MOA/ATCAA	**B-1**	200/200	9.1	0.46	1.02	0.46	0.23	0.11	5.46	1.37	0.00
	B-52	25/25	2.06	0.00	0.00	0.00	0.00	0.00	0.02	2.02	0.02
	Tanker	32/32	0.42	0.00	0.00	0.00	0.00	0.00	0.32	0.11	0.00
	Transient	100/100	3.4	0.18	0.18	0.00	0.00	0.65	0.83	1.31	0.24
Gateway East ATCAA	**B-1**	100/100	3.21	0.00	0.00	0.00	0.00	0.00	2.57	0.64	0.00
	B-52	25/25	1.46	0.00	0.00	0.00	0.00	0.00	0.02	1.42	0.02
	Tanker	32/32	0.3	0.00	0.00	0.00	0.00	0.00	0.23	0.08	0.00
	Transient	50/50	1.2	0.00	0.00	0.00	0.00	0.00	0.42	0.66	0.12
Gateway West ATCAA	**B-1**	475/175	204.46	0.00	0.00	0.00	0.00	0.00	195.63	8.83	0.00
	B-52	310/40	91.18	0.00	0.00	0.00	0.00	0.00	0.91	90.11	0.16
	Tanker	32/32	3.33	0.00	0.00	0.00	0.00	0.00	2.50	0.83	0.00
	Transient	51/51	14.39	0.00	0.00	0.00	0.00	0.00	4.98	8.07	1.34
Totals Alternative A	**B-1**	5227/2343	2359.99	107.62	242.14	107.62	53.81	26.90	1750.39	71.52	0.00
	B-52	1839/311	712.51	0.00	98.90	17.32	2.49	4.95	72.57	515.29	1.00
	Tanker	308/294	151.99	0.00	0.00	0.00	0.00	0.00	116.99	35.00	0.00
	Transient	825/809	162.99	7.96	7.96	0.00	0.00	28.30	43.98	63.85	10.94

2.5.4 Supersonic Activity

The Air Force proposes to conduct training which would involve supersonic flights within the PRTC airspace during LFEs. Supersonic flights could occur during air combat, air-to-air engagements, defensive maneuvers, and other tactics during the LFE. Table 2-8 provides an estimate of aircraft types and estimated time above supersonic speeds. All B-1 supersonic activities would occur above 20,000 feet MSL; transient fighter supersonic activity would be above 10,000 feet AGL. The B-1 would fly supersonic for about 30 seconds during 60 sorties during the 10 days of LFEs per year. Transient fighters would engage in an estimated 48 minutes of supersonic flight during the estimated 10 days of LFEs annually with an estimated 5 percent between 10,000 feet AGL and FL180, 25 percent from FL180 to FL300, and 70 percent above FL300. Supersonic activity would generally be toward the center of the LFE airspace over the proposed PR-2, PR-3, and Gap B MOAs/ATCAAs as aircraft use supersonic capabilities in engagements.

2.5.5 Defensive Countermeasures

Under Alternative A, an annual estimate of approximately 33,000 chaff bundles and 3,300 flares would be deployed. Table 2-18 presents the annual chaff and flare use for Alternative A from Table 2-9. Different aircraft types employ specific types of chaff and flares in quantities reflective of their missions. Chaff and flare use would adhere to the restrictions described in Section 2.4.6. Table 2-18 estimates the Alternative A annual numbers of chaff bundles and flares by airspace based upon time spent in the airspace. Chaff and flare residual materials would be as described in Section 2.4.6.3.

Table 2-18. Alternative A Estimated Chaff and Flare Use by Airspace

Airspace	*Chaff*	*Flares*
PR-1A/B MOAs/ATCAAs	8,300	820
PR-2 MOA/ATCAA	11,000	1,100
PR-3 MOA/ATCAA	4,200	420
PR-4 MOA/ATCAA	5,500	550
Gap A MOA/ATCAA	200	20
Gap B MOA/ATCAA	260	30
Gap C MOA/ATCAA	140	10
Gateway East/West ATCAA	3,400	350
Totals	33,000	3,300

2.5.6 Ground-Based Training Assets

The existing electronic range complex consists of the Belle Fourche ESS and numerous emitter and/or simulated threat sites underlying existing MOA and ATCAA airspace. These sites provide training opportunities within the existing Powder River airspace and would continue to support training in the proposed PR-2 MOA/ATCAA.

2.6 Alternative B

Alternative B expands and enhances the airspace and ground assets based on the existing Powder River airspace. Alternative B would include all the common elements described in Section 2.4.

2.6.1 Airspace Structure

Under Alternative B, the Air Force would request the FAA to establish the MOAs, ATCAAs, and Gap MOA ATCAAs defined for Alternative A with the exception of PR-1A MOAs, PR-1B MOA, and the Gap A MOAs (see Figure 2-10). Alternative B ATCAAs would be above the MOAs in PR-2, PR-3, PR-4, Gap B, and Gap C as they are for Alternative A. The PR-1A and PR-1B ATCAAs and Gap A ATCAA are included in Alternative B.

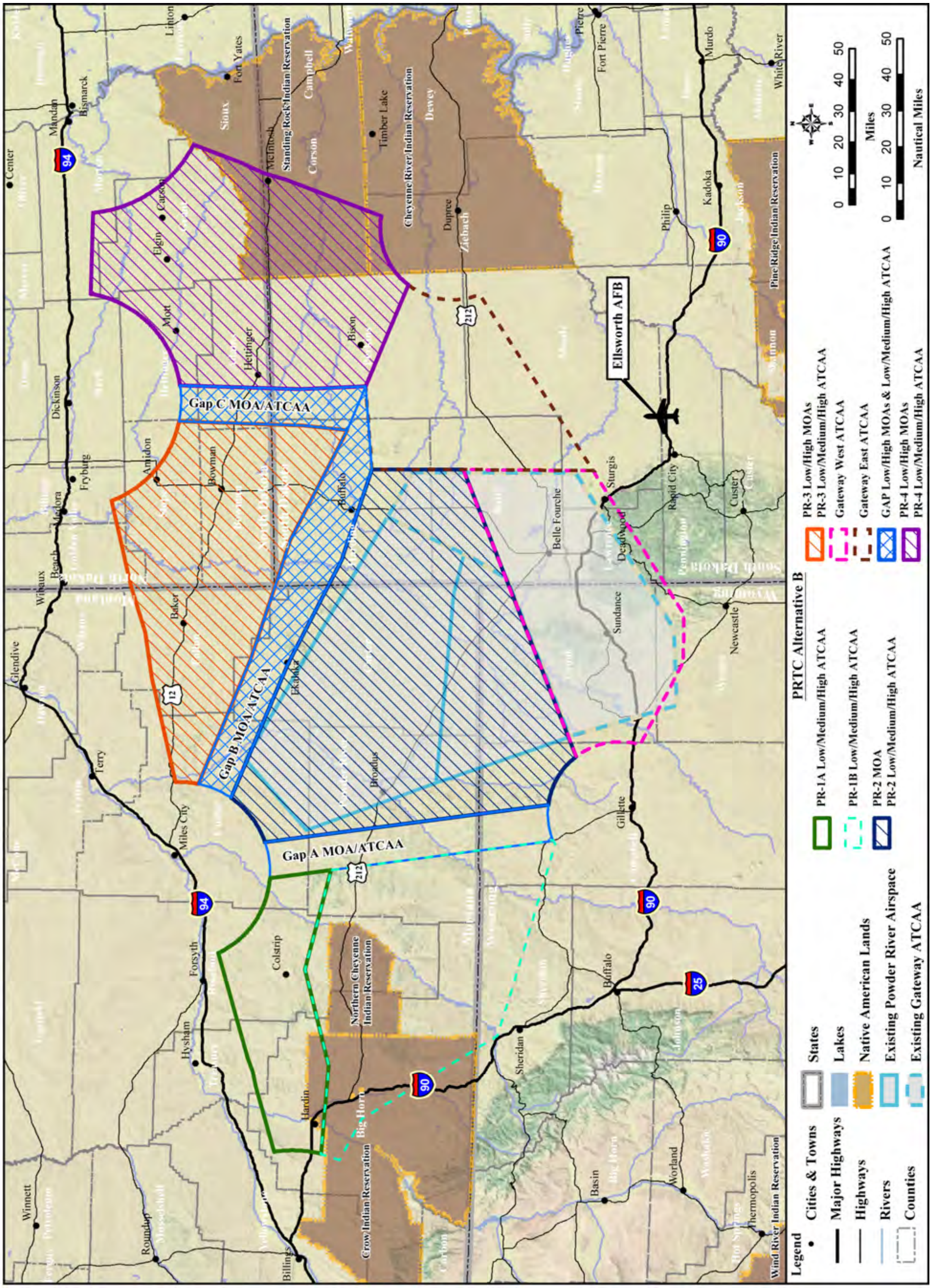


Figure 2-10. Alternative B Airspace

2.6.2 Airspace Operations

Under Alternative B, the primary users of the airspace would be the B-1s and B-52s. Table 2-19 compares local and remote sorties under baseline or existing conditions and Alternative B. This table demonstrates that Alternative B would increase local airspace training for B-1s from 46 percent of training sorties to 76 percent of training sorties and for B-52s from 31 percent to 76 percent of training sorties.

Table 2-19. Annual Sortie Comparison Between Baseline and Alternative B

	EXISTING				ALTERNATIVE B				CHANGE		Total B-1 and
Sortie	***B-1***	***%***	***B-52***	***%***	***B-1***	***%***	***B-52***	***%***	***B-1***	***B-52***	***B-52***
Local	1,000	46%	300	31%	1,940	76%	722	76%	+940	+422	+1,362
Remote	1,160	54%	650	69%	600	24%	228	24%	-560	-422	-982

With Alternative B, aircrews would use remote training complexes at a higher rate than with the Alternative A. As noted in Section 2.3.1.2, one criterion for quality training airspace is 1,000 feet of topography variation over a distance of 10 miles to conduct terrain following training. PR-1B MOA is the only proposed airspace with the ability to train with mountainous terrain needed for bomber terrain following tactics. Alternative B would not include this terrain.

Under Alternative B, approximately 76 percent of training sorties for the bombers would occur locally in the modified and new airspace. While this would constitute a substantial improvement over baseline conditions, it would be 9 percentage points lower than the 85 percent of local training sorties projected with Alternative A.

Table 2-20 presents Alternative B estimated and baseline sortie-operations in MOA and ATCAA airspaces for all aircraft during normal day-to-day and LFE training.

Table 2-20. Alternative B MOA and ATCAA Annual Sortie-Operations Comparison

	AIRCRAFT				
	B-1	***B-52***	***Transient[1]***	***Tankers***	***Total***
Baseline					
MOA	500	0	60	0	560
ATCAA	1,250	1,500	90	0	2,840
Projected					
MOA	1,295	320	307	0	1,922
ATCAA	5,135	1,692	1,123	601	8,551
Increase					
MOA	795	320	247	0	1,362
ATCAA	3,885	192	1,033	601	5,711

Note: 1. Includes F-16, F-15, and F-22 fighter aircraft and others (see Appendix B).

The Alternative B day-to-day annual military training hours by aircraft in each airspace is presented in Table 2-21. The table reflects Alternative B with no PR-1A/B MOAs. Table 2-22 presents the LFE training hours for each altitude and airspace, including the LFE only airspaces. Table 2-23 adds the day-to-day and LFE training hours to present the total estimated hourly training hours by aircraft and Alternative B airspace. Table 2-23 is an estimated annual usage, including transients and tankers. Transient fighters would be expected to perform most of their sortie-operations during LFEs and tanker aircraft would support training as needed. Table 2-23 represents the total projected PRTC airspace use for Alternative B. As future missions change, hour distributions could also vary.

Table 2-21. Estimated Annual Day-to-Day Time and Altitude Distribution, Alternative B (Page 1 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 – 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
PR-1A/B ATCAAs	**B-1**	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	219/12	190.5	0.00	0.00	0.00	0.00	0.00	1.91	188.59	0.00
	Tanker	9/2	11	0.00	0.00	0.00	0.00	0.00	8.25	2.75	0.00
	Transient	3/1	3	0.00	0.00	0.00	0.00	0.00	0.87	2.13	0.00
PR-2 MOA/ATCAA	**B-1**	1410/290	681.25	34.06	76.64	34.06	17.03	8.52	505.83	5.11	0.00
	B-52	570/30	225	0.00	41.40	7.25	1.04	2.07	1.73	171.52	0.00
	Tanker	1/1	1	0.00	0.00	0.00	0.00	0.00	0.75	0.25	0.00
	Transient	6/2	2	0.11	0.11	0.00	0.00	0.38	0.41	0.99	0.00
PR-3 MOA/ATCAA	**B-1**	614/126	370	18.50	41.63	18.50	9.25	4.63	277.50	0.00	0.00
	B-52	59/3	12.5	0.00	2.30	0.40	0.06	0.12	9.61	0.01	0.00
	Tanker	1/1	1	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
	Transient	6/2	3	0.16	0.16	0.00	0.00	0.58	2.10	0.00	0.00
PR-4 MOA/ATCAA	**B-1**	614/126	370	18.50	41.63	18.50	9.25	4.63	277.50	0.00	0.00
	B-52	350/19	75	0.00	13.80	2.42	0.35	0.69	57.73	0.01	0.00
	Tanker	9/2	11	0.00	0.00	0.00	0.00	0.00	8.25	2.75	0.00
	Transient	6/2	3	0.16	0.16	0.00	0.00	0.58	0.61	1.49	0.00
Gap A ATCAA	**B-1**	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gap B MOA/ATCAA	**B-1**	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 2-21. Estimated Annual Day-to-Day Time and Altitude Distribution, Alternative B (Page 2 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 - 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
Gap C MOA/ATCAA	**B-1**	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gateway East ATCAA	**B-1**	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gateway West ATCAA	**B-1**	375/75	168.75	0.00	0.00	0.00	0.00	0.00	167.06	1.69	0.00
	B-52	285/15	75	0.00	0.00	0.00	0.00	0.00	0.75	74.25	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	1/1	1	0.00	0.00	0.00	0.00	0.00	0.29	0.71	0.00
Totals Alternative B	**B-1**	3013/617	1590	71.06	159.89	71.06	35.53	17.77	1227.88	6.80	0.00
	B-52	1483/79	578	0.00	57.50	10.07	1.45	2.88	71.73	434.38	0.00
	Tanker	20/6	24	0.00	0.00	0.00	0.00	0.00	18.25	5.76	0.00
	Transient	22/8	12	0.43	0.43	0.00	0.00	1.54	4.28	5.32	0.00

Table 2-22. Estimated Annual LFE Time and Altitude Distribution, Alternative B (Page 1 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 – 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
PR-1A/B ATCAAs	**B-1**	100/100	52.1	0.00	0.00	0.00	0.00	0.00	41.68	10.42	0.00
	B-52	25/25	20.68	0.00	0.00	0.00	0.00	0.00	0.20	20.28	0.20
	Tanker	32/32	57.6	0.00	0.00	0.00	0.00	0.00	43.20	14.40	0.00
	Transient	50/50	19.54	0.00	0.00	0.00	0.00	0.00	6.84	10.75	1.95
PR-2 MOA/ATCAA	**B-1**	200/200	112.38	5.62	12.64	5.62	2.81	1.40	67.43	16.86	0.00
	B-52	25/25	22.3	0.00	0.00	0.00	0.00	0.00	0.22	21.86	0.22
	Tanker	32/32	4.58	0.00	0.00	0.00	0.00	0.00	3.44	1.15	0.00
	Transient	100/100	42.14	2.28	2.28	0.00	0.00	8.09	10.32	16.22	2.95
PR-3 MOA/ATCAA	**B-1**	200/200	67.24	3.36	7.56	3.36	1.68	0.84	40.34	10.09	0.00
	B-52	25/25	13.34	0.00	0.00	0.00	0.00	0.00	0.14	13.06	0.14
	Tanker	32/32	2.74	0.00	0.00	0.00	0.00	0.00	2.06	0.69	0.00
	Transient	100/100	25.22	1.36	1.36	0.00	0.00	4.84	6.18	9.71	1.77
PR-4 MOA/ATCAA	**B-1**	200/200	85.92	4.30	9.67	4.30	2.15	1.07	51.55	12.89	0.00
	B-52	25/25	17.05	0.00	0.00	0.00	0.00	0.00	0.18	16.69	0.18
	Tanker	32/32	57.6	0.00	0.00	0.00	0.00	0.00	43.20	14.40	0.00
	Transient	100/100	32.22	1.74	1.74	0.00	0.00	6.19	7.89	12.40	2.26
Gap A ATCAA	**B-1**	100/100	7.4	0.00	0.00	0.00	0.00	0.00	5.92	1.48	0.00
	B-52	25/25	2.94	0.00	0.00	0.00	0.00	0.00	0.02	2.90	0.02
	Tanker	32/32	0.6	0.00	0.00	0.00	0.00	0.00	0.45	0.15	0.00
	Transient	50/50	2.78	0.00	0.00	0.00	0.00	0.00	0.97	1.53	0.28
Gap B MOA/ATCAA	**B-1**	200/200	20.14	1.01	2.27	1.01	0.50	0.25	12.08	3.02	0.00
	B-52	25/25	4	0.00	0.00	0.00	0.00	0.00	0.04	3.92	0.04
	Tanker	32/32	0.82	0.00	0.00	0.00	0.00	0.00	0.62	0.21	0.00
	Transient	100/100	7.56	0.41	0.41	0.00	0.00	1.45	1.85	2.91	0.53

Table 2-22. Estimated Annual LFE Time and Altitude Distribution, Alternative B (Page 2 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 - 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
Gap C MOA/ATCAA	**B-1**	200/200	10.38	0.52	1.17	0.52	0.26	0.13	6.23	1.56	0.00
	B-52	25/25	2.06	0.00	0.00	0.00	0.00	0.00	0.02	2.02	0.02
	Tanker	32/32	0.42	0.00	0.00	0.00	0.00	0.00	0.32	0.11	0.00
	Transient	100/100	3.9	0.21	0.21	0.00	0.00	0.75	0.96	1.50	0.27
Gateway East ATCAA	**B-1**	100/100	3.67	0.00	0.00	0.00	0.00	0.00	2.94	0.73	0.00
	B-52	25/25	1.46	0.00	0.00	0.00	0.00	0.00	0.02	1.42	0.02
	Tanker	32/32	0.3	0.00	0.00	0.00	0.00	0.00	0.23	0.08	0.00
	Transient	50/50	1.38	0.00	0.00	0.00	0.00	0.00	0.48	0.76	0.14
Gateway West ATCAA	**B-1**	100/100	40.77	0.00	0.00	0.00	0.00	0.00	32.62	8.15	0.00
	B-52	25/25	16.18	0.00	0.00	0.00	0.00	0.00	0.16	15.86	0.16
	Tanker	32/32	3.33	0.00	0.00	0.00	0.00	0.00	2.50	0.83	0.00
	Transient	50/50	15.29	0.00	0.00	0.00	0.00	0.00	5.35	8.41	1.53
Totals Alternative B	**B-1**	1400/1400	359.23	14.80	33.31	14.80	7.40	3.70	228.17	57.04	0.00
	B-52	225/225	83.83	0.00	0.00	0.00	0.00	0.00	0.84	82.15	0.84
	Tanker	288/288	124.66	0.00	0.00	0.00	0.00	0.00	93.50	31.17	0.00
	Transient	700/700	134.74	6.00	6.00	0.00	0.00	21.32	35.50	55.79	10.14

Table 2-23. Estimated Annual Combined Use LFE and Day-to-Day Time and Altitude Distribution, Alternative B (Page 1 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 – 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
PR-1A/B ATCAAs	**B-1**	100/100	52.1	0.00	0.00	0.00	0.00	0.00	41.68	10.42	0.00
	B-52	244/37	211.18	0.00	0.00	0.00	0.00	0.00	2.11	208.87	0.20
	Tanker	41/34	68.6	0.00	0.00	0.00	0.00	0.00	51.45	17.15	0.00
	Transient	53/51	22.54	0.00	0.00	0.00	0.00	0.00	7.71	12.88	1.95
PR-2 MOA/ATCAA	**B-1**	1610/490	793.63	39.68	89.28	39.68	19.84	9.92	573.26	21.97	0.00
	B-52	595/55	247.3	0.00	41.40	7.25	1.04	2.07	1.95	193.38	0.22
	Tanker	33/33	5.58	0.00	0.00	0.00	0.00	0.00	4.19	1.40	0.00
	Transient	106/102	44.14	2.38	2.38	0.00	0.00	8.47	10.73	17.22	2.95
PR-3 MOA/ATCAA	**B-1**	814/326	437.24	21.86	49.19	21.86	10.93	5.47	317.84	10.09	0.00
	B-52	84/28	25.84	0.00	2.30	0.40	0.06	0.12	9.75	13.07	0.14
	Tanker	33/33	3.74	0.00	0.00	0.00	0.00	0.00	3.05	0.69	0.00
	Transient	106/102	28.22	1.52	1.52	0.00	0.00	5.42	8.28	9.70	1.77
PR-4 MOA/ATCAA	**B-1**	814/326	455.92	22.80	51.29	22.80	11.40	5.70	329.05	12.89	0.00
	B-52	375/44	92.05	0.00	13.80	2.42	0.35	0.69	57.91	16.70	0.18
	Tanker	41/34	68.6	0.00	0.00	0.00	0.00	0.00	51.45	17.15	0.00
	Transient	106/102	35.22	1.90	1.90	0.00	0.00	6.76	8.50	13.90	2.26
Gap A ATCAA	**B-1**	100/100	7.4	0.00	0.00	0.00	0.00	0.00	5.92	1.48	0.00
	B-52	25/25	2.94	0.00	0.00	0.00	0.00	0.00	0.02	2.90	0.02
	Tanker	32/32	0.6	0.00	0.00	0.00	0.00	0.00	0.45	0.15	0.00
	Transient	50/50	2.78	0.00	0.00	0.00	0.00	0.00	0.97	1.53	0.28
Gap B MOA/ATCAA	**B-1**	200/200	20.14	1.01	2.27	1.01	0.50	0.25	12.08	3.02	0.00
	B-52	25/25	4	0.00	0.00	0.00	0.00	0.00	0.04	3.92	0.04
	Tanker	32/32	0.82	0.00	0.00	0.00	0.00	0.00	0.62	0.21	0.00
	Transient	100/100	7.56	0.41	0.41	0.00	0.00	1.45	1.85	2.91	0.53

Table 2-23. Estimated Annual Combined Use LFE and Day-to-Day Time and Altitude Distribution, Alternative B (Page 2 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 - 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
Gap C MOA/ATCAA	**B-1**	200/200	10.38	0.52	1.17	0.52	0.26	0.13	6.23	1.56	0.00
	B-52	25/25	2.06	0.00	0.00	0.00	0.00	0.00	0.02	2.02	0.02
	Tanker	32/32	0.42	0.00	0.00	0.00	0.00	0.00	0.32	0.11	0.00
	Transient	100/100	3.9	0.21	0.21	0.00	0.00	0.75	0.96	1.50	0.27
Gateway East ATCAA	**B-1**	100/100	3.67	0.00	0.00	0.00	0.00	0.00	2.94	0.73	0.00
	B-52	25/25	1.46	0.00	0.00	0.00	0.00	0.00	0.02	1.42	0.02
	Tanker	32/32	0.3	0.00	0.00	0.00	0.00	0.00	0.23	0.08	0.00
	Transient	50/50	1.38	0.00	0.00	0.00	0.00	0.00	0.48	0.76	0.14
Gateway West ATCAA	**B-1**	475/175	209.52	0.00	0.00	0.00	0.00	0.00	199.68	9.84	0.00
	B-52	310/40	91.18	0.00	0.00	0.00	0.00	0.00	0.91	90.11	0.16
	Tanker	32/32	3.33	0.00	0.00	0.00	0.00	0.00	2.50	0.83	0.00
	Transient	51/51	16.29	0.00	0.00	0.00	0.00	0.00	5.64	9.12	1.53
Totals Alternative B	**B-1**	4413/2017	1990	85.87	193.20	85.87	42.93	21.47	1488.67	72.00	0.00
	B-52	1708/304	678.01	0.00	57.50	10.07	1.45	2.88	72.73	532.39	1.00
	Tanker	308/294	151.99	0.00	0.00	0.00	0.00	0.00	114.24	37.75	0.00
	Transient	722/708	162.03	6.43	6.43	0.00	0.00	22.86	45.13	69.51	11.68

2.6.3 Large Force Exercises

LFEs would form part of Alternative B, occurring with the same frequency and involving similar operations as described under the Alternative A. The patterns of use for LFEs and the distribution of sortie-operations would be similar to required training described for Alternative A with stand-off distance and altitude restrictions to account for the lack of the PR-1A, PR-1B, and Gap A MOAs. Sortie-operations for LFEs would be somewhat less than those described for Alternative A. Table 2-28 presents estimated LFE airspace usage. LFE would have reduced training effectiveness with Alternative B due to not having low-level mountainous terrain under the PR-1B ATCAA or extended stand-off distances at lower altitudes under the PR-1A, PR-1B, or Gap A MOAs.

2.6.4 Supersonic Activity

Alternative B supersonic activity would not be expected to discernibly change from Alternative A because LFE training would be the same as expected for Alternative A. B-1 supersonic flight would occur above 20,000 feet MSL within the airspace during LFEs as described for Alternative A. Alternative B would include authorization for transient fighter aircraft to fly supersonic above 10,000 feet AGL during LFEs. Total supersonic activity would be comparable to that described for Alternative A in Section 2.4.5. B-1 annual supersonic events would be estimated at 60 spread throughout the 10 days per year of LFEs. Table 2-8 lists the estimated supersonic minutes by aircraft type and altitudes. All B-1 and most fighter supersonic flight would occur in the ATCAAs.

2.6.5 Defensive Countermeasures

Under Alternative B, use of chaff and flares would follow the same patterns, procedures, and restrictions as described for Alternative A. The reduction in total sortie-operations between Alternative A and Alternative B would not be expected to result in a reduction in chaff and flare use because training with defensive chaff and flares would be required of aircrews. Table 2-24 presents the annual chaff and flare use under Alternative B from Table 2-9. Chaff and flare use would adhere to the restrictions described in Section 2.4.6. Residual materials and deposition would generally be as described for Alternative A.

Table 2–24. Alternative B Estimated Annual Chaff and Flare Use by Airspace

Airspace	*Chaff*	*Flares*
PR-1A/B ATCAAs	4,000	400
PR-2 MOA/ATCAA	11,500	1,150
PR-3 MOA/ATCAA	4,600	460
PR-4 MOA/ATCAA	5,850	600
Gap A ATCAA	130	10
Gap B MOA/ATCAA	300	30
Gap C MOA/ATCAA	150	20
Gateway East/West ATCAA	3,500	350
Totals	30,030	3,020

2.6.6 Ground-Based Training Assets

The existing electronic range complex consists of the Belle Fourche ESS and numerous emitter and/or simulated threat sites underlying existing MOA and ATCAA airspace. These sites provide training opportunities within the existing Powder River airspace and would continue to support training in the proposed PRTC.

2.7 Alternative C

Alternative C would expand and enhance the airspace and ground assets based on the existing Powder River airspace. Alternative C would include all the common elements described in Section 2.4.

2.7.1 Airspace Structure

For Alternative C, the Air Force would request the FAA to establish all the MOAs, ATCAAs, and Gap MOA ATCAAs defined for the Alternative A with the exception that the PR-4 and the GAP C MOAs would not be included in Alternative C. The PR-4 ATCAAs and the Gap C ATCAAs would be included in Alternative C. Figure 2-11 includes the MOA/ATCAA details of Alternative C.

2.7.2 Airspace Operations

Under Alternative C, the primary users of the airspace would be the B-1s and B-52s. Table 2-25 compares the local annual sorties under PRTC Alternative C with the baseline or existing Powder River airspace sorties. Alternative C would be comparable to Alternative B and aircrews would use remote training complexes at a higher rate than with Alternative A. Approximately 76 percent of training would occur locally within PRTC Alternative C. While this would constitute a substantial improvement over Powder River airspace baseline conditions, local training would be lower than Alternative A and similar to Alternative B except over a different geographic area. The inclusion of PR-1A and PR-1B MOAs in Alternative C would support quality low-level training to meet siting criteria for mountainous terrain following training as noted in Section 2.3.1.2.

Table 2–25. Annual Sortie Comparison Between Baseline and Alternative C

	EXISTING				ALTERNATIVE C				CHANGE		*Total B-1 and*
Sortie	***B-1***	***%***	***B-52***	***%***	***B-1***	***%***	***B-52***	***%***	***B-1***	***B-52***	***B-52***
Local	1,000	46%	300	31%	1,940	76%	722	76%	+940	+422	+1,362
Remote	1,160	54%	650	69%	600	24%	228	24%	-560	-422	-982

B-1s would be the primary users of the MOAs while B-1s and B-52s would share the ATCAAs. Table 2-26 provides the Alternative C estimated and baseline sortie-operations in the MOA and ATCAA airspaces for all aircraft during daily and LFE training.

Table 2–26. Alternative C MOA and ATCAA Annual Sortie-Operations Comparison

	AIRCRAFT				
	B-1	***B-52***	***Transient[1]***	***Tankers***	***Total***
Baseline					
MOA	500	0	60	0	560
ATCAA	1,250	1,500	90	0	2,840
Projected					
MOA	1,295	320	297	0	1,912
ATCAA	5,135	1,692	1,137	602	8,566
Increase					
MOA	795	320	237	0	1,352
ATCAA	3,885	192	1,047	602	5,726

Note: 1. Includes F-16, F-15, and F-22 fighter aircraft and others (see Appendix B).

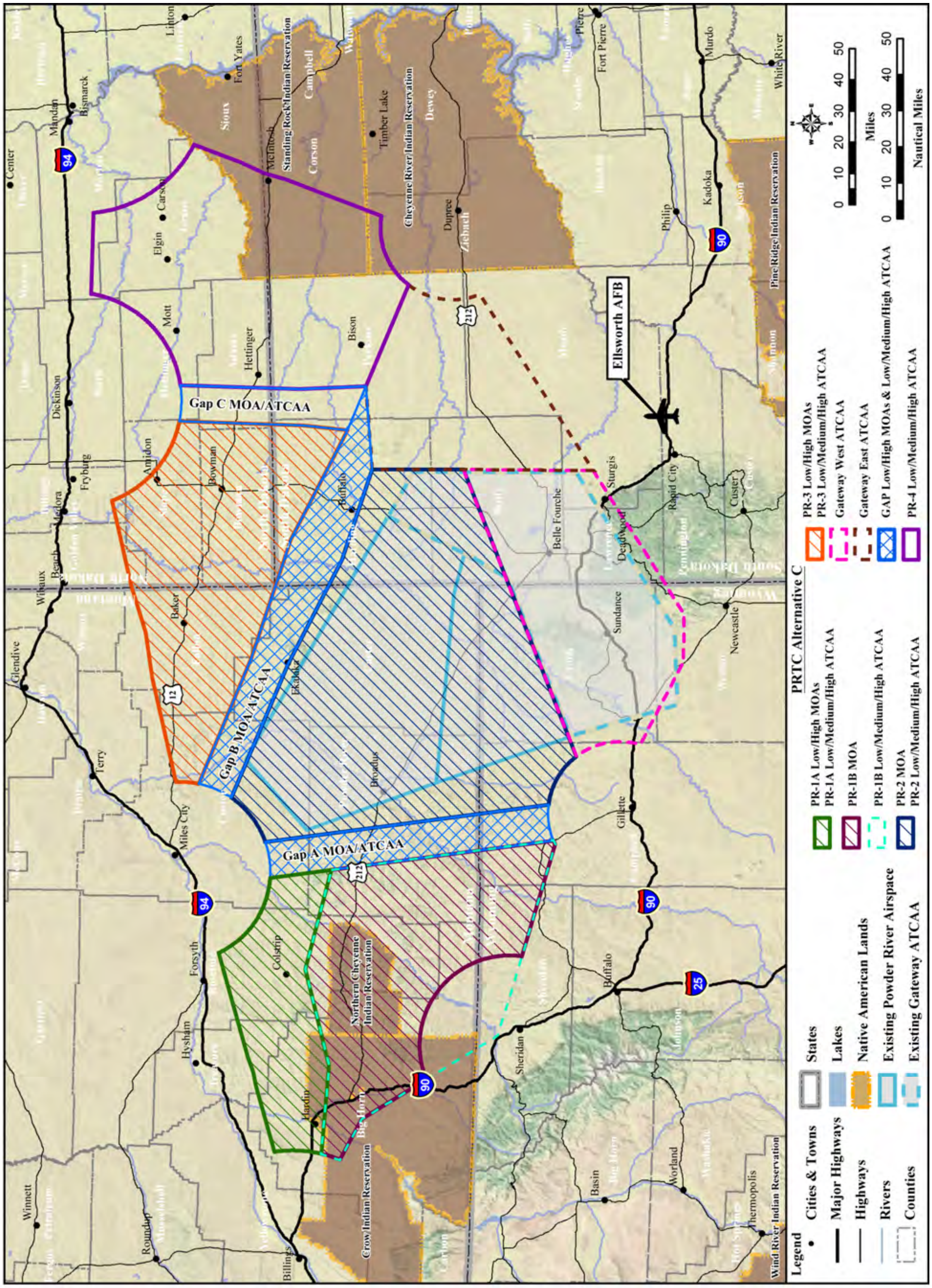


Figure 2-11. Alternative C Airspace

Alternative C annual day-to-day training activity estimated for each aircraft for each altitude within each airspace is presented in Table 2-27. This is the Alternative C estimated annual usage for B-1s, B-52s, transients, and tankers. Transient fighters would be expected to perform most of their sortie-operations during LFEs and tanker aircraft would support training as needed. Table 2-28 presents the Alternative C training hours for an LFE. Table 2-29 combines Tables 2-27 and 2-28 to produce the total Alternative C expected training hours by aircraft, by airspace, and by altitude. Table 2-29 represents the estimated total airspace use with Alternative C. Real world experience and expected missions will change and estimated aircraft training hour distribution would be expected to vary accordingly.

2.7.3 Large Force Exercises

Under Alternative C, LFEs would occur with the same frequency and involve similar operations as described under Alternative A. LFEs would distribute sortie-operations similar to the description under Alternative A with stand-off distances and altitude restrictions to account for the lack of PR-4 MOA and Gap C MOA airspace. Adjustments to account for the different airspace would result in somewhat more traffic in the available airspace. Table 2-28 presents the annual estimated LFE training by aircraft type. Under Alternative C, LFEs would have somewhat higher quality training than under Alternative B because the PR-1B MOA overflies a diversified geographic area suitable for B-1 bomber terrain following tactics.

2.7.4 Supersonic Activity

Alternative C would include B-1 supersonic flight above 20,000 feet MSL during LFEs as described for Alternative A. Although there would be a reduced total amount of day-to-day training, the LFE training and LFE events would be the same as Alternative A. Transient fighter aircraft would operate at supersonic speeds above 10,000 feet AGL during LFEs. Total supersonic activity would match that defined for the Alternative A (refer to Section 2.4.5). Table 2-8 lists the estimated supersonic minutes by aircraft type and altitudes during the expected 10 days of LFEs transient fighters would fly an estimated 100 supersonic events during LFEs. All the B-1 and most of the fighter supersonic activity would occur in the ATCAAs above FL180.

2.7.5 Defensive Countermeasures

With Alternative C, chaff and flare use would follow the same patterns, procedures, and restrictions as described for Alternative A. Alternative C would have approximately the same amount of chaff and flare use as Alternative A as aircrews train for defensive maneuvers. Alternative C total projected chaff and flare use is presented in Table 2-30 from Table 2-9. Table 2-30 gives the total estimated chaff and flare use by airspace for both normal and LFE training. Chaff and flare residual materials would be as described for Alternative A. Restrictions on chaff and flare use would be as described in Section 2.4.6.

2.7.6 Ground-Based Training Assets

The existing electronic range complex consists of the Belle Fourche ESS and numerous emitter and/or simulated threat sites underlying existing MOA and ATCAA airspace. These sites provide training opportunities within the existing Powder River airspace and would continue to support training in the proposed PR-2 MOA/ATCAA.

Table 2-27. Estimated Annual Day-to-Day Time and Altitude Distribution, Alternative C (Page 1 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 – 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
PR-1A/B MOAs/ATCAAs	**B-1**	614/126	370	18.50	41.63	18.50	9.25	4.63	274.73	2.78	0.00
	B-52	350/19	75	0.00	13.80	2.42	0.35	0.69	0.58	57.16	0.00
	Tanker	9/2	11	0.00	0.00	0.00	0.00	0.00	8.25	2.75	0.00
	Transient	6/2	3	0.16	0.16	0.00	0.00	0.58	0.61	1.49	0.00
PR-2 MOA/ATCAA	**B-1**	1410/290	681.25	34.06	76.64	34.06	17.03	8.52	505.83	5.11	0.00
	B-52	570/30	225	0.00	41.40	7.25	1.04	2.07	1.73	171.52	0.00
	Tanker	1/1	1	0.00	0.00	0.00	0.00	0.00	0.75	0.25	0.00
	Transient	6/2	2	0.11	0.11	0.00	0.00	0.38	0.41	0.99	0.00
PR-3 MOA/ATCAA	**B-1**	614/126	370	18.50	41.63	18.50	9.25	4.63	277.50	0.00	0.00
	B-52	59/3	12.5	0.00	2.30	0.40	0.06	0.12	9.60	0.02	0.00
	Tanker	1/1	1	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
	Transient	6/2	3	0.16	0.16	0.00	0.00	0.58	2.10	0.00	0.00
PR-4 ATCAA	**B-1**	0/0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	219/12	190.5	0.00	0.00	0.00	0.00	0.00	190.49	0.01	0.00
	Tanker	9/2	11	0.00	0.00	0.00	0.00	0.00	11.00	0.00	0.00
	Transient	6/2	3	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00
Gap A MOA/ATCAA	**B-1**	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gap B MOA/ATCAA	**B-1**	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 2-27. Estimated Annual Day-to-Day Time and Altitude Distribution, Alternative C (Page 2 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 - 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
Gap C ATCAA	**B-1**	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gateway East ATCAA	**B-1**	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	0/0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gateway West ATCAA	**B-1**	375/75	168.75	0.00	0.00	0.00	0.00	0.00	167.06	1.69	0.00
	B-52	285/15	75	0.00	0.00	0.00	0.00	0.00	0.75	74.25	0.00
	Tanker	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transient	1/1	1	0.00	0.00	0.00	0.00	0.00	0.29	0.71	0.00
Totals Alternative C	**B-1**	3013/617	1590.0	71.06	159.89	71.06	35.53	17.77	1225.11	9.57	0.00
	B-52	1483/79	578	0.00	57.50	10.07	1.45	2.88	203.15	302.96	0.00
	Tanker	20/6	24	0.00	0.00	0.00	0.00	0.00	21.00	3.01	0.00
	Transient	25/9	12	0.43	0.43	0.00	0.00	1.54	6.41	3.19	0.00

Table 2-28. Estimated Annual LFE Time and Altitude Distribution, Alternative C (Page 1 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 – 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
PR-1A/B MOAs/ATCAAs	**B-1**	200/200	99.33	4.97	11.17	4.97	2.48	1.24	59.60	14.90	0.00
	B-52	25/25	20.68	0.00	0.00	0.00	0.00	0.00	0.20	20.28	0.20
	Tanker	32/32	57.6	0.00	0.00	0.00	0.00	0.00	43.20	14.40	0.00
	Transient	100/100	36.24	1.96	1.96	0.00	0.00	6.96	8.88	13.95	2.54
PR-2 MOA/ATCAA	**B-1**	200/200	110	5.50	12.38	5.50	2.75	1.38	66.00	16.50	0.00
	B-52	25/25	22.3	0.00	0.00	0.00	0.00	0.00	0.22	21.86	0.22
	Tanker	32/32	4.58	0.00	0.00	0.00	0.00	0.00	3.44	1.15	0.00
	Transient	100/100	41.26	2.23	2.23	0.00	0.00	7.92	10.11	15.89	2.89
PR-3 MOA/ATCAA	**B-1**	200/200	65.82	3.29	7.40	3.29	1.65	0.82	39.49	9.87	0.00
	B-52	25/25	13.34	0.00	0.00	0.00	0.00	0.00	0.14	13.06	0.14
	Tanker	32/32	2.74	0.00	0.00	0.00	0.00	0.00	2.06	0.69	0.00
	Transient	100/100	24.68	1.33	1.33	0.00	0.00	4.74	6.05	9.50	1.73
PR-4 ATCAA	**B-1**	100/100	42.05	0.00	0.00	0.00	0.00	0.00	33.64	8.81	0.00
	B-52	25/25	17.05	0.00	0.00	0.00	0.00	0.00	0.18	16.69	0.18
	Tanker	32/32	57.6	0.00	0.00	0.00	0.00	0.00	43.20	14.40	0.00
	Transient	50/50	15.77	0.00	0.00	0.00	0.00	0.00	5.52	8.67	1.58
Gap A MOA/ATCAA	**B-1**	200/200	14.5	0.73	1.63	0.73	0.36	0.18	8.70	2.18	0.00
	B-52	25/25	2.94	0.00	0.00	0.00	0.00	0.00	0.02	2.90	0.02
	Tanker	32/32	0.6	0.00	0.00	0.00	0.00	0.00	0.45	0.15	0.00
	Transient	100/100	5.44	0.29	0.29	0.00	0.00	1.04	1.33	2.09	0.38
Gap B MOA/ATCAA	**B-1**	200/200	19.72	0.99	2.22	0.99	0.49	0.25	11.83	2.96	0.00
	B-52	25/25	4	0.00	0.00	0.00	0.00	0.00	0.04	3.92	0.04
	Tanker	32/32	0.82	0.00	0.00	0.00	0.00	0.00	0.62	0.21	0.00
	Transient	100/100	7.4	0.40	0.40	0.00	0.00	1.42	1.81	2.85	0.52

Table 2-28. Estimated Annual LFE Time and Altitude Distribution, Alternative C (Page 2 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 - 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
Gap C ATCAA	**B-1**	100/100	5.08	0.00	0.00	0.00	0.00	0.00	4.06	1.02	0.00
	B-52	25/25	2.06	0.00	0.00	0.00	0.00	0.00	0.02	2.02	0.02
	Tanker	32/32	0.42	0.00	0.00	0.00	0.00	0.00	0.32	0.11	0.00
	Transient	50/50	1.91	0.00	0.00	0.00	0.00	0.00	0.67	1.05	0.19
Gateway East ATCAA	**B-1**	100/100	3.59	0.00	0.00	0.00	0.00	0.00	2.87	0.72	0.00
	B-52	25/25	1.46	0.00	0.00	0.00	0.00	0.00	0.02	1.42	0.02
	Tanker	32/32	0.3	0.00	0.00	0.00	0.00	0.00	0.23	0.08	0.00
	Transient	50/50	1.35	0.00	0.00	0.00	0.00	0.00	0.47	0.74	0.14
Gateway West ATCAA	**B-1**	100/100	39.91	0.00	0.00	0.00	0.00	0.00	31.93	7.98	0.00
	B-52	25/25	16.18	0.00	0.00	0.00	0.00	0.00	0.16	15.86	0.16
	Tanker	32/32	3.33	0.00	0.00	0.00	0.00	0.00	2.50	0.83	0.00
	Transient	50/50	14.97	0.00	0.00	0.00	0.00	0.00	5.24	8.23	1.50
Totals Alternative C	**B-1**	1400/1400	400.00	15.47	34.80	15.47	7.74	3.86	258.13	64.53	0.00
	B-52	225/225	100.01	0.00	0.00	0.00	0.00	0.00	1.00	98.01	1.00
	Tanker	288/288	127.99	0.00	0.00	0.00	0.00	0.00	95.99	32.00	0.00
	Transient	700/700	149.02	6.21	6.21	0.00	0.00	22.08	40.08	62.98	11.45

Table 2-29. Estimated Annual Combined Use LFEs and Day-to-Day Time and Altitude Distribution, Alternative C (Page 1 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 – 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
PR-1A/B MOAs/ATCAAs	**B-1**	814/326	469.33	23.47	52.80	23.47	11.73	5.87	334.32	17.67	0.00
	B-52	375/44	95.68	0.00	13.80	2.42	0.35	0.69	0.78	77.44	0.20
	Tanker	41/34	68.6	0.00	0.00	0.00	0.00	0.00	51.45	17.15	0.00
	Transient	106/102	39.24	2.12	2.12	0.00	0.00	7.53	9.49	15.44	2.54
PR-2 MOA/ATCAA	**B-1**	1610/490	791.25	39.56	89.02	39.56	19.78	9.89	571.83	21.61	0.00
	B-52	595/55	247.3	0.00	41.40	7.25	1.04	2.07	1.95	193.38	0.22
	Tanker	33/33	5.58	0.00	0.00	0.00	0.00	0.00	4.19	1.40	0.00
	Transient	106/102	43.26	2.34	2.34	0.00	0.00	8.31	10.51	16.88	2.89
PR-3 MOA/ATCAA	**B-1**	814/326	435.82	21.79	49.03	21.79	10.90	5.45	316.99	9.87	0.00
	B-52	84/28	25.84	0.00	2.30	0.40	0.06	0.12	9.74	13.08	0.14
	Tanker	33/33	3.74	0.00	0.00	0.00	0.00	0.00	3.05	0.69	0.00
	Transient	106/102	27.68	1.49	1.49	0.00	0.00	5.31	8.15	9.50	1.73
PR-4 ATCAA	**B-1**	100/100	42.05	0.00	0.00	0.00	0.00	0.00	33.64	8.41	0.00
	B-52	244/37	207.55	0.00	0.00	0.00	0.00	0.00	190.67	16.70	0.18
	Tanker	41/34	68.6	0.00	0.00	0.00	0.00	0.00	54.20	14.40	0.00
	Transient	56/52	18.77	0.00	0.00	0.00	0.00	0.00	8.52	8.67	1.58
Gap A MOA/ATCAA	**B-1**	200/200	14.5	0.73	1.63	0.73	0.36	0.18	8.70	2.18	0.00
	B-52	25/25	2.94	0.00	0.00	0.00	0.00	0.00	0.02	2.90	0.02
	Tanker	32/32	0.6	0.00	0.00	0.00	0.00	0.00	0.45	0.15	0.00
	Transient	100/100	5.44	0.29	0.29	0.00	0.00	1.04	1.33	2.09	0.38
Gap B MOA/ATCAA	**B-1**	200/200	19.72	0.99	2.22	0.99	0.49	0.25	11.83	2.96	0.00
	B-52	25/25	4	0.00	0.00	0.00	0.00	0.00	0.04	3.92	0.04
	Tanker	32/32	0.82	0.00	0.00	0.00	0.00	0.00	0.62	0.21	0.00
	Transient	100/100	7.4	0.40	0.40	0.00	0.00	1.42	1.81	2.85	0.52

Table 2-29. Estimated Annual Combined Use LFEs and Day-to-Day Time and Altitude Distribution, Alternative C (Page 2 of 2)

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @ Altitude 500 - 999 AGL HR/YR*	*Time @ Altitude 1,000 – 1,999 AGL HR/YR*	*Time @ Altitude 2,000 - 4,999 AGL HR/YR*	*Time @ Altitude 5,000 – 9,999 AGL HR/YR*	*Time @ Altitude 10,000 AGL – 17,999 MSL HR/YR*	*Time @ Altitude 18,000 – 25,999 MSL HR/YR*	*Time @ Altitude 26,000 - 36,999 MSL HR/YR*	*Time @ Altitude 37,000 - 60,000 MSL HR/YR*
Gap C ATCAA	**B-1**	100/100	5.08	0.00	0.00	0.00	0.00	0.00	4.06	1.02	0.00
	B-52	25/25	2.06	0.00	0.00	0.00	0.00	0.00	0.02	2.02	0.02
	Tanker	32/32	0.42	0.00	0.00	0.00	0.00	0.00	0.32	0.11	0.00
	Transient	50/50	1.91	0.00	0.00	0.00	0.00	0.00	0.67	1.05	0.19
Gateway East ATCAA	**B-1**	100/100	3.59	0.00	0.00	0.00	0.00	0.00	2.87	0.72	0.00
	B-52	25/25	1.46	0.00	0.00	0.00	0.00	0.00	0.02	1.42	0.02
	Tanker	32/32	0.3	0.00	0.00	0.00	0.00	0.00	0.23	0.08	0.00
	Transient	50/50	1.35	0.00	0.00	0.00	0.00	0.00	0.47	0.74	0.14
Gateway West ATCAA	**B-1**	475/175	208.66	0.00	0.00	0.00	0.00	0.00	198.99	9.67	0.00
	B-52	310/40	91.18	0.00	0.00	0.00	0.00	0.00	0.91	90.11	0.16
	Tanker	32/32	3.33	0.00	0.00	0.00	0.00	0.00	2.50	0.83	0.00
	Transient	51/51	15.97	0.00	0.00	0.00	0.00	0.00	5.53	8.94	1.50
Totals Alternative C	**B-1**	4413/2017	1990	86.53	194.69	86.53	43.27	21.63	1483.24	74.10	0.00
	B-52	1708/304	678.01	0.00	57.50	10.07	1.45	2.88	204.15	400.97	1.00
	Tanker	308/294	151.99	0.00	0.00	0.00	0.00	0.00	116.99	35.00	0.00
	Transient	725/709	161.02	6.64	6.64	0.00	0.00	23.62	46.49	66.17	11.45

Table 2-30. Alternative C Estimated Annual Chaff and Flare Use by Airspace

Airspace	*Chaff*	*Flares*
PR-1A/B MOAs/ATCAAs	6,000	600
PR-2 MOA/ATCAA	11,500	1,500
PR-3 MOA/ATCAA	4,600	450
PR-4 MOA/ATCAA	4,000	400
Gap A MOA/ATCAA	200	20
Gap B MOA/ATCAA	300	30
Gap C MOA/ATCAA	90	10
Gateway East/West ATCAA	3,500	350
Totals	30,190	3,360

2.8 No-Action Alternative

The No-Action Alternative would not create the PRTC or expand training airspace. The No-Action Alternative represents continued use of the existing Powder River airspace for training at baseline levels. Figure 2-1 includes the existing Powder River airspace. Use of remote complexes, depicted in Figure 1-1, for training would continue to expend a substantial number of flying hours. Combat readiness would be impaired and training with system upgrades would not be accommodated.

Baseline conditions for the bases and the airspace can differ depending upon deployments to combat areas. Deployments take away aircraft and reduce use of the airspace. Over the past several years, one squadron of B-1s from Ellsworth AFB has been deployed regularly in the Overseas Contingency Operation. When aircrews prepare to deploy, they have an increase in their required level of flight activity and training. When aircrews return from deployments, they must re-qualify and become mission capable in new tactics, aircraft upgrades, threats, sensor or other activities not available in foreign airspace, or activities prohibited in combat zones. These training requirements increase sorties and training from Ellsworth AFB and Minot AFB.

All Ellsworth AFB-based and Minot AFB-based squadrons are assumed to be training, to the extent possible, in Powder River airspace as the baseline for this EIS. This approach ensures that analysis of the impacts from the No-Action Alternative consistently examines the full potential B-1 operations and is not affected by temporary changes, such as a decrease in training with deployment or an increase in training such as from Dyess AFB B-1s relocating to Ellsworth AFB during extended runway work at Dyess AFB during 2008.

2.8.1 Airspace Structure

The existing Powder River airspace includes Powder River A and B MOAs. Powder River A extends from the surface up to but not including FL180 (refer to Figure 2-1). Powder River B MOA has a floor of 1,000 feet AGL and a ceiling up to, but not including, FL180. For the purpose of this EIS, the Powder River airspace includes four ATCAAs: Powder River, Gateway, Crossbow, and Black Hills. As noted in Section 2.1.2, Crossbow is not considered a part of the Powder River airspace. Extending from FL180 up to FL260, the Powder River ATCAA directly overlies the Powder River MOAs. The Gateway ATCAA provides airspace from FL180 up to FL260 and extends about 40 NM southeast from the Powder River ATCAA. The Crossbow ATCAA extends from FL270 up to FL450. The horizontal footprint conforms to the Powder River and Gateway ATCAAs and the airspace is managed to not have a 1,000-foot vertical gap between the ceiling of the lower ATCAAs and the floor of the Crossbow ATCAA. With a narrow vertical extent (18,000 to 20,000 feet MSL), the Black Hills ATCAA partially overlaps within the Gateway ATCAA and extends roughly 80 NM south-southwestward from it. About 25 percent of the 50 NM-wide Black Hills ATCAA coincides with the Gateway ATCAA. The Black Hills ATCAA also provides refueling airspace for AR-678. Table 2-31 presents the estimated square miles under the existing Powder River airspace for the No-Action alternative.

Table 2-31. Surface Overflown by Existing Powder River Airspace (Square Miles), No-Action Alternative

Airspace Type	*Airspace Unit*	*No Action Alternative*
MOA	Powder River A	4,026.82
	Powder River B	1,828.24
TOTAL MOA		5,855.06
ATCAA	Powder River	5,855.06
	Gateway	3,892.98
	Crossbow[1]	9,748.04
	Black Hills[2]	4,322.66
TOTAL ATCAA[3]		14,070.69

Notes:
1. Crossbow ATCAA overlies Powder River ATCAA and Gateway ATCAA
2. Estimate does not double count portion of Black Hills ATCAA within Gateway ATCAA
3. Total area under the ATCAAs includes Crossbow ATCAA and portion of Black Hills ATCAA not included in the Crossbow ATCAA.

2.8.2 Airspace Operations

Under no-action (or baseline) conditions, B-1s would continue to conduct approximately 1,000 sortie-operations in each of the MOAs and the ATCAAs, with the majority occurring between 7 a.m. and 10 p.m. Table 2-32 presents baseline condition B-1s, B-52s, and other users training in the Powder River airspace. Approximately 24 hours of transient operations occur annually, primarily conducted by F-16s. All current restrictions on flight activities and avoidance areas would remain in place, and the Air Force's policies and procedures for defining such areas would continue to apply. Simulated ordnance delivery training would continue with the use of the Belle Fourche ESS and emitter and target sites (see Figure 2-3).

As Table 2-32 presents, B-1s spend an average of 250 hours annually in the MOAs and operate 625 hours in the ATCAAs. The B-52s currently perform nearly all of their Powder River airspace training in the ATCAAs. F-16s and other transients fly fewer than 4 hours per year below 2,000 feet AGL.

Table 2-32. Powder River Airspace Average Annual Baseline Training Hours

Airspace Unit	*Aircraft*	*# of Sortie Ops Day/Night*	*Time Spent In Airspace HR/YR (Total)*	*Time @Altitude 500 - 999 AGL HR/YR*	*Time @ Altitude 1000 - 1999 AGL HR/YR*	*Time @ Altitude 2000 - 4999 AGL HR/YR*	*Time @ Altitude 5000 - 9999 AGL HR/YR*	*Time @ Altitude 1000 - 17999 AGL HR/YR*	*Time @ Altitude 18000 - 23999 AGL HR/YR*	*Time @Altitude 24000 - 60000 AGL HR/YR*
Powder River A MOA	**B-1**	200/50	125.00	25.00	56.25	25.00	12.50	6.25	0.00	0.00
	B-52	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	F-16	22/8	5.00	0.90	0.90	0.00	0.00	3.20	0.00	0.00
Powder River B MOA	**B-1**	200/50	125.00	25.00	56.25	25.00	12.50	6.25	0.00	0.00
	B-52	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	F-16	22/8	5.00	0.90	0.90	0.00	0.00	3.20	0.00	0.00
Powder River ATCAA	**B-1**	622/128	375.00	0.00	0.00	0.00	0.00	0.00	300.00	75.00
	B-52	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	F-16	22/8	3.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00
Crossbow ATCAA	**B-1**	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B-52	1,425/75	300.00	0.00	0.00	0.00	0.00	0.00	0.00	300.00
	Tanker	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	F-16	22/8	8.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
Gateway ATCAA	**B-1**	415/85	250.00	0.00	0.00	0.00	0.00	0.00	200.00	50.00
	B-52	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tanker	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	F-16	22/8	3.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00
Totals	**B-1**	1,437/313	875.00	50.00	112.50	50.00	25.00	12.50	500.00	125.00
	B-52	1,425/75	300.00	0.00	0.00	0.00	0.00	0.00	0.00	300.00
	Tanker	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	F-16	110/40	24.00	1.80	1.80	0.00	0.00	6.40	6.00	8.00

Note: Assumes no B-1s are deployed and Powder River A/B MOA airspace saturation.

2.8.3 Large Force Exercises

The existing Powder River airspace cannot support any current LFE due to aircraft capabilities and airspace size limitations. Occasional existing training includes F-16 and B-1 aircraft training together. Aircrews would continue to expend flying hours commuting to distant training complexes to participate in realistic LFEs. Training and readiness would continue to suffer.

2.8.4 Supersonic Activity

No supersonic activity would occur within the Powder River airspace. Under the No-Action Alternative, aircrews would commute to approved airspace to acquire supersonic training.

2.8.5 Defensive Countermeasures

No defensive countermeasures can be deployed within the Powder River airspace. Under the No-Action Alternative, aircrews would continue to simulate countermeasure deployment, which does not result in realistic training. Limited opportunities to train with defensive countermeasures would occur when aircrews train in airspace approved for defensive countermeasures.

2.8.6 Ground-Based Training Assets

Section 2.1.3 describes the existing Powder River airspace ground-based assets. These include the Belle Fourche ESS and other locations under or near the Powder River A and B MOAs. These locations would continue to be used for threat emitters, no-drop targets, and/or support facilities.

2.9 Public Involvement

The Air Force initiated early public and agency involvement in the environmental analysis of the proposed PRTC. The Air Force published newspaper advertisements, sent out press releases, and distributed Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) letters. These announcements solicited public and agency input on the proposal and invited the public and agencies to attend community outreach scoping meetings on the PRTC in MT, ND, SD, and WY. Table 2-33 presents the details on the scoping meetings.

Scoping meetings were conducted at communities under and adjacent to the proposed airspace. The participant concerns dealt with, among other things, the ability for people to conduct their lives as they were conducting them in the typically rural settings. Some individuals had remained on family properties, returned to family properties, or moved to the area to be able to experience the rural, relatively undisturbed quality of life such a regional landscape provides. The Northern Cheyenne fought their way back from Oklahoma to occupy their traditional lands.

During scoping, individuals recalled low-level B-1 or B-52 flights (on MTRs) in the area and reminded Air Force and FAA participants that the rural residents are patriotic Americans and continue their support of the military. The participants expressed concern about the uncertainty of low-level overflights and sonic booms and the inability to communicate to find when and where such impacts to their rural lifestyle could occur. Frustration and annoyance at times were present as public scoping participants tried to identify ways, through airspace scheduling, MOA altitudes, or other measures, to reduce uncertainty and impacts.

Table 2-34 presents concerns identified by the public during scoping for this EIS. An EIS section where the concern is addressed is included in Table 2-34.

In many cases, the concern is addressed in other resource sections in addition to the one referenced. For example, the effects of noise on ranching operations are addressed in the referenced section, as well as under “Noise”,” Safety”, and others. As another example, socioeconomics is defined in this EIS as the basic attributes associated with human activities, particularly for population, economic activity, and public services. The issues raised relate to the economic activities and livelihoods of the affected population. These issues are considered in the referenced sections. Environmental justice addresses potential disproportionate adverse impacts on minority and low-income populations. As the largest minority group in the affected area and as a group that has high rates of poverty, Native American issues are specifically addressed. The reader is encouraged to read the entire EIS and not just the sections referenced in Table 2-34.

Table 2-33. Community Outreach Scoping Meetings (2008)

Date	*Location*	*Public & Agency Attendees*
Monday, June 16	Rapid City Library Rapid City, SD	19
Tuesday, June 17	Belle Fourche Community Center Belle Fourche, SD	17
Wednesday, June 18	Crook County Public Library Sundance, WY	7
Thursday, June 19	Carter County Fire Department Gillette, WY	6
Friday, June 20	Sheridan Senior Center Sheridan, WY	7
Monday, June 23	Apsaalooke Center Crow Agency, MT	13
Monday, June 23	Hardin Chamber of Commerce Hardin, MT	10
Tuesday, June 24	Tribal Administration Building Council Chambers Lame Deer, MT	7
Tuesday, June 24	Isabel Bills Community Learning Center Colstrip, MT	23
Wednesday, June 25	Miles Community College Miles City, MT	18
Thursday, June 26	St. Joan of Arc Parish Hall Ekalaka, MT	15
Friday, June 27	Powder River County High School Broadus, MT	15
Tuesday, July 8	Baker High School Baker, MT	10
Wednesday, July 9	Bowman City Hall Meeting Room Bowman, ND	32
Thursday, July 10	Elgin Community Center Elgin, ND	23
Friday, July 11	AJ Agard Community Center, Standing Rock Indian Reservation (North) Fort Yates, ND	4
Friday, July 11	Bear Soldier District Gym, Standing Rock Indian Reservation (South) McLaughlin, SD	2
Monday, July 14	Harding County Memorial Recreation Center Buffalo, SD	22
Tuesday, July 15	Bison School Bison, SD	15
Wednesday, July 16	Multi-Purpose Building, Cheyenne River Indian Reservation Dupree, SD	11

Table 2-34. Scoping Participant Concerns (Page 1 of 3)

Resource	*Issues Raised*	*Primary EIS Section*
Proposed Action	Details of proposed training	2.2
	Alternatives to action	2.3.1
	Opposition to "military expansion"	2.2.2
	General opposition to proposal purpose or need	1.1, 1.2
	Support for proposal	2.1
Airspace/Air Traffic	Restriction of airspace	4.1.4.1.3
	Radio/radar coverage and communication issues	3.3.3.1
	MOA navigation and checking for MOA activity	4.10.3.1.2
	General aviation (agricultural operations,)	4.10.3.1.2
	GPS-IFR approaches should be included for airports under MOA	4.1.4.1.3
	Avoidance areas	4.9.3
	Air Force jets outside of MOA boundary	4.1.4.1.2
	Air Force "buzzing" livestock, people, buildings	4.1.4.1.2
Noise	Noise pollution	4.2
	General negative impacts from noise	4.2.3
	Disruptive vibrations from sonic booms	4.2.1.4
	Property damage from sonic booms	4.2.1.5
	People (startle effect)	4.2.3
	Booms (general fear/annoyance factor)	4.9.3
	Might cause health impacts	4.2.3.5
	Noise effects on domestic animals	4.6.3.1
Safety	Flight safety	4.3.3.1.2
	Impacts from vortices	4.3.3.1.2
	Mid-air collision avoidance	4.1.4.1.3
	Supersonic effects and flight safety	4.3.3.1.2
	Life flight issues (disruption/interference)	4.10.3.1.2
	Fire-fighting planes (disruption/interference)	4.10.3.1.2
	Chaff ingestion by livestock and wildlife	4.6.3.1
	Fire danger—flares	4.3.3.1.3
	Flare fire-energy resource	4.3.3.1.3
	Dud flare safety	4.3.3.1.3
	Air Force response to fires	4.3.3.1.3
Air Quality	General negative effects on air quality	4.4.3.1
	Aircraft emissions effects on human health	4.4.3.1
	Cumulative effects from aircraft emissions and coal	4.4.3.1
	Aircraft emissions (visual impediments)	4.4.3.1
	Cloud formation and sonic booms	4.2.3.10

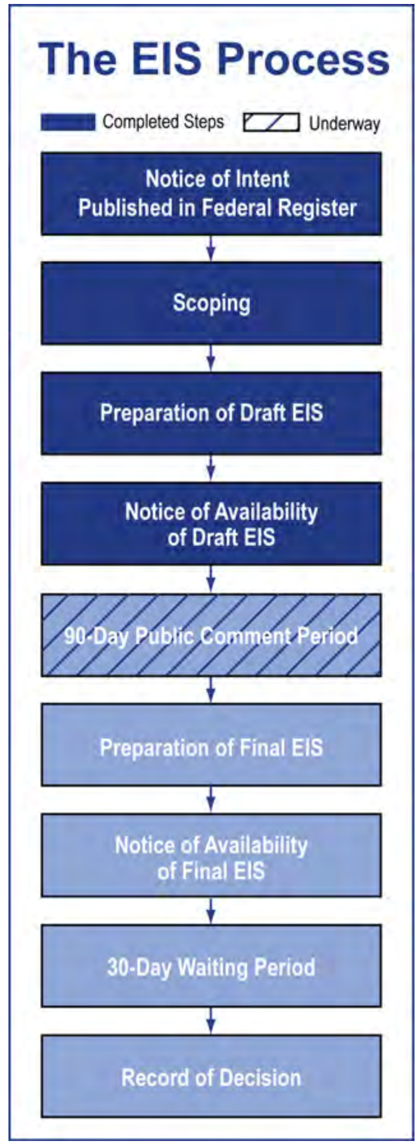
Table 2-34. Scoping Participant Concerns (Page 2 of 3)

Resource	***Issues Raised***	***Primary EIS Section***
Physical Resources (soils, water)	Chaff/flare effects on soil	4.5.3.1
	Chaff/flare effects on water	4.5.3.1
	General chaff litter	4.9.3.1
	Trash/residual materials (falling from aircraft)	4.3.3.1.3
	Who is responsible for cleanup of chaff and “aluminum foil”?	4.3.3.1.3
	Cumulative chaff/flare buildup effects on soil over time	4.5.3.1
	Effects of flare constituents on soils	4.5.3.1
	Effects of fire on soils	4.6.3.1
	Protection of resources against fire, chaff/flare	4.6.3.1
Biological Resources	Overflight noise effects on wildlife	4.6.3.1
	Wildlife (startle effect)	4.6.3.1
	Overflight noise effects on livestock (cows, sheep, goats, etc.)	4.6.3.1
	Livestock (spooking/stampeding)	4.10.3.1.5
	Calving interference	4.10.3.1.5
	Chaff/flare impacts on livestock	4.6.3.1
	Chaff/flare impacts on wildlife	4.6.3.1
	Chaff/flare impacts on vegetation	4.5.3.1
Cultural and Historic Resources	Conflict with Tribal ceremonies	4.7.2.1
	Surveillance of culturally sensitive ceremonies/areas	4.7.2.1
	Impacts to sensitive sites (e.g., Devils Tower, Wind Cave, Bear Butte)	4.7.3.1
	Overflight of Tribal lands	4.7.2.1
Land Use	General quality of life (solace, disruption of the landscape)	4.8.2
	Low-level flight impacts on recreation/outdoor activities	4.8.3.1
	Concerns about restrictions to personal land uses	4.9.1
	Overflight effects on tourist activities	4.8.3.1
	Impacts to recreational flying (e.g., skydiving, gliding, parasailing)	4.1.4.1.4

Table 2-34. Scoping Participant Concerns (Page 3 of 3)

Resource	***Issues Raised***	***Primary EIS Section***
Socioeconomics and Environmental Justice	Energy generation conflicts	4.10.3.1.4
	Hampers development of oil resources	4.10.3.1.4
	Impacts to local oil and gas companies	4.10.3.1.4
	Impacts on wind farms	4.10.3.1.4
	Commercial flight interference	4.1.4.1.3
	General impacts to economy	4.10.3
	Economic impacts to local airports	4.10.3.1.2
	Cost impacts to private pilots (landing fees, fuel, etc.)	4.10.3.1.2
	Loss of visitors to motels/restaurants	4.8.3.1
	Fair compensation for property damages, decreased values, and crop damages	4.3.3.1.3
	Decreased property values	4.10.3.1.1
	General impacts to agriculture	4.10.5.1
	Sonic boom effects on livestock production (milk, calving)	4.10.3.1.5
	Death and loss of livestock due to stampeding	4.3.3.1.3
	Time loss due to spooked and scattered livestock	4.10.3.1.5
	Effects on ranching livelihood	4.8.3.1
	Cause cattle conception/pregnancy rates to decline	4.6.3.1
	Physical/psychological stress to livestock hampers productivity	4.6.3.1
	Weather Modification Flight Interference	4.10.3.1.2
	Indirect economic impacts: effects on agricultural production	4.10.3.1.2
	Indirect economic impacts from flare fire	4.10.3.1.6
	Breach of tribal sovereignty	4.7.2.1
	Hunting seasons Interference	4.8.3.1
Hazardous Materials	Aluminum oxide from chaff	4.5.3.1
	Chemical spraying at emitter sites	4.5.3.1

2.10 NEPA/EIAP Process



This PRTC Draft EIS has been prepared in accordance with NEPA (42 USC 4321-4347), implementing regulations of the Council of Environmental Quality (CEQ 40 CFR § 1500-1508), and 32 CFR 989, *et seq*., *Environmental Impact Analysis Process* (formerly known as AFI 32-7061). In addition, this EIS was prepared in accordance with the current versions of the following FAA orders (available online at www.faa.gov): (1) Order 1050.1E, Environmental Impacts: Policies and Procedures (through Change 1); and (2) Order JO 7400.2G, Procedures for Handling Airspace Matters (through Change 2). An EIS is prepared as a tool for compiling information about a proposal and providing a full and fair discussion of environmental impacts to the natural and human environment. Reasonable alternatives to the proposed action as well as the No-Action Alternative are also evaluated in an EIS. In this Draft EIS, the No-Action Alternative means that there would be no modifications or additions to the current airspace managed by Ellsworth AFB. As described in Section 2.8, this will maintain training conditions as they are today. The Air Force and FAA analyze alternatives to ensure that fully informed decisions are made after review of the comprehensive, multidisciplinary analysis of potential environmental consequences. Compliance with NEPA guidance for preparation of an EIS involves several critical steps depicted in the steps to the right and summarized below.

1. *Announce that an EIS will be prepared*. For this PRTC EIS, a Notice of Intent was published in the *Federal Register* on May 29, 2008.
2. *Conduct scoping.* This is the first major step to identify the relevant issues to be analyzed in depth and to eliminate issues that are not relevant. Scoping for this EIS ran from May 29 through August 4, 2008. Throughout the comment period, the Air Force actively solicited comments through press releases, newspaper ads, public service announcements, flyers, letters, and postcards to the public, local governments, federal and state agencies, Native Americans, and pilot associations. These entities were solicited to ensure that their concerns and comments about the proposal were included in the analyses. In June 2008, the Air Force initiated the IICEP and submitted letters to local, state, tribal and federal agencies informing them of the Air Force's intent to prepare this EIS (Appendix E). More than twenty public or tribal scoping meetings were held in MT, ND, SD, and WY to present details about the proposal, the NEPA process and opportunities for public and agency involvement (refer to Table 2-33). Approximately 276 members of the public and agency representatives attended the meetings. In addition to receiving verbal and written comments at the scoping meetings, the Air Force also received written comments from the public and agencies through the mail. To the extent possible, scoping comments have been used to shape the analysis and focus the issues in this Draft EIS (see Section 2.9). Comments on the Proposed Action and alternatives will continue to be accepted throughout the environmental impact review process.

3. *Prepare a Draft EIS.* The Draft EIS is a comprehensive document for public and agency review. The Draft EIS describes the PRTC purpose and need, explains the Proposed Action and alternatives, presents the existing conditions in the region potentially affected, and provides analysis of the environmental consequences of the Proposed Action and each alternative, including the No-Action Alternative. This Draft EIS has been distributed to agencies, regional libraries, and members of the public who have requested copies to ensure the widest dissemination possible. The public comment period began when the Notice of Availability for this Draft EIS was filed in the *Federal Register*.
4. *Public/Agency Review.* The public comment period is to provide the public and agencies the opportunity to review the Draft EIS and to provide comments on the analysis. This comment opportunity includes a series of public hearings held during the comment period. The hearings give the public and agencies an opportunity to orally comment on the Draft EIS after their review and evaluation of the document. The hearings provide direct feedback to the Air Force from the public and agencies. All comments received during the public comment period are incorporated into the Final EIS. Comments on the Draft EIS need to be provided by the specified date to be sure the comments are included in the Final EIS. Verbal and written comments submitted at public hearings and those received through the mail by the Air Force are given equal consideration in the preparation of the Final EIS.
5. *Prepare a Final EIS.* The Final EIS will be prepared following the public comment period and will address comments submitted during the public comment period or presented at public hearings that address matters within the scope of the EIS. All written comments received will be included in the Final EIS. The Final EIS will revise the Draft EIS to reflect public and agency comments, the Air Force's responses, and additional information received from reviewers. The Final EIS will provide the decision maker with a comprehensive review of the potential environmental consequences of selecting the Proposed Action or an alternative. A Notice of Availability will be published in the *Federal Register* to announce availability of the Final EIS. The FAA, as a cooperating agency, can adopt the Final EIS as the required NEPA documentation to support FAA SUA decisions.
6. *Issue a Record of Decision.* The final step in the NEPA process is approval of the Record of Decision (ROD). The Notice of Availability will begin a 30-day waiting period before the ROD is signed. The ROD will identify which action has been selected by the Air Force decision maker and what management actions or mitigation measures would be carried out to reduce, where possible, adverse impacts to the environment. The ROD specifies the entities responsible for implementing mitigations and the source of funds to implement mitigations.

The goal is for this EIS to satisfy the NEPA requirements for both the FAA and the Air Force. The relevant statutes, regulations, and guidelines are presented in Appendix F. FAA's federal actions are dependent upon the SUA proposal.

2.10.1 FAA Impact Analysis Categories

The FAA considers analysis of an array of environmental resources similar to the Air Force's. Table 2-35 lists those resource analysis categories, as identified in FAA Order 1050.1E (2006), and correlates them with the resources discussed in the PRTC EIS.

Table 2-35. Impact Analysis Categories Identified in FAA Order 1050.1E 2006

FAA Impact Analysis Categories	*How Addressed by PRTC EIS Analyses (relevant PRTC EIS sections in brackets)*	*Comment*
Air Quality	Air Quality (3.4, 4.4)	Change in number of sorties and chaff and flare use
Coastal Resources	Not Applicable	Project airspace is not over or near coast line
Compatible Land Use	Land Use and Recreational Resources (3.8, 4.8)	
Construction Impacts	Not Applicable	No proposed construction
Land Use	Not Applicable	Designation of airspace for military flight operations is not subject to Section 4(f) (49 USC 303 note).
Farmlands	Land Use (3.8, 4.8)	No proposed conversion of farmland to non-agricultural uses
Fish, Wildlife, and Plants	Biological Resources (3.6, 4.6)	
Floodplains	Physical Resources (3.5, 4.5)	No actions will encroach on any floodplain
Hazardous Materials, Pollution Prevention, and Solid Waste	Safety (3.3, 4.3), Physical Resources (3.5, 4.5), and Socioeconomics (3.9, 4.9)	
Historical, Architectural, Archeological, and Cultural Resources	Cultural Resources (3.7, 4.7)	Includes consultation with affected Native American Tribes
Light Emissions and Visual Impacts	Land Use and Recreational Resources (3.8, 4.8)	Proposed action and alternatives include low-level aircraft flights and training with defensive flares
Natural Resources and Energy Supply	Socioeconomics (3.9, 4.9)	
Noise	Noise (3.2, 4.2)	
Secondary (Induced) Impacts	Discussed in each section and in cumulative impacts (5.0)	
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks	Socioeconomics (3.9, 4.9) Safety (3.3, 4.3) Environmental Justice (3.10, 4.10)	
Water Quality	Physical Resources (3.5, 4.5)	
Wetlands	Biological Resources (3.6, 4.6)	
Wild and Scenic Rivers	Not applicable	No wild and scenic rivers are located beneath project airspace

Source: FAA Order 1050.1E,

2.11 Comparison of Environmental Consequences

Table 2-36 summarizes the potential environmental consequences of the Proposed Action (Alternative A), Alternative B, Alternative C, and the No-Action Alternative. The detailed analysis behind the summary statements in Table 2-36 is contained in Chapter 4.0, *Environmental Consequences*.

Table 2-36. Summary of Impacts by Resource (Page 1 of 14)

Environmental Resource	***Alternative A Preferred Alternative***
Airspace/Air Traffic (EIS Section 4.1)	Two public airports and no private airfields are under PR-1A, Gap A; no public and 1 private under PR-1B; 2 public and 1 private under PR-2; 4 public and 8 private under PR-3/Gap B; 6 public and 2 private under PR-4/Gap C; 12 public and 9 private on the periphery of the proposed MOAs; and 16 public and private under or near the Gateway ATCAAs. Civil aircraft do not rely on IFR below FL180 in much of the area because radar and radio communication are limited. An estimated 129 civil operations impacted Monday through Thursday (approximately one-third of that number on Friday morning) through ground holds/diversions or needing to fly VFR see-and-avoid in an active MOA. MOAs/ATCAAs adjusted to avoid traffic at major airports. Low and High MOAs support civilian IFR traffic. Civil aircraft not able to fly IFR could fly VFR using see-and-avoid, weather permitting. MOA scheduling during Monday-Thursday mornings and late afternoons/evenings and Friday mornings designed to reduce uncertainty, provide times when MOA not activated, and support weekend civilian flights. Training aircraft to be relocated from an area which needed emergency access as is currently done in the Powder River airspace. Agricultural applicators with a near gross weight aircraft concerned about impacts from bombers at low altitude. Communication and coordination required for weather modification, aerial mapping, recreational gliding, and skydiving. Low, Medium, and High ATCAAs allow B-1s to avoid impacting commercial and other traffic during day-to-day training. An ATCAA to FL260 would allow 99 percent of B-1 training; B-52 training and LFEs have potential to significantly impact commercial traffic. Depending on the 4-hour training periods, an LFE above FL260 could impact from 43 to 244 high altitude civilian flights. LFEs would impact all civil aviation seeking to traverse the airspace for a period of 2 to 4 hours. LFEs could to be viewed as a significant impact to airspace users.
Noise (EIS Section 4.2)	Day-night average sound level (DNL) under the proposed PR-1A, PR-1B, PR-3, and PR-4 MOAs would be expected to change from existing less than 45 dB to a calculated <45 to 47 dB range. DNL under existing Powder River A and B MOAs to minimally decline from DNL 49 dB to 47 dB. Noise levels under the existing Gateway ATCAAs would remain below 45 dB DNL. USEPA had identified DNL of 55 dB as level above which to assess public health and welfare. Increased noise levels or sudden low overflight noise would be noticed and could be perceived as a significant impact by residents under the airspace. Overflight of a bomber 2,000 feet AGL or below within one-quarter mile of the flight path expected to occur over 2 to 4 percent of each MOA each training day or an average at any location of 6 to 9 low-level overflights per year (could be more or fewer than average at any specific location). MOAs scheduled in the mornings and late afternoon/evening to somewhat reduce uncertainty of low-altitude flights. Rapid B-1 acceleration and climb with afterburners creates a localized single event onset rate adjusted sound exposure level (SEL_r) of 133 db. While operating at high speeds at 500 AGL, B-1 aircraft generate SEL_r of 117 dB. B-52 aircraft generate SEL_r of 100 dB during overflight at 1,000 feet AGL. Sudden onset sounds can be startling to humans and animals and has resulted in damage to penned cattle and fencing. Sudden low-level overflights identified as an impact by public. Air Force to extend Powder River airspace policy of establishing seasonal avoidance areas to reduce potential for ranching and cultural impacts. Supersonic during 10 days of LFEs with B-1s above FL200 and fighters above 12,000 feet AGL could result in an average of one sonic boom per day at any given location on the ground. Most sonic booms heard as thunder although each boom could result in local areas experiencing an overpressure of 4 psf or greater. Glass, plaster, and other structural elements, normally in good condition, would not be expected to fail as a result of overpressures but failure would be possible. Should a sonic boom or low-level overflight occur during a hunting or ranching operation, it could result in a reaction on the part of the animals. Reactions not likely to significantly impact the species but could be an annoyance to persons on the ground.

Table 2-36. Summary of Impacts by Resource (Page 2 of 14)

Alternative B	Alternative C	No Action Alternative
Public airports, private airfields, and civilian aircraft flights below FL180 impacted in PR-2, PR-3, PR-4, and associated Gap MOAs as described for Alternative A. No PR-1A, PR-1B, or Gap A MOAs would be established under ATCAAs and aircraft and airports within the Billings-Miles City-Gillette triangle below FL180 would not be impacted below FL180. Estimated 97 civil operations impacted Monday through Thursday (approximately one-third of that number on Friday morning) when the Alternative B MOAs activated. Impacts a mix of ground delays, re-routing, or having to fly VFR see-and-avoid, weather permitting, in active MOA. ATCAA impacts same as Alternative A. LFE impacts as described for Alternative A with exception that Alternative B would not include military training overflights below FL180 in the Billings-Miles City-Gillette triangle.	Public airports, private airfields, and civilian aircraft flights below FL180 impacted in PR-1A, PR-1B, PR-2, PR-3, and associated Gap MOAs as described for Alternative A. There would be no impacts below FL180 under PR-4 or Gap C ATCAAs or to airports or airfields in the Bismarck-Dickinson-Rapid City triangle below FL180. Estimated 79 civil operations impacted Monday through Thursday (approximately one-third of that number on Friday morning) when Alternative C MOAs active. Impacts include delays, re-routing, or having to fly see-and-avoid, weather permitting, in an active MOA. ATCAA impacts same as Alternative A. LFE impacts as described for Alternative A with exception that Alternative C would not include military training flights below FL180 in Bismarck-Dickinson-Rapid City triangle.	No-Action Alternative would not change projected baseline conditions with B-1 and B-52 flight training in the Powder River A/B MOAs (nearly all of the proposed PR-2 MOA). Projected baseline conditions with aircraft from overseas activities expected to increase annual sortie operations in the existing Powder River airspace. Estimated 7 civilian operations impacted weekdays by delay, re-routing, or having to fly VFR see-and-avoid in an active MOA. Flight training in Powder River ATCAAs would continue as permitted under existing letters of agreement with the FAA. Powder River airspace would continue to provide limited training to B-1 and B-52 aircrews.
Noise under PR-2, PR-3, PR-4, and associated Gap MOAs and ATCAAs would be as described for Alternative A. 6 to 9 low-altitude overflights per year, an average of one sonic boom per LFE day, and startle effects in these MOAs as described under Alternative A. Low-level overflights would not occur under PR-1A, PR-1B, or Gap A ATCAAs. Noise under these areas would be less than DNL 45 dB.	Noise under PR-1A, PR-1B, PR-2, PR-3, and associated Gap MOAs and ATCAAs would be as described for Alternative A. 6 to 9 low-altitude overflights per year, an average of one sonic boom per LFE day, and startle effects in these MOAs as described under Alternative A. Low-level overflights would not occur under PR-4 or Gap C ATCAAs. Noise under these areas would be less than DNL 45 dB.	Noise under the existing Powder River airspace would continue at DNL 49 dB as the base returns to the peacetime operational tempo. Low-altitude startle effects would continue to be experienced within Powder River A/B MOAs. Supersonic flight would not be authorized.

Table 2-36. Summary of Impacts by Resource (Page 3 of 14)

Environmental Resource	*Alternative A Preferred Alternative*
Safety (EIS Section 4.3)	Limited communication and radar coverage impact safe civil aircraft operations below 12,000 feet MSL in much of the proposed airspace and below FL180 in some areas. Impacts highest in PR-3, the western portion of PR-4, existing PR-2, and the eastern portion of PR-1A and PR-1B. No proposal for increased radio frequency coverage or radar coverage for the PRTC airspace. General aviation pilots accustomed to flying through the airspace with GPS coordinates perceived requirement to call the Ellsworth AFB airspace management office to determine status of the proposed MOAs as an impact to their transit of the airspace. Air Force proposes to reduce potential flight safety impacts to commercial and other aircraft above FL300 by letters of agreement with the FAA to restrict use of most Medium and High ATCAAs to LFEs. During LFEs the use of ATCAA airspace to FL600 would be available for training above FL300 during limited periods. MOAs provide access to large commercial airports such as Billings and Bismarck. Proposed Low and High MOAs designed to reduce impacts to IFR traffic. Class A mishap and bird strikes expected to be proportional to the amount of training time in the proposed airspace with some increased risk in PR-3 and PR-4 MOAs. Chaff or flare residual materials not expected to result in a safety impact; finding a piece of chaff or flare material on the ground could annoy persons. Flare use restricted to above 2,000 feet AGL and discontinued in airspace with extreme fire conditions not expected to increase fire risk. Risk from estimated one dud flare falling every three years or being found under PRTC very low. Startle effects from low-altitude overflight or sonic booms during LFEs could impact the safety of recreationists or ranchers. Low-altitude flights during training would overfly any location within one-quarter mile by an aircraft flying 2,000 feet AGL or below an average of 6 to 9 times per year. The number of actual overflights experienced by any location could be more or fewer then average. An unexpected low-altitude overflight could have safety impacts to a recreationist on a horse or a rancher working cattle in open range. Temporary avoidance areas could be established to reduce the potential for impacts from low-altitude overflight. Communication regarding seasonal ranching operations, combined with implementing avoidance areas, could reduce impacts to ranching. Large aircraft wake vortex of air turbulence at the wing tips could, in rapid maneuvering and unusual meteorological conditions, damage windmills. Atmospheric conditions and winds such as those common to the ROI cause accelerated vortex decay and dissipation. Most wake vortices would not reach ground level but could be seen as potential impact to crop dusters or other small aircraft. Significant impacts could result from aircraft electronic emissions inadvertently setting off mining or construction explosives or otherwise impacting operations. Procedures would be required to communicate with mining operators regarding potential interference with mining radio frequencies.
Air Quality (EIS Section 4.4)	No significant air quality impacts with Alternative A. B-1 and B-52 low-level overflight in PR-1 and PR-1B would contribute approximately 1.65 tons of PM_{10} per year within the Lame Deer nonattainment area and 0.02 tons of PM_{10} per year within the Sheridan nonattainment area. Emissions not expected to increase the number of days when the PM_{10} air quality standard is exceeded. B-1 and B-52 training aircraft would not produce enough emissions to affect air quality or visibility to nearest PSD Class I areas (Wind Caves National Park and Badland National Park) or the Northern Cheyenne Reservation. Defensive flare emissions are insignificant. National greenhouse gas (GHG) emissions would not substantially change from the No-Action Alternative under which B-1 and B-52 aircraft would continue to fly essentially the same amount of time to achieve lesser quality training.
Physical Sciences (EIS Section 4.5)	No construction or direct impact to water or soils. Chaff particles on the surface would be chemically stable and subject to mechanical degradation. Soils pH is outside the range necessary to degrade the aluminum coating on chaff particles. Chaff and flare residual materials would be inert and not in sufficient quantities to impact physical resources. No impact to soils or water bodies expected.

Table 2-36. Summary of Impacts by Resource (Page 4 of 14)

Alternative B	*Alternative C*	*No Action Alternative*
Alternative B includes same communication, flight safety, and ground safety impact under PR-2, PR-3, PR-4, and associated Gap MOAs and ATCAAs as explained for Alternative A. Under the PR-1A, PR-1B, and Gap A ATCAAs there would be no low-altitude startle effects and few environmental impacts other than very infrequent sonic booms and chaff and flare residual materials; no mining impacts under PR-1A/1B ATCAAs.	Alternative C includes same communication, flight safety, and ground safety impacts under PR-1A, PR-1B, PR-2, PR-3, and associated Gap MOAs and ATCAAs as explained for Alternative A. No low-flying startle or other environmental effects from aircraft under the PR-4 and Gap C ATCAAs. Few impacts from infrequent sonic booms and chaff and flare residual materials under PR-4 and Gap C ATCAAs.	No changes to Powder River airspace. Low-level overflights continue in the Powder River A/B MOAs, and communication would continue to be required to identify seasonal avoidance areas and reduce impacts from low-level overflight to ranching or recreational activities.
No significant air quality impacts with Alternative B. No low-level overflight in PR-1A or PR-1B. Aircraft training operations would not fly over or otherwise impact any Federal PSD Class I areas. National GHG emissions would not substantially change from the No-Action Alternative under which B-1 and B-52 aircraft would continue to fly essentially the same amount of time to achieve lesser quality training.	No anticipated air quality impacts. Potential effects to air quality would be comparable to those described under Alternative A, including low-level overflight in Lame Deer and Sheridan non-attainment areas (PR-1A and PR-1B). National GHG emissions would not substantially change from No-Action Alternative.	No anticipated air quality impacts. Overflights below 3,000 feet AGL would continue within Powder River A/B MOAs.
Physical effects would be the same as those described for Alternative A.	Alternative C physical effects would be the same as those described under Alternative A.	The No-Action Alternative would not affect physical resources under the Powder River airspace.

Table 2-36. Summary of Impacts by Resource (Page 5 of 14)

Environmental Resource	*Alternative A Preferred Alternative*
Biological Sciences (EIS Section 4.6)	Loud, sudden noises combined with a visual stimulus produce the most intense reaction by animals. Most species within the areas under the proposed PRTC already occupy comparable environments under the Powder River A/B MOAs where low-level overflights occur. Sound exposure levels (SEL) above 40 dB are associated with a number of behaviors such as retreat from the sound, freezing, or a strong startle response. Animals under the newly proposed PR-1A, PR-1B, PR-3, PR-4, and associated Gaps MOAs expected to be temporarily more sensitive to noise due to lower previous exposure. Animals typically exhibit continually decreasing responses to noise exposure suggesting habituation. Minimal to no effects to threatened, endangered, and other special status species including greater sage-grouse or rare migrants, such as the piping plover, least tern, whooping crane, or yellow-billed cuckoo. Any impact to sensitive species would likely be short-term and unlikely to significantly affect the population. Potential bird aircraft strikes in PR-2 and PR-4 Low MOAs where migratory flyways converge. If migratory bird species involved in bird aircraft strike, it would be considered an incidental taking and would be exempt from any permitting requirement. An infrequent special status bird aircraft strike would not be expected to adversely affect any populations. No evidence of chaff and flare residual materials or chaff fibers affecting wildlife or domestic animals through ingestion, inhalation, or direct body contact. The potential for fire as a result of Air Force activity is minimal and not considered a significant risk to wildlife habitat quality or quantity.
Cultural and Historic Resources (EIS Section 4.7)	As of spring 2010, there were 239 National Register of Historic Places (NRHP) properties under Alternative A airspace. Impacts to cultural resources could occur from low-level overflights or supersonic noise during LFEs. Sonic booms are normally experienced as distant thunder although each boom could result in local areas experiencing an overpressure of 4 psf or greater. Infrequent and random sonic booms are not expected to have structural damage to historic buildings, but bric-a-brac could be vibrated off shelves and structures subject to a focus boom could be impacted. Even infrequent sonic booms at historic landmarks, such as Bear Butte, national monuments, such as Devils Tower or the Little Bighorn Battlefield, or locations such as the Deadwood Historic District could be seen as intrusions. Sudden and random overflights of the Little Bighorn Battlefield would not be below 2,000 feet AGL. The estimated 6 to 9 low-level overflights per year would not be expected to be perceived as a significant intrusion to the national monument. The change in setting created by increased noise from low-altitude overflights and even infrequent sonic booms would be expected to have an adverse impact upon traditional cultural properties and cultural landscapes. Visual intrusions can include overflights of a Tribal ceremony or residual materials from chaff and flares. Amish and Hutterite settlements may be similarly impacted under proposed PR-1B MOA. During consultations, Native Americans from the four directly impacted reservations explained that low-level overflights and intrusive noise would be detrimental to their cultural practices. The change in setting created by increased noise and low-level training overflights could be seen as a significant impact to Native American Reservations. An estimated annual 6 to 9 low-level overflights of the agricultural portions of the Standing Rock Reservation could occur. Only a small corner of the Cheyenne River Reservation is under the proposed PR-4 MOA and low-level overflights would be expected. Populated portions of the Crow Reservation and all residents of the Northern Cheyenne Reservation would experience low-level overflight, on average, 6 to 9 times per year. The Air Force would establish reasonable temporary or seasonal avoidance areas or could adopt other measures identified in Government-to-Government consultation with affected Tribes to reduce intrusive impacts.

Table 2-36. Summary of Impacts by Resource (Page 6 of 14)

Alternative B	*Alternative C*	*No Action Alternative*
Alternative B has same effects as Alternative A with exception that the more environmentally diversified area and higher terrain under the PR-1A, PR-1B, and Gap A ATCAAs would not be subject to low-level overflights. This would result in no low-altitude noise impacts to species in those areas. Impacts to other areas of proposed low-altitude airspace as described for Alternative A.	Alternative C has same effects as those described for Alternative A with exception that the more agricultural area under the proposed PR-4 and Gap C ATCAAs would not be subject to low-level overflights. This would result in no expected low-altitude startle impacts or bird-aircraft strikes to species in those areas. The more environmentally diversified area under the PR-1A, PR-1B MOAs included in Alternatives A and C. Alternative C biological effects less than Alternative A, but somewhat greater than Alternative B.	Low-level overflight of the Powder River A/B MOAs would continue. Existing biological conditions would continue.
Alternative B has 202 NHRP listed properties under the airspace with impacts similar to those described for Alternative A. The exception is that there would be reduced impacts on the Crow and Northern Cheyenne Reservations under PR-1A and PR-1B ATCAAs when compared with Alternative A. No low-level overflight over the Little Bighorn Battlefield National Monument or the Tongue River Cultural Landscape. Intrusions to sites under the PR-1A/1B ATCAAs from infrequent sonic booms and not from low-level overflights. Effects to Devils Tower, Bear Butte, the Deadwood Historic District, and other historic locations could occur as under Alternative A. Portions of the Standing Rock and Cheyenne River Reservation would be affected by low-altitude overflights and sonic booms although populations not concentrated in areas overflown. Impacts to cultural resources would be as described for Alternative A.	Alternative C has 208 NHRP listed properties under the airspace with impacts similar to those described for Alternative A. The exception is that Alternative C would not have low-altitude training over the Standing Rock and Cheyenne River Reservations. Impacts from infrequent sonic booms and low-level overflights would generally be comparable to those described for Alternative A, including impacts to the Little Bighorn Battlefield and Traditional Cultural Places under the PR-1A/1B MOAs. Portions of the Crow and all of the Northern Cheyenne Reservations would be affected by an average of 6 to 9 low-level overflights and an average of 1 sonic boom per day during the 10 LFE days per year. Impacts to cultural resources would be as described for Alternative A.	There would be no change to overflight of historic properties within the Powder River airspace. PR-A and PR-B MOAs do not overlie Native American Reservations.

Table 2-36. Summary of Impacts by Resource (Page 7 of 14)

Environmental Resource	*Alternative A Preferred Alternative*
Land Use (EIS Section 4.8)	Land uses under the existing Powder River airspace have been overflown by a variety of military aircraft for 20 years. Public concerns at scoping included the effect of sonic booms and low-level overflight on use of the land. Land uses under Powder River airspace within WY, SD, and MT are comparable to those in other portions of the area proposed for the PRTC airspace. Supersonic training scheduled only during LFEs and an estimate of one sonic boom per LFE day (10 days per year) projected to occur toward the center of the airspace and not expected to impact land uses. Low-level overflight activity could cause individual annoyance and could result in sleep disturbance or temporarily interfere with personal communication. Approximately 2 to 4 percent of the MOAs would be overflown by an aircraft 2,000 feet AGL or below on a daily basis. The random nature of the aircraft overflight could result in any location under each MOA being overflown an average of approximately 6 to 9 times per year (any given location could be overflown more or less frequently). Overflight is not expected to impact overall land use although some individuals could be annoyed. Low-level overflight impacts to ranching land uses could be reduced through communication with Air Force to identify temporary avoidance areas. Hunting and other recreational land uses may be disturbed by infrequent low-level military flights but overall land use not expected to be impacted. Recreation from Friday noon through Monday morning not expected to be impacted when military training would generally not be scheduled. Land use for energy development not expected to be impacted assuming electronic emissions coordinated for mine and construction safety. Chaff or flare residual debris, which consists of plastic pieces or wrapping material, would not be expected to affect land uses but could cause annoyance if found.

Table 2-36. Summary of Impacts by Resource (Page 8 of 14)

Alternative B	*Alternative C*	*No Action Alternative*
Alternative B land use effects comparable to those described for Alternative A. Areas under the PR-1A, PR-1B, and associated Gap A ATCAAs not subject to low-level overflight. In these areas, land uses not affected and civilian flights below FL180 not affected. Remainder of Low MOA airspace subject to low-level overflight an average of approximately 6 to 9 times per year. These events and infrequent supersonic events would not be expected to impact land use although this could be seen as an annoyance to persons using the land.	Alternative C land use effects comparable to those described for Alternative A. Areas under PR-4 and associated Gap C ATCAAs not subject to low-level overflight. Land use or civilian flights below FL180 in these areas not affected. Remainder of airspace subject to low-level overflight and intermittent sonic booms as described for Alternative A. An estimated annual average of 6 to 9 low-level events would be experienced by residents living under the Low MOAs. Land use not expected to be impacted although low-level and infrequent supersonic events could be seen as an annoyance to persons using the land.	No-Action Alternative would not change effects upon land use under the existing Powder River airspace.

Table 2-36. Summary of Impacts by Resource (Page 9 of 14)

Environmental Resource	*Alternative A Preferred Alternative*
Socioeconomics (EIS Section 4.9)	Estimated 129 civilian aircraft operations under the airspace during Monday through Thursday (approximately one-third of that number on Friday morning) could be impacted by delay, re-routing, needing to fly VFR in an active MOA, or not being able to fly IFR. Delays of 2 to 4 hours and could be seen as an economic impact at public airports and private airfields under airspace. FAA to limit training above FL300 to avoid significant impacts upon air carrier economics and regional and national air traffic. During LFEs entire airspace unavailable for IFR or overflight traffic for a period of 2 to 4 hours per day for 1 to 3 days per quarter. LFE civil aviation impacts expected to include from 43 to 244 daily operations above FL180 plus 76 daily civil operations in the MOAs. The inability of crop duster aerial applicators to know where and at what altitude a training bomber could fly over the area could impact and affect business decisions and economics. Review of assessor procedures and MT, ND, SD, or WY state laws has shown no requirement for disclosure under a MOA. Existing Powder River MOAs not considered relevant by assessors in MT, SD, and WY. No quantifiable property value impacts anticipated. Airspace not expected to impact energy resource development except time-critical deliveries could be delayed. Coordination would be required between mine operators or other blasting operations and the Air Force to ensure that radio frequencies used for mining were not used by Air Force aircraft during training. Potential for aircraft frequencies to result in a triggering of explosives used in mining or construction could have significant impacts. Alternative A noise level changes in PR-1A, PR-1B, PR-3, and PR-4 from a DNL of less than 45 dB to an aircraft calculated <45DNL to 47 dB could be noticeable and be perceived as an impact although noise levels would be below the USEPA-identified DNL of 55 dB which is a noise protective of the public health and welfare. An average of 6 to 9 low-level overflights and approximately one sonic boom during each of 10 days of annual LFEs could impact ranching operations, especially during times when range stock are penned. Within the Powder River A/B MOAs, ranchers have coordinated with the Air Force to identify temporary avoidance areas so that the potential for low-altitude aircraft impact could be reduced. Sonic booms cannot be directed to avoid a location, although the schedule for LFEs would be published in advance. Chaff and flare impacts not expected, although an individual finding a piece of chaff or flare plastic or wrapper residual material could be annoyed. Emergency flight operations such as firefighting and air ambulance would continue under ATC emergency flight procedures. No impact expected. The Air Force would immediately move training activities outside the required airspace to meet emergency needs.

Table 2-36. Summary of Impacts by Resource (Page 10 of 14)

Alternative B	*Alternative C*	*No Action Alternative*
An estimated average of 97 civil aircraft operations could be impacted Monday through Thursday (approximately one-third of that number on Friday morning) as described for Alternative A. Alternative B impacts comparable to Alternative A except that Alternative B does not have airspace below FL180 under the PR-1A, PR-1B, and Gap A ATCAAs. This means no low-altitude overflights over existing or proposed mining operations in the area. Ranching, Tribal, other settlements, and recreational activities in Billings-Miles City-Gillette triangle not overflown below FL180. LFE civil daily impacts to be from 43 to 244 operations above FL180 plus an estimated 57 civil operations in MOAs. Impacts to other areas as described for Alternative A.	Civil aircraft operations impacted by Alternative C estimated at 79 Monday through Thursday (approximately one-third of that number on Friday morning). Alternative C impacts comparable to Alternative A. Alternative C does not have airspace below FL180 under the PR-4 and Gap C ATCAAs. This means that Tribal lands, ranching, recreation, and other activities within this area would not experience low-altitude overflights. LFE civil daily impacts to be from 43 to 244 operations above FL180 plus an estimated 48 civil operations in MOAs. Impacts to other areas as described for Alternative A.	Continue training including low-level overflights in Powder River airspace. Estimated 7 civilian operations to be impacted daily. No change in socioeconomic effects.

Table 2-36. Summary of Impacts by Resource (Page 11 of 14)

Environmental Resource	*Alternative A Preferred Alternative*
Environmental Justice (EIS Section 4.10)	Alternative A minority and low-income population concentrations reside on the entire Northern Cheyenne Reservation and portions of the Crow Reservation under PR-1B. PR-4 MOA on the eastern side of the airspace is not over population concentrations of the Standing Rock Reservation and only overflies a corner of the Cheyenne River Reservation. Tribes have sacred sites for spiritual ceremonies and vision quests under proposed airspace. Sites which are culturally or spiritually significant to Native Americans are located on or near reservations and ceremonies may be conducted by Native Americans at these sites. The potential for adverse impacts at these culturally significant sites would be disproportionate for the Native Americans associated with the four reservations located beneath the proposed PRTC, especially for the Northern Cheyenne and Crow Reservations. During Government-to-Government consultations, the Air Force has sought to identify sacred sites and specific times of the year when temporary avoidance areas could be established to reduce the potential disruption from aircraft noise and visual disturbances. Coordinating flight schedules, establishing altitude restrictions, and identifying avoidance areas could reduce the potential for impacts to tribal lands although disproportionate impacts could occur, particularly to minority and low-income populations under PR-1B. Youth populations in the affected counties are highest on the Crow and Northern Cheyenne Reservations under PR-1B. Reaction to low-level overflight or sonic booms could temporarily disrupt classrooms but would not be expected to have long-term learning or health impact upon children. The primary exception to this is under the proposed PR-1B MOA where the concentration of youth exists. Under the PR-2, PR-3, and PR-4 MOAs, which would be subject to low-level overflights, the affected population is 20,122 persons, of which 558 are minority, 2,932 live below the poverty level, and 5,016 are children, including the affected populations within the Standing Rock and Cheyenne River Reservations. Under the PR-1A and PR-1B MOAs, the affected populations is 16,746 persons, of which 9,717 are minority, 4,734 live below the poverty level, and 6,074 are children, including the affected populations within the Northern Cheyenne and Crow Reservations.

Table 2-36. Summary of Impacts by Resource (Page 12 of 14)

Alternative B	Alternative C	No Action Alternative
Alternative B would not establish PR-1A/1B MOAs and would not overfly the Crow or Northern Cheyenne Reservations below FL180. Potential would exist to impact the rural areas of the Standing Rock Reservation and a small corner of the Cheyenne River Reservation located beneath proposed PR-4 MOA. There would be the potential for disproportionate adverse impact on the Native American reservations under PR-4. Coordinating flight schedules, establishing altitude restrictions, and identifying avoidance areas could reduce the potential for significant impacts to tribal lands. Effects on youth populations would generally be less than those described for Alternative A.	Alternative C would include PR-1A and PR-1B MOAs and would impact portions of the Crow Reservation and all of the Northern Cheyenne Reservation as described for Alternative A. There would be no low-level overflights of Standing Rock and Cheyenne River Reservations. Potential for disproportionate adverse impact on the Crow and Northern Cheyenne Reservations as described for Alternative A. Coordinating flight schedules, establishing altitude restrictions, and identifying avoidance areas could reduce the potential for impacts to tribal lands although disproportionate impacts, particularly under PR-1B, could be expected. Effects on youth populations would be generally as described for Alternative A with the higher proportion of youth impacted under the proposed PR-1B MOA than under any other proposed airspace.	No Tribal Reservations under existing Powder River airspace. No disproportionate impact upon environmental justice population associated with the existing Powder River airspace.

Table 2-36. Summary of Impacts by Resource (Page 13 of 14)

Environmental Resource	*Cumulative*
Cumulative (EIS Section 5.0)	Cumulative effects analysis considers the potential incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency or person undertakes any such action. Potential cumulative projects in the ROI include plans and permits to develop mineral reserves, including oil, gas, and coal reserves, and transportation of excavated resources. Other cumulative projects include beddown of an additional B-52 squadron at Minot AFB, airspace actions in North Dakota and Utah, and potential addition of threat emitters and simulated targets to add realism to aircrew training. **Airspace, Noise, and Safety** The additional B-52 squadron has been included throughout the EIS as a baseline condition. Cumulative potential effects upon other airspace users or potential users have been included throughout this EIS, including impacts to airspace access and impacts to time-sensitive deliveries as a result of the inability to fly IFR through an active MOA. Approximately 2 to 4 hour delays or re- routing could impact time-sensitive deliveries to existing or proposed mining, transportation projects, industrial development, or agricultural operations. Limited communication and radar coverage which impact safe civil aircraft operations and airports would continue below 12,000 feet MSL in much of the proposed airspace. The B-1 or B-52 would randomly overfly at levels of 2,000 feet AGL or below approximately 2 to 4 percent of each MOA during any training workday. This level of overflight and potential startle effect is not expected to significantly alter or cumulatively affect any development plan or resources within the region. Infrequent sonic booms during LFEs not expected to interfere or cumulatively affect other ongoing or proposed activities. Aircraft training overflight noise is expected to be random and would not cumulatively interact with construction sites. Coordination and communication with mining or other blasting related activities, such as new rail lines, would be required for safety to avoid significant cumulative impacts. No cumulative effects to noise or safety from PRTC would be expected in conjunction with other projects in the ROI. **Physical Resources and Air Quality** Mineral excavation and transportation line construction could potentially impact large amounts of soil and water resources and could contribute to air quality impacts. Separate environmental analyses, prepared for the projects, will document impacts and mitigations. Potential construction of emitter sites would not be expected to have an impact on soils, water, or air quality resource. Any threat emitters on 15-acre sites would be subject to environmental review. Siting criteria would include being near power for electricity to run the threat emitters, so no air quality effects from generators would be anticipated. Aircraft overflights do not produce an amount of emissions which could contribute to cumulative air quality impacts or result in discernible contributions to present or future nonattainment areas. No cumulative effects are anticipated to physical resources or air quality as a result of the proposed PRTC. **Natural and Cultural Resources** Mineral excavation and transportation line construction could impact natural and cultural resources. Construction and other ground-disturbing projects could impact Tribal lands and cultural resources. Separate environmental documentation would assess direct and indirect impacts of these projects. Cultural resources on Tribal lands experiencing construction or other ground-disturbing effects could be impacted directly as a result of other projects in the ROI. Some cumulative effects could occur from infrequent low-level overflights in conjunction with extensive planned mineral operations on Tribal lands. Potential construction of emitter sites would not be expected to have a cumulative impact in conjunction with large scale mining projects based on the relatively small size of the emitter sites and the need for sites to be on an open rise where they could project out as far as possible. Emitters would be located to avoid environmentally sensitive areas and would not be expected to cumulatively contribute to disturbance of natural or cultural resources.

Table 2-36. Summary of Impacts by Resource (Page 14 of 14)

Environmental Resource	*Cumulative*
Cumulative (EIS Section 5.0) (continued)	**Land Use, Socioeconomics, and Environmental Justice** Substantial construction projects in the ROI would alter employment patterns in areas of mineral development or transportation projects. Construction projects and additional large-scale mining would contribute to regional employment while changing the nature of the economy. Agreements regarding construction and operation jobs for Tribal members could improve economic opportunities for minority and low income populations. Temporary avoidance areas would be established over construction sites where tall cranes or helicopters would be used in the construction. Permanent avoidance areas would be mapped for tall structures such as smokestacks or wind generation machines. Cumulative impacts from overflight in conjunction with mining operations would not be anticipated. Low-level overflight and associated hunting and other recreation continue throughout the area overlain by the existing Powder River A/B MOAs. The fact that recreation occurs in areas of current low-level overflights suggests that the actual military aircraft overflight impacts could be less than the uncertainty of an average of 6 to 9 low-level overflights per year. For all environmental resources except civilian air operations and cultural resources where impacts would occur, the establishment of the PRTC in combination with any other ongoing activity by federal or other agencies or enterprises would not be expected to cumulatively impact environmental resources.

2.12 Mitigation Measures

The Air Force would employ the following measures during regular training and LFEs to mitigate impacts:

1. Airspace scheduled times of use are specified in the Air Force's aeronautical proposal, summarized in Tables 2-10 and 2-11, and published online at http://sua.faa.gov/sua/Welcome.do
2. Airspace scheduled outside of normal published times of use is disseminated via Notice to Airmen (NOTAMs), available at https://pilotweb.nas.faa.gov/.
3. Low and High MOAs allow ATC to vector IFR traffic as soon as training is completed in an airspace segment.
4. Airspace use and long term planning information on deconfliction, fire-fighting operations, and special events/cultural events is available during normal business hours 8:00 am-5:00 pm Local, Monday through Friday from the Ellsworth AFB Airspace Management Office at (605) 385-1230.
5. Information posted on flyers and posters can be found at public airports underlying the airspace and is updated annually by the Ellsworth AFB Flight Safety Office as part of the Mid-Air Collision Avoidance Program at (605) 385-4419.
6. The Ellsworth AFB Public Affairs Office is available to answer inquiries and complaints at (605) 385-5056 8:00 am-5:00 pm Monday through Friday. In the event of any damage or injury associated with PRTC operations, descriptive documentation related to the Air Force Claims Program can be sent in to the Ellsworth AFB Public Affairs Office.
7. The Air Force would establish reasonable temporary or seasonal avoidance areas or could adopt other measures identified in consultation with affected tribes to reduce intrusive impacts.
8. The Air Force would extend the current practice of establishing reasonable temporary or seasonal avoidance areas in response to affected ranchers who call Ellsworth AFB Public Affairs Office to identify locations of ranch operations, such as calving, weaning, and branding.
9. Where schedule changes require use of airspace outside of published times of use, the Air Force would inform ARTCCs at least 2 hours in advance in order to facilitate issuance of a NOTAM.
10. Publish a notice at least one month in advance of LFEs to help civil aircraft pilots and the public plan for LFE airspace activation.
11. The Air Force would establish procedures to avoid low altitude overflight of and frequency interference with known blasting operations e.g. associated with coal mining operations.
12. The Air Force would establish communication procedures to ensure the ability to recall the military aircraft from the low altitude MOAs in PR-1A, PR-3, and PR-4 to allow civil IFR departures and arrivals.
13. The Air Force would establish communication procedures to ensure deconfliction with emergency flight operations within the proposed airspace.

3.0 AFFECTED ENVIRONMENT

This chapter describes the baseline or existing condition within the geographic areas potentially affected by the alternatives described in Chapter 2.0.

The National Environmental Policy Act (NEPA) requires that the analysis address those locations and the components of the environment potentially affected by the Proposed Action or alternatives. Locations and environmental resources with no potential to be affected need not be analyzed. Public and agency scoping comments were used to focus the analysis on those environmental resources of interest to scoping participants. Environmental consequences are addressed in Chapter 4.0. Cumulative effects associated with other federal and regional actions are described in Chapter 5.0.

The expected geographic area of potential impacts is known as the region of influence (ROI). The ROI for this project is defined for each environmental resource as the outermost boundary of potential environmental consequences. The ROI generally is focused on the four-state region underlying the proposed airspace. For some resources, such as airspace, air quality, and socioeconomics, the ROI extends beyond the four-state area directly under the proposed airspace.

3.1 Airspace/Air Traffic

3.1.1 Definition of the Resource

Airspace management and Air Traffic Control (ATC) consist of the direction, control, and coordination of flight operations in the “navigable airspace” that overlies the geopolitical borders of the United States (U.S.) and its territories. Navigable airspace consists of airspace above the minimum altitudes of flight prescribed by regulations under United States Code (USC) Title 49, Subtitle VII, Part A, and includes airspace needed to ensure safety in the takeoff and landing of aircraft (49 USC § 40102). The U.S. government has exclusive sovereignty over all airspace extending from the surface to above 60,000 feet mean sea level (MSL) (49USC 40103(a)(1). The ROI for airspace has direct and indirect components. The direct ROI is the Powder River Training Complex (PRTC) airspace proposed for training activities and the airports under the proposed PRTC. The indirect ROI consists of airports on the periphery of the proposed PRTC, as well as more distant aviation facilities which could be affected by changes in flight patterns resulting from the proposed PRTC.

Several small public airports and private airfields are located under the proposed airspace with larger airports on the periphery of the airspace. Air travel can be the most practical means of transport for remote areas in southeastern MT, the western Dakotas, and northeastern WY. Emergency transport operations use the air space for the medical evacuation of patients to regional medical centers from remote areas. Rapid delivery of machinery parts and personnel can be critical during harvesting periods or other industrial operations. During scoping meetings, participants indicated that ranchers and farmers use private aircraft for access, crop-dusting, and general property surveillance. Often these pilots fly without local or regional radio contact and much of the area in which they fly has limited radio or radar tracking.

3.1.2 Regulatory Setting

Congress has charged the Federal Aviation Administration (FAA) with the responsibility to develop plans and policy for the use of the navigable airspace and to assign by regulation or order, the use of the airspace necessary to ensure the safety of aircraft and its efficient use (49 USC § 40103(b)). Special Use Airspace (SUA) identified by FAA for military and other governmental activities is charted and published by the National Aeronautical Charting Office in accordance with FAA Order 7400.2 and other applicable regulations and orders. Airspace management considers how airspace is designated, used, and administered to best accommodate the individual and common needs of military, commercial, and general aviation. The FAA considers multiple, and sometimes competing, demands for aviation airspace in relation to airport operations, federal airways, jet routes, military flight training activities, and other special needs to determine how the National Airspace System can best be structured to address all user requirements.

The United States Air Force (Air Force) requests airspace from FAA and schedules and uses airspace in accordance with processes and procedures detailed in Air Force Instruction (AFI) 13-201 *Air Force Airspace Management*. AFI 13-201 implements Air Force Planning Document 13-2, *Air Traffic Control, Airspace, Airfield, and Range Management*, and Department of Defense (DoD) Directive 5030.19, *DoD Responsibilities on Federal Aviation and National Airspace System Matters*. AFI 13-201 addresses the development and processing of SUA, and covers aeronautical matters governing the efficient planning, acquisition, use, and management of airspace required to support Air Force flight operations (Air Force 2001a). Ellsworth Air Force Base (AFB) schedules the Powder River A and B Military Operations Areas (MOAs) and would schedule the proposed PRTC MOAs. Air Traffic Control Assigned Airspace (ATCAA) is controlled by Air Route Traffic Control Centers (ARTCC) and may be released for military use when requested.

3.1.3 Existing Conditions

The alternatives presented in Chapter 2.0 describe the establishment of new MOAs and ATCAAs and modification to existing MOAs and ATCAAs. This section explains the national airspace structure and the management of that structure.

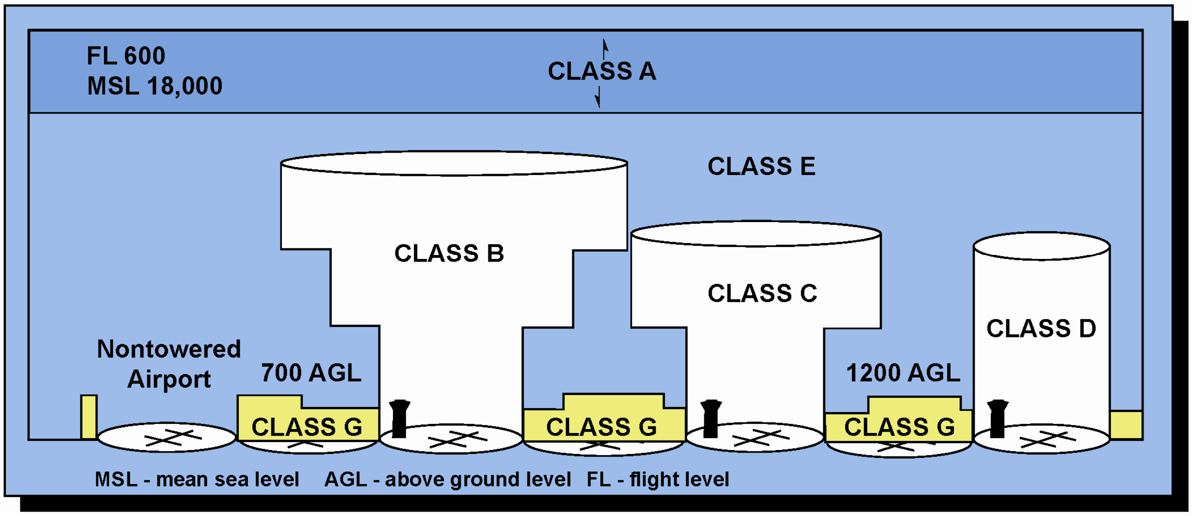
3.1.3.1 Airspace Categories

FAA defines two categories of airspace or airspace areas, regulatory and non-regulatory. Within these two categories, there are four types of airspace, Controlled, Special Use, Other, and Uncontrolled airspace (Class G). Controlled airspace is airspace of defined dimensions within which air traffic control service is provided to Instrument Flight Rules (IFR) flights and to Visual Flight Rules (VFR) flights in accordance with the airspace classification (FAA 2004).

Controlled airspace is categorized into five separate classes: Classes A through E. Class F airspace is not used in the U.S. The airspace classes are shown graphically in Figure 3.1-1. Classes A through E identify airspace that is controlled, airspace supporting airport operations, and designated airways affording en route transit from place-to-place. The classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace.

Class A airspace, generally, is that airspace from 18,000 feet MSL up to, and including, Flight Level (FL) 600. FL600 is equal to approximately 60,000 feet MSL. Flight levels are MSL altitudes based on the use of a directed barometric altimeter setting, and are expressed in hundreds-of-feet. The proposed PRTC ATCAAs where B-1, B-52, transient fighters, and Large Force Exercise (LFE) training could occur are in Class A airspace.

Class B airspace, generally, is that airspace from the surface to 10,000 feet MSL around the nation's busiest airports. The actual configuration of Class B airspace is individually tailored and consists of a surface area and two or more layers, and is designed to contain all published instrument procedures (FAA 2004). There is no Class B airspace in the direct ROI. The relationship of en-route aircraft to the use of training airspace above FL260 has been identified by FAA as a potential indirect impact upon scheduling in selected Class B airspace.



Source: United States Department of Transportation/FAA 2003

Figure 3.1-1. Controlled/Uncontrolled Airspace Schematic

Uncontrolled airspace is designated Class G airspace.

Class C airspace, generally, is that airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Although the actual configuration of Class C airspace is individually tailored, it usually consists of a surface area with a 5 nautical mile (NM) radius, and an outer circle with a 10 NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation (FAA 2004). Billings is within Class C airspace.

Class D airspace, generally, is that airspace from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored and when instrument procedures are published, the airspace will normally be designed to contain the procedures. Arrival extensions for instrument approach procedures may be designated as Class D or Class E airspace (FAA 2004). Bismarck, Gillette, Ellsworth AFB, Rapid City, and Minot AFB have Class D airspace.

Class E airspace is controlled airspace that is not Class A, B, C, or D. The floor of Class E airspace is generally 700 feet above ground level (AGL). There are areas where Class E airspace begins at either the surface or 700 feet AGL that are used to transition to/from the terminal or en route environment (around non-towered airports). These areas are designated by VFR sectional charts. In most areas of the U.S., Class E airspace extends from 1,200 feet AGL up to, but not including, 18,000 feet MSL, the lower limit of Class A airspace. No ATC clearance or radio communication is required for VFR flight in Class E airspace. VFR visibility requirements below 10,000 feet MSL are 3 statute miles visibility and cloud clearance of 500 feet below, 1,000 feet above, and 2,000 horizontal. Above 10,000 feet MSL the requirement is 5 statute miles visibility, and cloud clearance of 1,000 feet below, 1,000 feet above, and 1 mile laterally (FAA 2003). Most airspace in the ROI below FL180 is Class E. There are seven types of Class E airspace, as described below.

- **Surface Area Designated for an Airport.** When so designated, the airspace will be configured to contain all instrument procedures.
- **Extension to a Surface Area.** These are Class E airspace areas that serve as extensions to Class B, C, and D surface areas designated for an airport. This airspace provides controlled airspace to

contain standard instrument approach procedures without imposing a communications requirement on pilots operating under VFR.

- **Airspace Used for Transition.** These are Class E airspace areas beginning at either 700 or 1,200 feet AGL used to transition to/from the terminal or en route environment.
- **En Route Domestic Airspace Areas.** These areas are Class E airspace areas that extend upward from a specified altitude to provide controlled airspace where there is a requirement for IFR en route air traffic control services, but where the Federal Airway system is inadequate.
- **Federal Airways.** Federal Airways (Victor Airways) are Class E airspace areas, and, unless otherwise specified, extend upward from 1,200 feet to, but not including, 18,000 feet MSL. The proposed Gap MOAs are along Victor Airways within the ROI.
- **Other.** Unless designated at a lower altitude, Class E airspace begins at 14,500 feet MSL to, but not including, 18,000 feet MSL overlying: a) the 48 contiguous states, including the waters within 12 miles from the coast of the 48 contiguous states; b) the District of Columbia; c) Alaska, including the waters within 12 miles from the coast of Alaska, and that airspace above FL600; d) excluding the Alaska peninsula west of 160°00'00" west longitude, and the airspace below 1,500 feet above the surface of the earth unless specifically so designated.
- **Offshore/Control Airspace Areas.** This includes airspace areas beyond 12 NM from the coast of the U.S., wherein air traffic control services are provided (FAA 2004). There are no offshore/control airspace areas in the proposed airspace changes.

Airspace that has not been designated as Class A, B, C, D, or E airspace is Uncontrolled Airspace (Class G) (FAA 2004). Class "G" airspace generally underlies Class E airspace with vertical limits up to 700 feet AGL, 1,200 feet AGL, or 14,500 feet AGL, whichever applies. Cloud clearance and visibility requirements differ by altitude and day versus night.

Most of the airspace directly affected by the proposed PRTC consists of Class E. As noted above, some airports in the ROI include Class D airspace.

3.1.3.2 Special Activity Airspace

Special Activity Airspace (SAA), a term that includes Airspace for Special Use, SUA, and others (i.e., Temporary Flight Restrictions [TFRs]), is any airspace with defined dimensions within the National Airspace System wherein limitations may be imposed upon aircraft operations. This airspace may be prohibited areas, restricted areas, military operations areas, air traffic control assigned airspace, and any other designated airspace areas.

Airspace for Special Use includes Military Training Routes (MTRs) (Instrument Routes [IR]/Visual Routes [VR]), ATCAA, aerial refueling track/anchors, slow routes, and low-altitude tactical navigation areas. MTRs, IRs, ATCAAs, and aerial refueling tracks are within the ROI. Establishment of new ATCAAs and changes to existing ATCAAs are part of the proposed airspace changes to support B-1 and B-52 training.

SUA is defined airspace wherein activities must be confined because of their nature, or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. The types of SUA are Prohibited Areas, Restricted Areas, MOAs, Warning Areas, Alert Areas, Controlled Firing Areas, and National Security Areas. MOAs are SUAs in the ROI. Establishment of new MOAs and changes to existing MOAs are part of the proposed airspace changes to support B-1 and B-52 training.

3.1.3.2.2 MILITARY OPERATIONS AREAS

MOAs are established to separate or segregate certain non-hazardous military activities from IFR aircraft traffic and to identify VFR aircraft traffic where these military activities are conducted (see Figure 2-2). Ellsworth AFB manages existing MOAs, and is proposing new MOAs as part of the PRTC. A MOA is SUA of defined vertical and lateral limits established outside Class A airspace to separate and segregate certain non-hazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted (FAA 2004). MOAs are considered "joint use" airspace. Non-participating aircraft operating under VFR are permitted to enter a MOA, even when the MOA is active for military use. Aircraft operating under IFR must remain clear of an active MOA unless approved by the responsible ATC. If an IFR aircraft is approved to transit a MOA that part of the MOA is effectively made not active for military training during the IFR aircraft transit.

Within an active MOA, flight by both participating and VFR non-participating aircraft is conducted under the "see-and-avoid" concept, which stipulates that "when weather conditions permit, pilots operating VFR are required to observe and maneuver to avoid other aircraft. Right-of-way rules are contained in Code of Federal Regulations (14 CFR) Part 91" (FAA 2004). The responsible ATC provides separation service for aircraft operating under IFR and MOA participants. The see-and-avoid procedures mean that if a MOA were active during weather with restricted visibility, the general aviation pilot flying VFR could not safely access the MOA airspace and a pilot requesting IFR clearance would not be permitted to access the active MOA. An aircraft flying VFR which encountered weather or other conditions requiring IFR flight would need to declare an in-flight emergency and communicate with the ATC who would communicate with Ellsworth AFB to contact training aircraft and establish a temporary floor in the MOA high enough for the VFR pilot to be safely directed IFR by ATC.

Figure 3.1-2 presents the existing Powder River airspace and the proposed PRTC. The existing Powder River A MOA has a charted altitude from the surface to FL180 and is used intermittently by Notice to Airmen (NOTAM). Powder River B MOA has a charted altitude from 1,000 feet AGL to FL180 and is used intermittently by NOTAM (Billings Sectional Aeronautical Chart). When there is a change in the MOA activation, such as a mechanical delay in launch of a B-1 training mission, a new NOTAM is issued two hours in advance of the launch. Powder River A and B MOAs exclude airspace below 1,500 feet AGL over the Broadus and Belle Creek public airports and have avoidance areas over Lanning, Laird, and Sky private airfields, as well as over other locations. During scoping, some individuals expressed dissatisfaction with the existing Powder River airspace MOAs and others individuals noted that training in the MOAs does not significantly impact ranching activities.

3.1.3.2.3 AIR TRAFFIC CONTROL ASSIGNED AIRSPACE

ATCAA is airspace of defined vertical and lateral limits, assigned by Air Traffic Control for the purpose of providing air traffic segregation between the specified activities being conducted within the assigned airspace and other IFR air traffic (FAA 2004). This airspace, if not required for other purposes, may be made available for military use. ATCAAs are in Class A airspace and are frequently structured and used to extend the horizontal and/or vertical boundaries of MOAs. ATCAAs overlie the Powder River MOAs (conceptually depicted in Figure 2-2) and would be part of the PRTC (see Figure 3.1-2).

The alternatives for the PRTC include establishment of new ATCAA airspace and modification to existing ATCAAs. Each MOA on Figure 3.1-2 is overlain by an ATCAA of the same airspace dimensions except for the Powder River 1B (PR-1B) MOA, where the proposed MOA includes a semi-circle cut-out to support the Sheridan, Wyoming (WY) airport. Figure 3.1-2 also depicts the proposed Gateway West and East ATCAAs which do not propose corresponding MOAs beneath the ATCAAs.

The MOAs and ATCAAs associated with the Powder River airspace are developed, coordinated, used, and managed in accordance with Letters of Agreement between the 28th Bomb Wing (28 BW) and Salt Lake City, and Denver ARTCCs. For the Powder River airspace, the Letter of Agreement defines responsibilities, and outlines procedures for aircraft operations, air traffic control operations, and utilization of airspace for which the 28 BW is the scheduling authority. Such Letters of Agreement are supplementary to the procedures in FAA Orders 7110.65T (Air Traffic Control) and 7610.4N (Special Military Operations). Currently, B-1s operate within all airspace units associated with the existing complex, while B-52 operations occur primarily within the Crossbow ATCAA above the Powder River A/B MOA.

Table 3.1-1 lists existing MOAs and ATCAAs associated with the current Powder River airspace. During scoping, the FAA explained that high altitude commercial flights traverse the existing ATCAAs and commercial airline representatives explained that they were usually above FL260. Figure 3.1-3 indicates the airspace boundaries of the controlling ARTCC overlain on the proposed PRTC.

Table 3.1-1. Existing MOAs and ATCAAs Associated with the Powder River Airspace

	ALTITUDES		
	Floor	***Ceiling***	***Controlling ARTCC***
Powder River A MOA	Surface	Up to but not including FL180	Salt Lake City
Powder River B MOA	1,000 feet AGL	Up to but not including FL180	Denver
Powder River ATCAA	FL 180	FL260 inclusive or as assigned	Denver
Gateway ATCAA	FL 180	FL260 inclusive or as assigned	Denver
Crossbow ATCAA	FL 270	FL 450 inclusive or as assigned	Denver
Black Hills ATCAA	FL 200	FL 230 inclusive	Denver

Note: FL180 = Flight Level 180 (approximately 18,000 feet MSL)

Source: FAA Order 7400.8 Special Use Airspace, Denver ARTCC/Salt Lake City ARTCC/28BW Letter of Agreement, Subject: Powder River Training Complex and Crossbow ATCAA. December 10, 2006.

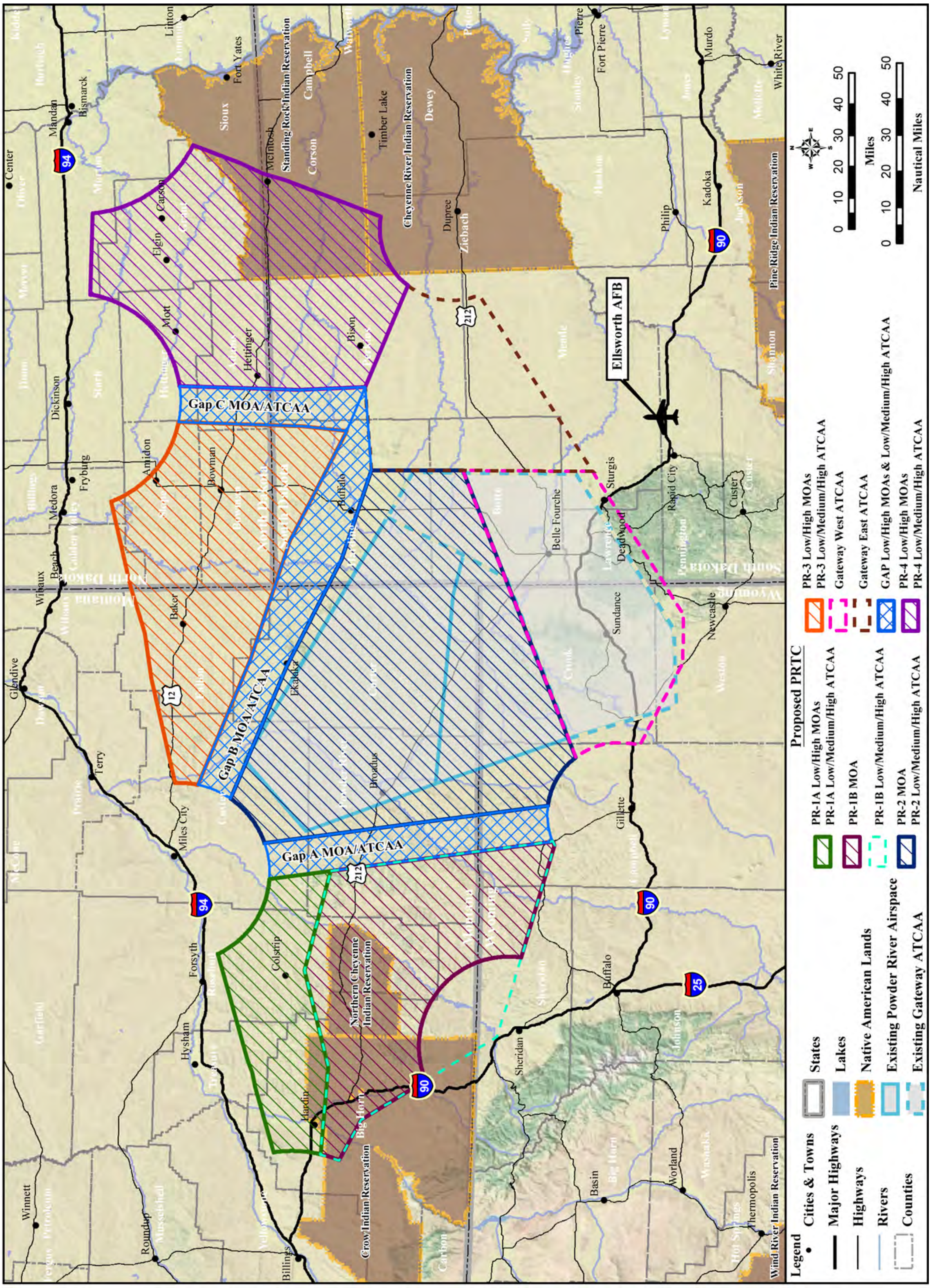


Figure 3.1-2. Current and Proposed PRTC Airspace

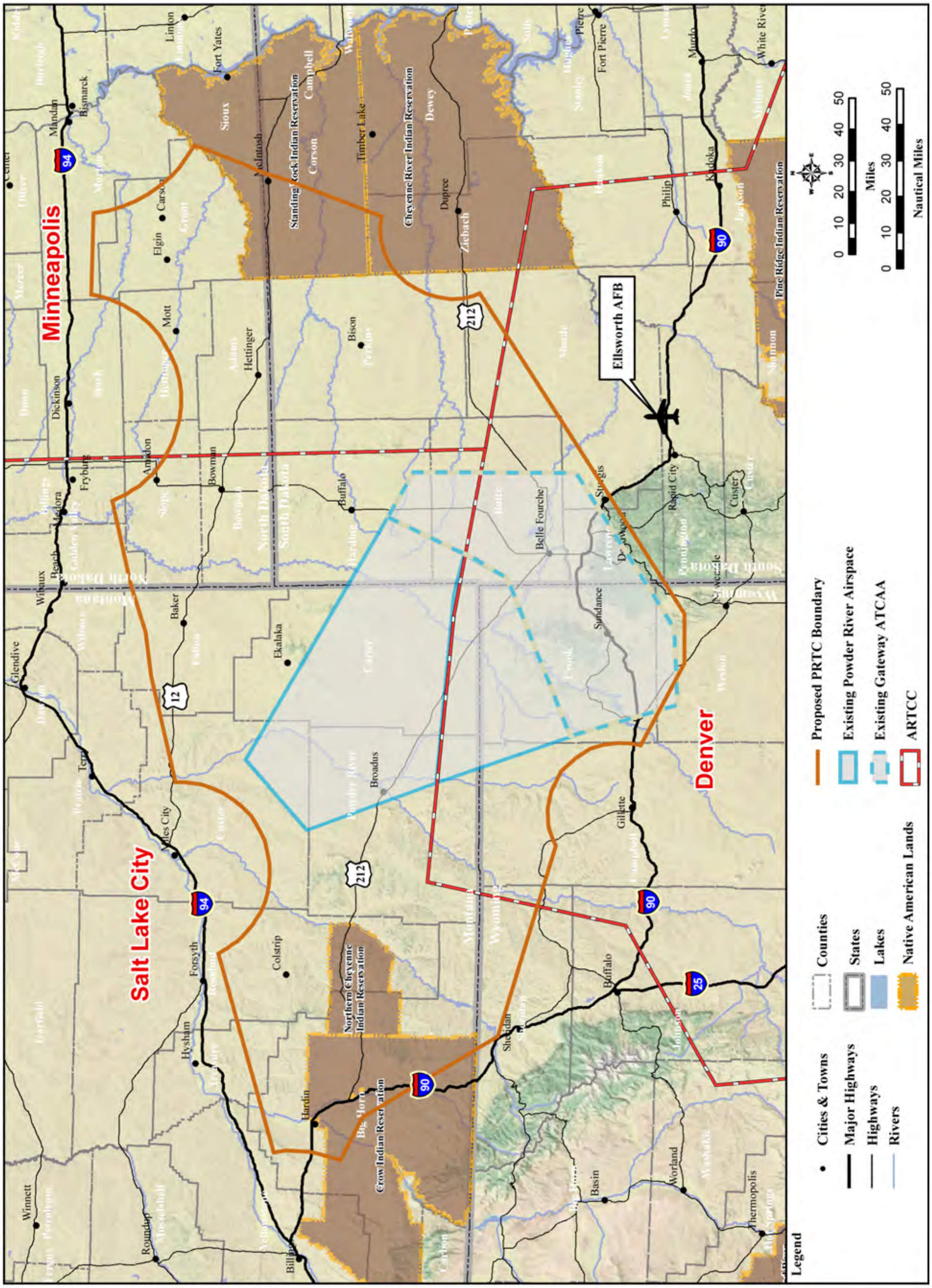


Figure 3.1-3. Controlling ARTCCs and the Proposed PRTC

3.1.3.3 Military Training Routes

B-52 (pictured here) and B-1 bombers have historically used MTRs in Montana, North Dakota, South Dakota, and Wyoming for low-altitude penetration mission training.

MTRs are single direction flight corridors developed and used by the DoD and associated Air National Guard (ANG) units to practice high-speed, low-altitude flight, generally below 10,000 feet MSL. Specifically, MTRs are airspace of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots indicated airspeed (FAA 2004). MTRs are developed in accordance with criteria specified in FAA Order 7610.4 (DoD 2005). They are described by a centerline with defined horizontal limits on either side of the centerline and vertical limits expressed as minimum and maximum altitudes along the flight path. MTRs are identified as VR or IR.

MTRs designated as VR are flown under VFR conditions whereas MTRS designated as IR are flown under IFR conditions. Figure 3.1-4 shows the three IRs which traverse the area and have been used by a variety of aircraft over the years, including B-1 and B-52 aircrews training for their low-level penetration missions. During public scoping meetings, participants under the proposed Powder River 3 (PR-3) and Powder River 4 (PR-4) MOAs noted having experienced low-level B-52 and B-1 overflights on the MTRs. Public comments during scoping noted that B-52s were easier to see and avoid than fighters on the IRs. A public concern was expressed that fully loaded crop dusters at 500 feet AGL would be unable to avoid a high speed low-level B-1 and could experience wake vortex impacts. IR-473, IR-485, and IR-492 converge on the Belle Fourche Electronic Scoring Site (ESS) with simulated threats and targets. These IRs were extensively used for low-altitude Cold War era penetration training. The PRTC proposal does not involve any changes to the structure or use of MTRs.

3.1.3.4 Civil Airspace Usage

Civil aircraft consist primarily of commercial aircraft and general aviation. Civil aircraft operations can occur anywhere within the airspace described in Section 3.1.3.1 if and when permitted. Civilian aircraft often fly VFR using topographic or highway features and/or using GPS for direct routing. There are also specified routes and areas which have been identified to facilitate air transportation and airspace management. This section describes these routes and areas.

Aviation and Airspace Use Terminology

Above Ground Level (AGL): *Altitude expressed in feet measured above the ground surface.*

Mean Sea Level (MSL): *Altitude expressed in feet measured above average (mean) sea level.*

Flight Level (FL): *Manner in which altitudes at 18,000 feet MSL and above are expressed, as measured by a standard altimeter setting of 29.92.*

Visual Flight Rules (VFR): *A standard set of rules that all pilots, both civilian and military, must follow when not operating under instrument flight rules and in visual meteorological conditions. These rules require that pilots remain clear of clouds and avoid other aircraft.*

Instrument Flight Rules (IFR): *A standard set of rules that all pilots, civilian and military, must follow when operating under flight conditions that are more stringent than visual flight rules. These conditions include operating an aircraft in clouds, operating above certain altitudes prescribed by Federal Aviation Administration (FAA) regulations, and operating in some locations such as major civilian airports. Air Traffic Control (ATC) agencies ensure separation of all aircraft operating under IFR.*

Source: FAA 2004

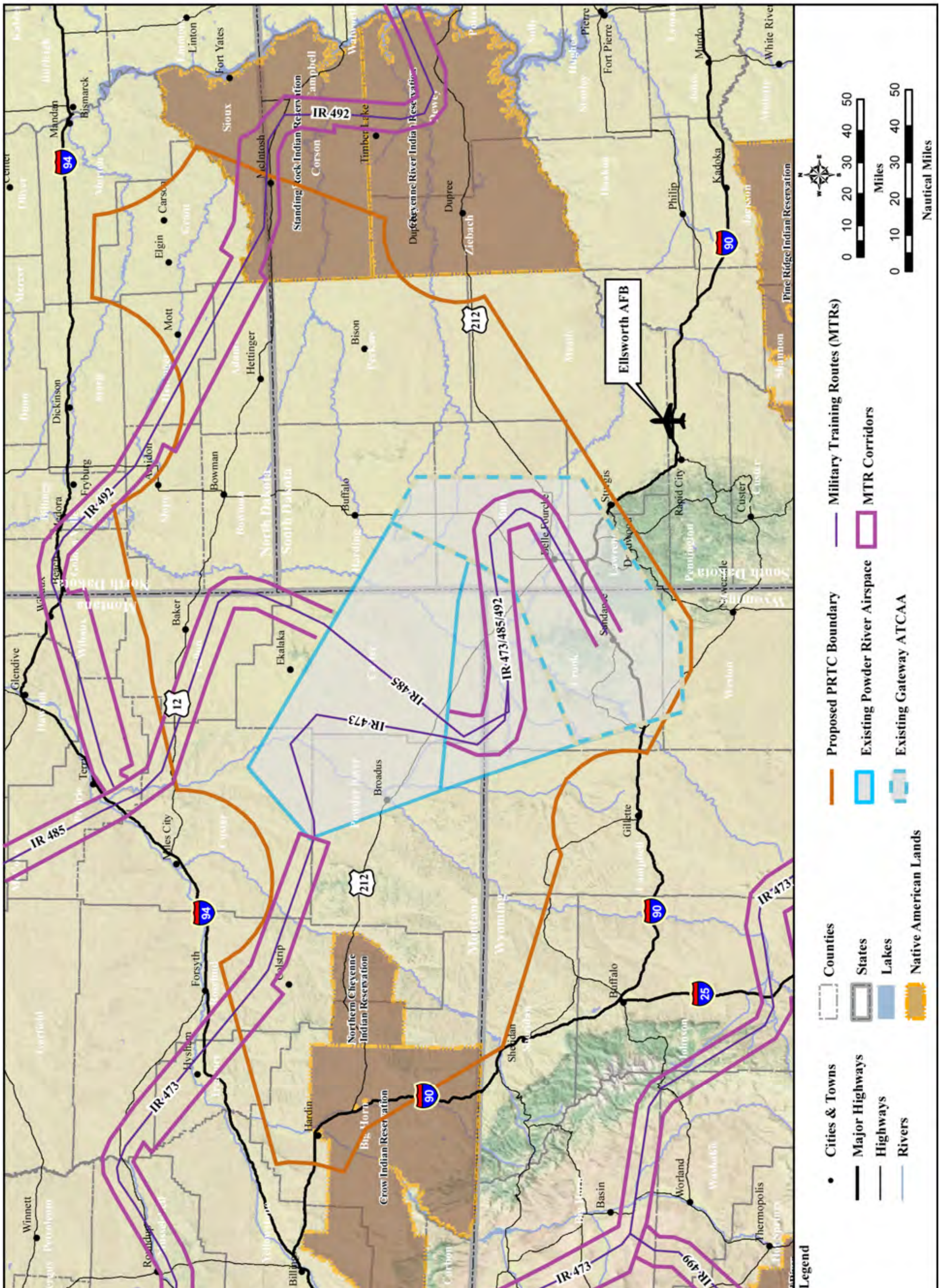


Figure 3.1-4. MTRs Associated with the Proposed PRTC

3.1.3.4.1 Victor Airways

Victor Airways are "highways in the sky" and are used by aircraft to transit between navigational aids. Victor Airways are designated on aeronautical charts with the letter "V" (hence Victor). Victor Airways, sometimes referred to as Victor Routes, are Class E airspace extending typically from 1,200 feet AGL to FL180. The width of the victor corridor depends on the distance from the navigational aids (such as VHF omnidirectional radio range [VOR's]). When VOR's are less than 102NM from each other, the Victor airway extends 4NM on either side of the center line (8nm total width). When VOR's are more than 102NM from each other, the width of the airway in the middle increases. The width of the airway beyond 51NM from a navigational aid (navaid) is 4.5 degrees on either side of the center line between the two navaids (at 51NM from a navaid, 4.5 degrees from the centerline of a radial is equivalent to 4NM). The maximum width of the airway is at the middle point between the two navaids. This is when 4.5 degrees from the center radial results in a maximum distance for both navaids. Victor Airways and Jet Routes are presented on Figure 3.1-5.

The PRTC MOAs are designed to avoid most Victor Airways during day-to-day training operations. Three Victor Airways are coincident with the proposed Gap MOAs. The Gap MOAs are proposed for use during LFEs for 1 to 3 days a maximum of once a quarter. The three Victor Airway/Gap MOA routes and the Victor Airway within the proposed PRTC are:

- V-247, between Sheridan, WY and Billings, Montana (MT), traverses south outside of the proposed PR-1B MOA where the proposed MOA was adjusted to not impact V-247. V-247 has en route obstacles which reach 9,600 feet MSL. Traffic on V-247 is approximately three to four flights per day (personal communication, Payne 2008).
- V-254, between Gillette, WY and Miles City, MT, is the proposed Gap A MOA. V-254 has en route obstacles which reach 4,800 feet MSL. V-254 has a traffic count of approximately three flights per day (Table 3.1-2).
- V-86, between Billings, MT and Rapid City, South Dakota (SD), traverses the southern border of the proposed PR-1B MOA and crosses under the Gateway West ATCAA. V-86 has en route obstacles which reach 4,500 feet MSL. V-86 has a daily traffic count of 12 to 18 flights.
- V-491, between Dickinson, North Dakota (ND) and Rapid City, SD, is the proposed Gap C MOA. V-491 has en route obstacles which reach 3,700 feet MSL. V-491 has a traffic count of approximately one flight every four days (Table 3.1-2).
- V-120, between Miles City, MT and Dupree, SD, is the proposed Gap B MOA. V-120 has a minimum en route altitude of 9,000 feet MSL. V-120 is a primary route running from Minneapolis westward and is utilized by pilots seeking to fly below Class A airspace; the route has a lower minimum en route altitude across the northern Rockies (personal communication, Payne 2008). V-120 has a traffic count of approximately two to three flights per day (Table 3.1-2).

Section 3.1.3.5 suggests that one explanation for the relatively low Victor Route traffic counts is the limited radar coverage, and, in some cases, limited radio coverage in portions of the ROI. Civil pilots in the region typically use direct routing with Global Positioning System (GPS) instead of flying on Victor Routes.

As previously indicated, the proposed PRTC was laid out to avoid as many Victor Airways as possible. This places a series of additional Victor Airway segments outside the proposed PRTC. These segments include V--465 between Billings and Miles City, V-2 between Miles City and Dickerson, V-169 between Bismarck and Rapid City, V-536 between Gillette and Sheridan, and V86-611 between Sheridan and Billings.

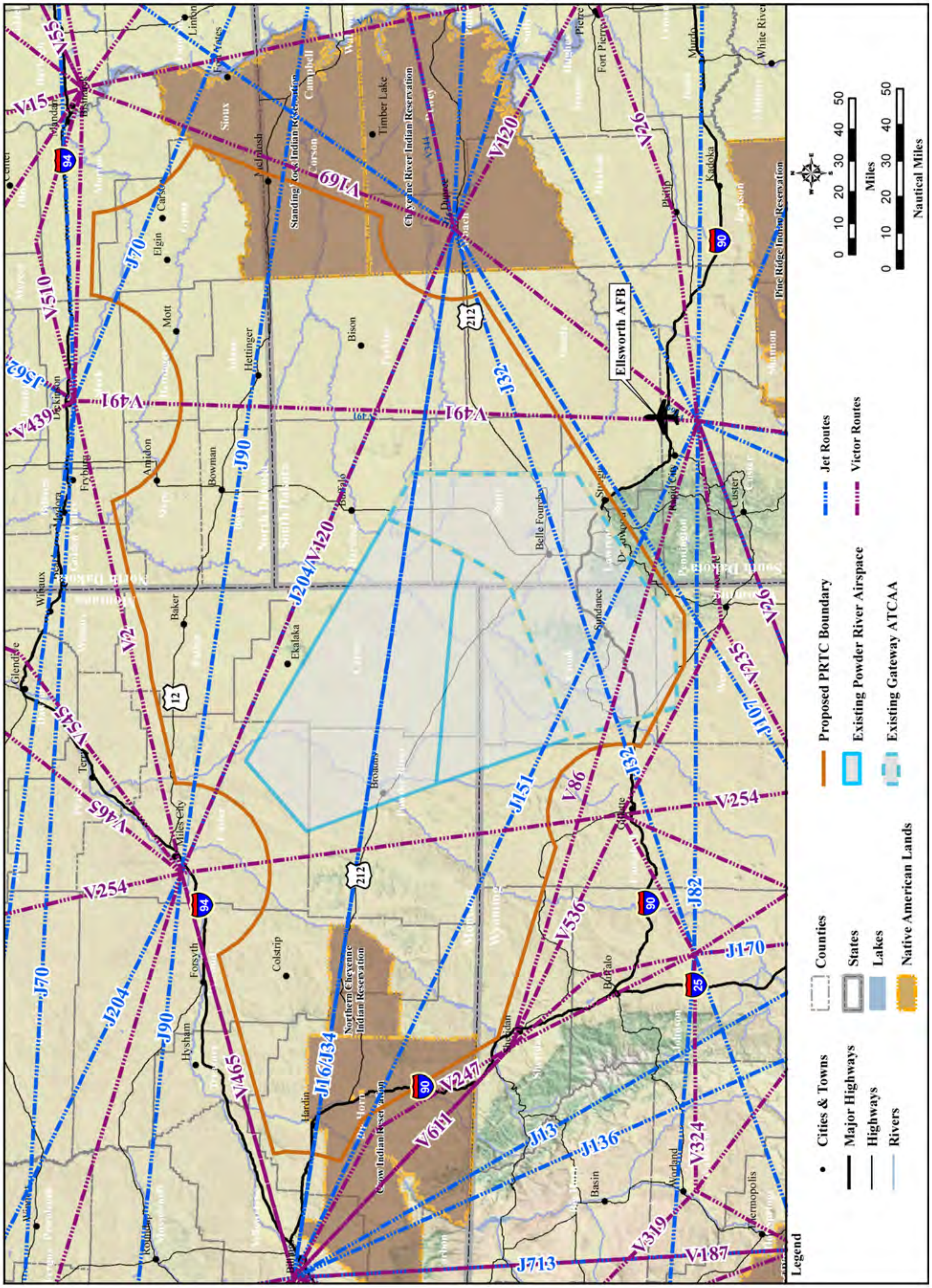


Figure 3.1-5. Victor and Jet Routes Associated with the Proposed PRTC

3.1.3.3.2 Jet Routes

Jet routes are designated highways in Class A airspace for high altitude traffic above FL180. These routes are used by commercial aviation that fly under IFR control by the three FAA ARTCC centers (Minneapolis, Salt Lake City, or Denver). Figure 3.1-3 demonstrates the three ARTCC areas as they relate to the proposed PRTC.

Jet routes are established under Federal Aviation Regulation Part 71 in Class A airspace above FL180 to designate frequently used routings. Jet routes have no specified width; width varies depending on many aeronautical factors (FAA 2004). Jet routes 151 (J-151), J-32, and J-16/34 cross Gateway, Powder River 1A (PR-1A), PR-1B, and Powder River 2 (PR-2) ATCAAs; while J-90 passes through PR-3 and PR-4 ATCAAs.

J-32 crosses Gateway ATCAA and passes near Belle Fourche. J-90 and J-151 traverse southeast/northwest and generally handle commercial traffic transiting east and west across the country. The Gap B ATCAA follows J-204 from Miles City, MT to Dupree, SD. J-32 and J-151 traverse the Gateway ATCAAs. J-70 traverses the airspace from southeast to northwest across the northern portions of the PR-4 ATCAA and handles between 121 and 144 flights on a typical day.

The proposed PRTC airspace is traversed by designated severe weather avoidance routes which provide access between the San Francisco Bay area and the Pacific Northwest, and airports in the northeast. These weather avoidance routes include Canadian airspace and are referred to as Canadian (CAN) routes. Weather avoidance routes are the most common commercial aircraft routes used to avoid thunderstorms in the Great Plains and the Ohio Valley. These severe weather avoidance routes are typically used between 80 and 100 days per year to support traffic flow into the New York region, as well as into Minneapolis, Chicago O'Hare, and Detroit metro airports.

While the minimum en route altitude for many of these routes is FL180, the majority of flight activity on these routes is at altitudes above FL260 and up to FL450. Table 3.1-2 presents average traffic counts for the jet routes during two representative eight-day time periods. A comparison of Figure 3.1-5 with the jet routes and the jet route traffic counts from Table 3.1-2 demonstrate that some Victor Routes are infrequently used and some jet routes are used by a substantial number of aircraft.

Table 3.1-2. Victor Airways and Jet Route Traffic

	Data Range			
	12/01/2008 – 12/08/2008		**5/05/2009 – 5/12/2009**	
Victor Routes	***Total***	***Daily Average***	***Total***	***Daily Average***
V-247	25	3.2	22	2.8
V-254	22	2.8	23	2.9
V-86	144	18	89	11.2
V-491	2	.25	2	.25
V-120	11	1.4	22	2.8
J-151	248	31	253	31.7
J-32	852	106.5	1,003	125.4
J-16	1,006	125.8	1,002	125.3
J-204	102	12.8	77	9.7
J-90	337	42.2	408	51
J-70	967	120.9	1,150	143.8

Source: FAA 2009

3.1.3.3.3 Airports and Airfields

Multiple public airports and private airfields are located under the proposed PRTC. Figure 3.1-6 presents the public airports. Table 3.1-3 lists the public airports and based aircraft under (U) or near (N) each of the proposed PRTC MOAs as of February 2010. Table 3.1-4 provides comparable information for the identified private airfields under (U) or near (N) each of the proposed PRTC MOAs. Table 3.1-5 summarizes the number of public airports and private airfields associated with, and those under, the proposed PRTC MOAs and associated Gap MOAs. Table 3.1-6 provides both elevation and operation information for public airports under (U) or near (N) each proposed PRTC MOA. The operations are further broken down by aircraft type.

Table 3.1-7 presents data for private airfields with elevations and estimated annual operations based on extrapolations from public airport operations per based aircraft. Annual operations for private airfields under the proposed airspace are estimated by calculating the reported total based aircraft on public airports under the proposed airspace, calculating the reported annual operations for the public airports, and dividing the annual operations by the number of based aircraft. This produces an annual estimate of 440 operations per private airfield based aircraft. The estimated private airfield annual operations in Table 3.1-7 are the regions annual average operations per based aircraft at public airports multiplied by the number of based aircraft reported at the private airfield.

Two small public airports underlie the proposed PR-1A MOA airspace: Fairgrounds and Colstrip. The St. Labre, MT private airfield underlies the PR-1B MOA. Colstrip has controlled airspace above 700 feet AGL associated with its operation. Table 3.1-8 presents the instrument approaches for Colstrip Airport during the first four months of 2009. These data demonstrate that a typical month would average one to two instrument flights per day into Colstrip Airport. Assuming each instrument approach represented two airfield operations (one landing and one take-off), the estimated 345 annual IFR approaches represent 690 annual airfield operations or 6.0 percent of the reported existing annual operations from Table 3.1-6. Private airfields under the airspace are shown in Table 3.1-4 with their total estimated annual operations shown in Table 3.1-7.

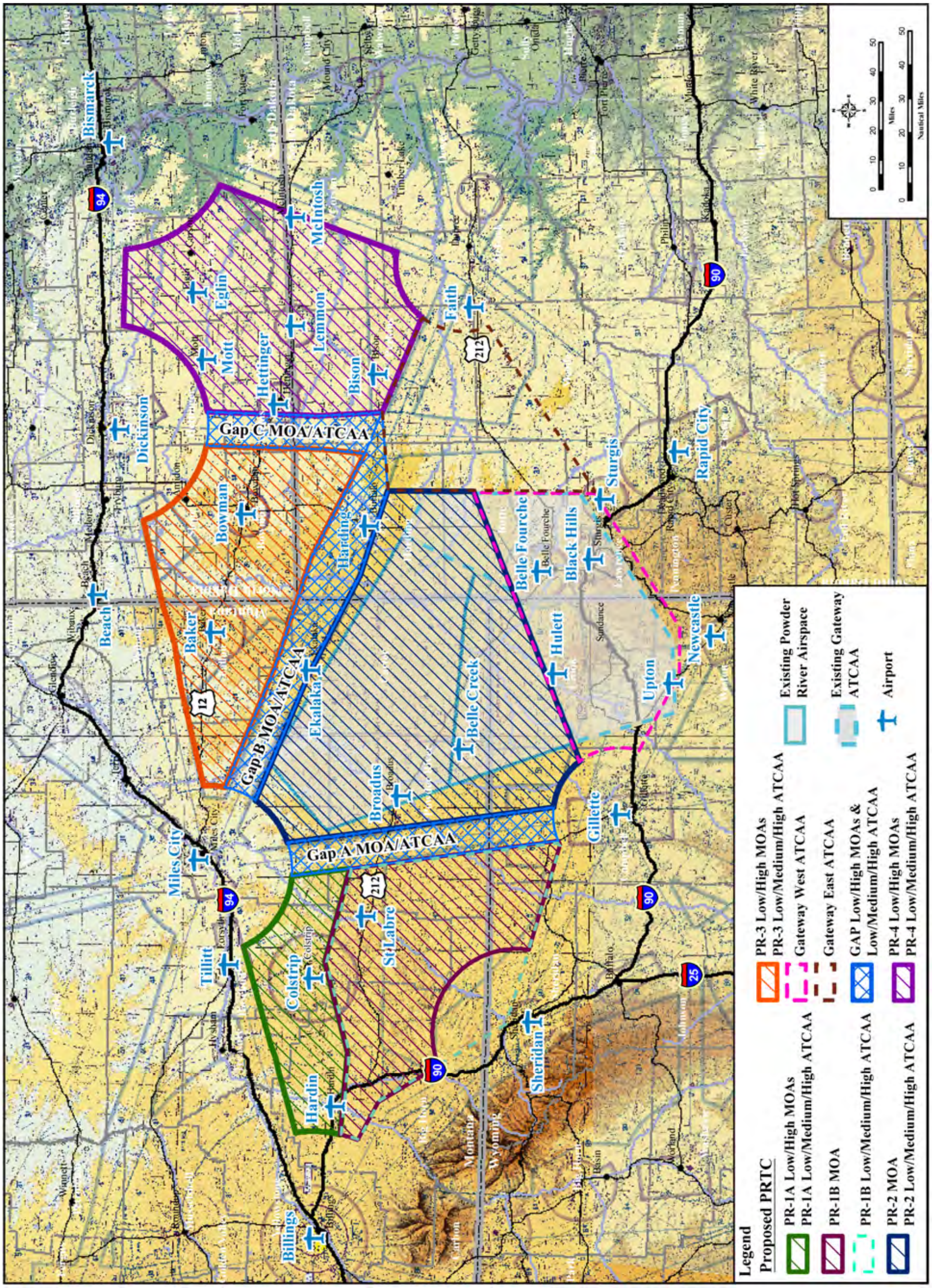


Figure 3.1-6. Public Airports under and Near the Proposed PRTC Airspace

Table 3.1-3. Public Airports and Based Aircraft (Page 1 of 2)

Location[1]	*Airport (Proposed MOA)*	*State*	*Airport Designation*	*Elevation*	*Tower*	*Fixed Base Operator*	*Total Based Aircraft*[2]	AIRCRAFT TYPE					
								Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
Proposed PR-1A or PR-1B[3] MOAs Associated Public Airports and Based Aircraft													
N	Billings (1A)	MT	BIL	3,652	Yes	Yes	173	94	63	9	7		
U	Colstrip (1A)	MT	M46	3,426	No	No	14	12	2				
N	Fort Smith (1A)	MT	5U7	3,242	No	No	0						
U	Hardin(1A)	MT	F02	2,911	No	No	7	7					
N	Sheridan (1B)	WY	SHR	4,021	No	Yes	93	62	22	3	4		2
N	Tillitt-Forsyth (1A)	MT	1S3	2,727	No	Yes	25	24	1				
Total Under and Near Proposed PR-1A/B MOAs							312	199	88	12	11	0	2
Total Under Proposed PR-1A/B MOAs							21	19	2	0	0	0	0
Proposed PR-2 MOA Associated Public Airports and Based Aircraft													
U	Belle Creek[4]	MT	3V7	3,678	No	No	4	3					1
U	Broadus	MT	00F	3,280	No	No	1	1					
N	Gillette	WY	GCC	4,365	Yes	Yes	50	43	6	1			
Total Under and Near Proposed PR-2 MOA							55	47	6	1	0	0	0
Total Under Proposed PR-2 MOA							5	4	0	0	0	0	1
Proposed PR-3[5] MOA Associated Public Airports and Based Aircraft													
U	Baker	MT	BHK	2,975	No	Yes	28	24	2	1	1		
N	Beach	ND	20U	2,756	No	No	9	9					
U	Bowman	ND	BPP	2,958	No	Yes	16	14	2				
U	Ekalaka[6]	MT	97M	3,503	No	No	3	3					
U	Harding-Buffalo	SD	9D2	2,889	No	No	4	4					
N	Miles City	MT	MLS	2,630	N	N	22	20	2				
Total Under and Near Proposed PR-3 MOA							82	74	6	1	1	0	0
Total Under Proposed PR-3 MOA							51	45	4	1	1	0	0

Table 3.1-3. Public Airports and Based Aircraft (Page 2 of 2)

Location[1]	*Airport (Proposed MOA)*	*State*	*Airport Designation*	*Elevation*	*Tower*	*Fixed Base Operator*	*Total Based Aircraft*[2]	Aircraft Type					
								Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
Proposed PR-4[7] MOA Associated Public Airports and Based Aircraft													
N	Bismarck	ND	BIS	1,661	Yes	Yes	95	51	19	8		17	
U	Bison	SD	6V5	2,785	No	No	10	10					
N	Dickinson	ND	DIK	2,592	No	Yes	18	16	2				
U	Elgin[6]	ND	Y71	2,355	No	No	2	2					
N	Faith	SD	D07	2,582	No	Yes	7	6			1		
N	Glen Ullin	ND	D57	2,089	No	No	8	7					1
U	Hettinger	ND	HEI	2,705	No	Yes	25	24	1				
U	Lemmon	SD	LEM	2,571	No	Yes	11	10	1				
N	Mandan	ND	Y19	1,944	No	Yes	53	50	3				
U	McIntosh[6]	SD	8D6	2,251	No	No	NR						
U	Mott	ND	3P3	2,411	No	No	9	8			1		
Total Under and Near Proposed PR-4 MOA							238	184	26	8	2	17	1
Total Under Proposed PR-4 MOA							57	54	2	0	1	0	0
Proposed Gateway East and West ATCAAs Associated Public Airports and Based Aircraft													
U	Belle Fourche	SD	EFC	3,190	No	Yes	30	25	1				4
U	Black Hills	SD	SPF	3,931	No	Yes	64	56	5				3
U	Hulett	WY	W43	4,264	No	No	1	1					
N	Newcastle	WY	ECS	4,174	No	No	9	7	1				1
N	Rapid City	SD	RAP	3,204	Yes	Yes	125	80	27	4	4	10	
U	Sturgis	SD	49B	3,243	No	Yes	26	24	2				
U	Upton[6]	WY	83V	4,290	No	No	NR						
Total Under and Near Proposed Gateway ATCAA							255	193	36	4	4	10	8
Total Under Proposed Gateway ATCAA							121	106	8	0	0	0	7

Notes:
1. U = Under; N = Near
2. NR = none reported.
3. Proposed PR-1B includes Gap A data.
4. Database effective date: 2 July 2009 from fltplan.com
5. Proposed PR-3 includes Gap B data.
6. FAA information effective 11 February 2010 from airnav.com
7. Proposed PR-4 includes Gap C data.

Source: Source material (2008) from fltplan.com with exception of footnoted airports from airnav.com

Table 3.1-4. Private Airfields and Based Aircraft (Page 1 of 3)

Location[1]	Airfield	State	Designation	Elevation	Tower	Fixed Base Operator	Total Based Aircraft[2]	Aircraft Type					
								Single Engine	Multi Engine	Jet	Helicopter	Military	Glider/ Ultralight
Proposed PR-1A or PR-1B MOAs[3] Associated Private Airfield and Based Aircraft													
N	Ruff (Custer) (1A)	MT	MT34	2,740	No	No	1	1					
U	St. Labre (Ashland) (1B)	MT	3U4	2,909	No	No	NR						
N	Xingu (Dayton) (1B)	WY	99WY	4,340	No	No	NR						
Total Under and Near Proposed PR-1A/B MOAs							1	1	0	0	0	0	0
Total Under Proposed PR-1A/B MOAs							NR						
Proposed PR-2 MOA Associated Private Airfield and Based Aircraft													
U	Lanning (Alzada)	MT	MT50	3,995	No	No	1	1					
N	Madsen (Gillette)	WY	WY65	4,500	No	No	3	3					
Total Under and Near Proposed PR-2 MOA							4	4	0	0	0	0	0
Total Under Proposed PR-2 MOA							1	1	0	0	0	0	0
Proposed PR-3 MOA[4] Associated Private Airfield and Based Aircraft													
N	Boyd (Golva)	ND	0NA9	2,750	No	No	1	1					
U	Castleberry (Ekalaka)	MT	MT45	3,373	No	No	1	1					
U	Dilse (Scranton)	ND	NA98	2,878	No	No	3	2					1
U	Hagen (Reeder)	ND	14ND	2,810	No	No	1	1					
N	Hollstein (Wilbaux)	MT	MT20	2,778	No	No	2	2					
U	Laird Ranch (Ekalaka)	MT	MT05	3,462	No	No	3	2	1				
U	Sikorski Ranch (Ekalaka)	MT	MT74	3,330	No	No	2	2					
U	Sky Ranch (Camp Crook)	SD	SD33	3,200	No	No	3	2	1				
N	Sunday Creek (Miles City)	MT	MT29	2,490	No	Yes	6	6					

Table 3.1-4. Private Airfields and Based Aircraft (Page 2 of 3)

Location[1]	Airfield	State	Designation	Elevation	Tower	Fixed Base Operator	Total Based Aircraft[2]	Aircraft Type: Single Engine	Multi Engine	Jet	Helicopter	Military	Glider/ Ultralight
with Proposed PR-3 MOA[4] Associated Private Airfield and Based Aircraft (continued)													
U	Swenson (Belfield)	ND	ND29	2,900	No	No	1	1					
U	Tennant Ranch (Camp Crook)	SD	SD76	3,090	No	No	1	1					
Total Under and Near Proposed PR-3 MOA							24	21	2	0	0	0	1
Total Under Proposed PR-3 MOA							15	12	2	0	0	0	1
Proposed PR-4 MOA[5] Associated Private Airfield and Based Aircraft													
N	Chase (Hebron)	ND	6NA5	2,140	No	No	3	3					
U	Dorsey (Glad Valley)	SD	1SD0	2,350	No	No	2	2					
N	Fitterer (Glen Ullin)	ND	06ND	2,180	No	No	NR						
N	Jurgens	ND	75ND	2,370	No	No	1	1					
U	VIG Limousin (Faith)	SD	1SD4	2,552	No	No	1	1					
Total Under and Near Proposed PR-4 MOA							7	7	0	0	0	0	0
Total Under Proposed PR-4 MOA							3	3	0	0	0	0	0
Proposed East and West Gateway ATCAAs Associated Private Airfield and Based Aircraft													
U	Barber (Enning)	SD	SD98	2,655	No	No	1	1					
U	Bruch Airfield (Sturgis)	SD	SD35	2,980	No	No	1	1					
U	Bruch Ranch (Sturgis)	SD	SD24	3,070	No	No	3	1					2
U	Ipy Ranch (Hulett)	WY	WY14	3,960	No	No	1	1					
U	Keyhole (Moorcroft)	WY	01WY	4,250	No	No	1	1					

Table 3.1-4. Private Airfields and Based Aircraft (Page 3 of 3)

Location[1]	Airfield	State	Designation	Elevation	Tower	Fixed Base Operator	Total Based Aircraft[2]	Aircraft Type: Single Engine	Multi Engine	Jet	Helicopter	Military	Glider/ Ultralight
Proposed East and West Gateway ATCAAs Associated Private Airfield and Based Aircraft (continued)													
N	Paradise Valley (Nemo)	SD	2SD0	4,500	No	No	3	3					
U	Running Colors (Rapid City)	SD	3SD6	2,920	No	No	1	1					
U	Taylor Field (Sundance)	WY	WY55	4,950	No	No	1	1					
U	VIG (Opal)	SD	SD72	2,600	No	No	2	2					
Total Under and Near Proposed Gateway ATCAA							14	12	0	0	0	0	2
Total Under Proposed Gateway ATCAA							11	9	0	0	0	0	2

Notes:
1. U = Under; N = Near
2. NR = None reported.
3. Proposed PR-1B includes Gap A.
4. Proposed PR-3 includes Gap B.
5. Proposed PR-4 includes Gap C.

Source: Source material from airnav.com FAA information effective 11 Feb 2010

Table 3.1-5. Summary of Public Airports, Private Airfields, and Based Aircraft (Page 1 of 2)

Proposed Airspace	*Total Airports and Airfields*	*Total Based Aircraft*[1]	AIRCRAFT TYPE					
			Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
PR-1A MOA/ATCAA[2]								
Public Airport Totals Under and Near PR-1A	5	219	137	66	9	7	0	0
Public Airport Totals Under PR-1A	2	21	19	2	0	0	0	0
Private Airfield Totals Under and Near PR-1A	1	1	1	0	0	0	0	0
Private Airfield Totals Under PR-1A	0							
PR-1B MOA/ATCAA								
Public Airport Totals Under and Near PR-1B	1	93	62	22	3	4	0	2
Public Airport Totals Under PR-1B	0							
Private Airfield Totals Under and Near PR-1B	2							
Private Airfield Totals Under PR-1B	1							
PR-2 MOA/ATCAA								
Public Airport Totals Under and Near PR-2	3	55	47	6	1	0	0	1
Public Airport Totals Under PR-2	2	5	4	0	0	0	0	1
Private Airfield Totals Under and Near PR-2	2	4	4	0	0	0	0	0
Private Airfield Totals Under PR-2	1	1	1	0	0	0	0	0
PR-3 MOA/ATCAA[3]								
Public Airport Totals Under and Near PR-3	6	82	74	6	1	1	0	0
Public Airport Totals Under PR-3	4	51	45	4	1	1	0	0
Private Airfield Totals Under and Near PR-3	11	24	21	2	0	0	0	1
Private Airfield Totals Under PR-3	8	15	12	2	0	0	0	1
PR-4 MOA/ATCAA[4]								
Public Airport Totals Under and Near PR-4	11	238	184	26	8	2	17	1
Public Airport Totals Under PR-4	6	57	54	2	0	1	0	0
Private Airfield Totals Under and Near PR-4	5	7	7	0	0	0	0	0
Private Airfield Totals Under PR-4	2	3	3	0	0	0	0	

Table 3.1-5. Summary of Public Airports, Private Airfields, and Based Aircraft (Page 2 of 2)

Proposed Airspace	*Total Airports and Airfields*	*Total Based Aircraft*[2]	AIRCRAFT TYPE					
			Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
Proposed Gateway ATCAAs (included in Alternatives A, B, C)								
Public Airport Totals Under and Near Proposed Gateway ATCAAs	7	255	193	36	4	4	10	8
Public Airport Totals Under Proposed Gateway ATCAAs	5	121	106	8	0	0	0	7
Private Airfield Totals Under and Near Proposed Gateway ATCAAs	9	14	12	0	0	0	0	2
Private Airfield Totals Under Proposed Gateway ATCAAs	8	11	9	0	0	0	0	2
Totals								
Total Airports, Airfields, and Based Aircraft Under and Near the Proposed MOA/ATCAA Airspace	47	723	537	128	22	14	17	5
Total Airports, Airfields, and Based Aircraft Under the Proposed MOA/ATCAAs	26	153	138	10	1	2	0	2
Total Airports, Airfields, and Based Aircraft Under and Near Gateway ATCAAs	16	269	205	36	4	4	10	10
Total Airports, Airfields, and Based Aircraft Under Gateway ATCAAs	13	132	115	8	0	0	0	9
Total Airports, Airfields, and Based Aircraft Under and Near the Proposed Airspace	63	992	742	164	26	18	27	15
Total Airports, Airfields, and Based Aircraft Under Proposed Airspace	39	285	253	18	1	2	0	11

Notes:
1. Blank = None reported.
2. PR-1A includes Gap A.
3. PR-3 includes Gap B.
4. PR-4 includes Gap C.

Source: From Tables 3.1-3 and 3.1-4

Table 3.1-6. Public Airports and Annual Operations Associated with the Proposed PRTC (Page 1 of 2)

Location[1]	Airport	State	Designation	Elevation	Total Annual Operations	Annual Operations By Type				
						Transient	Local	Air Taxi	Commercial	Military
PR-1A MOA/ATCAA										
N	Billings	MT	BIL	3,652	92,319	31,608	20,016	26,805	13,453	437
U	Colstrip	MT	M46	3,426	5,750	3,000	2,000	750		
N	Fort Smith	MT	5U7	3,242	3,100	2,750	225	125		
U	Hardin	MT	F02	2,911	6,600	2,650	3,725	225		
N	Tillitt-Forsyth	MT	1S3	2,727	9,170	3,995	4,825	325		25
Totals					116,939	44,003	30,791	28,230	13,453	462
PR-1B MOA/ATCAA[2]										
N	Sheridan	WY	SHR	4,021	41,832	20,597	15,538	2,555	2,992	150
Totals					41,832	20,597	15,538	2,555	2,992	150
PR-2										
U	Belle Creek[3]	MT	3V7	3,678	550	200	350			
U	Broadus	MT	00F	3,280	5,350	500	4,750	100		
N	Gillette	WY	GCC	4,365	22,218	9,680	5,640	6,819	35	44
Totals					28,118	10,380	10,740	6,919	35	44
PR-3 MOA/ATCAA[4]										
U	Baker	MT	BHK	2,975	7,000	1,400	5,300	300		
N	Beach	ND	20U	2,756	1,170	300	800	60		10
U	Bowman	ND	BPP	2,958	4,140	2,000	1,500	600		40
U (Gap B)	Ekalaka[5]	MT	97M	3,503	2,028	1,500	487	41		
U (Gap B)	Harding-Buffalo	SD	9D2	2,889	2,300	400	1,900			
N	Miles City	MT	MLS	2,630	11,200	4,800	3,200	3,200		
Totals					27,838	10,400	13,187	4,201	0	50
PR-4 MOA/ATCAA[6]										
N	Bismarck	ND	BIS	1,661	46,472	19,438	10,208	8,926	2,973	4,927
U	Bison	SD	6V5	2,785	5,500	500	5,000			
N	Dickinson	ND	DIK	2,592	8,673	3,000	2,852	1,528	1,191	102
U	Elgin[7]	ND	Y71	2,355	160	101	40	19		
N	Faith	SD	D07	2,582	2,700	1,200	1,500			

Table 3.1-6. Public Airports and Annual Operations Associated with the Proposed PRTC (Page 2 of 2)

Location[1]	*Airport*	*State*	*Designation*	*Elevation*	*Total Annual Operations*	*Transient*	*Local*	*Air Taxi*	*Commercial*	*Military*
PR-4 MOA/ATCAA[6] (continued)										
N	Glen Ullin	ND	D57	2,089	860	500	300	50		10
U	Hettinger	ND	HEI	2,705	4,450	1,500	2,500	400		50
U	Lemmon	SD	LEM	2,571	12,500	2,500	10,000			
N	Mandan	ND	Y19	1,944	24,740	8,000	15,000	1,140		600
U	McIntosh[8]	SD	8D6	2,251	70	50	20			
U	Mott	ND	3P3	2,411	1,690	600	1,000	50		40
Totals					107,815	37,389	48,420	12,113	4,164	5,729
Proposed Gateway ATCAAs										
U	Belle Fourche	SD	EFC	3,191	12,112	2,100	10,000			12
U	Black Hills[9]	SD	SPF	3,931	27,600	10,000	16,000	1,500		100
U	Hulett	WY	W43	4,264	400	100	300			
N	Newcastle	WY	ECS	4,174	4,500	2,200	2,100	100		100
N	Rapid City	SD	RAP	3,204	40,896	7,223	15,912	10,878	4,479	2,404
U	Sturgis	SD	49B	3,243	23,000	7,800	15,000	200		
U	Upton[10]	WY	83V	4,290	8		8			
Totals					108,516	29,423	59,320	12,678	4,479	2,616
Grand Totals					431,058	152,192	177,996	66,696	25,123	9,051

Notes:
1. U = Under; N = Near
2. PR-1B includes Gap A data.
3. Database effective date: 02 July 2009 from fltplan.com
4. PR-3 includes Gap B data.
5. FAA information effective 11 February 2010 from airnav.com; operations for 12-month period ending 12 July 2006.
6. PR-4 includes Gap C data.
7. FAA information effective 11 February 2010 from airnav.com; operations for 12-month period ending 06 December 1999.
8. FAA information effective 11 February 2010 from airnav.com; operations for 12-month period ending 08 September 2008.
9. Period covered 20 May 2007 to 20 May 2008.
10. FAA information effective 11 February 2010 from airnav.com; operations for 12-month period ending 31 July 2008.

Table 3.1-7. Private Airfields and Estimated Annual Operations Associated with the Proposed PRTC

Location[1]	*Airport*	*State*	*Designation*	*Elevation*	*Total*[2] *Annual Operations*
PR-1A					
N	Ruff (Custer) (1A)	MT	MT34	2,740	440
PR-1B					
U	St. Labre[3] (Ashland) (1B)	MT	3U4	2,909	600
N	Xingu (Dayton) (1B)	WY	99WY	4,340	440
PR-2					
U	Lanning (Alzada)	MT	MT50	3,995	440
N	Madsen (Gillette)	WY	WY65	4,500	1320
PR-3					
N	Boyd (Golva)	ND	0NA9	2,750	440
U	Castleberry (Ekalaka)	MT	MT45	3,373	440
U	Dilse (Scranton)	ND	NA98	2,878	1320
U	Hagen (Reeder)	ND	14ND	2,810	440
N	Hollstein (Wilbaux)	MT	MT20	2,778	880
U	Laird Ranch (Ekalaka)	MT	MT05	3,462	1320
U	Sikorski Ranch (Ekalaka)	MT	MT74	3,330	880
U	Sky Ranch (Camp Crook)	SD	SD33	3,200	1320
N	Sunday Creek (Miles City)	MT	MT29	2,490	2640
U	Swenson (Belfield)	ND	ND29	2,900	440
U	Tennant Ranch (Camp Crook)	SD	SD76	3,090	440
PR-4					
N	Chase (Hebron)	ND	6NA5	2,140	1320
U	Dorsey (Glad Valley)	SD	1SD0	2,350	880
N	Fitterer (Glen Ullin)	ND	06ND	2,180	440
N	Jurgens (Taylor)	ND	75ND	2,370	440
U	VIG Limousin (Faith)	SD	1SD4	2,552	440
Gateway ATCAAs					
U	Barber (Enning)	SD	SD98	2,655	440
U	Bruch Airfield (Sturgis)	SD	SD35	2,980	440
U	Bruch Ranch (Sturgis)	SD	SD24	3,070	1320
U	Ipy Ranch (Hulett)	WY	WY14	3,960	440
U	Keyhole (Moorcroft)[4]	WY	01WY	4,250	1,612
N	Paradise Valley (Nemo)	SD	2SD0	4,500	1320
U	Running Colors (Rapid City)	SD	3SD6	2,920	440
U	Taylor Field (Sundance)	WY	WY55	4,950	440
U	VIG (Opal)	SD	SD72	2,600	880

Notes:
1. U = Under; N = Near
2. Estimated based on average of 440 annual operations per based aircraft reported at public airports under the proposed airspace.
3. For 12-month period ending 11 July 2006
4. For 12-month period ending 24 June 1984

Source material: FAA information effective 11 February 2010 from airnav.com

Table 3.1-8. Instrument Approaches Into Colstrip Airport

	Commercial	*Air Taxi*	*General Aviation*	*Military*	*Total Monthly*
April 2009	0	35	5	2	42
March 2009	0	14	2	2	18
February 2009	0	16	4	1	21
January 2009	0	25	5	4	34

Two public airports underlie the existing Powder River A/B MOAs and the proposed PR-2 MOAs: Broadus and Belle Creek, MT. Private airfields Laird, Castleberry, Sikorski, and Lanning, MT; and Camp Crook and Sky, SD, are also located under the PR-2 MOA. There is no controlled airspace associated with any of these public or private operations. Aeronautical charts reflect that the floor of the MOA is restricted to 1,500 feet AGL in the vicinity of these airports. Average daily traffic within the proposed PR-2 MOA from 500 feet AGL to 17,999 feet MSL is approximately 6 flights (Table 3.1-9). The combined average daily operations reported from public airports under the existing Powder River A and B MOAs is approximately 17 operations (Table 3.1-6) at 365 days per year.

The Broadus Airport is on the edge of the existing Powder River A MOA.

The proposed PR-3 MOA overlies two public airports with associated controlled airspace above 700 feet AGL: Baker, MT and Bowman, ND. Four private airfields underlie the proposed PR-3 MOA: Dilse, Folske, McGee, and Swenson, ND. Average daily traffic count transiting the proposed PR-3 MOA from 500 feet AGL to 17,999 feet MSL is 3 (Table 3.1-9). Assuming 365 flying days per year, the combined average daily operations reported from public airports under the proposed PR-3 MOA is approximately 3 operations (Table 3.1-6).

There are two public airports beneath the proposed PR-4 MOA with controlled airspace above 700 feet AGL: Lemmon and Hettinger, ND. Smaller public airports which underlie the airspace include Bison and McIntosh, SD; and Mott and Elgin, ND. Average traffic transiting the proposed MOA from 500 feet AGL to 17,999 feet MSL is approximately 12 (Table 3.1-9). Assuming 365 flying days per year, the combined average daily operations reported from public airports under the proposed PR-4 MOA is 67 operations (Table 3.1-6).

The proposed Gap B MOA overlies the Ekalaka, MT and Harding County, SD public airports. The proposed Gap C MOA overlies the two private airfields of Carr, SD, and Hagen, ND.

Public airports and private airfields under the proposed PRTC generally support small communities, ranches, agricultural applications, medical services, cloud seeding (where permitted), oil and gas exploration, and recreation, including hunting. The larger regional airports outside the proposed PRTC include regularly scheduled airline service at Billings, MT; Bismarck, ND; and Rapid City, SD. Other airports on the periphery of the proposed PRTC have had intermittent commercial flight services.

Public airports and private airfields under and near to the proposed MOAs had approximately 723 based aircraft reported in February 2010 (see Tables 3.1-3 and 3.1-4). Of these based aircraft, 153 were reported at public airports or private airfields under the proposed PRTC MOAs. There were 5 reported aircraft based at public airports under the existing Powder River A or B MOAs (Table 3.1-3).

Glider operations occur infrequently at the Belle Fourche, SD airport, but no soaring club or organized group utilizes the airport. The Black Hills Soaring Club previously operated out of the airport on a regular basis, but has recently moved operations south to the Hot Springs airport. Gliders prefer to fly in Class E airspace. Techniques for seeing and avoiding other aircraft are a required practice, especially when joining, soaring, and ridge soaring. Gliders that are not transponder equipped generally monitor applicable frequencies to allow others to know of their location and intentions while in-flight. Sky diving operations occur infrequently at a few of the small airports under the proposed airspace; no organized groups maintain a club or regularly schedule sky diving events.

3.1.3.5 Other Civil Operations

Commercial and general aviation throughout the ROI is diversified. Flight activities include airline operations, cargo, aerial agricultural application, air charter, flight instruction, air ambulance, flying doctors, recreational flying, law enforcement, wildlife aerial surveillance, predator control, aerial photographic mapping, fire surveillance, fire suppression, and tourism.

This section identifies representative users of the airspace in the area potentially affected by the Proposed Action or any alternative. These examples are not all-inclusive but demonstrate the level and diversity of flight activity in southeastern MT, southwestern ND, northwestern SD, and northeastern WY.

3.1.3.4.1 Commercial Carriers in the ROI

Section 3.1.3.3.2 describes the high-altitude and jet route users of the airspace either transiting the airspace en route or as commercial carrier destinations. Section 3.1.3.3.3 summarizes airport activities. This section describes the activity of commercial carriers within the ROI. Table 3.1-6 presents the annual commercial operations by public airports associated with the proposed PRTC within the ROI. There are no public airports with scheduled commercial flights under the proposed PRTC airspace.

Other Commerce

Regional air cargo service is provided by United Parcel Service and Federal Express. Typical cargo is time sensitive and related to farm parts, medical supplies, or legal documents.

Utility companies have aviation departments which fly power line and pipeline patrols monthly to quarterly at low altitudes below 6,000 feet MSL (approximately 2,000 feet AGL). Contractor and engineering firms and states perform aerial county mapping at low altitudes. Weather modification flights, such as those in ND, have to rapidly respond to appropriate meteorological conditions to fulfill rainfall enhancement contracts. Fixed Base Operators are businesses on airports which provide one or more aeronautical services. These services can be aircraft maintenance, flight instruction, aerial surveillance, aircraft fuel sales, aerial photo, aircraft rental, flight information, and other related services. Fixed Base Operators are listed by airport under each proposed PRTC MOA in Tables 3.1-3 and 3.1-4. Aircraft based at airports in the ROI which do not have Fixed Base Operators typically transit to Fixed Base Operator airports for routine service.

Air taxi and air charter services operate throughout the ROI. Air taxi firms provide charters for businesses, hunters, fishermen, medical staff and others. Most charter aircraft are twin-engine propeller or medium business jet aircraft with GPS and very high frequency omni-directional radio range/instrument landing system (ILS) navigational equipment. These aircraft usually operate IFR. Regular air taxi services include student transport contracts with, for example, the ND School for Deaf, to take students to and from home for weekends. Transient charter companies use regional airports for fuel stops and other servicing.

3.1.3.4.2 AGRICULTURE, GAME MANAGEMENT, AND RECREATION

Farm operation flights typically use VFR and fly direct routes and altitudes for efficiency. Agricultural flight activities with aircraft and helicopters support farming operations with aerial application of herbicide, insecticide, fungicide, and other crop protection. An estimated 40 aerial application private and commercial firms are located on both public airports and private airfields within the ROI. Aerial application firms operate aircraft within the ROI with an estimated annual total of 10,000 annual aircraft operations. The trade area for spraying is typically 80 to 100 miles from the spraying aircraft base location. Applicator flights are below 500 feet AGL. Applications typically fly 500 feet AGL during transit although weather conditions could require transit flights up to 2,000 feet AGL. Public commentors during scoping expressed concerns that application aircraft flying to fields are low to the ground, at very near gross weight, and have little ability to maneuver or adjust to a random flight or wake turbulence of a large military aircraft.

State Game and Fish and U.S. Fish and Wildlife (USFWS) flight operations include aerial surveillance, wetland surveys, predator control, and game counting patrols for operations. Activities such as wetland surveys can only be conducted at specified weather and at altitudes to ensure year-to-year consistency of survey data. Most game management flights are in the 1,000 to 3,000 feet AGL range; although cross country flights and aerial surveillance can occur day or night to 10,000 feet MSL. Digital aerial photography of cities, towns, and highways are often flown at established altitudes at or above 2,000 feet AGL or 6,000 feet MSL.

Pleasure flying, proficiency training, and agriculture-related flights occur throughout the ROI. Farmers and ranchers conduct aerial observation of farms, cattle, fences, and predator control at altitudes below 3,000 feet AGL. Recreational hunting is a substantial regional industry and essentially constitutes a "cash crop" for ranchers, local service industries, and aircraft operating out of private airfields and public airports. Flight transport of hunters before and during hunting season is a regionally important economic activity.

3.1.3.4.3 EMERGENCY AND RELATED SERVICES

Air ambulance and life flight services support rural health care facilities throughout the ROI. Most ROI hospitals have access to airfields to support air emergency transport of critical patients. Ground ambulances can connect with air ambulances at rural airports and transfer critical patients to regional medical facilities. Air ambulance services in the region can be fixed-wing aircraft or helicopters.

Hospitals which are part of the regional air ambulance service are normally connected to airports with GPS or IFR approach procedures. Medical services include flights to transport medical personnel between urban and rural hospitals. Flying doctors provide rural health care to small towns in portions of the ROI. Medical specialists fly from large cities to rural community hospitals usually between 8 a.m. and 6 p.m. Flight operations are scheduled by the day and normally operate on IFR about 10,000 feet MSL, depending on weather conditions. Aircraft are normally in the light, twin-engine class with IFR equipment.

Emergency flight activities also include firefighting. Fires from lightning or other causes can result in potentially damaging range fires. In such situations, aerial spotter aircraft, aerial tankers, and helicopters may be employed to support ground firefighting equipment. Ellsworth AFB and the Montana Bureau of Land Management have a Memorandum of Understanding establishing training temporary flight restrictions to support firefighting activity (BLM-MOU-MT925-1001 approved 7 October 2009)

3.1.3.6 FAA Airspace Usage Data

This section presents FAA data of existing airspace usage within the ROI. FAA traffic counts are for a representative winter period, December 1 through December 8, 2008, and for a representative spring to summer period, May 5 through May 12, 2009. The traffic counts provide data with eight day total and daily average flights for each of the potentially affected airspaces. For the purpose of this Environmental Impact Statement (EIS), the FAA traffic counts for the proposed PR-2 MOA represent baseline conditions for the Powder River A and B MOAs. Daily flight activity in Class A airspace can be the result of seasonal variation, convection and re-routing, and/or flow control as described in Section 3.1.3.3.2. The data in Table 3.1-9 represents primarily IFR flights in MOAs. Due to limitations on radar coverage, the data do not capture all flight activity.

The FAA representative day average civil flights by hour are listed by altitude segment for the proposed PRTC airspaces on Figures 3.1-7, 3.1-8, 3.1-9, 3.1-10, 3.1-11, and 3.1-12. The hourly data include all ATCAA flight activity and available MOA activity. The existing radar and communication infrastructure is not able to track most MOA flights at lower altitudes. All aircraft above FL180 can be tracked. Figures 3.1-10 and 3.1-11 demonstrate that the large majority of the commercial traffic on jet routes, as noted in Section 3.1.3.3.2, is above FL260. Figure 3.1-12 data demonstrate that the higher altitude commercial traffic above FL370 also traverses the proposed PRTC airspace particularly in the afternoon and evening.

Figures 3.1-13 through 3.1-16 and 3.1-19 through 3.1-21 demonstrate that much of the MOA traffic captured on FAA data represents traffic traversing the proposed MOA airspaces. This would suggest that civilian VFR traffic with an origin or destination within the airspace is not being tracked in Table 3.1-9. Table 3.1-6 presents the total reported operations for public airports. Table 3.1-10 compares that data with the FAA tracked aircraft for the respective airspaces. PR-1A and PR-1B have been grouped for Table 3.1-10.

Table 3.1-10 provides an estimate of MOA IFR and VFR traffic. IFR average daily traffic from the FAA data are rounded up from Table 3.1-9 and all annually reported operations from the public airports are also counted (see Table 3.1-6). Annual operations from private airfields are from Table 3.1-7.

Table 3.1-10 inherently assumes that the flights originating from or traveling to airports or airfields under the proposed airspace are not included in the FAA data. This conservative assumption has the potential to overstate the number of aircraft operations in the respective airspaces. Table 3.1-10 inherently also assumes that FAA data capture the MOA en route traffic. This assumption potentially underestimates the VFR traffic in the airspace. The use of average operations by based aircraft for the private airfield means that operations of some airfields are overestimated and at others are underestimated. The private airfield average is based on reported public airports under the airspace and it is likely that the public operations are reasonably representative.

The assumption of 365 flying days a year overstates the number of annual flying days but also overestimates the number of civilian flight operations during weekdays because it does not account for high-use on weekends and holidays. Public scoping comments referred to “Sunday fliers” or pilots who are generally out enjoying the country, especially on weekends with nice weather conditions. Table 3.1-10 distributes reported and estimated operations throughout the year and does not account for an increased proportion of civilian fliers during weekends or holidays when the proposed PRTC MOAs would typically not be activated for military training. This represents a potential overstatement of the civilian flight operations in a MOA on a typical military training day.

Table 3.1-11 presents FAA documented ATCAA traffic by airspace. As described in Section 3.1.3.1, Class A airspace is controlled airspace and the FAA data present the representative daily traffic in the respective low, medium, and high proposed ATCAAs. From Table 3.1-11, baseline traffic counts for the

PR-2 ATCAA represent baseline conditions for the Powder River ATCAA to FL260. FAA traffic counts for the Gateway ATCAA baseline conditions are reflected in Table 3.1-11 as the Gateway West and East ATCAAs to FL260. Baseline or existing condition FAA traffic counts for the Crossbow ATCAA are represented in Table 3.1-11 by flight activity in the proposed PR-2 ATCAA above FL260 and the proposed Gateway ATCAAs above FL260.

Table 3.1-9. FAA MOA Traffic Counts

Proposed MOA	*Altitude*	REPRESENTATIVE DAILY TRAFFIC			
		December 08		**May 09**	
		8 Days	*Average/ Day*	*8 Days*	*Average/ Day*
PR-1A Low	500 feet AGL to, but not including, 12,000 feet MSL	16	2.00	17	2.13
PR-1A High	12,000 feet MSL to, but not including, FL180	31	3.88	33	4.13
PR-1B	500 feet AGL to, but not including, FL180	82	10.25	84	10.50
PR-2	500 feet AGL to, but not including, FL180	47	5.88	39	4.88
PR-3 Low	500 feet AGL to, but not including, 12000 feet MSL	6	0.75	7	0.88
PR-3 High	12,000 feet MSL to, but not including, FL180	15	1.88	16	2.00
PR-4 Low	500 feet AGL to, but not including 12,000 feet MSL	28	3.5	17	2.13
PR-4 High	12,000 feet MSL to, but not including, FL180	63	7.88	78	9.75
Gap A Low	500 feet AGL to, but not including 12,000 feet MSL	10	1.25	16	2.00
Gap A High	12,000 feet MSL to, but not including, FL180	41	5.13	46	5.75
Gap B Low	500 feet AGL to, but not including, 12,000 feet MSL	6	0.75	6	0.75
Gap B High	12,000 feet MSL to, but not including, FL180	9	1.13	11	1.38
Gap C Low	500 feet AGL to, but not including, 12,000 feet MSL	26	3.25	17	2.13
Gap C High	12,000 feet MSL to, but not including, FL180	24	3.00	37	4.63

Source: FAA Performance Data Analysis and Reporting System (PDARS) data for 1-8 December 2008 and 5-12 May 2009.

Table 3.1-10. Estimated Daily Civilian Operations in the Proposed MOAs

Proposed MOA	ESTIMATED DAILY CIVILIAN FLIGHT OPERATIONS			
	FAA IFR[1]	*Public Airports Under Airspace Reported Operations*[2]	*Private Airfields Under Airspace Estimated Operations*[3]	*Estimated Total Daily Average Civilian Operations*
PR-1A/1B	17	34	2	53
PR-2	6	17	2	25
PR-3	3	31	18	52
PR-4	12	67	4	83
Gap A	8	0	0	8
Gap B	2	12	0	14
Gap C	7	0	0	7

Notes: 1. Data derived from Table 3.1-9, rounded up from highest daily average.
2. Data derived from Table 3.1-6, airports under airspace; annual (365 days) rounded up.
3 Data derived from Table 3.1-7, based on public airport operations per based aircraft; annual (365 days) rounded up.

Table 3.1-11. FAA ATCAA Traffic Counts

		Representative Daily IFR Traffic			
		December 08		May 09	
ATCAA	***Altitude***	***8 Days***	***Average/ Day***	***8 Days***	***Average/ Day***
PR-1A Low	FL180 to, but not including, FL260	34	4.25	32	4.00
PR-1A Medium	Above FL260, but not including, FL370	203	25.38	211	26.38
PR-1A High	Above FL370	175	21.88	209	26.13
PR-1B Low	FL180 to, but not including, FL260	48	6.00	46	5.75
PR-1B Medium	Above FL260, but not including, FL370	303	37.88	315	39.38
PR-1B High	Above FL370	261	32.63	312	39.00
PR-2 Low	FL180 to, but not including, FL260	100	12.50	75	9.38
PR-2 Medium	Above FL260, but not including, FL370	474	59.25	494	61.75
PR-3 High	Above FL370	266	33.25	384	48.00
PR-4 Low	FL180 to, but not including, FL260	67	8.38	76	9.50
PR-4 Medium	Above FL260, but not including, FL370	517	64.63	584	73.00
PR-4 High	Above FL370	437	54.63	562	70.25
Gap A Low	FL180 to, but not including, FL260	55	6.88	47	5.88
Gap A Medium	Above FL260, but not including, FL370	421	52.63	421	52.63
Gap A High	Above FL370	401	50.13	468	58.50
Gap B Low	FL180 to, but not including, FL260	83	10.38	81	10.13
Gap B Medium	Above FL260, but not including, FL370	229	28.63	224	28.00
Gap B High	Above FL370	188	23.50	219	27.38
Gap C Low	FL180 to, but not including, FL260	44	5.50	64	8.00
Gap C Medium	Above FL260, but not including, FL370	277	34.63	334	41.75
Gap C High	Above FL370	253	31.63	349	43.63
Gateway West Low	FL180 to, but not including, FL260	93	11.63	125	15.63
Gateway West Medium	Above FL260, but not including, FL370	373	46.63	373	46.63
Gateway West High	Above FL370	354	44.25	382	47.75
Gateway East Low	FL180 to, but not including, FL260	136	17.00	188	23.50
Gateway East Medium	Above FL260, but not including, FL370	587	73.38	655	81.88
Gateway East High	Above FL370	557	69.63	651	81.38

Source: FAA PDARS data for 1-8 December 2008 and 5-12 May 2009.

In general, the average daily IFR traffic for the FAA two representative time periods is within nine daily overflights of each other below FL370. Above FL370, the daily difference for the two periods can be up to 16 flights per day.

Lower altitude traffic on the Victor Airways and otherwise throughout the airspace is depicted on Figures 3.1-7 through 3.1-9. This lower altitude traffic frequently takes advantage of GPS capabilities to fly direct routing rather than use Victor Airways, as demonstrated on Figure 3.1-13, 3.1-14, and 3.1-15.

Figures 3.1-13 through 3.1-18 present the "spaghetti chart" mapping of flight operations during winter for traffic below 4,000 feet MSL (Figure 3.1-13) to above FL370 (Figure 3.1-18). The charted flight paths depict a 48 hour representative winter period from 20-22 February 2008. The flight paths show the maneuvering B-1 winter training loops in the existing Powder River MOAs and associated ATCAAs in Figures 3.1-14 through 3.1-16. The Powder River A and B MOAs essentially represent the proposed PR-2 MOA.

The FAA flight paths from Figures 3.1-13 through 3.1-18 demonstrate the relatively congested area around Billings International Airport on the west side of the proposed airspace and around Bismarck Airport on the east side of the proposed airspace. Figure 3.1-13 and Figure 3.1-14 show a concentration of flight paths from Billings airport to the east and a comparison with Figures 3.1-9 and 3.1-10 demonstrates that some Billings flights may be below FL180 until approximately 35 NM east of Billings. Some aircraft may not be above FL270 until nearly 50 NM east of Billings.

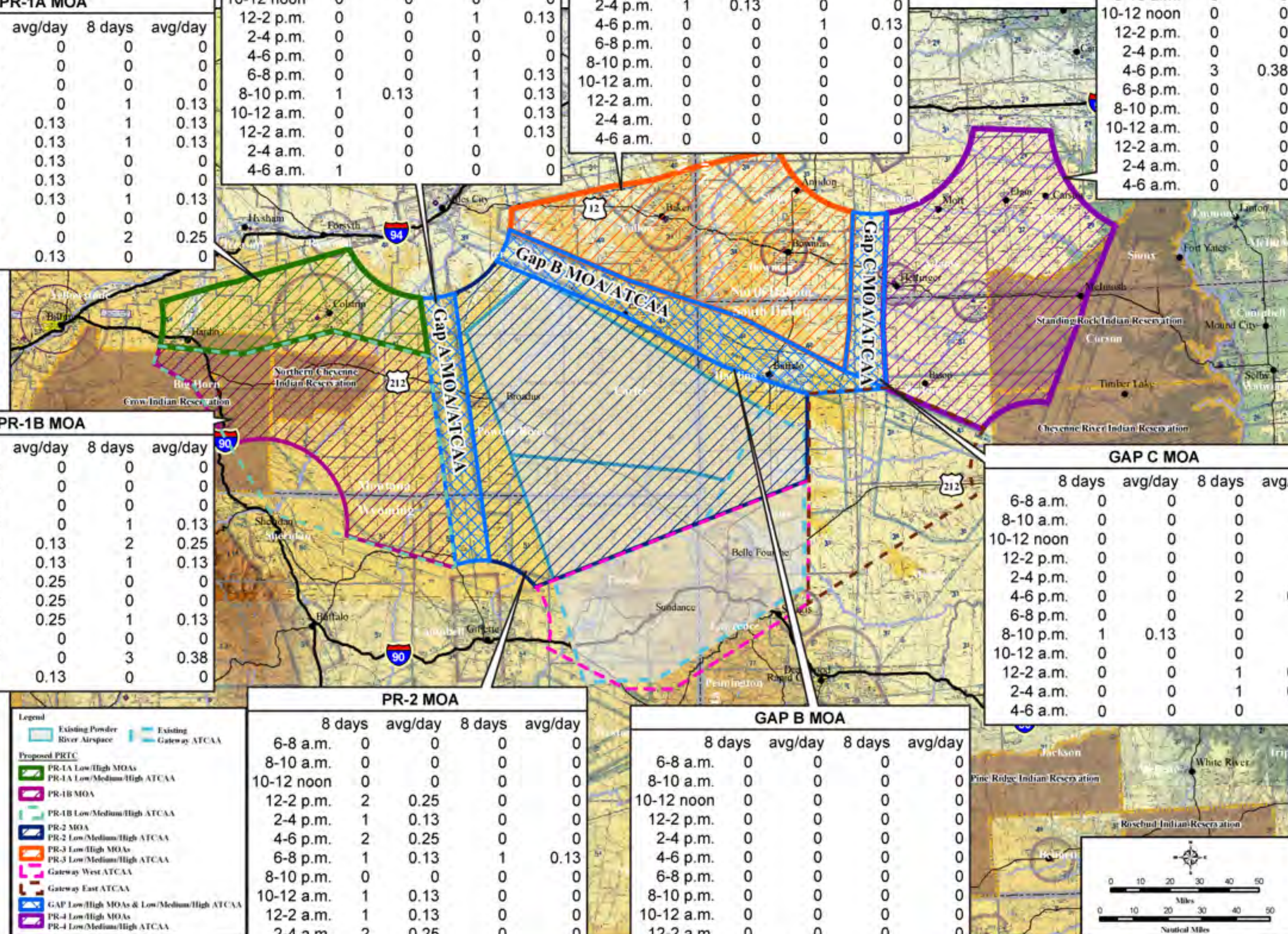
Figures 3.1-19 through 3.1-24 present the summer flight paths for the altitude below 4,000 feet MSL (Figure 3.1-19) to above FL370 (Figure 3.1-24). The charted flight paths depict a 48 hour representative winter period from 20-22 February 2008. Figures 3.1-20, 3.1-21, and 3.1-22 show the B-1 maneuvering summer training loop patterns within the existing Powder River MOAs. Figure 3.1-20 presents the existing B-1 training and maneuvering between 4,000 MSL and 10,000 MSL. Figure 3.1-21 presents the existing B-1 training and maneuvering between 10,000 feet MSL and FL180, and Figure 3.1-22 shows the B-1 training between FL180 and FL260. Commercial flights dominate the flight paths above FL260, with an apparent greater density of commercial and other high-altitude flights between FL260 and FL370 (Figure 3.1-23) than above FL370 (Figure 3.1-24).

The baseline traffic counts for the MOAs presented on Figures 3.1-7 through 3.1-9 represent the best available FAA documented MOA flight activity. These data do not represent the VFR traffic within the airspace. Public scoping commentors expressed concern that existing VFR traffic would not be adequately represented in the available data because VFR traffic could not be tracked with available FAA infrastructure. The number of based aircraft and reported operations for public airports and the reported number of based aircraft at private airfields suggests that lower altitude civilian flight operations below 10,000 feet MSL are underrepresented in the FAA data. A comparison of flight paths below 4,000 feet MSL in Figures 3.1-13 and 3.1-19 with civil flight operations reported in Table 3.1-6 and estimated in Table 3.1-7 supports the public scoping comments that lower altitude VFR flights are not captured in the FAA data. Table 3.1-10 presents estimated MOA traffic using reported operational data from airports and estimated operations from airfields under the respective airspaces. This approach aggregates all available information with the FAA data presented in Table 3.1-9 and in Figures 3.1-7 through 3.1-9. Table 3.1-10 adds the daily average FAA flight traffic data in the MOAs to the daily average flight traffic derived from the reported public airport operations on Table 3.1-6. Table 3.1-10 includes the estimated private airfield operations by applying the average public airport annual operations per based aircraft at the private airfields. These operations are derived from Table 3.1-7.

Table 3.1-10, with all the above inherent assumptions, does suggest that the FAA data captures an estimated 32 percent of the traffic in PR-1A/1B, 24 percent of the traffic in PR-2, 6 percent of the traffic in PR-3, and 15 percent of the traffic in PR-4.

The calculation distributes the estimated IFR and VFR daily traffic from Table 3.1-10 proportionate to the hourly data where FAA data are expected to be most complete in the proposed PR-1A/B MOAs. The PR-1A and PR-1B MOA data by altitude and by hour capture approximately 32 percent of the total traffic count estimated in Table 3.1-10. An estimate of the distribution of IFR and VFR by time of day and altitude can be made by applying the PR-1A/1B MOA hourly and altitude distribution percentages to the estimated IFR and VFR traffic by airspace from Table 3.1-10 and Figures 3.1-7, 3.1-8, and 3.1-9.

Existing airspace in the ROI is characterized by lower altitude flights, typically below FL180 and often below 10,000 feet MSL. These flights are conducted for a variety of activities ranging from chartered just in time delivery of machine parts or personnel to a large mining or ranching operation to weekend pleasure flying in the wide open spaces. Airspace use above FL180, and especially above FL260, consists of relatively heavily traveled commercial routes connecting coastal and inland airport hubs.



PR-1A MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	0	0
12-2 p.m.	0	0	1	0.13
2-4 p.m.	1	0.13	1	0.13
4-6 p.m.	1	0.13	1	0.13
6-8 p.m.	1	0.13	0	0
8-10 p.m.	1	0.13	0	0
10-12 a.m.	1	0.13	1	0.13
12-2 a.m.	0	0	0	0
2-4 a.m.	0	0	2	0.25
4-6 a.m.	1	0.13	0	0

GAP A MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	0	0
12-2 p.m.	0	0	1	0.13
2-4 p.m.	0	0	0	0
4-6 p.m.	0	0	0	0
6-8 p.m.	0	0	1	0.13
8-10 p.m.	1	0.13	1	0.13
10-12 a.m.	0	0	1	0.13
12-2 a.m.	0	0	1	0.13
2-4 a.m.	0	0	0	0
4-6 a.m.	1	0	0	0

PR-3 MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	0	0
12-2 p.m.	0	0	0	0
2-4 p.m.	1	0.13	0	0
4-6 p.m.	0	0	1	0.13
6-8 p.m.	0	0	0	0
8-10 p.m.	0	0	0	0
10-12 a.m.	0	0	0	0
12-2 a.m.	0	0	0	0
2-4 a.m.	0	0	0	0
4-6 a.m.	0	0	0	0

PR-4 MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	0	0
12-2 p.m.	0	0	0	0
2-4 p.m.	0	0	0	0
4-6 p.m.	3	0.38	0	0
6-8 p.m.	0	0	0	0
8-10 p.m.	0	0	0	0
10-12 a.m.	0	0	0	0
12-2 a.m.	0	0	1	0.13
2-4 a.m.	0	0	0	0
4-6 a.m.	0	0	0	0

PR-1B MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	0	0
12-2 p.m.	0	0	1	0.13
2-4 p.m.	1	0.13	2	0.25
4-6 p.m.	1	0.13	1	0.13
6-8 p.m.	2	0.25	0	0
8-10 p.m.	2	0.25	0	0
10-12 a.m.	2	0.25	1	0.13
12-2 a.m.	0	0	0	0
2-4 a.m.	0	0	3	0.38
4-6 a.m.	1	0.13	0	0

PR-2 MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	0	0
12-2 p.m.	2	0.25	0	0
2-4 p.m.	1	0.13	0	0
4-6 p.m.	2	0.25	0	0
6-8 p.m.	1	0.13	1	0.13
8-10 p.m.	0	0	0	0
10-12 a.m.	1	0.13	0	0
12-2 a.m.	1	0.13	0	0
2-4 a.m.	2	0.25	0	0
4-6 a.m.	0	0	0	0

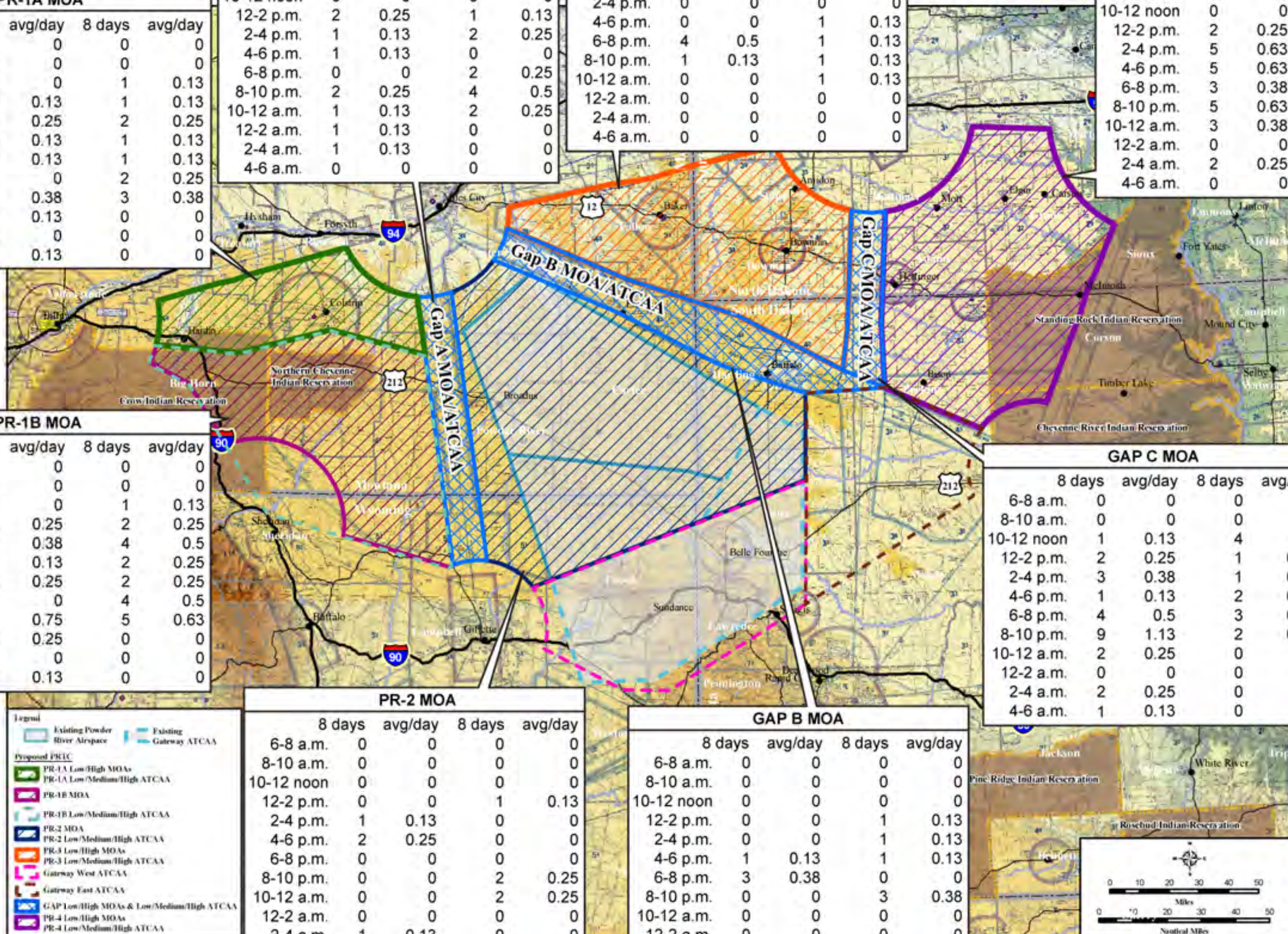
GAP B MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	0	0
12-2 p.m.	0	0	0	0
2-4 p.m.	0	0	0	0
4-6 p.m.	0	0	0	0
6-8 p.m.	0	0	0	0
8-10 p.m.	0	0	0	0
10-12 a.m.	0	0	0	0
12-2 a.m.	0	0	0	0
2-4 a.m.	2	0.25	0	0
4-6 a.m.	0	0	0	0

GAP C MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	0	0
12-2 p.m.	0	0	0	0
2-4 p.m.	0	0	0	0
4-6 p.m.	0	0	2	0.25
6-8 p.m.	0	0	0	0
8-10 p.m.	1	0.13	0	0
10-12 a.m.	0	0	0	0
12-2 a.m.	0	0	1	0.13
2-4 a.m.	0	0	1	0.13
4-6 a.m.	0	0	0	0

Figure 3.1-7.MOA Average Daily FAA Documented Aircraft Operations Below 2,000 Feet AGL



PR-1A MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	1	0.13
12-2 p.m.	1	0.13	1	0.13
2-4 p.m.	2	0.25	2	0.25
4-6 p.m.	1	0.13	1	0.13
6-8 p.m.	1	0.13	1	0.13
8-10 p.m.	0	0	2	0.25
10-12 a.m.	3	0.38	3	0.38
12-2 a.m.	1	0.13	0	0
2-4 a.m.	0	0	0	0
4-6 a.m.	1	0.13	0	0

GAP A MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	0	0
12-2 p.m.	2	0.25	1	0.13
2-4 p.m.	1	0.13	2	0.25
4-6 p.m.	1	0.13	0	0
6-8 p.m.	0	0	2	0.25
8-10 p.m.	2	0.25	4	0.5
10-12 a.m.	1	0.13	2	0.25
12-2 a.m.	1	0.13	0	0
2-4 a.m.	1	0.13	0	0
4-6 a.m.	0	0	0	0

PR-3 MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	1	0.13
12-2 p.m.	0	0	1	0.13
2-4 p.m.	0	0	0	0
4-6 p.m.	0	0	1	0.13
6-8 p.m.	4	0.5	1	0.13
8-10 p.m.	1	0.13	1	0.13
10-12 a.m.	0	0	1	0.13
12-2 a.m.	0	0	0	0
2-4 a.m.	0	0	0	0
4-6 a.m.	0	0	0	0

PR-4 MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	0	0
12-2 p.m.	2	0.25	4	0.5
2-4 p.m.	5	0.63	0	0
4-6 p.m.	5	0.63	3	0.38
6-8 p.m.	3	0.38	5	0.63
8-10 p.m.	5	0.63	0	0
10-12 a.m.	3	0.38	2	0.25
12-2 a.m.	0	0	1	0.13
2-4 a.m.	2	0.25	1	0.13
4-6 a.m.	0	0	0	0

PR-1B MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	1	0.13
12-2 p.m.	2	0.25	2	0.25
2-4 p.m.	3	0.38	4	0.5
4-6 p.m.	1	0.13	2	0.25
6-8 p.m.	2	0.25	2	0.25
8-10 p.m.	0	0	4	0.5
10-12 a.m.	6	0.75	5	0.63
12-2 a.m.	2	0.25	0	0
2-4 a.m.	0	0	0	0
4-6 a.m.	1	0.13	0	0

GAP C MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	1	0.13	4	0.5
12-2 p.m.	2	0.25	1	0.13
2-4 p.m.	3	0.38	1	0.13
4-6 p.m.	1	0.13	2	0.25
6-8 p.m.	4	0.5	3	0.38
8-10 p.m.	9	1.13	2	0.25
10-12 a.m.	2	0.25	0	0
12-2 a.m.	0	0	0	0
2-4 a.m.	2	0.25	0	0
4-6 a.m.	1	0.13	0	0

PR-2 MOA

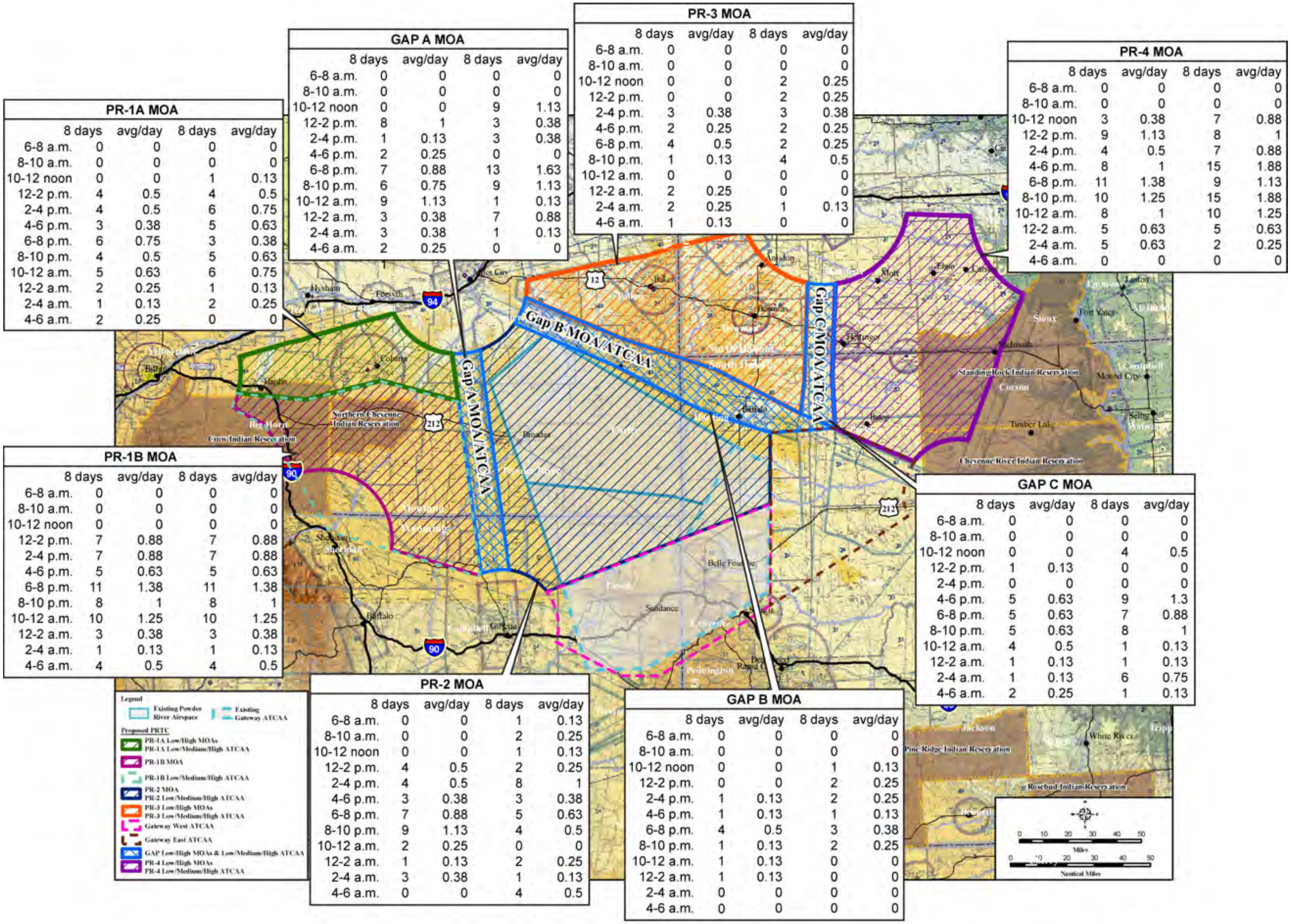
	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	0	0
12-2 p.m.	0	0	1	0.13
2-4 p.m.	1	0.13	0	0
4-6 p.m.	2	0.25	0	0
6-8 p.m.	0	0	0	0
8-10 p.m.	0	0	2	0.25
10-12 a.m.	0	0	2	0.25
12-2 a.m.	0	0	0	0
2-4 a.m.	1	0.13	0	0
4-6 a.m.	0	0	0	0

GAP B MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	0	0
12-2 p.m.	0	0	1	0.13
2-4 p.m.	0	0	1	0.13
4-6 p.m.	1	0.13	1	0.13
6-8 p.m.	3	0.38	0	0
8-10 p.m.	0	0	3	0.38
10-12 a.m.	0	0	0	0
12-2 a.m.	0	0	0	0
2-4 a.m.	0	0	0	0
4-6 a.m.	0	0	0	0

MOA Altitude Bands (2,000 feet AGL UTBNI 18,000 feet MSL)

Figure 3.1-8. MOA Average Daily FAA Documented Aircraft Operations from 2,000 Feet AGL to, but not including, 12,000 Feet MSL



PR-1A MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	1	0.13
12-2 p.m.	4	0.5	4	0.5
2-4 p.m.	4	0.5	6	0.75
4-6 p.m.	3	0.38	5	0.63
6-8 p.m.	6	0.75	3	0.38
8-10 p.m.	4	0.5	5	0.63
10-12 a.m.	5	0.63	6	0.75
12-2 a.m.	2	0.25	1	0.13
2-4 a.m.	1	0.13	2	0.25
4-6 a.m.	2	0.25	0	0

GAP A MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	9	1.13
12-2 p.m.	8	1	3	0.38
2-4 p.m.	1	0.13	3	0.38
4-6 p.m.	2	0.25	0	0
6-8 p.m.	7	0.88	13	1.63
8-10 p.m.	6	0.75	9	1.13
10-12 a.m.	9	1.13	1	0.13
12-2 a.m.	3	0.38	7	0.88
2-4 a.m.	3	0.38	1	0.13
4-6 a.m.	2	0.25	0	0

PR-3 MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	2	0.25
12-2 p.m.	0	0	2	0.25
2-4 p.m.	3	0.38	3	0.38
4-6 p.m.	2	0.25	2	0.25
6-8 p.m.	4	0.5	2	0.25
8-10 p.m.	1	0.13	4	0.5
10-12 a.m.	0	0	0	0
12-2 a.m.	2	0.25	0	0
2-4 a.m.	2	0.25	1	0.13
4-6 a.m.	1	0.13	0	0

PR-4 MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	3	0.38	7	0.88
12-2 p.m.	9	1.13	8	1
2-4 p.m.	4	0.5	7	0.88
4-6 p.m.	8	1	15	1.88
6-8 p.m.	11	1.38	9	1.13
8-10 p.m.	10	1.25	15	1.88
10-12 a.m.	8	1	10	1.25
12-2 a.m.	5	0.63	5	0.63
2-4 a.m.	5	0.63	2	0.25
4-6 a.m.	0	0	0	0

PR-1B MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	0	0
12-2 p.m.	7	0.88	7	0.88
2-4 p.m.	7	0.88	7	0.88
4-6 p.m.	5	0.63	5	0.63
6-8 p.m.	11	1.38	11	1.38
8-10 p.m.	8	1	8	1
10-12 a.m.	10	1.25	10	1.25
12-2 a.m.	3	0.38	3	0.38
2-4 a.m.	1	0.13	1	0.13
4-6 a.m.	4	0.5	4	0.5

GAP C MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	4	0.5
12-2 p.m.	1	0.13	0	0
2-4 p.m.	0	0	0	0
4-6 p.m.	5	0.63	9	1.3
6-8 p.m.	5	0.63	7	0.88
8-10 p.m.	5	0.63	8	1
10-12 a.m.	4	0.5	1	0.13
12-2 a.m.	1	0.13	1	0.13
2-4 a.m.	1	0.13	6	0.75
4-6 a.m.	2	0.25	1	0.13

PR-2 MOA

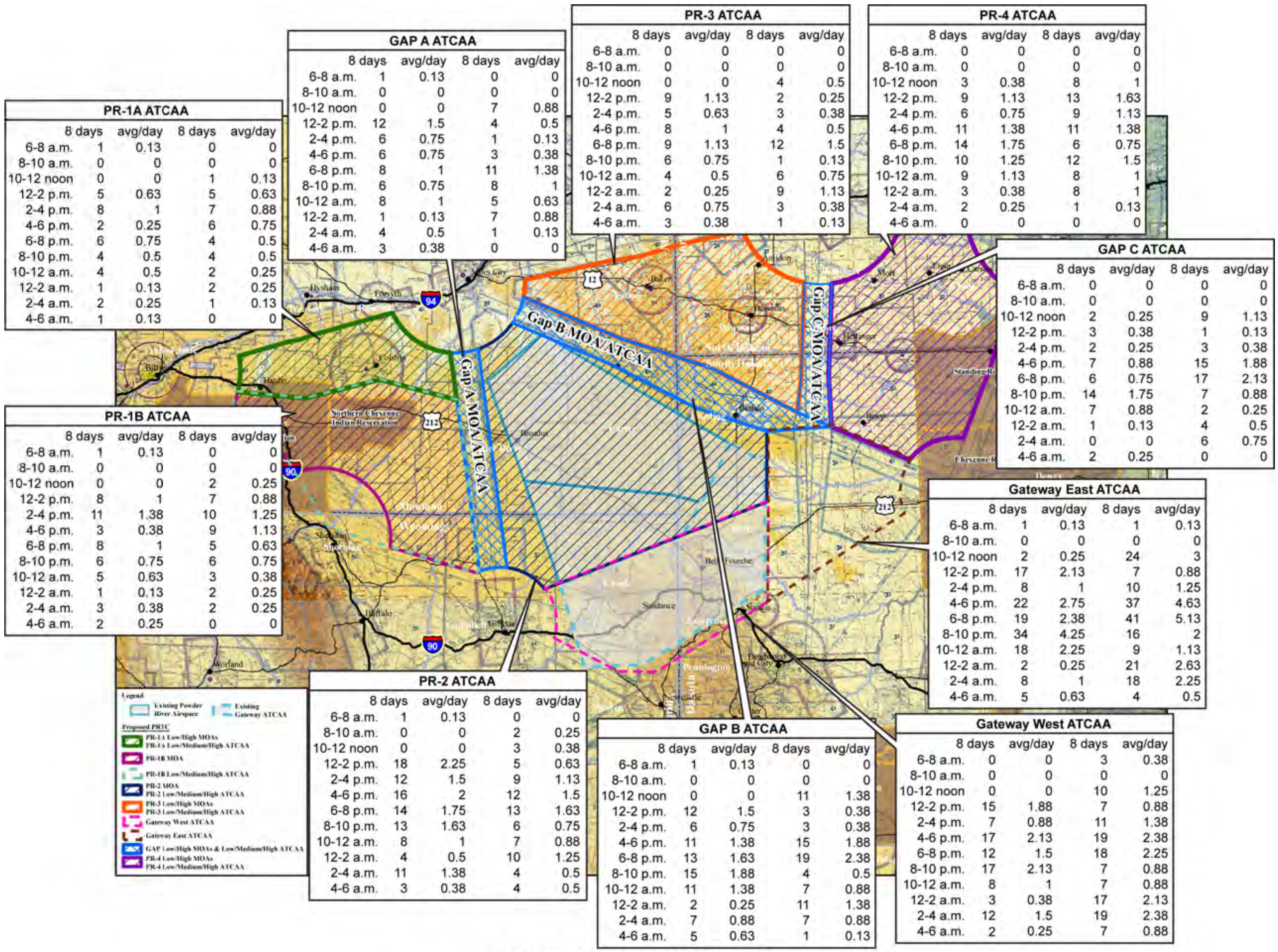
	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	1	0.13
8-10 a.m.	0	0	2	0.25
10-12 noon	0	0	1	0.13
12-2 p.m.	4	0.5	2	0.25
2-4 p.m.	4	0.5	8	1
4-6 p.m.	3	0.38	3	0.38
6-8 p.m.	7	0.88	5	0.63
8-10 p.m.	9	1.13	4	0.5
10-12 a.m.	2	0.25	0	0
12-2 a.m.	1	0.13	2	0.25
2-4 a.m.	3	0.38	1	0.13
4-6 a.m.	0	0	4	0.5

GAP B MOA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	1	0.13
12-2 p.m.	0	0	2	0.25
2-4 p.m.	1	0.13	2	0.25
4-6 p.m.	1	0.13	1	0.13
6-8 p.m.	4	0.5	3	0.38
8-10 p.m.	1	0.13	2	0.25
10-12 a.m.	1	0.13	0	0
12-2 a.m.	1	0.13	0	0
2-4 a.m.	0	0	0	0
4-6 a.m.	0	0	0	0

MOA Altitude Bands (12,000 feet UTBNI FL180)

Figure 3.1-9. MOA Average Daily FAA Documented Aircraft Operations from 12,000 Feet MSL To, But Not Including, FL180.



PR-1A ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	1	0.13	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	1	0.13
12-2 p.m.	5	0.63	5	0.63
2-4 p.m.	8	1	7	0.88
4-6 p.m.	2	0.25	6	0.75
6-8 p.m.	6	0.75	4	0.5
8-10 p.m.	4	0.5	4	0.5
10-12 a.m.	4	0.5	2	0.25
12-2 a.m.	1	0.13	2	0.25
2-4 a.m.	2	0.25	1	0.13
4-6 a.m.	1	0.13	0	0

GAP A ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	1	0.13	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	7	0.88
12-2 p.m.	12	1.5	4	0.5
2-4 p.m.	6	0.75	1	0.13
4-6 p.m.	6	0.75	3	0.38
6-8 p.m.	8	1	11	1.38
8-10 p.m.	6	0.75	8	1
10-12 a.m.	8	1	5	0.63
12-2 a.m.	1	0.13	7	0.88
2-4 a.m.	4	0.5	1	0.13
4-6 a.m.	3	0.38	0	0

PR-3 ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	4	0.5
12-2 p.m.	9	1.13	2	0.25
2-4 p.m.	5	0.63	3	0.38
4-6 p.m.	8	1	4	0.5
6-8 p.m.	9	1.13	12	1.5
8-10 p.m.	6	0.75	1	0.13
10-12 a.m.	4	0.5	6	0.75
12-2 a.m.	2	0.25	9	1.13
2-4 a.m.	6	0.75	3	0.38
4-6 a.m.	3	0.38	1	0.13

PR-4 ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	3	0.38	8	1
12-2 p.m.	9	1.13	13	1.63
2-4 p.m.	6	0.75	9	1.13
4-6 p.m.	11	1.38	11	1.38
6-8 p.m.	14	1.75	6	0.75
8-10 p.m.	10	1.25	12	1.5
10-12 a.m.	9	1.13	8	1
12-2 a.m.	3	0.38	8	1
2-4 a.m.	2	0.25	1	0.13
4-6 a.m.	0	0	0	0

GAP C ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0
8-10 a.m.	0	0	0	0
10-12 noon	2	0.25	9	1.13
12-2 p.m.	3	0.38	1	0.13
2-4 p.m.	2	0.25	3	0.38
4-6 p.m.	7	0.88	15	1.88
6-8 p.m.	6	0.75	17	2.13
8-10 p.m.	14	1.75	7	0.88
10-12 a.m.	7	0.88	2	0.25
12-2 a.m.	1	0.13	4	0.5
2-4 a.m.	0	0	6	0.75
4-6 a.m.	2	0.25	0	0

PR-1B ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	1	0.13	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	2	0.25
12-2 p.m.	8	1	7	0.88
2-4 p.m.	11	1.38	10	1.25
4-6 p.m.	3	0.38	9	1.13
6-8 p.m.	8	1	5	0.63
8-10 p.m.	6	0.75	6	0.75
10-12 a.m.	5	0.63	3	0.38
12-2 a.m.	1	0.13	2	0.25
2-4 a.m.	3	0.38	2	0.25
4-6 a.m.	2	0.25	0	0

Gateway East ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	1	0.13	1	0.13
8-10 a.m.	0	0	0	0
10-12 noon	2	0.25	24	3
12-2 p.m.	17	2.13	7	0.88
2-4 p.m.	8	1	10	1.25
4-6 p.m.	22	2.75	37	4.63
6-8 p.m.	19	2.38	41	5.13
8-10 p.m.	34	4.25	16	2
10-12 a.m.	18	2.25	9	1.13
12-2 a.m.	2	0.25	21	2.63
2-4 a.m.	8	1	18	2.25
4-6 a.m.	5	0.63	4	0.5

PR-2 ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	1	0.13	0	0
8-10 a.m.	0	0	2	0.25
10-12 noon	0	0	3	0.38
12-2 p.m.	18	2.25	5	0.63
2-4 p.m.	12	1.5	9	1.13
4-6 p.m.	16	2	12	1.5
6-8 p.m.	14	1.75	13	1.63
8-10 p.m.	13	1.63	6	0.75
10-12 a.m.	8	1	7	0.88
12-2 a.m.	4	0.5	10	1.25
2-4 a.m.	11	1.38	4	0.5
4-6 a.m.	3	0.38	4	0.5

GAP B ATCAA

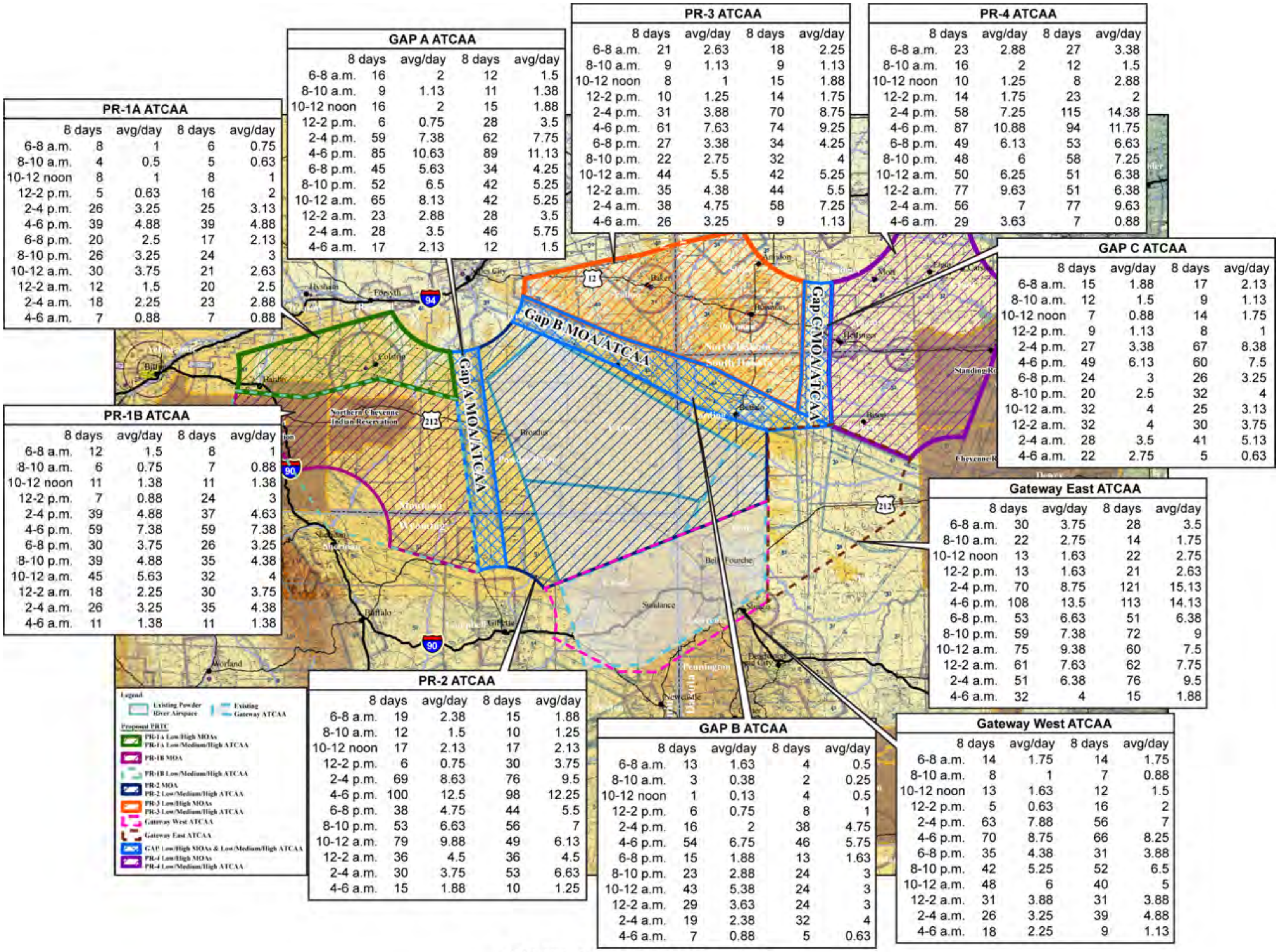
	8 days	avg/day	8 days	avg/day
6-8 a.m.	1	0.13	0	0
8-10 a.m.	0	0	0	0
10-12 noon	0	0	11	1.38
12-2 p.m.	12	1.5	3	0.38
2-4 p.m.	6	0.75	3	0.38
4-6 p.m.	11	1.38	15	1.88
6-8 p.m.	13	1.63	19	2.38
8-10 p.m.	15	1.88	4	0.5
10-12 a.m.	11	1.38	7	0.88
12-2 a.m.	2	0.25	11	1.38
2-4 a.m.	7	0.88	7	0.88
4-6 a.m.	5	0.63	1	0.13

Gateway West ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	3	0.38
8-10 a.m.	0	0	0	0
10-12 noon	0	0	10	1.25
12-2 p.m.	15	1.88	7	0.88
2-4 p.m.	7	0.88	11	1.38
4-6 p.m.	17	2.13	19	2.38
6-8 p.m.	12	1.5	18	2.25
8-10 p.m.	17	2.13	7	0.88
10-12 a.m.	8	1	7	0.88
12-2 a.m.	3	0.38	17	2.13
2-4 a.m.	12	1.5	19	2.38
4-6 a.m.	2	0.25	7	0.88

MOA Altitude Bands (from FL180 to FL260)

Figure 3.1-10. ATCAA Average Daily FAA Documented Aircraft Operations From FL180 To FL260



PR-1A ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	8	1	6	0.75
8-10 a.m.	4	0.5	5	0.63
10-12 noon	8	1	8	1
12-2 p.m.	5	0.63	16	2
2-4 p.m.	26	3.25	25	3.13
4-6 p.m.	39	4.88	39	4.88
6-8 p.m.	20	2.5	17	2.13
8-10 p.m.	26	3.25	24	3
10-12 a.m.	30	3.75	21	2.63
12-2 a.m.	12	1.5	20	2.5
2-4 a.m.	18	2.25	23	2.88
4-6 a.m.	7	0.88	7	0.88

PR-1B ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	12	1.5	8	1
8-10 a.m.	6	0.75	7	0.88
10-12 noon	11	1.38	11	1.38
12-2 p.m.	7	0.88	24	3
2-4 p.m.	39	4.88	37	4.63
4-6 p.m.	59	7.38	59	7.38
6-8 p.m.	30	3.75	26	3.25
8-10 p.m.	39	4.88	35	4.38
10-12 a.m.	45	5.63	32	4
12-2 a.m.	18	2.25	30	3.75
2-4 a.m.	26	3.25	35	4.38
4-6 a.m.	11	1.38	11	1.38

GAP A ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	16	2	12	1.5
8-10 a.m.	9	1.13	11	1.38
10-12 noon	16	2	15	1.88
12-2 p.m.	6	0.75	28	3.5
2-4 p.m.	59	7.38	62	7.75
4-6 p.m.	85	10.63	89	11.13
6-8 p.m.	45	5.63	34	4.25
8-10 p.m.	52	6.5	42	5.25
10-12 a.m.	65	8.13	42	5.25
12-2 a.m.	23	2.88	28	3.5
2-4 a.m.	28	3.5	46	5.75
4-6 a.m.	17	2.13	12	1.5

PR-3 ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	21	2.63	18	2.25
8-10 a.m.	9	1.13	9	1.13
10-12 noon	8	1	15	1.88
12-2 p.m.	10	1.25	14	1.75
2-4 p.m.	31	3.88	70	8.75
4-6 p.m.	61	7.63	74	9.25
6-8 p.m.	27	3.38	34	4.25
8-10 p.m.	22	2.75	32	4
10-12 a.m.	44	5.5	42	5.25
12-2 a.m.	35	4.38	44	5.5
2-4 a.m.	38	4.75	58	7.25
4-6 a.m.	26	3.25	9	1.13

PR-4 ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	23	2.88	27	3.38
8-10 a.m.	16	2	12	1.5
10-12 noon	10	1.25	8	2.88
12-2 p.m.	14	1.75	23	2
2-4 p.m.	58	7.25	115	14.38
4-6 p.m.	87	10.88	94	11.75
6-8 p.m.	49	6.13	53	6.63
8-10 p.m.	48	6	58	7.25
10-12 a.m.	50	6.25	51	6.38
12-2 a.m.	77	9.63	51	6.38
2-4 a.m.	56	7	77	9.63
4-6 a.m.	29	3.63	7	0.88

GAP C ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	15	1.88	17	2.13
8-10 a.m.	12	1.5	9	1.13
10-12 noon	7	0.88	14	1.75
12-2 p.m.	9	1.13	8	1
2-4 p.m.	27	3.38	67	8.38
4-6 p.m.	49	6.13	60	7.5
6-8 p.m.	24	3	26	3.25
8-10 p.m.	20	2.5	32	4
10-12 a.m.	32	4	25	3.13
12-2 a.m.	32	4	30	3.75
2-4 a.m.	28	3.5	41	5.13
4-6 a.m.	22	2.75	5	0.63

Gateway East ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	30	3.75	28	3.5
8-10 a.m.	22	2.75	14	1.75
10-12 noon	13	1.63	22	2.75
12-2 p.m.	13	1.63	21	2.63
2-4 p.m.	70	8.75	121	15.13
4-6 p.m.	108	13.5	113	14.13
6-8 p.m.	53	6.63	51	6.38
8-10 p.m.	59	7.38	72	9
10-12 a.m.	75	9.38	60	7.5
12-2 a.m.	61	7.63	62	7.75
2-4 a.m.	51	6.38	76	9.5
4-6 a.m.	32	4	15	1.88

PR-2 ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	19	2.38	15	1.88
8-10 a.m.	12	1.5	10	1.25
10-12 noon	17	2.13	17	2.13
12-2 p.m.	6	0.75	30	3.75
2-4 p.m.	69	8.63	76	9.5
4-6 p.m.	100	12.5	98	12.25
6-8 p.m.	38	4.75	44	5.5
8-10 p.m.	53	6.63	56	7
10-12 a.m.	79	9.88	49	6.13
12-2 a.m.	36	4.5	36	4.5
2-4 a.m.	30	3.75	53	6.63
4-6 a.m.	15	1.88	10	1.25

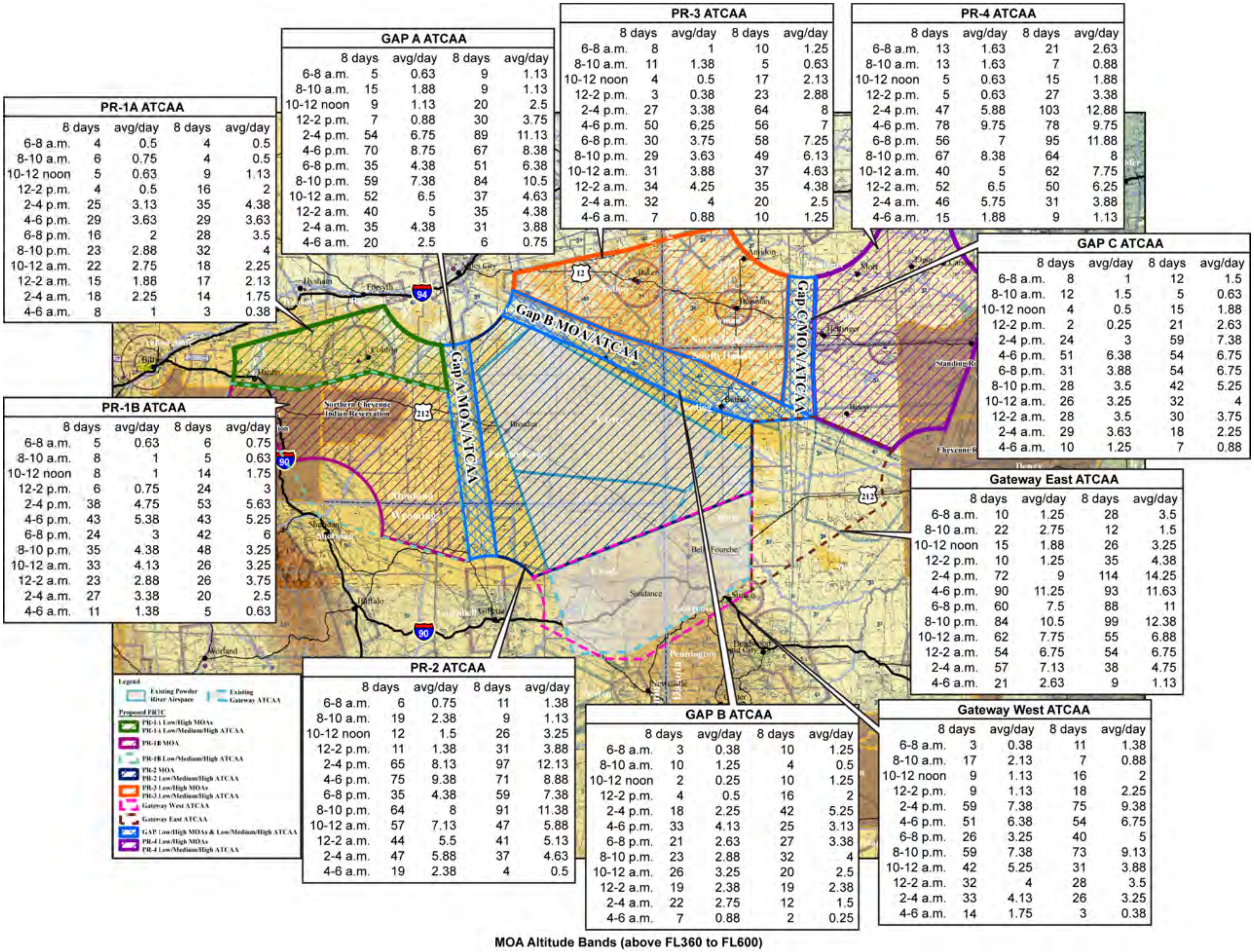
GAP B ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	13	1.63	4	0.5
8-10 a.m.	3	0.38	2	0.25
10-12 noon	1	0.13	4	0.5
12-2 p.m.	6	0.75	8	1
2-4 p.m.	16	2	38	4.75
4-6 p.m.	54	6.75	46	5.75
6-8 p.m.	15	1.88	13	1.63
8-10 p.m.	23	2.88	24	3
10-12 a.m.	43	5.38	24	3
12-2 a.m.	29	3.63	24	3
2-4 a.m.	19	2.38	32	4
4-6 a.m.	7	0.88	5	0.63

Gateway West ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	14	1.75	14	1.75
8-10 a.m.	8	1	7	0.88
10-12 noon	13	1.63	12	1.5
12-2 p.m.	5	0.63	16	2
2-4 p.m.	63	7.88	56	7
4-6 p.m.	70	8.75	66	8.25
6-8 p.m.	35	4.38	31	3.88
8-10 p.m.	42	5.25	52	6.5
10-12 a.m.	48	6	40	5
12-2 a.m.	31	3.88	31	3.88
2-4 a.m.	26	3.25	39	4.88
4-6 a.m.	18	2.25	9	1.13

Figure 3.1-11. ATCAA Average Daily FAA Documented Aircraft Operations From FL260 To FL360



PR-1A ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	4	0.5	4	0.5
8-10 a.m.	6	0.75	4	0.5
10-12 noon	5	0.63	9	1.13
12-2 p.m.	4	0.5	16	2
2-4 p.m.	25	3.13	35	4.38
4-6 p.m.	29	3.63	29	3.63
6-8 p.m.	16	2	28	3.5
8-10 p.m.	23	2.88	32	4
10-12 a.m.	22	2.75	18	2.25
12-2 a.m.	15	1.88	17	2.13
2-4 a.m.	18	2.25	14	1.75
4-6 a.m.	8	1	3	0.38

PR-1B ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	5	0.63	6	0.75
8-10 a.m.	8	1	5	0.63
10-12 noon	8	1	14	1.75
12-2 p.m.	6	0.75	24	3
2-4 p.m.	38	4.75	53	5.63
4-6 p.m.	43	5.38	43	5.25
6-8 p.m.	24	3	42	6
8-10 p.m.	35	4.38	48	3.25
10-12 a.m.	33	4.13	26	3.25
12-2 a.m.	23	2.88	26	3.75
2-4 a.m.	27	3.38	20	2.5
4-6 a.m.	11	1.38	5	0.63

GAP A ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	5	0.63	9	1.13
8-10 a.m.	15	1.88	9	1.13
10-12 noon	9	1.13	20	2.5
12-2 p.m.	7	0.88	30	3.75
2-4 p.m.	54	6.75	89	11.13
4-6 p.m.	70	8.75	67	8.38
6-8 p.m.	35	4.38	51	6.38
8-10 p.m.	59	7.38	84	10.5
10-12 a.m.	52	6.5	37	4.63
12-2 a.m.	40	5	35	4.38
2-4 a.m.	35	4.38	31	3.88
4-6 a.m.	20	2.5	6	0.75

PR-3 ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	8	1	10	1.25
8-10 a.m.	11	1.38	5	0.63
10-12 noon	4	0.5	17	2.13
12-2 p.m.	3	0.38	23	2.88
2-4 p.m.	27	3.38	64	8
4-6 p.m.	50	6.25	56	7
6-8 p.m.	30	3.75	58	7.25
8-10 p.m.	29	3.63	49	6.13
10-12 a.m.	31	3.88	37	4.63
12-2 a.m.	34	4.25	35	4.38
2-4 a.m.	32	4	20	2.5
4-6 a.m.	7	0.88	10	1.25

PR-4 ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	13	1.63	21	2.63
8-10 a.m.	13	1.63	7	0.88
10-12 noon	5	0.63	15	1.88
12-2 p.m.	5	0.63	27	3.38
2-4 p.m.	47	5.88	103	12.88
4-6 p.m.	78	9.75	78	9.75
6-8 p.m.	56	7	95	11.88
8-10 p.m.	67	8.38	64	8
10-12 a.m.	40	5	62	7.75
12-2 a.m.	52	6.5	50	6.25
2-4 a.m.	46	5.75	31	3.88
4-6 a.m.	15	1.88	9	1.13

GAP C ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	8	1	12	1.5
8-10 a.m.	12	1.5	5	0.63
10-12 noon	4	0.5	15	1.88
12-2 p.m.	2	0.25	21	2.63
2-4 p.m.	24	3	59	7.38
4-6 p.m.	51	6.38	54	6.75
6-8 p.m.	31	3.88	54	6.75
8-10 p.m.	28	3.5	42	5.25
10-12 a.m.	26	3.25	32	4
12-2 a.m.	28	3.5	30	3.75
2-4 a.m.	29	3.63	18	2.25
4-6 a.m.	10	1.25	7	0.88

Gateway East ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	10	1.25	28	3.5
8-10 a.m.	22	2.75	12	1.5
10-12 noon	15	1.88	26	3.25
12-2 p.m.	10	1.25	35	4.38
2-4 p.m.	72	9	114	14.25
4-6 p.m.	90	11.25	93	11.63
6-8 p.m.	60	7.5	88	11
8-10 p.m.	84	10.5	99	12.38
10-12 a.m.	62	7.75	55	6.88
12-2 a.m.	54	6.75	54	6.75
2-4 a.m.	57	7.13	38	4.75
4-6 a.m.	21	2.63	9	1.13

PR-2 ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	6	0.75	11	1.38
8-10 a.m.	19	2.38	9	1.13
10-12 noon	12	1.5	26	3.25
12-2 p.m.	11	1.38	31	3.88
2-4 p.m.	65	8.13	97	12.13
4-6 p.m.	75	9.38	71	8.88
6-8 p.m.	35	4.38	59	7.38
8-10 p.m.	64	8	91	11.38
10-12 a.m.	57	7.13	47	5.88
12-2 a.m.	44	5.5	41	5.13
2-4 a.m.	47	5.88	37	4.63
4-6 a.m.	19	2.38	4	0.5

GAP B ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	3	0.38	10	1.25
8-10 a.m.	10	1.25	4	0.5
10-12 noon	2	0.25	10	1.25
12-2 p.m.	4	0.5	16	2
2-4 p.m.	18	2.25	42	5.25
4-6 p.m.	33	4.13	25	3.13
6-8 p.m.	21	2.63	27	3.38
8-10 p.m.	23	2.88	32	4
10-12 a.m.	26	3.25	20	2.5
12-2 a.m.	19	2.38	19	2.38
2-4 a.m.	22	2.75	12	1.5
4-6 a.m.	7	0.88	2	0.25

Gateway West ATCAA

	8 days	avg/day	8 days	avg/day
6-8 a.m.	3	0.38	11	1.38
8-10 a.m.	17	2.13	7	0.88
10-12 noon	9	1.13	16	2
12-2 p.m.	9	1.13	18	2.25
2-4 p.m.	59	7.38	75	9.38
4-6 p.m.	51	6.38	54	6.75
6-8 p.m.	26	3.25	40	5
8-10 p.m.	59	7.38	73	9.13
10-12 a.m.	42	5.25	31	3.88
12-2 a.m.	32	4	28	3.5
2-4 a.m.	33	4.13	26	3.25
4-6 a.m.	14	1.75	3	0.38

MOA Altitude Bands (above FL360 to FL600)

Figure 3.1-12. ATCAA Average Daily FAA Documented Aircraft Operations Above FL360 To FL600

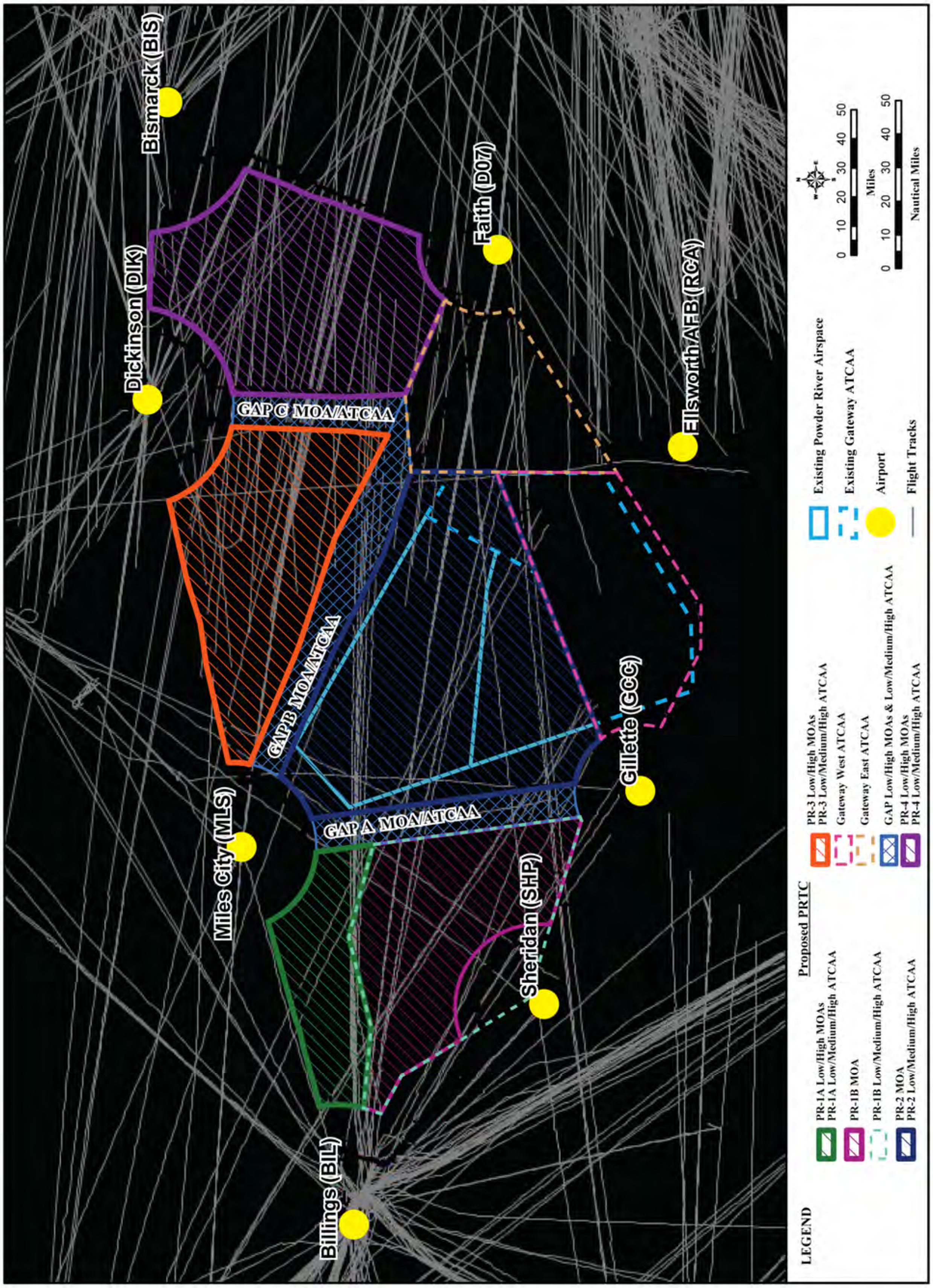


Figure 3.1-13. Winter below 4,000 feet MSL

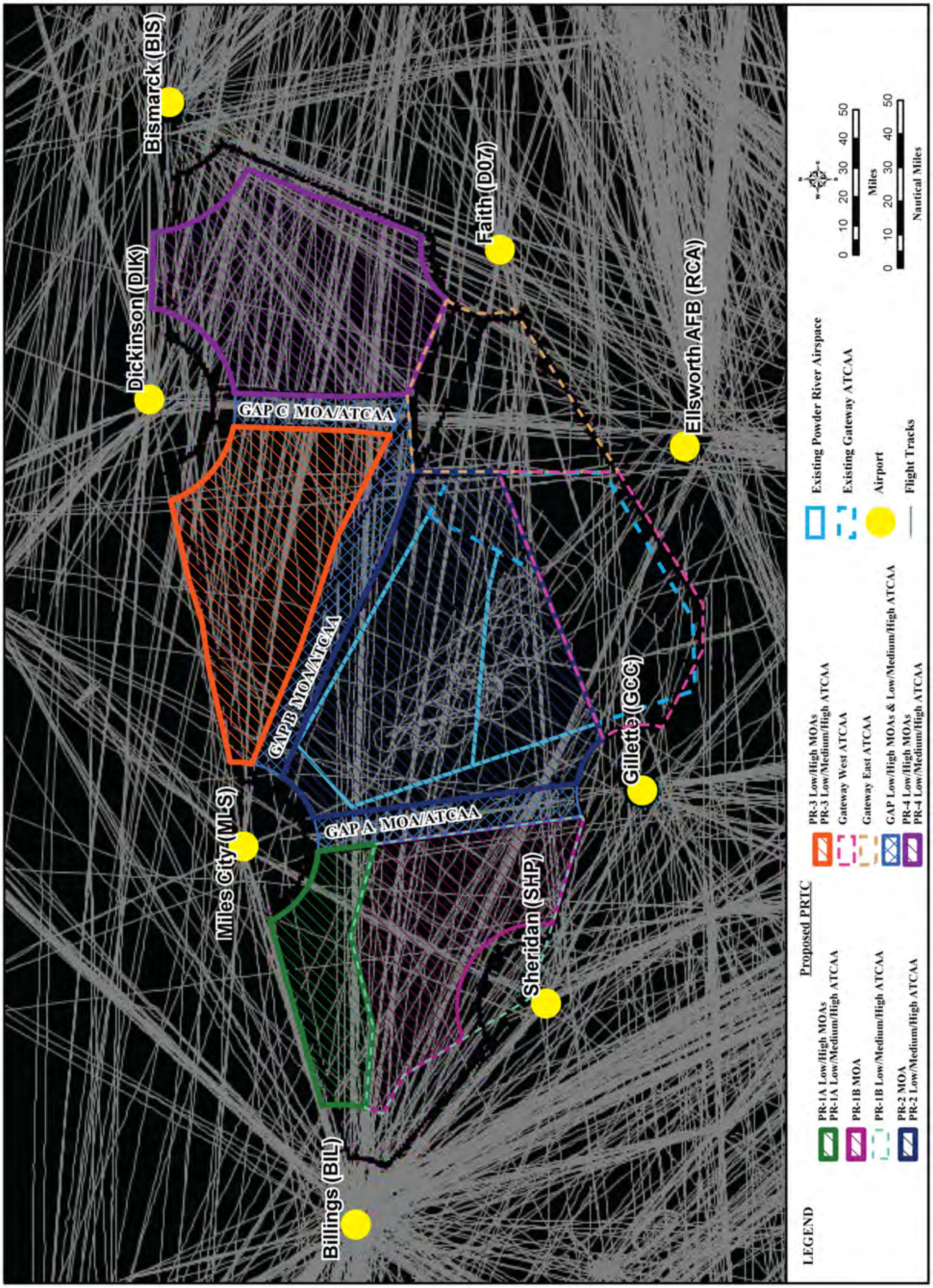


Figure 3.1-14. Winter from 4,000 feet MSL to, but not including, 10,000 feet MSL

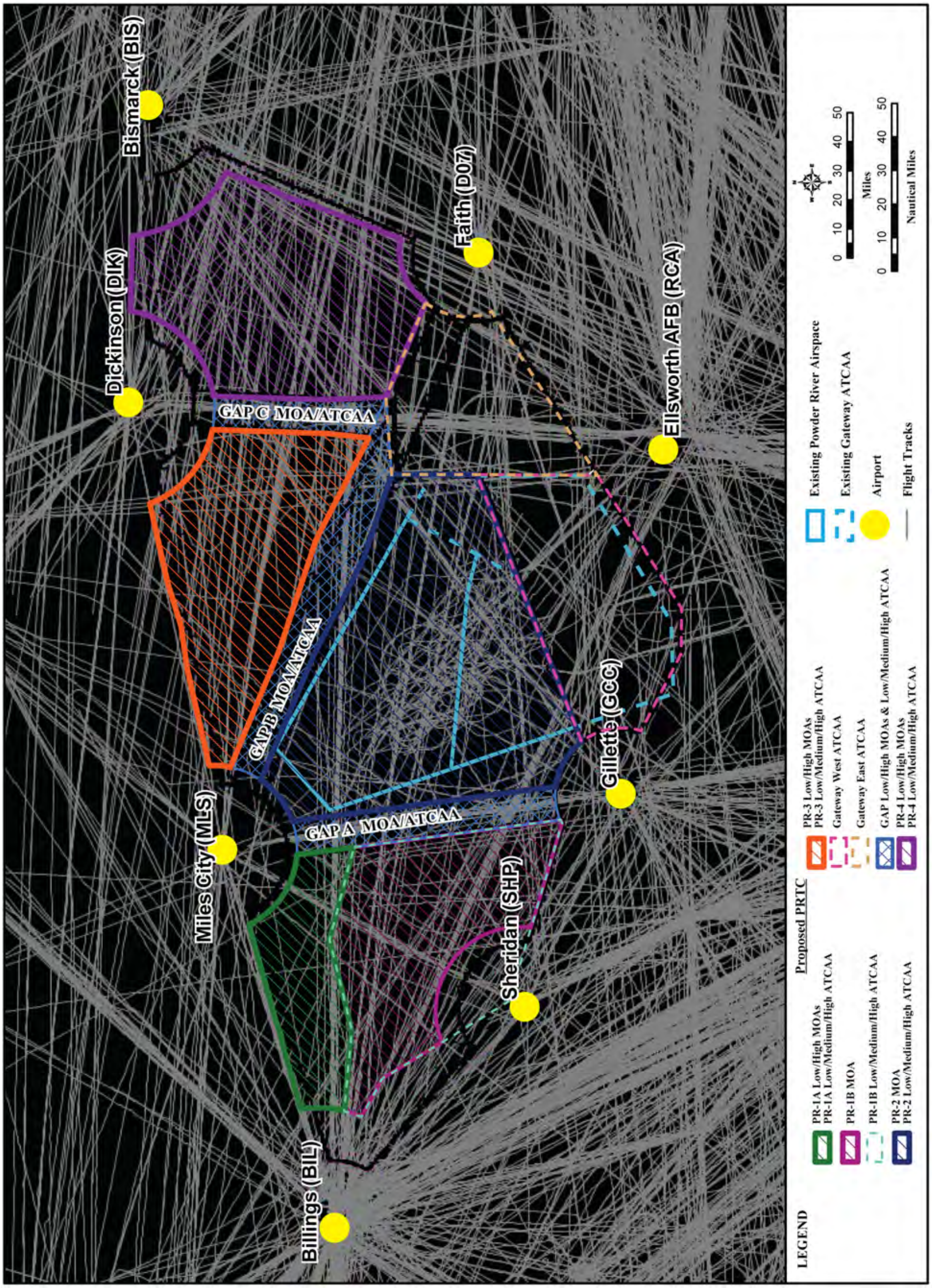


Figure 3.1-15. Winter from 10,000 feet MSL to, but not including, FL180

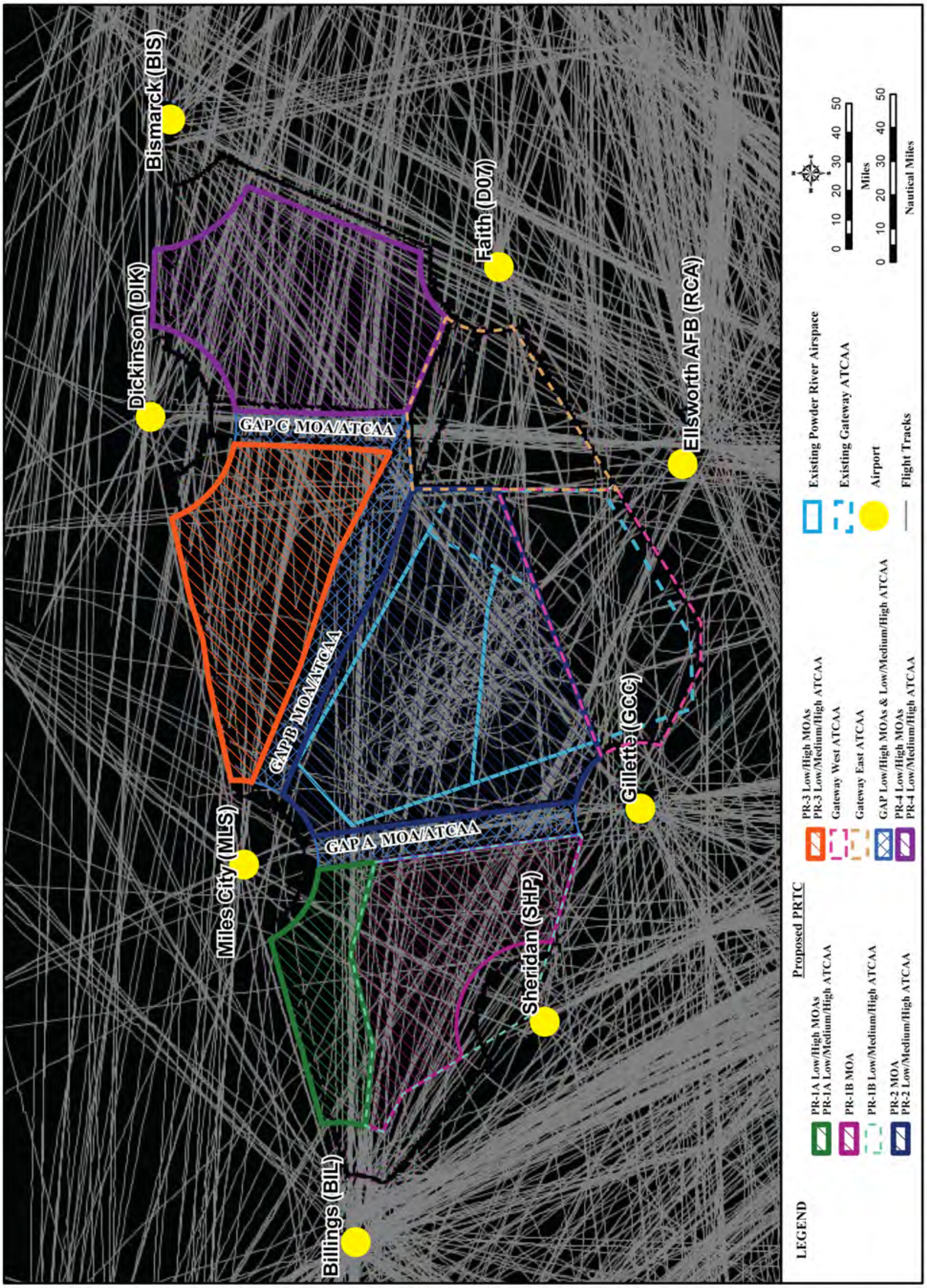


Figure 3.1-16. Winter Low ATCAA from FL180 to FL260

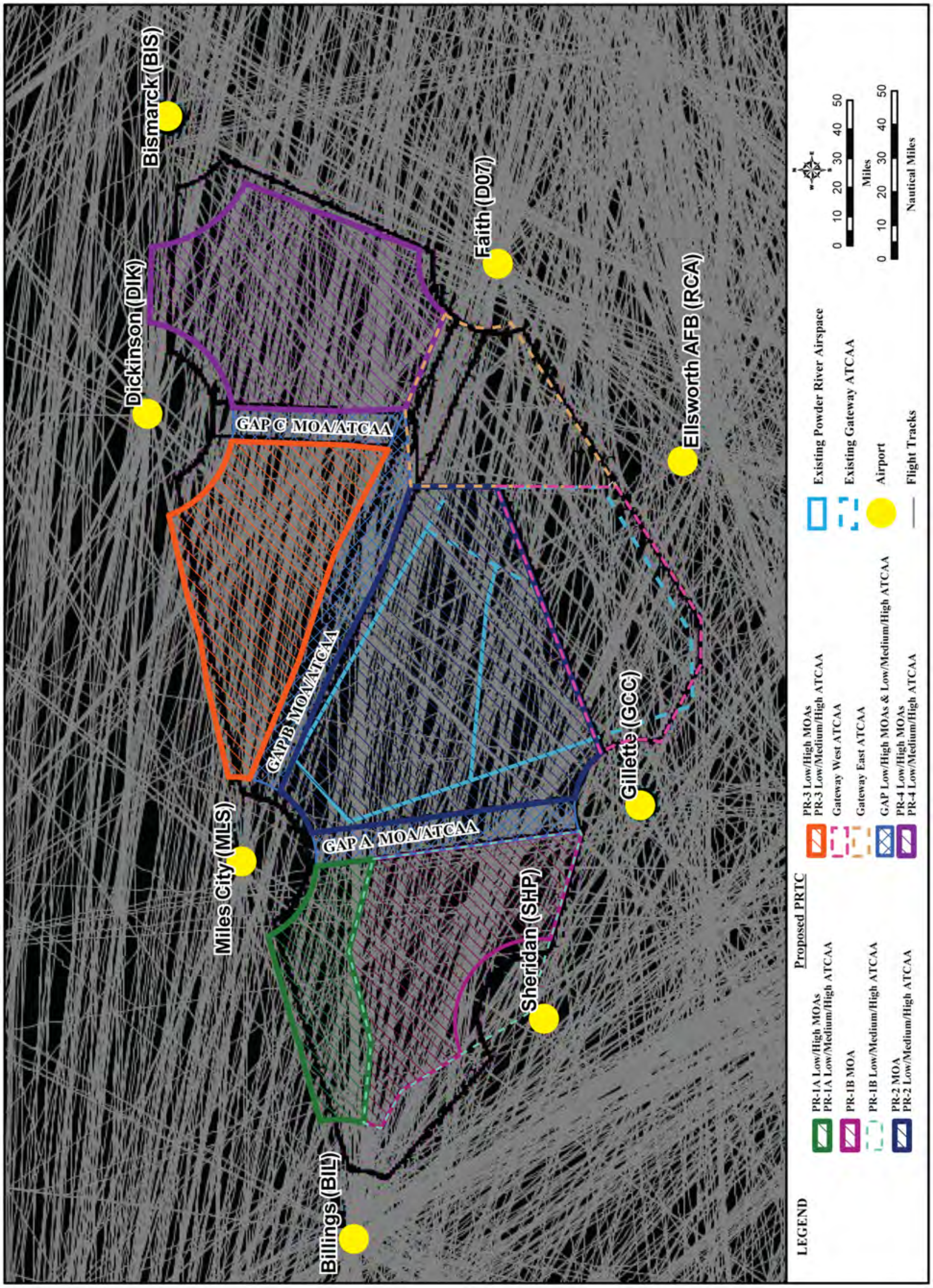


Figure 3.1-17. Winter Medium ATCAA from FL260 to FL370

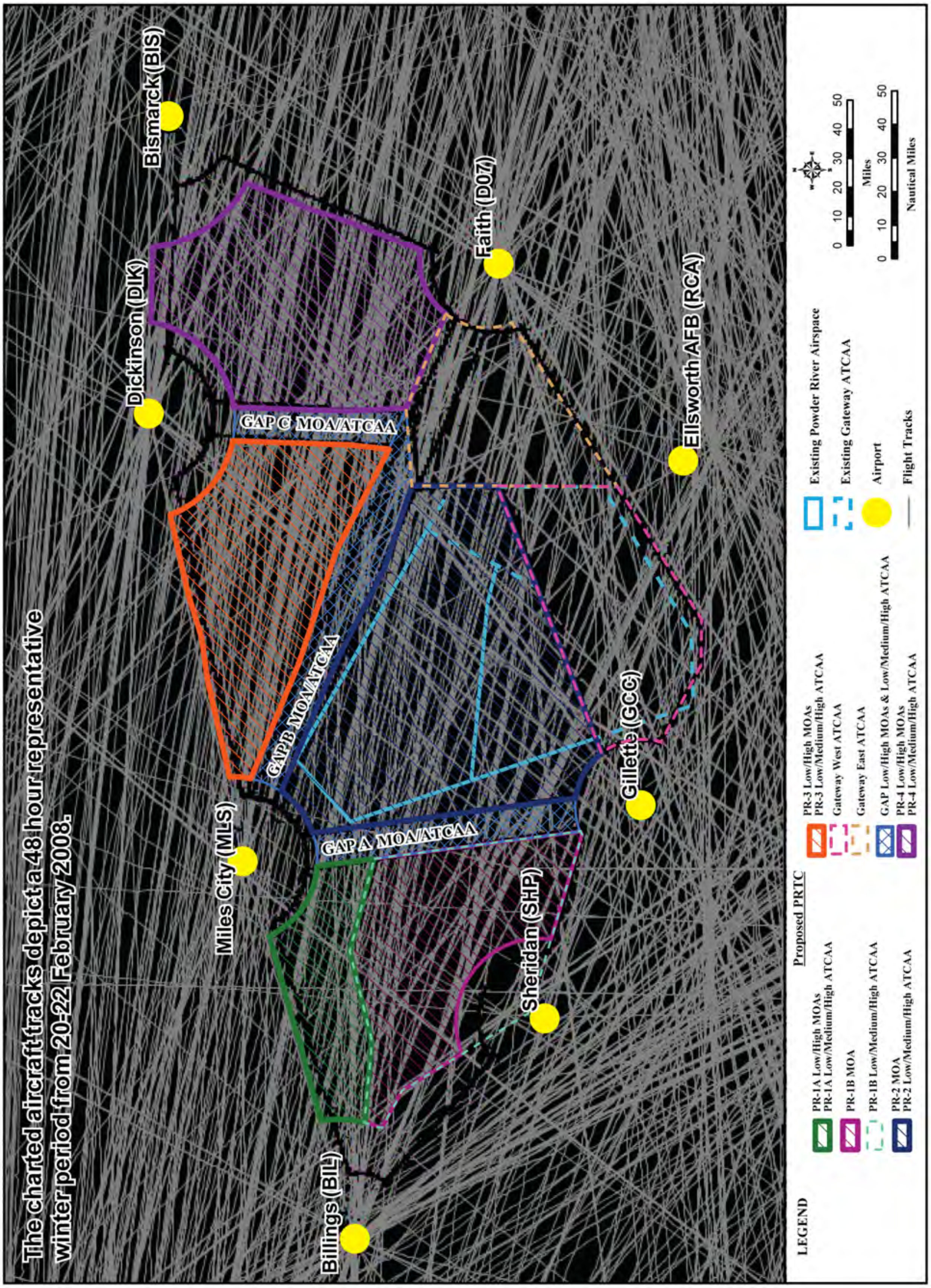


Figure 3.1-18. Winter High ATCAA above FL370 to FL600

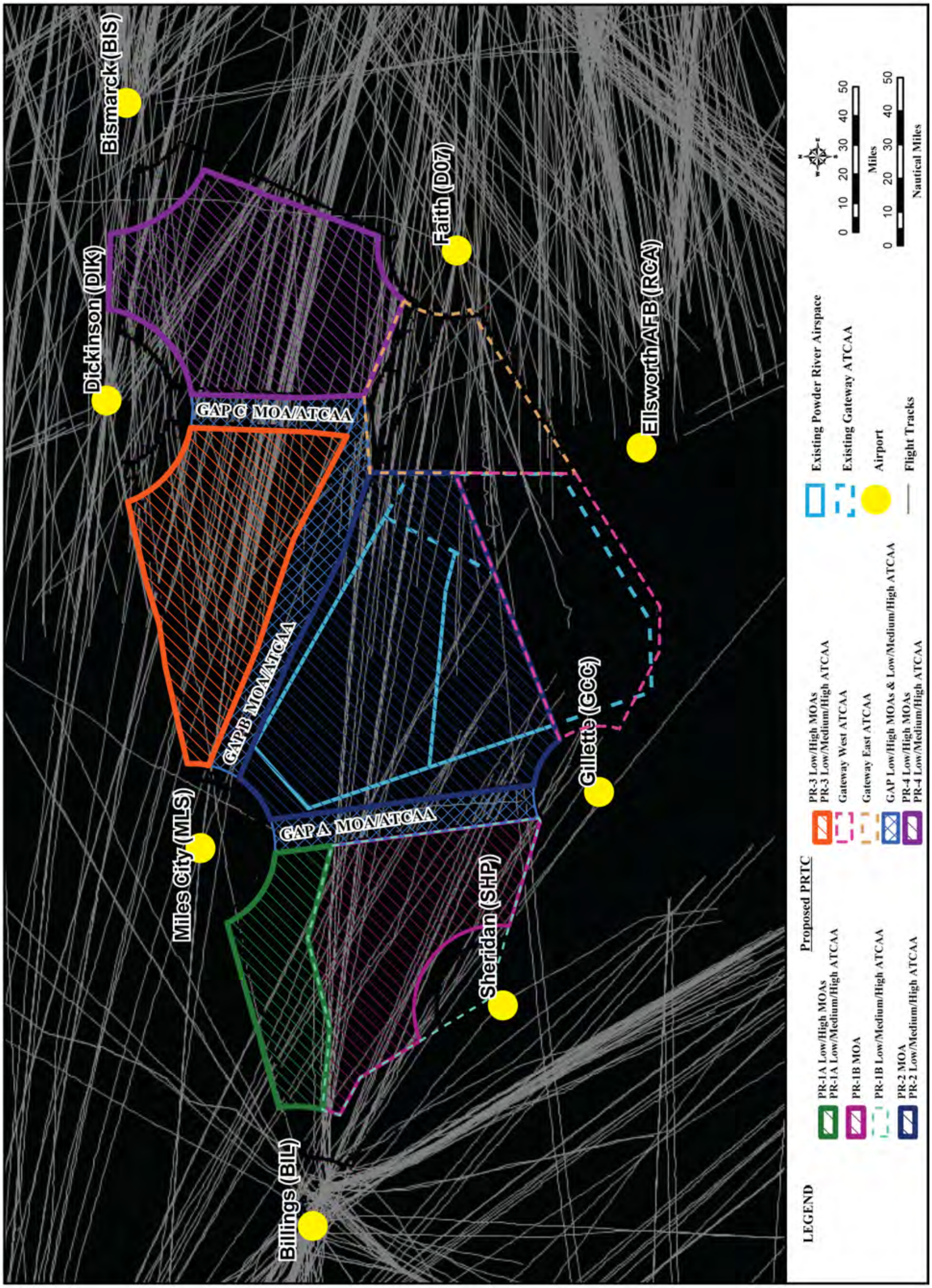


Figure 3.1-19. Summer below 4,000 feet MSL

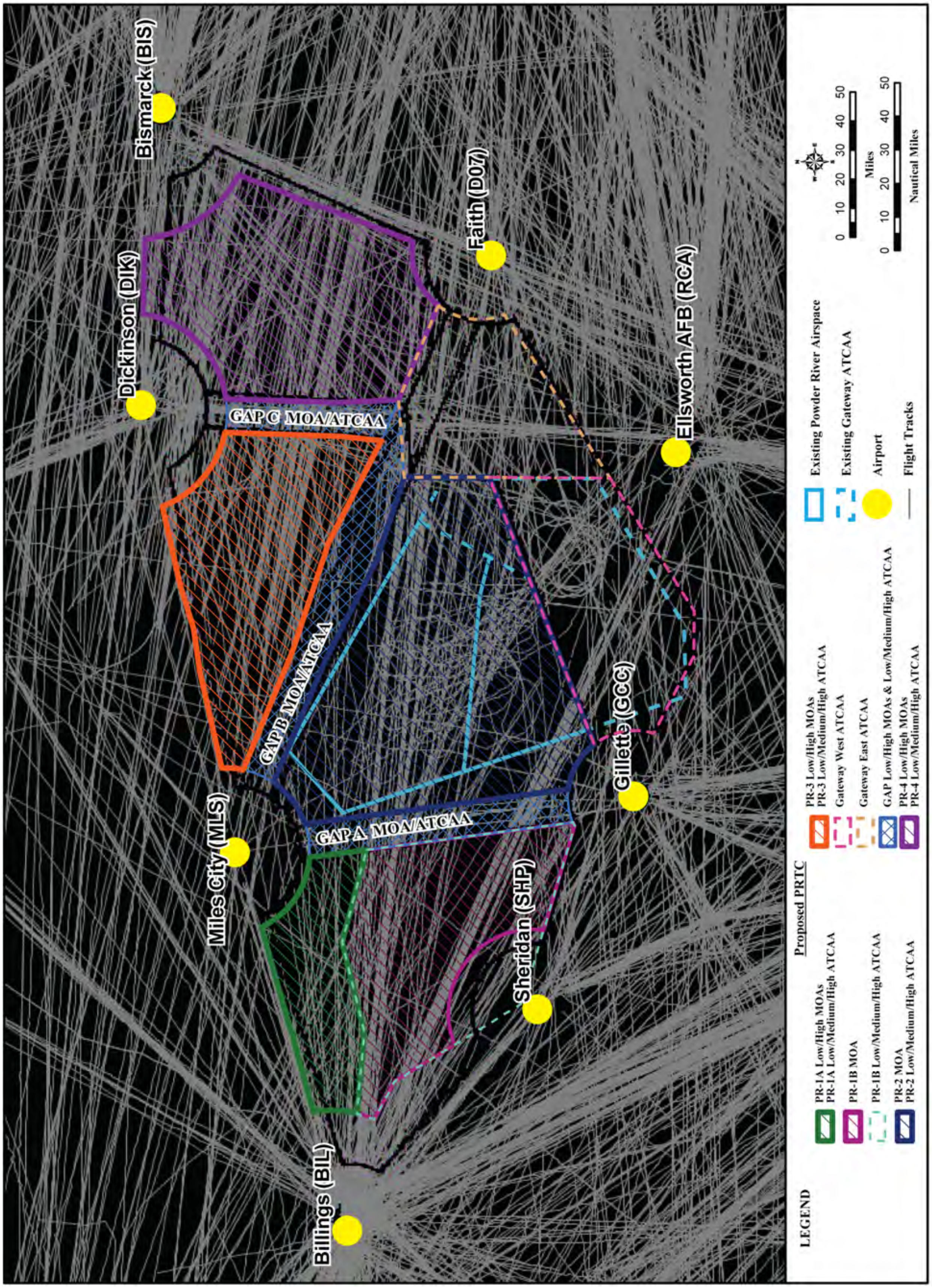


Figure 3.1-20. Summer from 4,000 feet MSL to, but not including 10,000 feet MSL

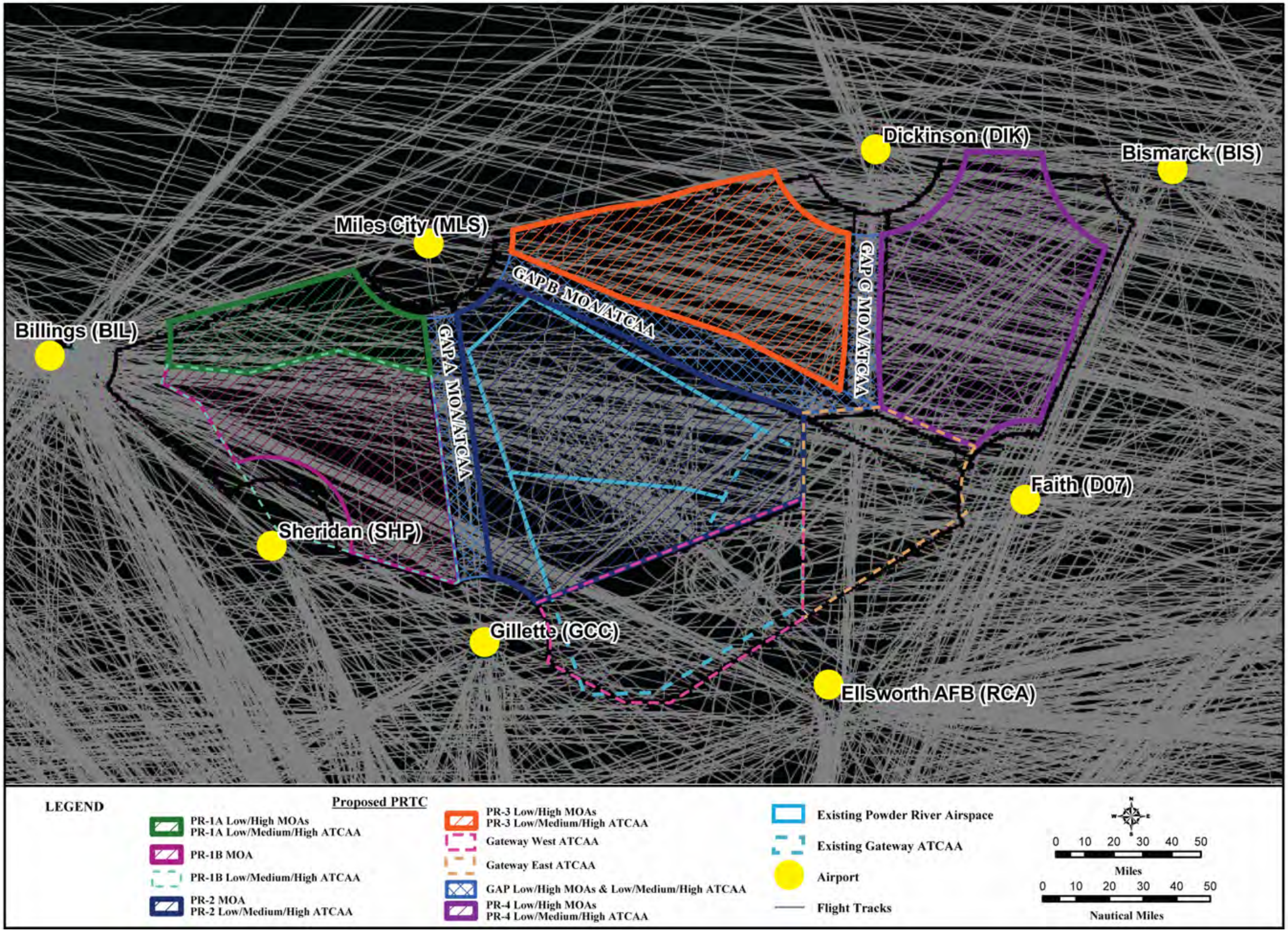


Figure 3.1-21. Summer from 10,000 feet MSL to, but not including FL180

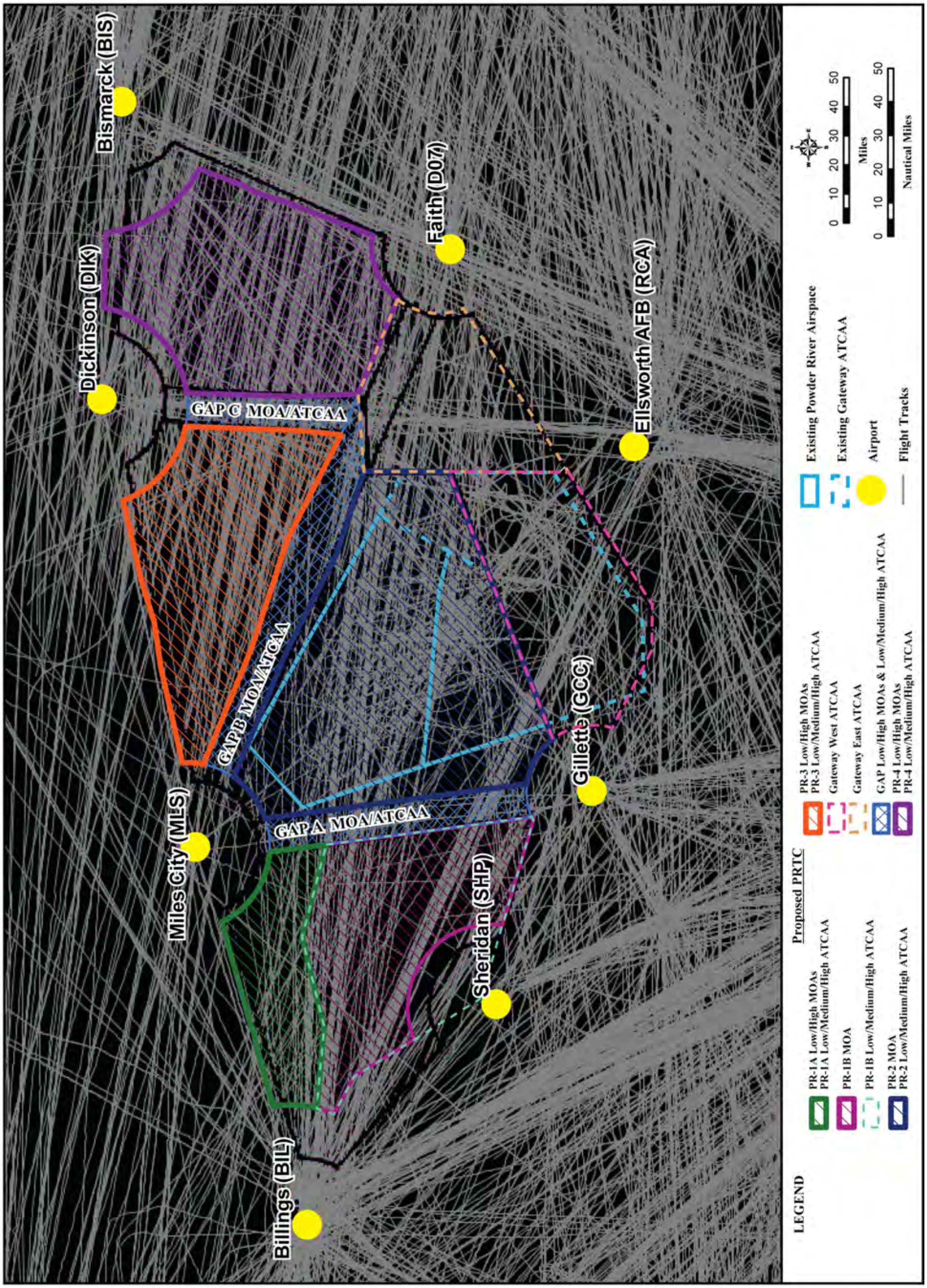


Figure 3.1-22. Summer Low ATCAA from FL180 to FL260

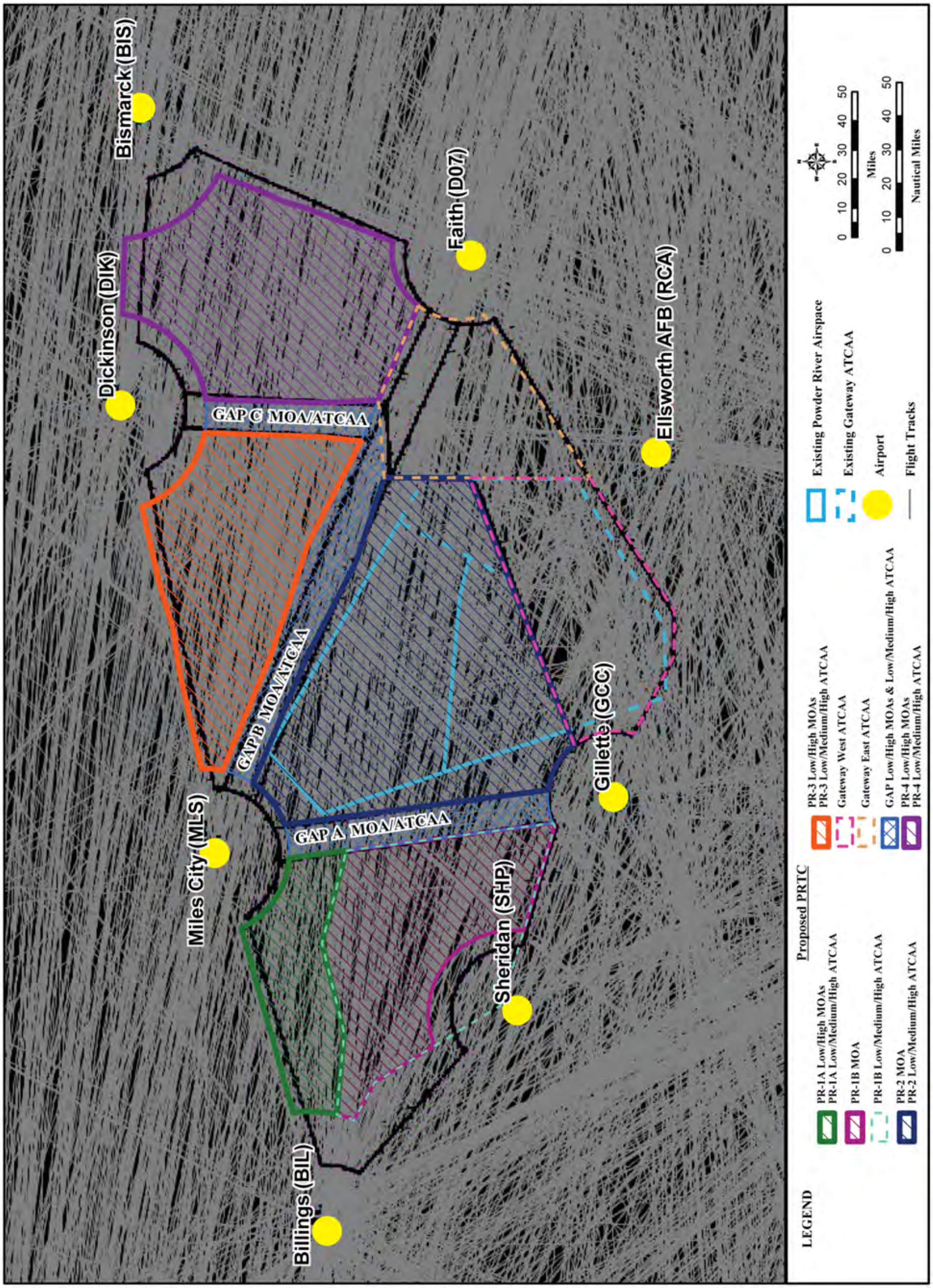


Figure 3.1-23. Summer from FL260 to FL370

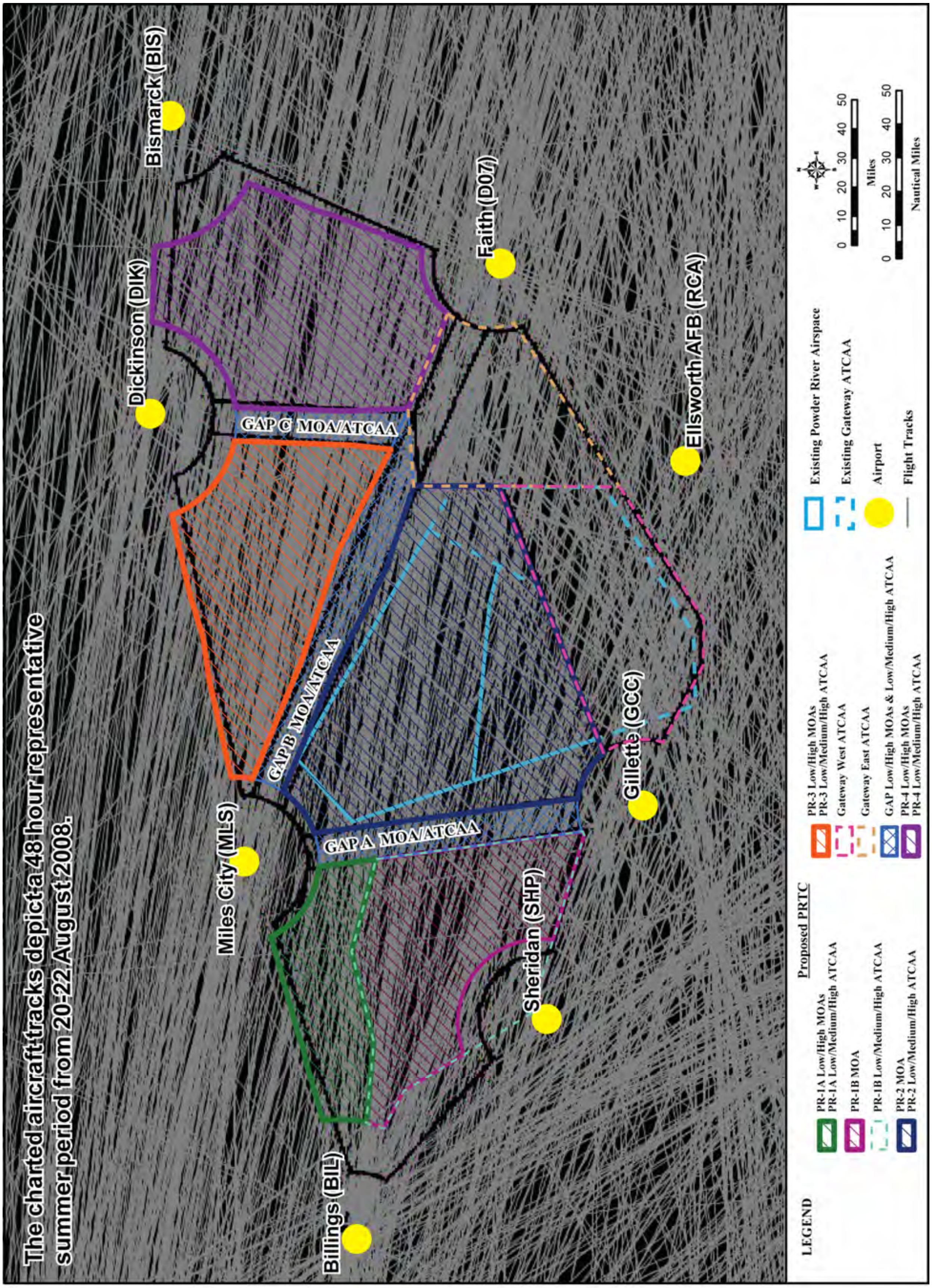


Figure 3.1-24. Summer High ATCAA above FL370 to FL600

3.2 Noise

3.2.1 Definition of the Resource

The definition of noise is simply unwanted sound. Noise is considered to be unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. Noise has the potential to impact several environmental resource areas. This noise section will describe baseline noise conditions and noise effects on human annoyance, health and structures. Noise impacts on biological, land use, socioeconomics, and cultural resources are discussed in separate sections dealing with those environmental resources. The ROI for noise consists of lands beneath current and proposed airspace.

Noise can be of several different types, each of which has its own characteristics. Continuous noise sources include machinery, such as an air-conditioning unit. Transient noise sources are those which move through the environment, either along established paths (e.g., highways or railroads) or randomly (e.g., training in a MOA). Some noise sources are impulsive (e.g., thunder clap or sonic boom). The response of a receptor (e.g., person, animal, or structure) to a noise depends on the characteristics of the noise itself as well as the sensitivity of the receptor at the time the noise is heard.

The physical characteristics of sound include its intensity, frequency, and duration. These characteristics are discussed briefly below, and discussed in more detail in Appendix H

Intensity – Sound consists of minute pressure waves which travel from the sound source to the ear. These waves can be compared to ripples spreading outward from a stone dropped in still water. Larger waves are interpreted by the ear as more intense sounds. Sound intensities are expressed using the logarithmic unit, the decibel. Using the decibel (dB) scale, a sound level that is 3 dB louder than another will be perceived as being noticeably louder while a sound that is 10 dB higher than another will be perceived as twice as loud. A whisper is typically 20 dB or lower while a thunderclap can be 120 dB or louder.

Frequency – The frequency of a sound, as measured with the unit Hertz (Hz) is the number of sound waves that pass a point in a second. A person with healthy hearing can detect sounds ranging from 20 Hz to 15,000 Hz but detects sounds in the middle frequencies of this range most strongly. Sound measurements are refined using “A-weighting” which emphasizes frequencies best heard by the human ear. In this EIS, dB is A-weighted unless otherwise noted. For impulsive sounds (e.g., sonic booms, thunder, or clapping), which have the potential to induce vibrations in objects, the “C-weighting” scale is used. The C-weighting scale does not de-emphasize high and low-frequency sounds to the extent that A-weighting does.

Duration – The duration of a noise event is the time between initially hearing the sound and the sound no longer being heard. From the ground, the sound level of an aircraft flying overhead changes continuously, starting at the ambient (background) level, increasing to a maximum as the aircraft passes closest to the receiver, and then decreasing to ambient as the aircraft flies into the distance.

Noise analysts use several “metrics,” which describe complex and variable sets of noise events. These metrics are designed to represent noise in such a way that noise impacts can be predicted. Noise metrics used in this analysis include the following:

- L_{max} (Maximum Sound Level) is the highest sound level measured during an event such as a single aircraft overflight.
- SEL (Sound Exposure Level) accounts for the maximum sound level and the length of time a sound lasts. SEL does not directly represent the sound level heard at any given time. Rather, it provides

a measure of the total sound exposure for an entire event. For many types of noise impacts, SEL provides a better measure of intrusiveness of the sound than L_{max}. When military aircraft fly low and fast, the sound can rise from ambient to its maximum very quickly. This rapid onset-rate carries a "surprise" effect that can make noise seem louder than its measured SEL would suggest. The calculation for SEL_r (Onset Rate-Adjusted Sound Exposure Level) has an additional noise penalty programmed into the calculation of up to 11 dB to account for this effect.

- DNL (Day-Night Average Sound Level [mathematically denoted as L_{dn}]) is a noise metric combining the levels and durations of noise events and the number of events over a 24-hour period. DNL also accounts for more intrusive night time noise, adding a 10 dB penalty for sounds after 10 p.m. and before 7 a.m. The FAA has determined that DNL is the appropriate measure to account for total noise exposure around airfields and airports. Depending on the regularity of operations, DNL is computed either as an annual average or for operations representing an average busy day.
- DNLmr (Onset Rate-Adjusted Day-Night Average Sound Level [mathematically denoted as L_{dnmr}]) is the measure used for subsonic aircraft noise in such training airspace as MOAs and MTRs. DNLmr accounts for the surprise effect of aircraft overflights and the sudden onset of the aircraft noise event on humans. The penalty ranges from 0 to 11 dB and is added to the normal SEL based on the altitude and airspeed of an approaching aircraft. DNLmr is computed for the busiest month of the year to account for the variation in the seasonal use of some airspace units. DNLmr is interpreted by the same criteria as used for DNL.
- CDNL (C-Weighted Day-Night Average Sound Level) is a day-night average sound level computed for areas subject to impulsive noise such as sonic booms. Areas subjected to supersonic noise are typically also subjected to subsonic noise which is assessed based on the DNLmr metric.
- Peak overpressure, pounds per square foot (psf) is used to characterize the strength of impulsive noise such as sonic booms. A decibel version of this, L_{pk}, is used when relating boom amplitude to human or animal response, although the direct physical pressure is most commonly used when assessing effects on structures.

Please see Appendix H for additional details on noise.

The ROI for the noise assessments includes the area underlying the proposed PRTC that is exposed to noise levels caused by aviation-related noise such as military training.

3.2.2 Regulatory Setting

The FAA has special expertise and authority in the area of aviation-related noise. See, e.g., 49 USC 47501-47507 (Aviation Safety and Noise Abatement Act of 1979, as amended); 49 USC 44715 (Noise Control Act of 1972). FAA Order 1050.1E Section 14, available online at www.faa.gov, describes policies and procedures for assessing noise impacts of FAA actions, including approval of SUA, that are subject to NEPA. DNL is the FAA's primary metric for establishing the cumulative exposure of individuals to noise resulting from aviation activities. The FAA generally requires the use of specific models for aviation noise analysis. FAA's Office of Environment and Energy has approved the DoD computer models MRNMAP, PC BOOM, and BOOMAP for use in this noise analysis related to SUA.

FAA has defined a significant noise impact as one which would occur if analysis shows that the Proposed Action will cause noise sensitive areas to experience an increase in noise of DNL 1.5 dB or more at or above DNL 65 dB noise exposure when compared to the No-Action Alternative for the same timeframe. For example, FAA would consider an increase from DNL 63.5 dB to DNL 65 dB a significant impact.

Special consideration needs to be given to the evaluation of the significance of noise impacts on noise sensitive areas within national parks, national wildlife refuges and historic sites, including traditional cultural properties. An area is defined by the FAA as noise-sensitive if noise interferes with normal activities associated with the area's use. Examples of noise-sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreation areas (including areas with wilderness characteristics), wildlife refuges, and cultural and historic sites where a quiet setting is a generally recognized feature or attribute.

3.2.3 Existing Conditions

This section establishes current noise levels and discusses sources of noise with the potential to cause environmental impacts where aircraft dominate noise levels heard on the ground. Noise modeling DNL values are calculated based on military activity in the airspace.

3.2.3.1 Subsonic Noise

Subsonic noise in military airspace has been studied by measurement and analysis of operations and noise in airspaces (Frampton *et al.* 1993; Lucas *et al.* 1995), and by computer modeling of those analyses (Lucas and Calamia 1996). The computer program MR_NMAP (MOA-Range NOISEMAP) was used to calculate subsonic aircraft noise beneath the existing Powder River airspace.

Figure 3.2-1 is a close-up of the Powder River A/B MOAs from Figure 3.1-15 showing the B-1 maneuvers as silver lined loops and curves within the Powder River A/B MOAs. These maneuvering flights can be seen on Figures 3.1-14, 3.1-15, 3.1-16, 3.1-20, 3.1-21, and 3.1-22.

In existing Powder River airspace, flights are typically widely dispersed within the airspace, although not along the airspace edges, and, over the long-term, are randomly located as depicted in Figure 3.2-1. Such non-predetermined or random flights are an important part of training. Military aircrews must learn to be flexible, and cannot become accustomed to particular landmarks, although visual reference points may be used as part of individual training missions. Over a period of time with several training missions, no one location under a training airspace is expected to experience substantially different flight activity from another, as depicted in Figure 3.2-1, locations around the edge of an airspace unit could be overflown less frequently than locations deeper within the airspace. The appropriateness of modeling MOA flight paths and noise as random has been recently affirmed by analysis of specially-collected radar data in Idaho airspace (Bradley *et al*. 2003) and noise monitoring in that same airspace (Fidell *et al*. 2003). As a result of this wide distribution of flights, noise events heard on the ground are sporadic. On some days, no aircraft would be heard, and on other days, one or more aircraft at different altitudes and distances could be heard.

The airspace ROI does not segment the MOAs or ATCAAs to calculate DNL values. For noise analysis, several altitude ranges, with different altitude bands, are used as appropriate for each mission flown (see Tables 2-15, 2-19, and 2-23). An aircraft at low altitude generates high noise levels directly under the flight path, but has a relatively short duration and a relatively narrow ground area affected. A B-1 aircraft at 500 feet AGL may not be heard a mile to the side, particularly if terrain is between the aircraft and the receptor. Estimates of noise levels in this document do not account for effects of terrain on noise propagation. Aircraft at high altitudes generate lower maximum noise levels, but the noise exposure, or noise footprint, is larger than at low levels (Figure 3.2-2). The noise generated by aircraft flying at high altitudes may last for over a minute and may be heard several miles to either side of the flight path. As noted in Section 3.2.1, the duration of a noise is important in determining its impacts. Table 3.2-1 lists SEL values for several aircraft types at various altitudes.

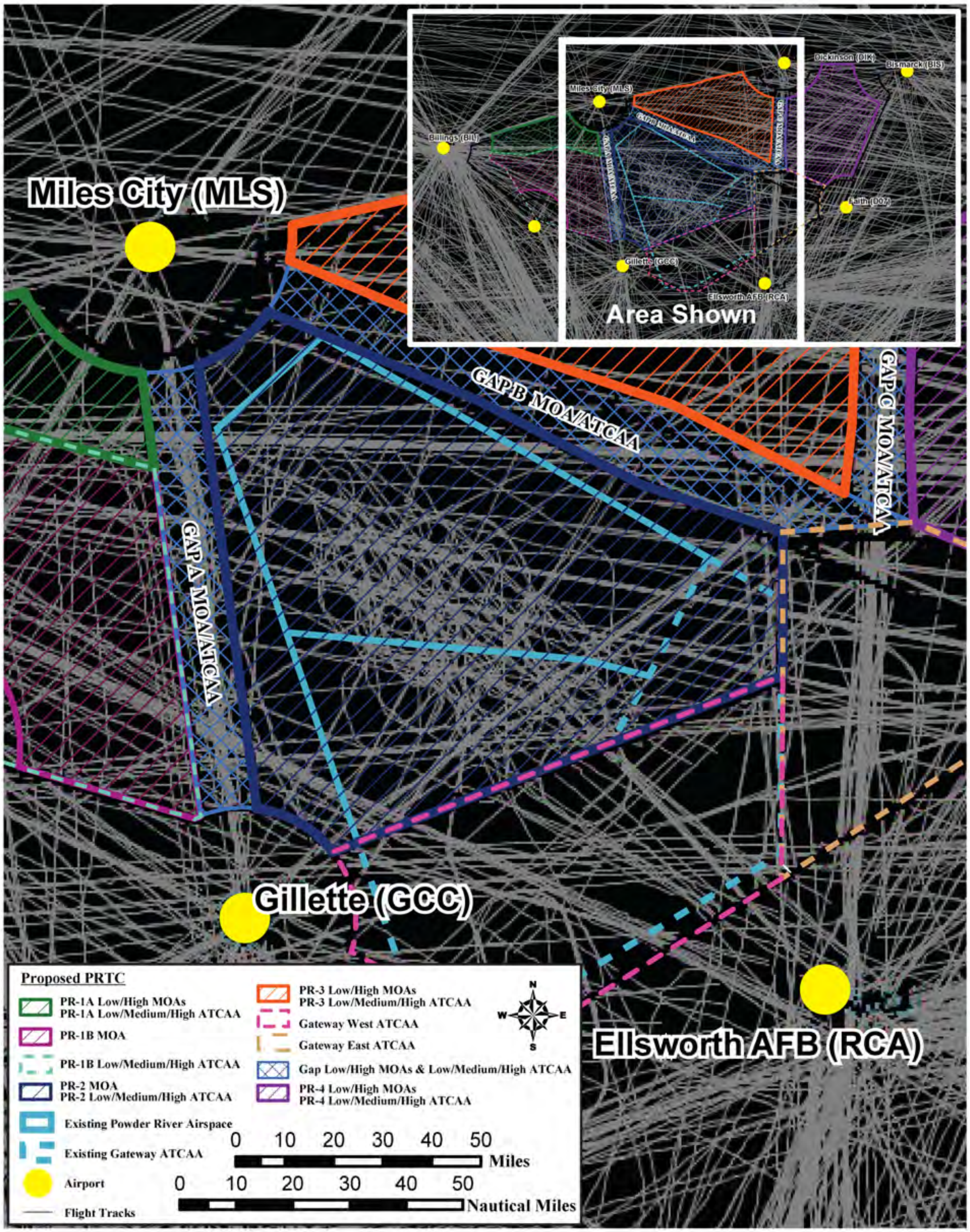


Figure 3.2-1. B-1 Random Flight Paths on Powder River A/B MOAs

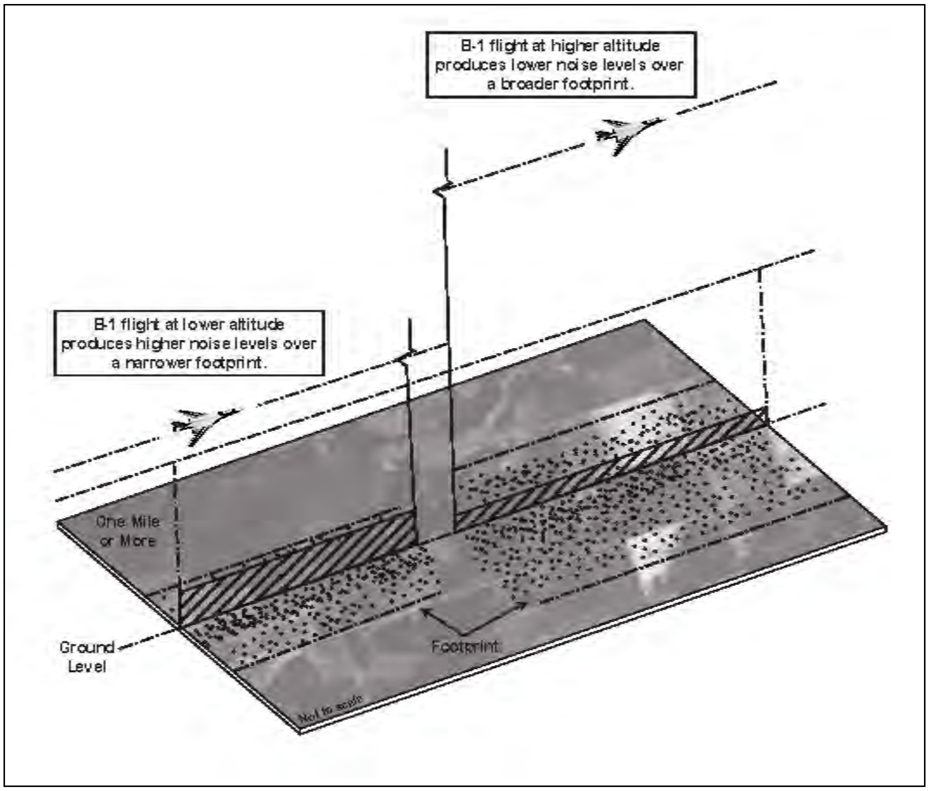


Figure 3.2-2. Depiction of B-1 Noise Footprint at Lower and Higher Flight Paths

Aircraft power settings and airspeeds vary during training missions as the aircrews adjust aircraft configuration to carry out training maneuvers. For example, when a B-1 aircrew encounters a simulated threat, the aircrew may engage in an evasive maneuver, which typically consists of a sharp turn at high power settings followed by a speedy egress from the area. During such maneuvers, the afterburner may be used.

Table 3.2-1 lists separate noise levels for the afterburner power setting because noise levels are much higher than they are without afterburner. Aircrews exercise strict discipline when using the afterburner to conserve fuel and to avoid unintentional supersonic flight.

Afterburners are used during B-1 “fly-ups” procedures which simulates malfunction of the aircraft’s automatic terrain following systems and consists of the aircraft climbing very quickly to an altitude at which terrain no longer poses a collision threat. This procedure is carried out once per sortie on average. Known sensitive noise receptors such as people, animals, or structures are avoided where possible, because any such receptors located behind the aircraft when it starts its climb experience high noise and vibration levels.

B-1 afterburner fly-ups, typically conducted once per mission, simulate malfunctions of the aircraft automatic terrain following system. Photo courtesy of A.S. Elliott

Table 3.2-1. Representative Onset Rate-Adjusted Sound Exposure Levels (SEL_r) Under the Flight Path for Various Aircraft Types and Flight Altitudes

Aircraft Type	*Airspeed (knots)*	*Power Setting*	ALTITUDE (FEET AGL)					
			500	*1,000*	*2,000*	*5,000*	*10,000*	*20,000*
B-1B	550	101% RPM	117	107	101	92	82	69
B-1B	449	A/B - 97.5% RPM	133	122	115	106	98	89
B-52H	350	4,500 LBS/HR	N/A	100[1]	92	82	68	56
F-16C[2]	450	99% NC	113	104	98	88	80	69
KC-135R	300	65% NF	N/A	88[1]	82	75	64	54
Twin Engine[3]	160	600 LBS	81	75	70	63	53	43
Single-Engine[4]	160	70% RPM	77	72	67	59	53	46

Notes: SEL was calculated under standard acoustic atmospheric conditions (70°F and 59 percent relative humidity)
1. B-52s and KC-135s do not fly lower than 1,000 feet AGL in Powder River MOA airspace.
2. F-16C with F110-GE-100 engine.
3. Cessna 500 "Citation."
4. Single-Engine Fixed-Pitch Propeller-Driven

NC = Core Engine Fan Speed; RPM = Revolutions Per Minute; LBS/HR = Pounds Per Hour; LBS = Pounds of thrust A/B= afterburner

Military aircraft are not the only source of sound in an ROI and where new airspace is proposed, noise from military aircraft over flights with background or "ambient" noise in addition to evaluating the military aircraft noise on an absolute basis. Ambient noise levels in metropolitan, urbanized areas typically range from 60 to 70 dB whereas in quiet suburban neighborhoods they range from approximately 45-50 dB DNL (USEPA 1978). The vast majority of the ROI for this proposed action consists of rural areas in which noise levels would be less than 45 dB DNL. For the purpose of this study, a DNL of 'less than 45 dB' was used as the ambient level for determining human annoyance effects. However, levels below 45 dB DNL are not specifically identified because 45 dB DNL represents the level at which social surveys resulted in a finding of less than 1 percent of the population which would be expected to become highly annoyed (Schultz, 1978; Finegold, et al., 1994).

Noise models were used to calculate aircraft-generated noise levels. Table 3.2-2 shows aircraft-generated noise levels under the MOAs and ATCAAs. The noise levels under the ATCAAs are less than 45 dB DNL. This means that aircraft noise under the ATCAAs would not be expected to quantitatively affect the ambient noise conditions.

DNLmr has been computed for aircraft noise in the areas under each current Powder River airspace unit and is presented in Table 3.2-2. The analysis incorporated operations of the Ellsworth-based B-1 and Minot-based B-52 aircraft, as well as transient fighter aircraft (see Section 2.8.2). The F-16C was the most common type of transient aircraft in the Powder River airspace and was used to represent other transient users of the airspace.

Where aircraft fly at different altitudes, the aircraft noise at ground level is the combination of all the flights above the ground. Table 3.2-2 and Figure 3.2-3 show the calculated total aircraft noise and estimated noise on the ground. For the purposes of noise analysis, it was assumed that B-52 training operations would occasionally occur in the MOAs. The noise levels reported reflect approximately 20 percent of total B-52 operations in the Powder River airspace occurring in MOAs and approximately 80 percent occurring in ATCAAs.

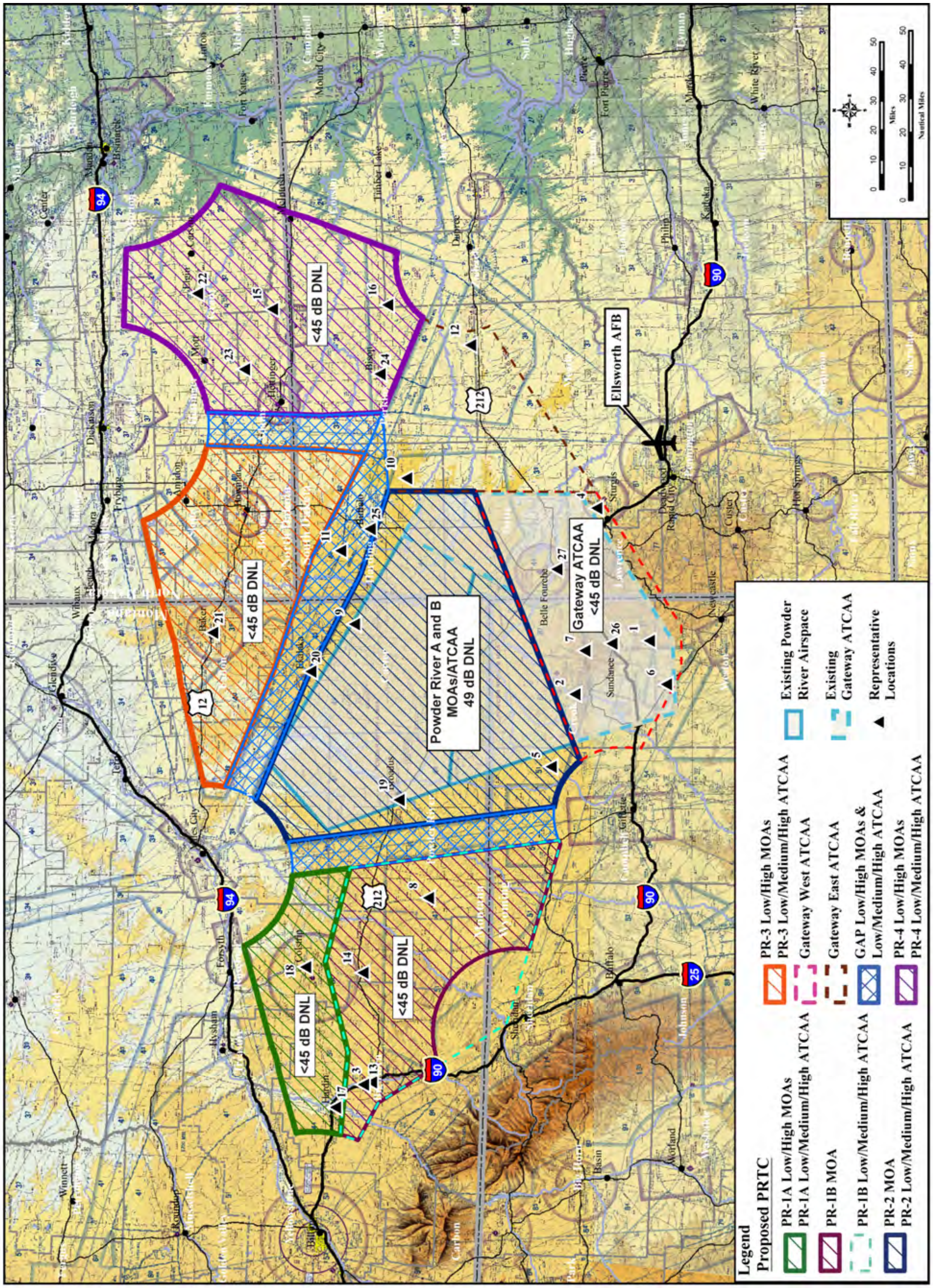


Figure 3.2-3. Estimated Baseline Noise Levels in DNL Under Existing and Proposed Airspace With Representative Locations

Table 3.2-2. Baseline Aircraft Noise Levels Under Existing Airspace

Airspace	*DNLmr*	Number of Events/ Day at a Representative Location Exceeding		
		SEL 65 dB	*SEL 75 dB*	*SEL 85 dB*
Powder River A MOA	49	0.26	0.12	<0.0
Powder River B MOA	49	0.8	0.23	<0.1
Gateway ATCAA	<45	0.4	0.1	<0.1

Note: 1. Operations in the ATCAAs do not contribute to the cumulative noise levels on the ground, which are dominated by MOA noise. However, individual overflight events in the ATCAAs would be audible on the ground as reflected by the listed number of events exceeding 65, 75, and 85 dB SEL.
2. Information on baseline sorties by types of aircraft are provided in Section 2.8.2

The cumulative metric DNLmr is widely used to quantify sound levels which are subject to additional noise penalties for environmental night (10 PM to 7 AM) and sudden onset sounds in the proposed airspace (see Appendix H). Cumulative noise metrics represent the overall noise level in an area and not the noise heard at any given time. Table 3.2-2 shows, in addition to DNLmr, the average number of events per day with SEL_r above 65 and 90 dB that a person under each proposed airspace unit at any representative location is likely to hear. These quantities are computed by MRNMAP (Lucas and Calamia 1996).

The noise environments shown in Table 3.2-2 and Figure 3.2-3 fall into two categories:

- ATCAA airspace with operations above 18,000 feet MSL. DNLmr noise levels in these areas from aircraft are calculated to be below 35 dB DNLmr.
- MOA airspace with training flight operations from a floor of 500 feet AGL or 1,000 feet AGL to FL180. DNLmr in these MOAs from aircraft is approximately 49 dB.

It is important to note that the ambient noise in the ROI is typically below 45 dB DNL. Under the Gateway ATCAA, military aircraft overflights would not result in an increase in overall average noise level to greater than 45 dB DNLmr.

Broadus is typical of an established small community under the airspace. Broadus is under the edge of the existing Powder River A MOA and would have an estimated existing DNLmr of less than 45 dB.

The frequency of noise events exceeding an SEL of 65, 75, and 85 dB at several representative noise sensitive locations are presented in Table 3.2-3. Figure 3.2-3 shows the representative noise sensitive locations relative to the existing Powder River airspace and the proposed PRTC.

Ellsworth AFB has established avoidance areas under the Powder River A/B MOAs to reduce noise and overflight above communities, ranches, and other noise-sensitive locations. The number and location of noise avoidance areas limit defensive reaction maneuvering in low-altitude training and create patterns that constrain diversity in some training. Avoidance areas force more training to higher altitudes and reduce training quality. Pilots are instructed to avoid known noise-sensitive avoidance areas by a specified vertical and horizontal distance. Such avoidance areas include known seasonal ranching operations such as calf weaning and branding.

Table 3.2-3. Average Frequency of Military Aircraft Noise Events at Selected Noise-Sensitive Locations

ID#	General Description		Baseline # Events Per Day Exceeding		
		Baseline Airspace	65 dB SEL	75 dB SEL	85 dB SEL
1	Inya Kara Mountain	Gateway ATCAA	0.4	0.1	<0.1
2	Devils Tower [2]	Gateway ATCAA	0.4	0.1	<0.1
3	Little Bighorn Battlefield National Monument [3]	None	n/a	n/a	n/a
4	Bear Butte	None	n/a	n/a	n/a
5	Thunder Basin National Forest (northern section)	None	n/a	n/a	n/a
6	Thunder Basin National Forest (southern section)	Gateway ATCAA	0.4	0.1	<0.1
7	Black Hills National Forest	Gateway ATCAA	0.4	0.1	<0.1
8	Custer National Forest (western section)	None	n/a	n/a	n/a
9	Custer National Forest (central section)	Powder River A	0.6	0.2	<0.1
10	Custer National Forest (southeastern section)	none	n/a	n/a	n/a
11	Little Missouri National Grassland	none	n/a	n/a	n/a
12	Grand River National Grassland	none	n/a	n/a	n/a
13	Crow Native American Reservation (Crow Agency, MT)	none	n/a	n/a	n/a
14	Northern Cheyenne Native American Reservation (Lame Deer, MT)	none	n/a	n/a	n/a
15	Standing Rock Native American Reservation	none	n/a	n/a	n/a
16	Cheyenne River Native American Reservation	none	n/a	n/a	n/a
17	Hardin, MT	none	n/a	n/a	n/a
18	Colstrip, MT	none	n/a	n/a	n/a
19	Broadus, MT [4]	Powder River A MOA	0.6	0.2	0.1
20	Ekalaka, MT	none	n/a	n/a	n/a
21	Baker, MT	none	n/a	n/a	n/a
22	Elgin, ND	none	n/a	n/a	n/a
23	Bowman, ND	none	n/a	n/a	n/a
24	Bison, SD	none	n/a	n/a	n/a
25	Buffalo, SD	none	n/a	n/a	n/a
26	Sundance, WY	Gateway ATCAA	0.4	0.1	<0.1
27	Belle Fourche, SD	Gateway ATCAA	0.4	0.1	<0.1

Notes:

1. Because several of the listed noise-sensitive areas are very large, locations were selected from within the designated areas that are near the center of proposed airspace units.
2. Devils Tower published aircraft avoidance area is 5 NM horizontally and 18,000 feet AGL
3. Little Bighorn Battlefield published aircraft avoidance area is ¾ NM horizontally and 2,000 feet AGL.
4. Broadus, MT published aircraft avoidance area is 3 NM horizontally and 1,500 feet AGL

3.2.3.2 Supersonic Noise

Supersonic aircraft flight is not currently permitted in the Powder River airspace. Speed is an essential component to B-1 survivability in high-threat environments and airspeeds may come close to Mach 1 during certain portions of training events. In the extremely rare event that an aircraft inadvertently achieves supersonic speeds, actions are taken by the aircrew to decrease speed. Overall, supersonic flight and resulting sonic booms are rare under baseline conditions.

3.3 Safety

3.3.1 Definition of the Resource

This section addresses ground safety and flight safety associated with operations conducted within the ROI consisting of the existing Powder River airspace and proposed PRTC airspace. Training operations would be conducted in proposed military training airspace. The ROI for safety is the same as the ROI for airspace management.

3.3.2 Regulatory Setting

The Air Force defines four major categories of aircraft mishaps: Classes A, B, C, and E, which includes High Accident Potential. Class A mishaps are defined as those which result in one or more of the following: a loss of life, permanent total disability, a total cost in excess of $1 million, or destruction of an aircraft. Class B mishaps result in total costs of more than $200,000, but less than $1 million, result in permanent partial disability or inpatient hospitalization of three or more personnel. Class C mishaps involve reportable damage of more than $20,000, but less than $200,000; an injury resulting in any loss of time from work beyond the day or shift on which it occurred, or occupational illness that causes loss of time from work at any time; or an occupational injury or illness resulting in permanent change of job. High Accident Potential events are any hazardous occurrence that has a high potential for becoming a mishap. For the proposed PRTC, all categories of impacts below Class A impacts would be expected to occur on or in association with the base. Class C mishaps and High Accident Potential, the most common types of accidents, represent relatively unimportant incidents because they generally involve minor damage and injuries, and rarely affect property or the public.

During scoping, most concerns centered on the potential for Class A mishaps because of their potentially catastrophic results. Concerns included crashes into the ground or mid-air crashes. Other safety issues identified during scoping were the inability to have radio frequency communication to learn the training activity within a MOA, the inability to know when a B-1 could traverse an area at a low level and at a high rate of speed, and the safety risk from flare usage in an arid environment.

3.3.3 Existing Conditions

This section addresses communication, flight, ground, and bird-aircraft strike baseline safety conditions within the proposed PRTC airspace.

3.3.3.1 Communication within the Airspace

Public and agency comments during scoping noted the limited radar and radio frequency communication and tracking capabilities under the rural parts of the airspace. As noted in Section 3.1, the proposed PR-2 and PR-3 airspaces, especially, as well as the eastern PR-1A/1B airspace and western PR-4 airspace, have limited communication or tracking capabilities.

FAA reviewers noted that V-120 southeast of Miles City, MT, between the proposed PR-2 and PR-3 and beyond, does not have radar coverage below 13,000 feet MSL. Radar coverage is unavailable below 16,000 feet MSL along V-491 and, especially, south of V-120. During mechanical or severe weather problems, radar coverage from the two radar locations at Gettysburg or Watford City can be out of service. If either radar site is out of service, radar coverage in the proposed PR-2 to PR-3 and western PR-4 can be lost below 37,000 feet MSL. The 50-NM area between Dupree, SD and Miles City, MT does not have radio frequency coverage below 18,000 feet MSL. This creates safety concerns with no radar coverage and limited or no communication.

The great distances between navigational aids in this region affect the route widths for low altitude en route traffic. With limited or no ability to communicate, the majority of low-altitude traffic flies direct routing. This can be seen as the straight lines crossing the MOAs in Figures 3.1-14, 3.1-15, 3.1-20, and 3.1-21. Navigational aids are inadequate for Victor Airways V-2/465 to the north, V-86 to the south, V-120 through the Gap B MOA, V-254 through the Gap A MOA, and V-491 through the Gap C MOA. The minimum en route altitude for IFR traffic for V-120 is 10,000 feet MSL due to the signal reception distance of 105 NM. The distance between navigational aids along V-120 is 196 NM. The minimum en route altitude along V-491 is 9,000 feet MSL due to the signal distance of 84 NM. The distance between navigational aids on V-491 is 173 NM.

Limited radio communication and radar tracking through much of the area results in general aviation pilots typically not flying on established Victor Airways, but rather flying much of the time direct using GPS coordinates. Figures 3.1-13 through 3.1-15 and 3.1-19 through 3.1-22 show the dispersed nature of flights below Class A airspace. This dispersed nature of flight patterns spreads aircraft out and creates a perception of improved safety with increased airspace volume per aircraft.

As described in Section 3.1, the commercial traffic, typically at altitudes above FL300, can be approximately 400 flights per day with up to approximately 80 flights per day in specific airspace segments. The jet routes which traverse the proposed PRTC airspace provide for commercial and other high flying aircraft to be safely directed by air traffic control services. During east coast congestion or Midwest weather conditions, the CAN routes which overfly this area are used to safety regulate traffic. Adequate communication exists to safety provide for these high-altitude commercial and other flights above FL300.

3.3.3.2 Flight Safety

One public concern during scoping with regard to flight safety was the potential for aircraft accidents. Such mishaps may occur as a result of weather-related accidents, mechanical failure, pilot error, mid-air collisions, collisions with manmade structures or terrain, or bird-aircraft collisions. Flight safety risks apply to all aircraft; they are not limited to the military. The Air Force defines four categories of aircraft mishaps described in Section 3.3.1.

It is impossible to predict the precise location of an aircraft accident, should one occur. Improved system awareness and sensing capabilities installed on B-1s for combat have the benefit of improved tracking and avoidance of light aircraft. Should a B-1 accident occur, the major consideration is loss of life followed by damage to property. The aircrew's ability to exit from a malfunctioning aircraft is dependent on the type of malfunction encountered. The probability of an aircraft crashing into a populated area is extremely low, but it cannot be totally discounted. Several factors are relevant to the existing Powder River MOAs and the proposed PRTC airspace complex. The area under the proposed airspace and the immediately surrounding areas have low population densities. During training in the existing Powder River airspace, pilots are instructed to avoid direct overflight of population centers at very low altitudes. The limited amount of time an aircraft is over any specific geographic area limits the probability of an impact of a disabled aircraft in a populated area.

Secondary effects of an aircraft crash include the potential for fire or environmental contamination. Again, because the extent of these secondary effects is dependent on the situation, they are difficult to quantify. A crash of any aircraft can cause damage and/or loss of life. The terrain overflown in the ROI is diverse. For example, should a mishap occur in highly vegetated areas during a hot, dry summer, such a mishap would have a higher risk of extensive fires than would a mishap in more barren and rocky areas during the winter. When an aircraft crashes, it may release hydrocarbons. The petroleum, oils, and lubricants not consumed in a fire could contaminate soil and water. The potential for contamination is dependent on several factors. The porosity of the surface soils will determine how rapidly contaminants are absorbed. The specific geologic structure in the region will determine the extent and direction of the contamination plume. The locations and characteristics of surface and groundwater in the area will also affect the extent of contamination to those resources.

Based on historical data on mishaps at all installations, and under all conditions of flight, the military services calculate Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory. These mishap rates do not consider combat losses due to enemy action. B-1 aircraft have a lifetime Class A mishap rate of 4.32 over the approximately 3 to 5 million hours since the aircraft entered the Air Force inventory during Fiscal Year (FY) 1985. B-52 Aircraft have a rate of 1.27 with over 7 million flight hours since entering the inventory in 1955. Table 3.3-1 presents Class A mishap rates for aircraft flown in the Powder River MOA/ATCAA airspace. These mishap rates demonstrate that the B-1 and representative transient F-16 fighters have mishap rates greater than the B-52. There has been one aircraft crash reported in the Powder River airspace since 1978 (Ellsworth AFB 2010).

Table 3.3-1. Projected Class A Mishap Rates for Aircraft

Aircraft	*Lifetime Mishap Rates per 100,000 Flight Hours*[1]	*Baseline Annual Hours in Powder River airspace*	*Years Between Projected Mishaps*
B-52	1.27	218	361.2
B-1	4.32	1,060	21.8
F-16[2]	3.98	4	6,281.4

Note: 1. Lifetime thru FY07 B-52 Calendar Year(CY) 55-FY 08, B-1 CY84-FY07
2. Representative transient aircraft.
Source: Air Force Safety Center 2009

Aircrews at Ellsworth flew their first B-1 training sortie in CY 1984. Since then, Ellsworth-based B-1s have been involved in three engine-related Class A incidents and three other incidents, one on Ellsworth involving an engine, one in Power River airspace which resulted in loss of the aircraft and one aircraft loss during a non-local training mission. Since the value of the engines exceeded $1 million, they were recorded as a Class A mishaps. This Class A event within the Powder River Airspace was noted by public during scoping meetings on this EIS. Citizens incurring damage from Ellsworth AFB mishaps need to contact Ellsworth AFB directly to inquire about the damage claims process. The Air Force has an established claims process for citizens who have damages as a result of aircraft training activities. This process is initiated through contact with a base's Public Affairs Office.

The 28 BW maintains detailed emergency and mishap response plans to react to an aircraft accident, should one occur. These plans assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on or off base. Response would normally occur in two phases.

The initial response focuses on rescue, evacuation, fire suppression, safety, elimination of explosive devices, ensuring security of the area, and other actions immediately necessary to prevent loss of life or further property damage. The initial response element consists of those personnel and agencies primarily responsible to initiate the initial phase. This element will include the Fire Chief, who will normally be the first On-scene Commander, firefighting and crash rescue personnel, medical personnel, security police, and crash recovery personnel. A subsequent response team will be comprised of an array of organizations whose participation will be governed by the circumstances associated with the mishap and actions required to be performed.

The Air Force has no specific rights or jurisdiction just because a military aircraft is involved. Regardless of the agency initially responding to the accident, efforts are directed at stabilizing the situation and minimizing further damage. The second, or investigation phase, is accomplished next. If the accident has occurred on non-federal property, a National Defense Area will normally be established around the accident scene and the site will be secured for the investigation phase. The landowner or land managing agency would be informed of the incident. Should there be a potential for environmental contamination from fuels or other materials, base environmental and security personnel will work together, and with the owner or managing agency personnel to identify, isolate, and clean up any contaminating materials. After all required actions on the site are complete, the aircraft will be removed and the site cleaned up to the extent possible.

A Class A mishap can result in metal debris on the ground. The extent of the debris field depends upon the aircraft accident. The Air Force makes every effort to locate, document, and then clean up debris resulting from the accident. This cleanup is performed to reconstruct the cause of the accident and to restore the accident site as much as possible. Small pieces may be missed in any cleanup process and remain at the crash site.

Public scoping comments expressed concern that tall structures on the ground have the potential to create hazards to flight. The FAA provides detailed instructions for the marking of obstructions (i.e., paint schemes and lighting) to warn pilots of their presence. Appendix I provides the main text of the applicable FAA circular. Any temporary or permanent structure that exceeds an overall height of 200 feet (61 meters) AGL or exceeds any obstruction standard contained in 14 CFR Part 77, should normally be marked and/or lighted. The FAA may also recommend marking and/or lighting a structure that does not exceed 200 feet AGL or 14 CFR Part 77 standards because of its particular location (FAA 2000). The obstruction standards in 14 CFR Part 77 are primarily focused on structures in the immediate vicinity of airports and approach and departure corridors from airports (14 CFR Part 77 2008).

There are a variety of communication, transmission, and wind farms within, and on the periphery of, the proposed PRTC airspace. These towers or high structures are marked with lighting, as noted above, and are mapped on updated aeronautical charts.

During scoping, public and agency concern was expressed regarding local emergency activities which could occur during the time when the MOA was activated. As explained in Section 3.1, in cases of emergency, such as air ambulance, law enforcement, or firefighting, which required ATC clearance, the Air Force has agreed-to procedures for the existing Powder River airspace. The Air Force immediately responds to ATC direction and relocates the B-1 or other aircraft training from the emergency needed airspace. This means that if a B-1 were flying in proposed PR-1A MOA and an emergency flight were required, the training aircraft would either move to the PR-1A ATCAA, move to another already activated MOA, or return to base, depending upon the extent and duration of the emergency. The training aircraft would not be able to move to an unactivated, unscheduled MOA and begin training because there would be a two-hour advance NOTAM to activate a MOA "other times by NOTAM." There are not adequate communication capabilities in the area to safely notify a civil aircraft in the airspace that military training aircraft were now using the airspace. If adequate communication was possible, and a MOA were activated by NOTAM, communication would be required with any aircraft flying IFR or VFR in the airspace. IFR flight would not be possible in an activated MOA although VFR aircraft could transit the airspace using see-and-avoid.

Scoping comments expressed concern for wake vortices on light aircraft from low level flight of large aircraft, such as the B-1 or B-52. As a plane travels through the air, the trail of disturbed air that follows the aircraft as it passes through the atmosphere is called the wake vortex. Wake vortices can cause a brief period of unstable air which could affect other aircraft. Air traffic control at airports will typically sequence aircraft using time or distance for departures or arrivals to avoid wake vortices. There have not been any reported incidents of pilots encountering wake vortices while traversing an active existing Powder River MOA. The relatively small number of training military aircraft would make it unlikely that a B-1 or B-52 undissipated wake vortex would be in the exact location traversed by a civil aircraft flying VFR in an active MOA.

3.3.3.3 Ground Safety

Day-to-day operations and maintenance activities conducted by the 28 BW are performed in accordance with applicable Air Force safety regulations, published Air Force Technical Orders, and standards prescribed by Air Force Occupational Safety and Health requirements.

Ellsworth AFB fire and emergency services meet all established Air Force staffing and equipment standards. Should extraordinary requirements occur, the Ellsworth AFB Fire Department has established mutual aid support agreements with the nearby community of Rapid City (Air Force 2001e).

During the Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) process and public scoping, the risk of fire was a ground safety issue noted by commentors. The surface environment under the proposed PRTC consists of high plains with range, farming, timber, mining, and other resource-dependent activities. These activities are very sensitive to wildfires. Fast moving range fires can result in substantial damage to rangeland, infrastructure such as fencing, water distribution systems, outbuildings, livestock, and wildlife. Fire risk throughout the area is ever present from natural lightning strikes and human activity. Aerial fire observation and fire suppression occurs throughout the four states under the proposed PRTC.

The National Fire Danger Rating System is a set of computer programs and algorithms that allow land management agencies to estimate fire danger for a given rating area. National Fire Danger Rating System characterizes fire danger by evaluating the approximate upper limit of fire behavior in a fire danger rating area during a 24-hour period. Calculations of fire behavior are based on fuels, topography, and weather. The National Fire Danger Rating System gives relative ratings of the potential growth and behavior of any wildfire. Fire danger ratings are guides for initiating pre-suppression activities and selecting the appropriate level of initial response to a reported wildfire. The National Fire Danger Rating System links an organization's readiness level (or pre-planned fire suppression actions) to the fire problems of the day (NOAA 2009).

Fire-danger ratings are relative, not absolute. In other words, when a component or index of the system doubles, a doubling of the fire activity or intensity should be expected. The National Fire Danger Rating System evaluates the worst conditions on a rating area by 1) taking fuel and weather measurements when fire danger is normally the highest (mid- to late-afternoon), 2) measuring fire danger in the open, and 3) measuring fire danger on south to west exposures. This means that extrapolation of fire danger to other areas not in the immediate vicinity of the fire danger stations would involve scaling the fire-danger values down, not up. The ratings and indices are interpreted in terms of fire occurrence and fire behavior.

A Red Flag Warning would be issued through the National Fire Danger Rating System when weather conditions could sustain extensive wildfire activity and meet one or more of the following criteria in conjunction with Very High or Extreme fire danger:

a. Sustained surface winds, or frequent gusts, of 25 miles per hour or higher.

b. Unusually hot and dry conditions (e.g., relative humidity less than 20 percent).

c. Dry thunderstorm activity is foreseen during an extremely dry period.

d. Any time the forecaster foresees a change in weather that would result in a significant increase in fire danger (e.g., very strong winds associated with a cold front even though the rangeland fire danger index is below the very high category, extensive lightning, etc.).

Ground safety risks identified during scoping meetings included those associated with mining operations, such as around Colstrip, MT. Substantial blasting occurs to support mining operations. Explosives are prepared and inserted at designated points identified for the mining operation. The explosives are armed and triggered electronically. Historically there was concern that two-way radio devices could have a frequency to trigger an explosive. Accordingly, vehicles within a blast zone were instructed to turn off their radios to reduce risk. The introduction of low flying, highly electronic emitting aircraft to a mining environment was identified as a safety risk by scoping participants.

Low-level subsonic and supersonic events have the potential to disturb loose surface materials through overpressure and vibration. Surface mining operations have the potential to have loose soils on slopes, which could be disturbed by low-level overflights or sonic booms.

Larger aircraft and lower altitudes produce a greater potential for a wake vortex effect on the ground. When the B-1 operates in the mid- to high-altitude range, it has no effect on ground structures. When a large aircraft operates at a low altitude, typically below 1,000 feet AGL, a wake vortex generated by the aircraft turbulence can strike the ground with the force of a brief, strong rotating wind. Extensive review of wake vortices has resulted in the conclusion that, under unique circumstances of aircraft size, altitude, configuration, and meteorological conditions, there is a possibility that wake vortex damage on the ground could occur.

The four-state region is subject to storm wind impacts and tornados. The area under the proposed PRTC airspace is subject to both high winds and tornados. Tornado damage in the area is usually minimal because of the relatively sparsely populated area. Tornados in the area are spawned by severe thunderstorm activity and typically occur in the early morning hours. Wake vortices currently occur within the existing Powder River airspace and do not generate tornado speed winds.

Under normal flight conditions, and all but rare atmospheric conditions, wake vortices from B-52 and B-1 low altitude flights would not generate sufficient velocities to damage structures or vehicles, or pose a hazard to people or animals on the surface. Under infrequent circumstances, such as unusual aircraft maneuvers, damage could occur to a structure, such as a stock watering windmill, which was facing into the normal wind and was impacted by a wake vortex which created a rapid strong wind force from a different direction and twisted the windmill (Jurkovich and Skujins 2006).

Modern wind machines, towers, and other tall structures are designed to withstand wind forces of the type which could result from a large low-flying aircraft. There have not been any documented reports of wake vortex problems with older stock windmills or otherwise from low-level B-1 training in the existing Powder River airspace. Should wake vortex damage occur, the Air Force has established procedures for damage claims that begin by contacting Ellsworth AFB Public Affairs.

3.3.3.4 Bird Strike Hazard

Bird-aircraft strikes constitute a safety concern because they can result in damage to aircraft or injury to aircrews or local populations if an aircraft crashes. Aircraft may encounter birds at altitudes up to 30,000 feet MSL or higher. However, most birds fly close to the ground. Over 97 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 30 percent of bird strikes happen in the airfield environment, and almost 55 percent occur during low-altitude flight training (Air Force Safety Center 2002).

Migratory waterfowl (e.g., ducks, geese, and swans) are the most hazardous birds to low-flying aircraft because of their size and their propensity for migrating in large flocks at a variety of elevations and times of day. Waterfowl vary considerably in size, from 1 to 2 pounds for ducks, 5 to 8 pounds for geese, and up to 20 pounds for swans. There are two normal migratory seasons, fall and spring. Waterfowl are usually only a hazard during migratory seasons. These birds typically migrate at night and generally fly between 1,500 to 3,000 feet AGL during the fall migration and from 1,000 to 3,000 feet AGL during the spring migration.

Along with waterfowl, raptors, shorebirds, gulls, herons, songbirds, and other birds also pose a wildlife strike hazard. The results of bird-aircraft strikes show that strikes involving raptors result in the majority of Class A and Class B mishaps related to bird-aircraft strikes. Soaring birds of greatest concern in the proposed PRTC airspace are vultures and red-tailed hawks. Peak migration periods for raptors are from October to mid-December and from mid-January to the beginning of March. In general, military training flights above 1,500 feet AGL would be above most soaring raptors.

Songbirds are small birds, usually less than one pound. During nocturnal migration periods, they navigate along major rivers, typically between 500 to 3,000 feet AGL. The potential for bird-aircraft strikes is greatest in areas used as migration corridors (flyways) or where birds congregate for foraging or resting (e.g., open water bodies, rivers, and wetlands). As shown in Figure 3.6-2 several flyways traverse the existing and proposed airspace.

In order to address the issues of aircraft bird strikes, the Air Force has developed The Avian Hazard Advisory System (AHAS) to monitor bird activity and forecast bird strike risks. Using Next Generation Radar (NEXRAD) weather radars and models developed to predict bird movement, the AHAS is an online, near real-time, geographic information system (GIS) used for bird strike risk flight planning across the continental United States and Alaska. Additionally, as part of an overall strategy to reduce Bird Aircraft Strike Hazard (BASH) risks, the Air Force has developed a Bird Avoidance Model (BAM) using Geographic Information System (GIS) technology as a key tool for analysis and correlation of bird habitat, migration, and breeding characteristics and is combined with key environmental and man-made geospatial data. The model was created to provide Air Force pilots and flight scheduler/planners with a tool for making informed decisions when selecting flight routes. The model was created in an effort to protect human lives, wildlife, and equipment during air operations. This information is integrated into required Pilot briefings which take place prior to any sortie. While any bird-aircraft strike has the potential to be serious, many result in little or no damage to the aircraft, and only a minute portion result in a Class A mishap. During the fiscal years 1985 to 2009, the Air Force Bird/Wildlife Aircraft BASH Team documented 86,189 bird strikes worldwide. Of these, 43 resulted in Class A mishaps where the aircraft was destroyed. These occurrences constituted approximately 0.05 percent of all reported bird-aircraft strikes (Air Force Safety Center 2010).

Bird-aircraft strike data from 1999 through 2007 indicate that Ellsworth-based aircraft experienced 11 bird strikes in the Powder River MOA in nine years. The majority, approximately 41 percent, occur during July, August, and September. The months of January, February, and March exhibit the lowest incidence of approximately 12 percent of recorded bird strikes. The largest number of strikes occurred in the existing Powder River B MOA.

3.4 Air Quality

3.4.1 Definition of the Resource

Air quality in a given location is defined by the size and topography of the air basin, the local and regional meteorological influences, and the type and concentration of pollutants in the atmosphere, which are generally expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). One aspect of significance is a pollutant's concentration in comparison to a national and/or state ambient air quality standard. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare and include a reasonable margin of safety to protect the more sensitive individuals in the population. National standards are established by the U.S. Environmental Protection Agency (USEPA). They are termed the National Ambient Air Quality Standards (NAAQS) and represent maximum acceptable concentrations that generally may not be exceeded more than once per year, except for the annual standards, which may never be exceeded. Under the Clean Air Act (CAA), state and local agencies may establish air quality standards and regulations of their own, provided these are at least as stringent as the federal requirements. The states of ND and WY have set their own ambient air quality standards for certain pollutants; while the states of MT and SD, in general, have adopted the federal NAAQS for all criteria pollutants. Table 3.4-1 presents a summary of the national and state ambient air quality standards that apply to the ROI.

Table 3.4-1. National and State Ambient Air Quality Standards

Pollutant	*Averaging Time*	*ND Standards*[2]	*WY Standards*[2]	*SD Standards*[2]	*MT Standards*[2]	NATIONAL STANDARDS[1]	
						Primary[2,3]	*Secondary*[2,4]
Ozone (O_3)	8-hour	0.075	0.08 ppm	0.075 ppm	0.075 ppm	0.075 ppm	SAP
Carbon monoxide (CO)	8-hour	9 ppm	9 ppm	9 ppm	9 ppm	9 ppm	—
	1-hour	35 ppm	35 ppm	35 ppm	23 ppm	35 ppm	—
Nitrogen dioxide (NO_2)	Annual	0.053 ppm	0.05 ppm	0.053 ppm	0.05 ppm	0.053 ppm	SAP
Sulfur dioxide (SO_2)	Annual	0.023 ppm	0.02 ppm	0.03 ppm	0.02 ppm	0.03 ppm	—
	24-hour	0.099 ppm	0.10 ppm	0.14 ppm	0.10 ppm	0.14 ppm	—
	3-hour	0.273 ppm[5]	0.50 ppm	—	—	—	0.5 ppm
Particulate matter less than 10 microns in diameter (PM_{10})	AAA	--	50 $\mu g/m^3$	--	50 $\mu g/m^3$	--	SAP
	24-hour	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$	SAP
Particulate matter less than 2.5 microns in diameter ($PM_{2.5}$)	AAA	15 $\mu g/m^3$	15 $\mu g/m^3$	15 $\mu g/m^3$	15 $\mu g/m^3$	15 $\mu g/m^3$	SAP
	24-hour	35 $\mu g/m^3$	35 $\mu g/m^3$	35 $\mu g/m^3$	35 $\mu g/m^3$	35 $\mu g/m^3$	SAP
Lead (Pb)	Calendar Quarter	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	SAP
	Rolling 3-Mo. Average			0.15 $\mu g/m^3$		0.15 $\mu g/m^3$	SAP
Hydrogen Sulfide	Instantaneous[6]	10 ppm	70 $\mu g/m^3$	—	—	—	—
	1-hour[7]	0.2 ppm	40 $\mu g/m^3$	—	—	—	—
	24-Day	0.1 ppm	—	—	—	—	—
	3-month	0.02 ppm	—	—	—	—	—

Notes:
(1) Standards, other than for ozone and those based on annual averages, are not to be exceeded more than once a year. The ozone standard is attained when the number of days above the standard in three continuous calendar years is less than four.
(2) Concentrations are expressed in units in which they were promulgated. Units shown as $\mu g/m^3$ are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury.
(3) Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
(4) Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
(5) 1-hour average concentration.
(6) WY standard is based on ½-hour average not to be exceeded more than 2 times per year.
(7) WY standard is based on ½-hour average not to be exceeded more than 2 times in any five consecutive days.

Sources: USEPA 2010b, USEPA 2010c.
WY - http://deq.state.wy.us/aqd/stnd/Chapter2_2-3-05FINAL_CLEAN.pdf
MT - http://www.deq.state.mt.us/dir/legal/Chapters/CH08-02.pdf
ND - http://www.legis.nd.gov/information/acdata/pdf/33-15-02.pdf
SD - http://legis.state.sd.us/rules/DisplayRule.aspx?Rule=74:36:02:02
AAA = Annual Arithmetic Mean.
SAP = Same as Primary

Identifying the ROI for air quality requires knowledge of the types of pollutants being emitted, pollutant emission rates, topography, and meteorological conditions. The ROI for inert pollutants (pollutants other than ozone [O_3] and its precursors) is generally limited to a few miles downwind from a source. The ROI for O_3 can extend much farther downwind than for inert pollutants. In the presence of solar radiation, the maximum effect of volatile organic compounds (VOCs) and nitrogen oxides (NO_x) emissions on O_3 levels usually occurs several hours after they are emitted and many miles from the source. Therefore, the ROI for O_3 may extend beyond the four-state region overlapped by the proposed PRTC.

Air quality within the planning area for the proposed PRTC and its surroundings could be affected by emissions from operations associated with the Proposed Action or an alternative. This section describes the existing air quality resource of the planning area and applicable air regulations that could apply to the proposed action and alternatives. Figure 2-7 shows the location of the proposed PRTC with respect to states and counties in the planning area. The Proposed Action would involve airspace over the states of MT, ND, SD, and WY. Table 3.4-2 summarizes the counties in each state that are within the ROI of the proposed PRTC project. Most of the ROI attains all national and state ambient air quality standards, and the impacts to air quality have not been a substantial constraint to new activities or projects in the ROI.

Table 3.4-2. Counties within Each State Potentially Affected by the Proposed PRTC

State	***County***	***NAAQS Attainment Status***
MT	Carter	In attainment
	Powder River	In attainment
	Fallon	In attainment
	Custer	In attainment
	Rosebud	Portion non-attainment PM_{10}
	Treasure	In attainment
	Big Horn	In attainment
WY	Crook	In attainment
	Campbell	In attainment
	Sheridan	Portion non-attainment PM_{10}
	Weston	In attainment
SD	Harding	In attainment
	Butte	In attainment
	Perkins	In attainment
	Carson	In attainment
	Ziebach	In attainment
	Meade	In attainment
	Lawrence	In attainment
	Pennington	In attainment
ND	Bowman	In attainment
	Slope	In attainment
	Adams	In attainment
	Hettinger	In attainment
	Grant	In attainment
	Sioux	In attainment
	Morton	In attainment
	Stark	In attainment
	Golden Valley	In attainment
	Billings	In attainment

3.4.2 Regulatory Setting

The federal CAA and its subsequent amendments establish air quality regulations and the NAAQS and delegate the enforcement of these standards to the states. The states enforce air pollution regulations and set guidelines to attain and maintain the national and state ambient air quality standards within their regions. These guidelines are found in a State Implementation Plan (SIP) designed to eliminate or reduce the severity and number of NAAQS violations. Following is a summary of the federal and state air quality rules and regulations that may apply to emission sources associated with the proposed action and alternatives. This is an inclusive summary. Because the Proposed Action involves the addition of airspaces and aircraft sorties to operations that are currently in place, the sources of air pollution expected to result from the proposed action are primarily aircraft exhaust emissions within the PRTC airspace. The Proposed Action includes no defined additions to the number of stationary sources at ground bases or restricted areas, and no increased ground-based vehicular activity within the PRTC.

Prevention of Significant Deterioration. Section 162 of the CAA established the goal of prevention of significant deterioration (PSD) of air quality in all international parks; national parks which exceeded 6,000 acres; and national wilderness areas which exceeded 5,000 acres if these areas were in existence on August 7, 1977. These areas were defined as mandatory Class I areas, while all other attainment or unclassifiable areas were defined as Class II areas. Under CAA Section 164, states or tribal nations, in addition to the federal government, have authority to re-designate certain areas as (non-mandatory) PSD Class I areas, i.e., a National Park or national wilderness area established after August 7, 1977, which exceeds 10,000 acres. Class I areas are areas where any appreciable deterioration of air quality is considered significant. Class II areas are those where moderate, well-controlled growth could be permitted. The PSD requirements affect construction of new major stationary sources in the Class I, II, and III areas and are a pre-construction permitting system.

PSD Class I Areas. Federal Mandatory PSD Class I areas are listed under 40 CFR Part 81. The closest mandatory PSD Class I Federal area in the region which potentially could be affected by the Proposed Action is Wind Cave National Park, Pennington County, SD approximately 30 miles from the proposed action (USEPA 2008a). Additionally, Native American lands of the Northern Cheyenne Reservation in Rosebud and Big Horn Counties, MT have been designated as a Class I state area by the State of MT and are within the region which potentially could be affected by the Proposed Action (MT Department of Environmental Quality 2007).

Visibility. CAA Section 169A established the additional goal of prevention of further visibility impairment in the Class I areas. Visibility impairment is defined as a reduction in the visual range and atmospheric discoloration. Determination of the significance of an activity on visibility in a Class I area is typically associated with evaluation of stationary source contributions. The USEPA is implementing a Regional Haze rule for Class I areas that will address contributions from mobile sources and pollution transported from other states or regions.

General Conformity. CAA Section 176(c), General Conformity, requires that federal agency actions be consistent with the CAA and any approved SIP. To implement this mandate, the EPA promulgated the conformity rule for general federal actions in the 30 November 1993 *Federal Register* (58 FR 63214-63259) and it became effective on 31 January 1994. In 2006, the EPA revised the general conformity rule to include *de minimis* emission levels for particulate matter with a diameter equal to or less than 2.5 microns ($PM_{2.5}$) and its precursors. On 5 April 2010, EPA finalized revisions to the general conformity rule that improve on the methods federal agencies can use to demonstrate conformity (75 FR 17253-17279) (EPA 2010a). These revisions took effect on July 6, 2010. Federal activities must not:

(a) Cause or contribute to any new violation;

(b) Increase the frequency or severity of any existing violation; or

(c) Delay timely attainment of any standard, interim emission reductions, or milestones in conformity to a SIP's purpose of eliminating or reducing the severity and number of NAAQS violations or achieving attainment of NAAQS.

General conformity applies only to nonattainment and maintenance areas. If the emissions from a federal action proposed in a nonattainment or maintenance area exceed annual *de minimis* thresholds (typically, 100 tons per year) identified in the rule, a formal conformity determination is required of that action. The *de minimis* thresholds are more restrictive as the severity of the nonattainment status of the region increases.

Primary Pollutant Concerns. The pollutants of primary concern for this air quality analysis in the ROI include VOCs, NO_x, carbon monoxide (CO), nitrogen dioxide (NO_2), O_3, sulfur dioxide (SO_2), lead (Pb), particulate matter less than 10 microns in diameter (PM_{10}), and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). Although VOCs and NO_x (other than NO_2) have no established ambient standards, they are important precursors to O_3 formation. O_3 is a secondary pollutant which formed in the atmosphere by photochemical reactions with these previously emitted precursors. In September 1997, the USEPA promulgated 8-hour O_3 (revised in 2008) and 24-hour and annual $PM_{2.5}$ NAAQS. Due to a lawsuit in May 1999, the U.S. Court rescinded these standards and the USEPA's authority to enforce them. Subsequent to an appeal of this decision by the USEPA, the U.S. Supreme Court in February 2001 upheld these standards. This action initiated a new planning process to monitor and evaluate emission control measures for these pollutants. An area will attain the 8-hour O_3 standard if its three-year running average of the annual fourth-highest daily maximum 8-hour O_3 concentration remains below 0.075 ppm. The 1-hour O_3 standard, as well as designations and classifications for all 1-hour O_3 nonattainment and maintenance areas, have been revoked (USEPA 2008c). As is the case for the ROI, implementation of the 8-hour O_3 standard replaced the existing 1-hour standard.

Greenhouse Gas Emissions. Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions occur from natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane, and nitrous oxide (N_2O). Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydro fluorocarbons and per fluorocarbons) and sulfur hexafluoride. Each GHG is assigned a global warming potential. The global warming potential is the ability of a gas or aerosol to trap heat in the atmosphere. The global warming potential rating system is standardized to CO_2, which has a value of one. For example, methane has a global warming potential of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis and N_2O has a global warming potential of 310. Total GHG emissions from a source are often reported as a CO_2 equivalent (CO_2e). The CO_2e is calculated by multiplying the emission of each GHG by its global warming potential and adding the results together to produce a single, combined emission rate representing all GHGs.

The USEPA issued the Final Mandatory Reporting of Greenhouse Gases Rule on 30 October 2009 (USEPA 2009). This rule does not apply to mobile sources of GHGs and would not apply to the PRTC training activities. EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, was signed by President Bush on January 24, 2007. The EO instructs federal agencies to conduct their environmental, transportation, and energy-related activities in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner. The EO requires federal agencies to meet specific goals to improve energy efficiency and reduce GHG emissions by annual energy usage reductions of 3 percent through the end of fiscal year 2015, or by 30 percent by the end of fiscal year 2015, relative to the baseline energy use of the agency in FY 2003. According to EO 13423 § 8 (c) military tactical equipment and vehicles may be exempted from this EO. In general, EO 13423 applies to activities and operations at the installation rather than to aircraft training activities. Thus, the PRTC is exempt from EO 13423.

In addition to EO 13423, on October 5, 2009, President Obama signed *EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance*, to establish an integrated strategy towards sustainability in the federal government and to make reduction of GHGs a priority for federal agencies. Under the Executive Order, the Air Force will be reporting a comprehensive inventory of GHG emissions, including such emissions associated with Powder River airspace operations, for Fiscal Year (FY) 2010 in early January 2011, and annually thereafter. The emissions reported will include all “Scope 1” emissions, which are all direct emissions of GHGs owned or controlled by the agency; all “Scope 2” emissions, which are all indirect emissions of GHGs from electricity, steam, or heat purchased by the agency; and all “Scope 3” emissions, which includes supply chain, business travel, and employee commuting emissions. The comprehensive GHG emissions inventories for FY 2010 and beyond will, among other things, include emissions from aircraft operations; tactical and highway vehicles; and non-road engines and equipment. While GHG emissions from aircraft and tactical vehicles and equipment will be reported annually beginning with FY 2010, these combat and combat support systems are not subject to the Executive Order’s GHG emissions reduction target. The PRTC is exempt from EO 13423 due to the proposed activity. EO 13514 § 19 (h) identifies an exemption for non-road equipment, vehicles and equipment, including aircraft, that are used in combat support or training for such operations.

On 18 February 2010, the Council on Environmental (CEQ) issued for public comment draft guidance “Consideration for Effects of Climate Change and Greenhouse Gas Emissions”, the first draft guidance on how federal agencies should evaluate the effects of climate change and GHG emissions for NEPA documentation (CEQ 2010).

3.4.3 Existing Conditions

The USEPA has designated all areas of the U.S. as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. A nonattainment designation generally means that a primary NAAQS has been exceeded more than once per year in a given area. Areas without sufficient data to determine the attainment/nonattainment status are designated as unclassified. Most of the project region attains all national and state ambient air quality standards. Lame Deer, MT, located in Rosebud County, is nonattainment for PM_{10} and is under the proposed airspace. Outside the airspace, the Laurel area of Yellowstone County, MT is nonattainment for SO_2 and the City of Sheridan portion of Sheridan County, WY is nonattainment for PM_{10}. (USEPA 2008c). Many counties within the project ROI presently have no ambient air monitoring stations due to their rural nature and lack of point source emissions or other known air quality concerns. These areas are considered as unclassified and are assumed to be attainment areas from a regulatory standpoint.

Generally, concentrations of photochemical smog are highest during the summer months and coincide with the season of maximum solar insulation. Inert pollutant concentrations tend to be the greatest during periods of light winds, stable atmospheric conditions, and surface-based temperature inversions. These conditions limit atmospheric dispersion.

Table 3.4-3 presents the maximum pollutant levels monitored at locations within the project ROI from 2004 through 2007. The monitoring station locations shown in the table were selected because they are within or near the project ROI and are thought to be representative of general background conditions in the ROI and are directly related to point source emissions or heavily populated areas.

Table 3.4-3. Maximum Pollutant Concentrations Monitored in the Proposed PRTC Project ROI—2004-2007

Pollutant/Monitoring Station[2]	*Averaging Time/ Measurement*	MAXIMUM CONCENTRATION BY YEAR[1]			
		2004	*2005*	*2006*	*2007*
Ozone O_3					
Thunder Basin, WY	1-hour (ppm)	0.078	0.074	0.087	0.087
Wind Cave, SD		–	0.083	0.083	0.079
Billings County, ND		0.062	0.065	0.073	0.071
Thunder Basin, WY[3]	8-hour (1) (ppm)	–	0.068	0.075	0.081
Wind Cave, SD		–	0.070	0.073	0.069
Billings County, ND		0.055	0.059	0.066	0.064
Nitrogen Dioxide NO_2					
Thunder Basin, WY	Annual (ppm)	0.002	0.002	0.002	0.002
Wind Cave, SD		–	0.001	0.001	0.001
Thunder Basin, WY	1-hour (ppm)	0.029	0.021	0.032	0.021
Sulfur Dioxide SO_2					
Wind Cave, SD	Annual (ppm)	–	0.001	0.001	0.001
Billings County, ND		0.001	0.001	0.001	0.001
Wind Cave, SD	24-hour (ppm)	–	0.002	0.003	0.002
Billings County, ND		0.002	0.002	0.002	0.002
Wind Cave, SD	3-hour (ppm)	–	0.003	0.007	0.004
Billings County, ND		0.006	0.005	0.007	0.009
PM_{10}					
Lame Deer, MT	Annual Arithmetic Mean ($\mu g/m^3$)	22	22	23	22
Arvada, WY		14	16	16	14
Wind Cave, SD		–	7	7	10
Lame Deer, MT	24-hour ($\mu g/m^3$)	48	80	120	107
Arvada, WY		36	138	51	40
Wind Cave, SD		–	32	28	44
$PM_{2.5}$					
Lame Deer, MT	Annual ($\mu g/m^3$)	5.9	7.7	–	–
Wind Cave, SD		–	5.4	5.3	6.9
Billings County, ND		4.4	4.3	4.8	5
Lame Deer, MT	24-hour ($\mu g/m^3$)	22	34	–	–
Wind Cave, SD		–	16	17	22
Billings County, ND		9	12	19	18

Notes: 1. No monitoring data available for CO or Pb.
2. Lame Deer, Rosebud County, MT – Site ID 30-087-0307
Arvada Elementary School, Sheridan County, WY – Site ID 560330099
Thunder Basin Grassland, Campbell County, WY – Site ID 560050123
Wind Cave National Park, Custer County, SD – Site ID 460330132
Billings County, ND – Site ID 380070002
3. 8-hour O_3concentration of 0.081 for Thunder Basin, WY exceeds Federal and State NAAQS

Sources: WY Department of Environmental Quality 2007, MT Department of Environmental Quality 2003, SD Department of Environment and Natural Resources 2005, and USEPA 2008b.

Some of the affected ROI does not have any ongoing monitoring and there are very few ambient monitoring stations within the Proposed Action area, and very limited within the existing Powder River airspace footprint. Not all parameters are measured at all monitoring stations. CO and Pb data were not reported at any of the selected monitoring stations. Air quality in the project ROI is generally considered excellent due to its rural nature, the presence of few substantial emission sources, and the relatively high wind speeds that aid in the dispersion of air pollutants. Only one monitoring location within the project ROI, Lame Deer, MT in Rosebud County reported exceedances of the PM_{10} NAAQS. This location is used to monitor potential human exposure from remote power generating facilities.

Annual baseline GHG emissions for aircraft combustive emissions were calculated for methane, N_2O, and CO_2 and for a total CO_2e. Table 3.4-4 shows the annual GHG emissions from baseline aircraft operations.

The coal-fired electrical plant at Colstrip in Rosebud County had two days in 2003 where PM_{10} emissions were exceeded. In 2008, the County did not exceed emission standards.

Table 3.4-4. Annual GHG Emissions from Baseline Aircraft Operations (metric tons/year)

State	*CO_2*	*Methane*	*N_2O*	*CO_2e*
MT	5,875.48	0.17	0.19	5,937.97
ND	-	-	-	-
SD	839.96	0.02	0.03	848.89
WY	2,807.74	0.08	0.09	2,837.60
Total	**9,523.18**	**0.27**	**0.31**	**9,624.46**

Regional Air Emissions

The USEPA estimates point, area, and mobile source emissions as part of their National Emission Trends database. While some states compile countywide emission inventories for stationary sources, an emissions inventory is not available for the combined proposed action area that includes parts of the states of MT, WY, SD, and ND. Therefore, emissions data were determined for some of the largest or most significant stationary sources in each state within or near the proposed PRTC ROI. The emissions data for 2002 (USEPA 2008b) in tons per year are summarized in Table 3.4-5. In general, the largest stationary sources of air emissions within the ROI are related to energy exploration and production. The region is very rural in nature with known coal, natural gas, and oil reserves. The coal power plants show the highest annual emissions for all parameters.

The only affected area under the proposed PRTC airspace ROI which has been identified as non-attainment area for the NAAQS is Rosebud County, MT and Sheridan County, WY. The area is identified as the Lame Deer and Sheridan non-attainment area in national records. Rosebud County includes the Colstrip mine, the larger communities of Colstrip and Lame Deer, smaller communities, and scattered ranches. In 2008, Rosebud County or Sheridan County did not exceed the NAAQS standards for PM_{10} or $PM_{2.5}$. Tables 3.4-6 and 3.4-8 summarize the 2008 maximum PM_{10} pollutant concentrations for Rosebud and Sheridan Counties, respectively. Tables 3.4-7 and 3.4-9 present the most recent (2002) emissions summary of criteria air pollutants for Rosebud County and Sheridan County, respectively.

Table 3.4-5. Summary of 2002 Annual Emissions for Counties Affected by the Proposed Action (tons per year)

Counties	*VOCs*	*CO*	*NO_x*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
MT						
Carter	30,476.12	132,590.53	934.48	681.82	14,184.39	10,702.48
Powder River	246.92	1,462.17	193.10	16.54	1,994.30	309.24
Fallon	432.81	2,093.28	1,367.71	27.33	2,931.66	428.64
Custer	654.99	5,634.97	1,704.78	85.63	3,319.35	508.42
Rosebud	1,079.00	9,816.00	35,896.00	17,619.00	8,604.00	2,911.00
Treasure	386.71	2,371.36	1,055.63	52.33	1,275.21	228.25
Big Horn	1,102.25	11,685.28	4,311.87	731.88	9,338.30	1,541.11
WY						
Crook	1,414.63	10,991.67	2,532.13	472.28	13,711.87	1,784.41
Campbell	4,458.76	29,366.76	12,644.17	10,617.26	37,319.35	10,437.21
Sheridan	2,400.85	17,461.47	3,351.55	522.97	22,136.62	2,539.67
Weston	1,149.59	4,836.16	3,264.04	3,791.54	9,501.09	1,538.58
SD						
Harding	193.97	934.72	128.66	11.13	1,731.56	290.36
Butte	409.71	2,754.03	442.74	68.21	1,947.20	351.08
Perkins	368.35	2,254.82	476.89	76.09	3,981.91	656.96
Corson	451.24	2,380.96	576.38	43.36	3,123.95	507.71
Ziebach	203.66	1,275.27	191.22	13.77	2,384.61	386.82
Meade	1,267.22	9,662.48	1,545.94	135.80	5,068.90	786.77
Lawrence	1,287.18	9,672.16	1,199.01	179.56	3,680.51	641.63
Pennington	5,448.76	40,535.73	9,558.01	2,738.69	8,409.39	1,802.38
ND						
Bowman	366.29	2,271.96	672.63	66.15	2,713.92	443.88
Slope	340.54	1,305.17	552.51	46.96	1,941.19	349.17
Adams	296.80	1,820.09	492.23	53.32	4,918.18	769.09
Hettinger	320.26	2,367.88	798.13	84.43	4,880.30	801.56
Grant	364.60	2,249.55	552.65	71.14	5,995.02	946.77
Sioux	1,571.31	7,885.42	351.55	55.00	2,874.75	798.89
Morton	1,492.08	14,168.11	4,834.49	7,176.91	9,186.64	2,128.65
Stark	1,352.71	11,894.73	3,241.20	365.32	6,248.70	1,028.07
Golden Valley	338.10	2,720.01	1,691.71	113.97	2,559.59	454.68
Billings	394.57	2,595.47	1,178.59	349.75	1,416.11	269.78

Source: USEPA 2008d, 2002 National Emissions Inventory

Table 3.4-6. 2008 Particulate Concentrations for Rosebud County, MT

Pollutant	*NAAQS Standard*	*Highest Recorded Concentration*	*Second Highest Recorded Concentration*	*Number of NAAQS Exceedances*	*Stations Monitoring Pollutant*
PM_{10}					
24-hour average	150 μg/m^3	56 μg/m^3	45 μg/m^3	0	2
Annual arithmetic mean	50 μg/m^3	21 μg/m^3	N/A	0	2

Table 3.4-7. 2002 Rosebud County, MT Criteria Pollutants Emissions (in tons per year of pollutant emitted)

	CO	*NO_x*	*$PM_{2.5}$*	*PM_{10}*	*SO_2*	*VOCs*
Non-Point + Mobile Sources	7,007	2,158	813	5,666	122	740
Point Sources	2,809	33,738	2,098	2,938	17,497	339
All Sources	9,816	35,896	2,911	8,604	17,619	1,079

Table 3.4-8. 2008 Particulate Concentrations for Sheridan County, WY

Pollutant	*NAAQS Standard*	*Highest Recorded Concentration*	*Second Highest Recorded Concentration*	*Number of NAAQS Exceedances*	*Stations Monitoring Pollutant*
PM_{10}					
24-hour average	150 μg/m³	103 μg/m³	83 μg/m³	0	3
Annual arithmetic mean	50 μg/m³	23 μg/m³	N/A	0	3

Table 3.4-9. 2002 Sheridan County, WY Criteria Pollutants Emissions (in tons per year of pollutant emitted)

	CO	*NO_x*	*$PM_{2.5}$*	*PM_{10}*	*SO_2*	*VOCs*
Non-Point + Mobile Sources	17,315	3,352	2,540	22,137	494	2,248
Point Sources	146	0	0	0	29	153
All Sources	17,462	3,352	2,540	22,137	523	2,401

Under the existing conditions, B-1s conduct 1,750 and B-52s conduct 1,500 sortie-operations in the MOAs and ATCAAs in the Powder River airspace (see Table 2-14). Approximately 150 transient operations occur annually, primarily conducted by F-16s. The emission factors used to calculate combustive emissions for B-1, B-52, F-15, F-16 and KC-135 aircrafts were obtained from the *Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations* (Air Force Institute for Environment, Safety, and Occupational Health Risk Analysis 2003).

Table 3.4-10 shows the annual criteria pollutant emissions from baseline aircraft operations. The detailed emission calculations are presented in Appendix J.

Table 3.4-10. Annual Criteria Pollutant Emissions from Baseline Aircraft Operations (tons per year)

State	*VOC*	*CO*	*NO_x*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
MT	0.24	1.72	26.58	14.54	3.45	3.45
ND	-	-	-	-	-	-
SD	0.03	0.25	3.80	2.08	0.49	0.49
WY	0.11	0.81	12.59	6.92	1.65	1.65
Total	**0.38**	**2.78**	**42.97**	**23.54**	**5.59**	**5.59**

3.5 Physical Sciences

3.5.1 Definition of the Resource

Physical sciences include topography, geology, soils, and water. Topography refers to an area's surface features including its vertical relief. These features may have scientific, historical, economic, and recreational value. Geologic resources of an area typically consist of surface and subsurface materials and their inherent properties. The term "soils" refers to unconsolidated materials formed from the underlying bedrock or other parent material. Soils play a critical role in both the natural and human environment.

Water resources include surface water, groundwater quantity and quality, floodplains, and wetlands. Surface water resources include lakes, rivers, and streams and are important for a variety of reasons, including economic, ecological, recreational, and human health. Groundwater includes the subsurface hydrologic resources of the physical environment and its properties are often described in terms of depth to aquifer or water table, water quality, and surrounding geologic composition.

Physical resources include a discussion of hazardous materials which can include fuels, paints, and maintenance products.

The ROI for physical sciences includes all land under the proposed PRTC MOAs and ATCAAs.

3.5.2 Regulatory Setting

The Clean Water Act (CWA) of 1977 (33 USC § 1251 *et seq*.) and the USEPA Storm Water General Permit regulate pollutant discharges. Section 404 of the CWA and EO 11990, *Protection of Wetlands*, regulate development activities in or near streams or wetlands. Potential development actions that may affect streams and/or wetlands require a permit from the U.S. Army Corps of Engineers (USACE) for dredging and filling in wetlands. Floodplains are defined by Executive Order (EO) 11988, *Floodplain Management*, as "the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, the areas subject to a one percent or greater chance of flooding in any given year." Floodplains are not expected to be affected by the actions considered in this EIS, so the existing conditions and environmental consequences discussions analyzed in this section are limited to surface water and groundwater. Wetlands are discussed in Section 3.6, *Biological Sciences*.

Hazardous materials are identified and regulated under the Comprehensive Environmental Response, Compensation, and Liability Act; the Occupational Safety and Health Administration; and the Emergency Planning and Community Right-to-Know Act. Hazardous materials have been defined in AFI 32-7086, *Hazardous Materials Management*, to include any substance with special characteristics that could harm people, plants, or animals. Hazardous waste is defined in the Resource Conservation and Recovery Act as any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes that could or do pose a substantial hazard to human health or the environment. Waste may be classified as hazardous because of its toxicity, reactivity, ignitibility, or corrosivity. In addition, certain types of waste are "listed" or identified as hazardous in 40 CFR 263.

3.5.3 Existing Conditions

3.5.3.1 Topography

Land resource regions are a group of geographically associated major land resource areas. Major land resource areas are geographically associated land resource units with similarities in climate, geology, physiography, soils, water sources, biological resources, and land use. Identification of these large areas is useful for describing regional characteristics for planning purposes.

The Northern Great Plains Spring Wheat Region major land resource area consists of rolling plains with isolated hills.

The proposed PRTC MOAs and ATCAAs are located within two major land resource areas: the Northern Great Plains Spring Wheat Region and the Western Great Plains Range and Irrigated

Region (U.S. Department of Agriculture [USDA] Natural Resource Conservation Service [NRCS] 2006). The Northern Great Plains Spring Wheat Region major land resource area, located almost entirely across North and South Dakota, consists of rolling plains with some local badlands, buttes, and isolated hills. Broad floodplains exist along most of the major drainages and elevation ranges from 1,650 feet in the east with gradual sloping to about 3,600 feet in the western portions of the proposed PRTC. Local relief is rolling with some relief up to 330 feet, but is typically lower in most areas of the Dakotas (USDA NRCS 2006).

The Western Great Plains Range and Irrigated Region major land resource area has large river valleys bordered by flat-topped buttes.

The Western Great Plains Range and Irrigated Region major land resource area is located across eastern MT and WY in an area of old, eroded plateaus and terraces. Some of the large river valleys in this area are bordered by badlands with steep slopes and flat-topped buttes that often rise sharply against the plains. Slopes are gently rolling to steep and elevation ranges from 2,950 feet to 5,900 feet increasing from east to west and north to south. Local relief is greater under the proposed PR-1A and PR-1B MOAs in the western area of the proposed PRTC (USDA NRCS 2006).

3.5.3.2 Geology

Surficial geology within the ROI consists primarily of shales, siltstones, and sandstones of the Tertiary Fort Union Formation. Marine and continental sediments of the Cretaceous MT Group typically underlie these deposits in MT and WY, while in ND and SD, the area is typically underlain by impermeable Cretaceous shale (USDA NRCS 2006).

The ROI lies within two large structural basins: the Williston Basin and the Powder River Basin. The Williston Basin is a sedimentary structural trough extending approximately 475 miles north-south and 300 miles east-west over eastern MT, western North and SD, and into Canada. Sedimentary deposition in the Williston Basin includes rocks well suited to serve as hydrocarbon sources (U.S. Geological Survey [USGS] 1996).

The Powder River Basin is a region in southeast MT and northeast WY about 120 miles east-west and 200 miles north-south known for its coal deposits. It is both a topographic drainage and geologic structural basin. The Powder River Basin is the single largest source of coal mined in the U.S., and contains one of the largest deposits of coal in the world (USGS 1998).

3.5.3.3 Soils

Soils information for this section is derived from the NRCS Soil Survey spatial and tabular database for the states of MT, WY, ND, and SD (USDA NRCS 2008a). A soil order is the highest organizational level in the soils classification system and soils are grouped according to the degree of their horizon development and the kinds of horizons present. Each of the soil map units described has minor soils that are encompassed within the map unit. These minor soils may have different properties and limitations that can only be delineated on-site. The properties and limitations of the soil type that comprises the majority of each soil map unit are presented in this section to provide an indication of the conditions and limitations found in the ROI. The soils within the ROI consist of five soil orders: Mollisols, Entisols, Inceptisols, Alfisols, and Vertisols (USDA U.S. Forest Service [USFS] 1980). These soil types are mapped on Figure 3.5-1.

Source: USDA NRCS 2008a

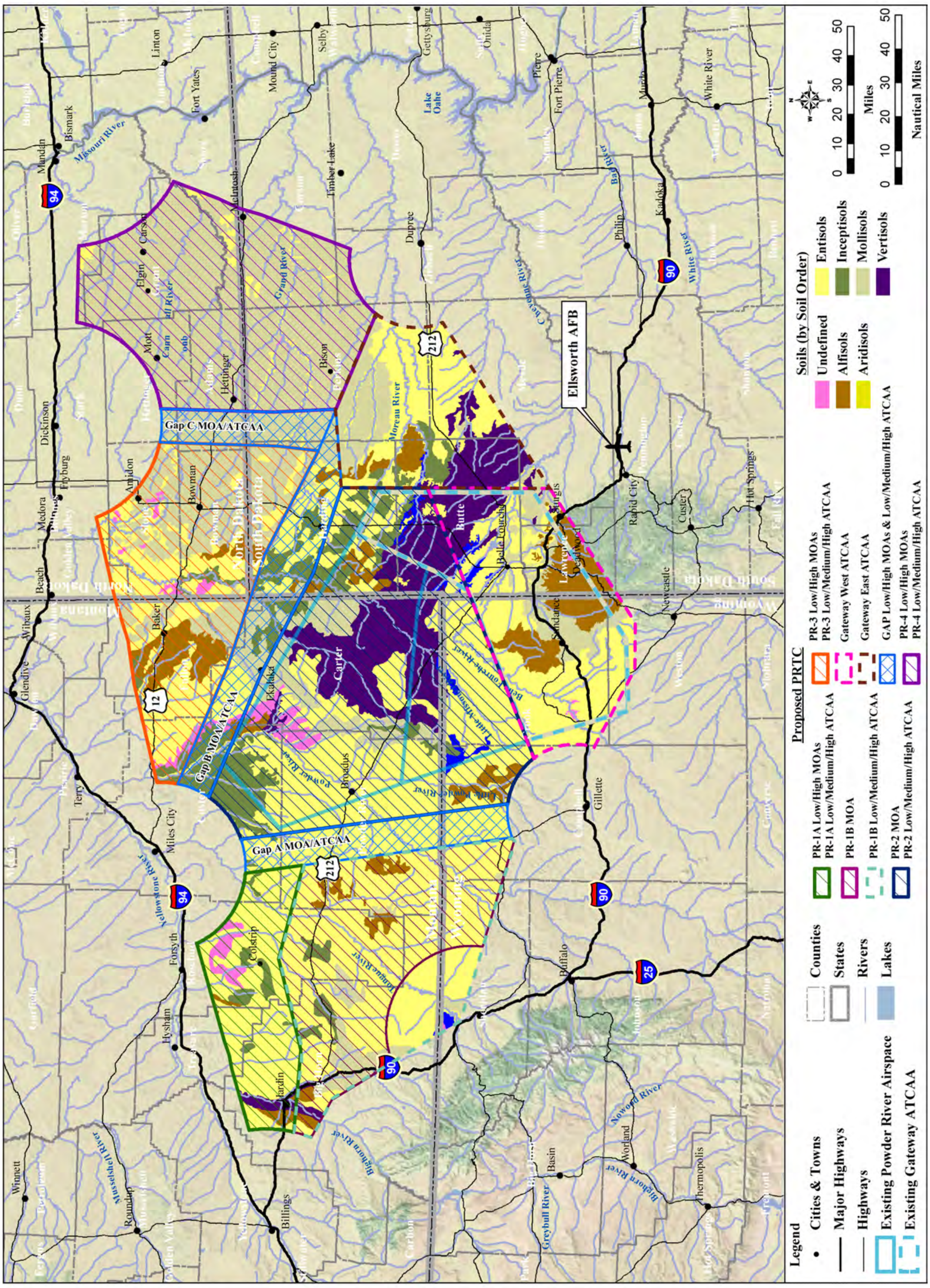


Figure 3.5-1. Soil Types Within the ROI

Mollisols: These young soils form in semi-arid to semi-humid areas, typically under a grassland cover. Their parent material is generally limestone, loess, or wind-blown sand and soils are typically a deep, high organic matter, nutrient-enriched surface soil between 60 to 80 centimeters thick. Because of their productivity and abundance, the mollisols are one of the more economically important soil orders (USDA NRCS 2008b).

Entisols: These soils are defined by their lack of horizons and are typically unaltered from their parent material. They are globally extensive, very diverse, and can be found in almost any climate. Many are sandy or very shallow (USDA NRCS 2008b).

Inceptisols: These soils are characterized by a minimal development of soil horizons. They tend to be widely distributed and found on fairly steep slopes, resistant parent material, and young geologic surfaces (USDA NRCS 2008b).

Alfisols: These soils are moderately leached, considered well developed, and their subsurface horizons typically contain clays, resulting in relatively high fertility. Typically, these soils are found in temperate humid and subhumid regions; they are extensive throughout the U.S. (USDA NRCS 2008b).

Vertisols: These soils are clayey soils that have deep, wide cracks for some time during the year that shrink as they dry and swell as they become moist. The natural vegetation is predominantly grass, savanna, open forest, or desert shrub (USDA NRCS 2008b). As shown on Figure 3.5-1, Vertisols underlie much of the existing Powder River airspace.

Almost all (99 percent) of the soils in the ROI have a pH greater than 5.0 (extremely acidic) or less than 8.5 (strongly alkaline), with the exception of approximately 0.38 percent (113,813 acres) of the soils whose pH of 4.6 is considered acidic (equivalent to tomato juice or black coffee) (Table 3.5-1).

Table 3.5-1. PRTC: pH of Soils within ROI

pH	*Percent of Soil with pH*	*Acres*
4.6	0.38%	113,813
5.8	0.31%	92,848
6.1	0.23%	68,887
6.2	0.05%	14,975
6.5	8.19%	2,452,987
6.7	6.47%	1,937,830
6.8	0.32%	95, 843
7	33.57%	10,054,555
7.2	13.19%	3,950,538
7.3	0.98%	293,519
7.5	11.55%	3,459,342
7.6	1.13%	338,446
7.8	0.63%	188,691
7.9	8.07%	2,417,046
8	1.01%	302,505
8.2	11.92%	3,570,160
Not rated	2.00%	599,020
Total	100.00%	29,951,005

3.5.3.4 Water

Surface Water

The proposed PRTC MOAs and ATCAAs lie within a large regional watershed system called the Missouri River Basin. The Missouri River subbasin, one of six major subbasins within the Missouri River Basin, encompasses 529,350 square miles and all or part of 10 states including those within the ROI: WY, MT, ND, and SD. The Missouri River flows 2,341 miles from its headwaters in the Rocky Mountains at Three Forks, MT to its confluence with the Mississippi River in St. Louis and drains one-sixth of the contiguous U.S. (USEPA 2008e).

The Tongue River, on Figure 3.5-2, is one of the major surface water features within the ROI

As shown in Figure 3.5-2, the major surface water features within the ROI include (in approximate order from west to east): the Bighorn, Tongue, Powder, Little Powder, Little Missouri, Belle Fourche, Cheyenne, Moreau, Grand, and Cannonball rivers. The Bighorn, Tongue, Powder, Little Powder and Little Missouri rivers all drain to the north until their confluence with the Yellowstone River. The Yellowstone River, a major tributary to the Missouri River, flows along the northern boundary of the ROI to the northeast until its confluence with the Missouri River. The Cannonball, Grand, Moreau, Belle Fourche, and the Cheyenne rivers all drain east into the Missouri River or Lake Oahe (part of the Missouri River system).

The rivers and their associated tributaries within the ROI serve as an important source of water for both domestic and commercial public-supply, agricultural, and industrial uses. Much of the surface water has been largely appropriated for agricultural use, primarily irrigation, and for compliance with downstream water pacts. Reservoirs store some of the surface water for flood control, irrigation, power generation, and recreational purposes (USGS 1996).

The acidity of surface water within the ROI reflects the soils and most lakes and rivers within the ROI have a pH within the range of 4.5 to 9 (USEPA 2007). Most of the surface waters measured by the National Atmospheric Deposition Program/National Trends Network, a nationwide network of water monitoring sites supported by the USDA, show surface water pH within the ROI ranging from 4.8 to 6.5 with trends typically showing a slight increase in pH over the past 20 years (National Atmospheric Deposition Program/National Trends Network 2008).

Groundwater

The proposed PRTC MOAs and ATCAAs lie within the Northern Great Plains aquifer system – a system that underlies most of ND and SD, about one-half of MT, and about one-third of WY encompassing about 300,000 square miles (USGS 1996). According to the USGS (2006), an aquifer system consists of two or more aquifers that function similarly, share common geologic and hydrologic characteristics, and can be hydraulically connected so that a change in hydrologic conditions in one of the aquifers could affect the other aquifers. The Northern Great Plains aquifer system lies primarily within the Williston and Powder River basins.

As shown in Figure 3.5-3, there are 4 major aquifers within the Northern Great Plains aquifer system in the ROI (from shallowest to deepest): Lower Tertiary, Upper Cretaceous, Lower Cretaceous, and Paleozoic (USGS 1996).

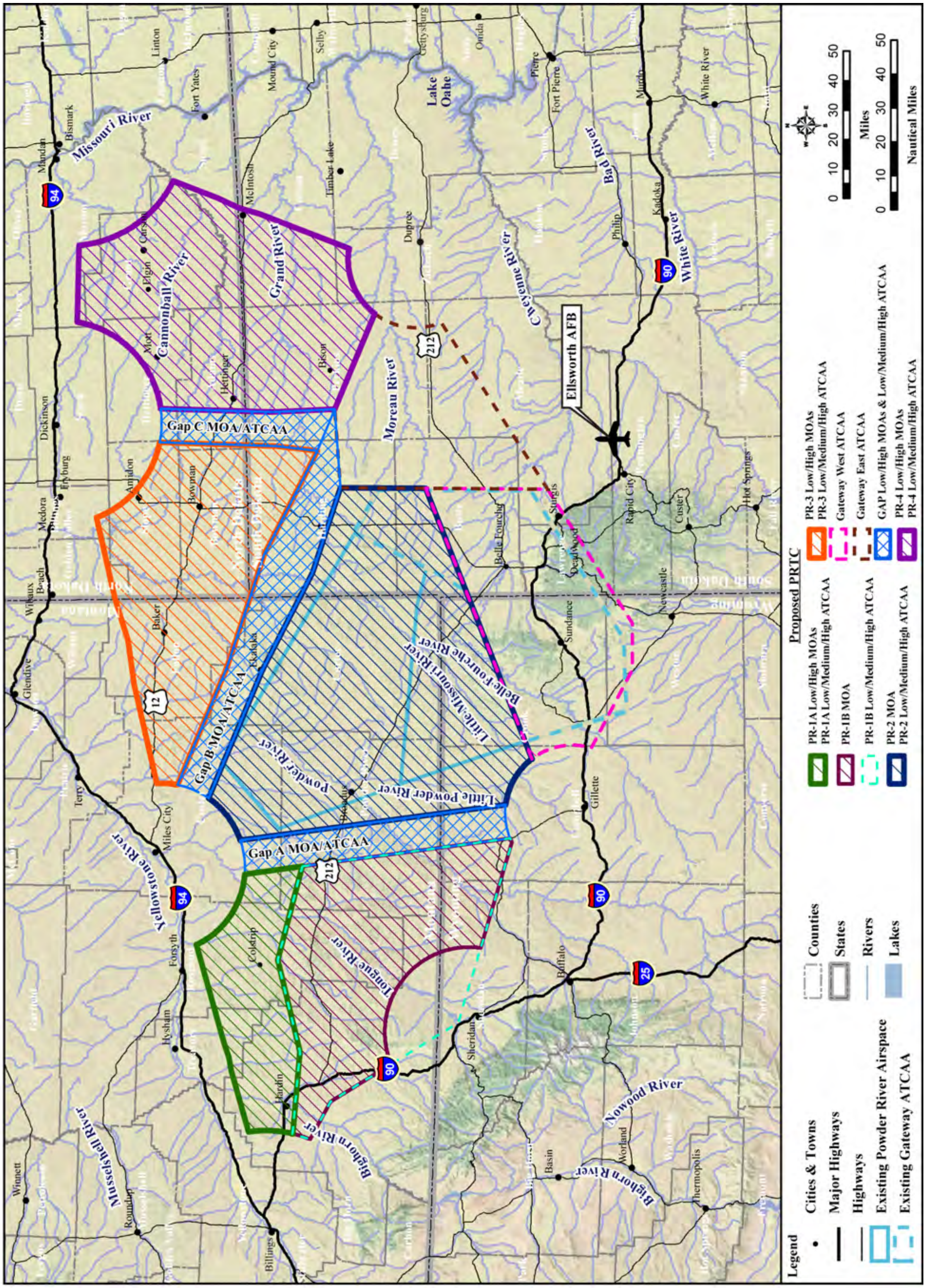


Figure 3.5-2. Surface Water Features

3.6 Biological Sciences

3.6.1 Definition of the Resource

Biological resources consist of native or naturalized plants and animals, along with their habitats, including wetlands. Although the existence and preservation of biological resources are both intrinsically valuable, these resources also provide essential aesthetic, recreational, and socioeconomic benefits to society. The analysis focuses on plant and animal species and vegetation types that are important to the functioning of local ecosystems, are of special societal importance, or are protected under federal or state law.

Biological resources include vegetation and habitat, wetlands, fish and wildlife, and special-status species. In addition, because of concerns expressed during scoping, domestic animals are included in the discussion of environmental consequences to biological resources.

The ROI for this resource is the lands under the proposed PRTC training airspace. The ROI spans several landownership classifications: Bureau of Land Management (BLM); USFS; DoD; National Park Service; USFWS; tribal, state, and local governments; and private lands.

3.6.2 Regulatory Setting

Endangered Species Act

The Endangered Species Act (ESA) of 1973 (16 USC §§ 1531–1544, as amended) established measures for the protection of plant and animal species that are federally listed as threatened and endangered, and for the conservation of habitats that are critical to the continued existence of those species. Federal agencies must evaluate the effects of their proposed actions through a set of defined procedures, which can include the preparation of a Biological Assessment and can require formal consultation with the USFWS under Section 7 of the Act.

Compliance with the ESA requires communication and consultation with the USFWS in cases where a federal action could affect listed threatened or endangered species, species proposed for listing, or candidates for listing. The primary focus of this consultation is to request a list of these species that may occur in the region of influence. If any of these species are present, a determination of the potential effects on the species is made. Should no species protected by the ESA be affected by the Proposed Action, no additional action is required. Letters were sent to the appropriate USFWS offices, as well as state agencies, informing them of the Proposed Action and alternatives, and requesting data regarding applicable protected species. Appendix E includes copies of relevant coordination letters sent by the Air Force.

Clean Water Act

The Clean Water Act (CWA) of 1977 (33 USC § 1251 *et seq.*) and the USEPA Storm Water General Permit regulate pollutant discharges. Section 404 of the CWA and EO 11990, *Protection of Wetlands*, regulate development activities in or near streams or wetlands. Potential development actions that may affect streams and/or wetlands require a permit from the U.S. Army Corps of Engineers (USACE) for dredging and filling in wetlands. EO 11988, *Floodplain Management*, requires federal agencies to take action to reduce the risk of flood damage; minimize the impacts of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains. Federal agencies are directed to consider the proximity of their actions to or within floodplains.

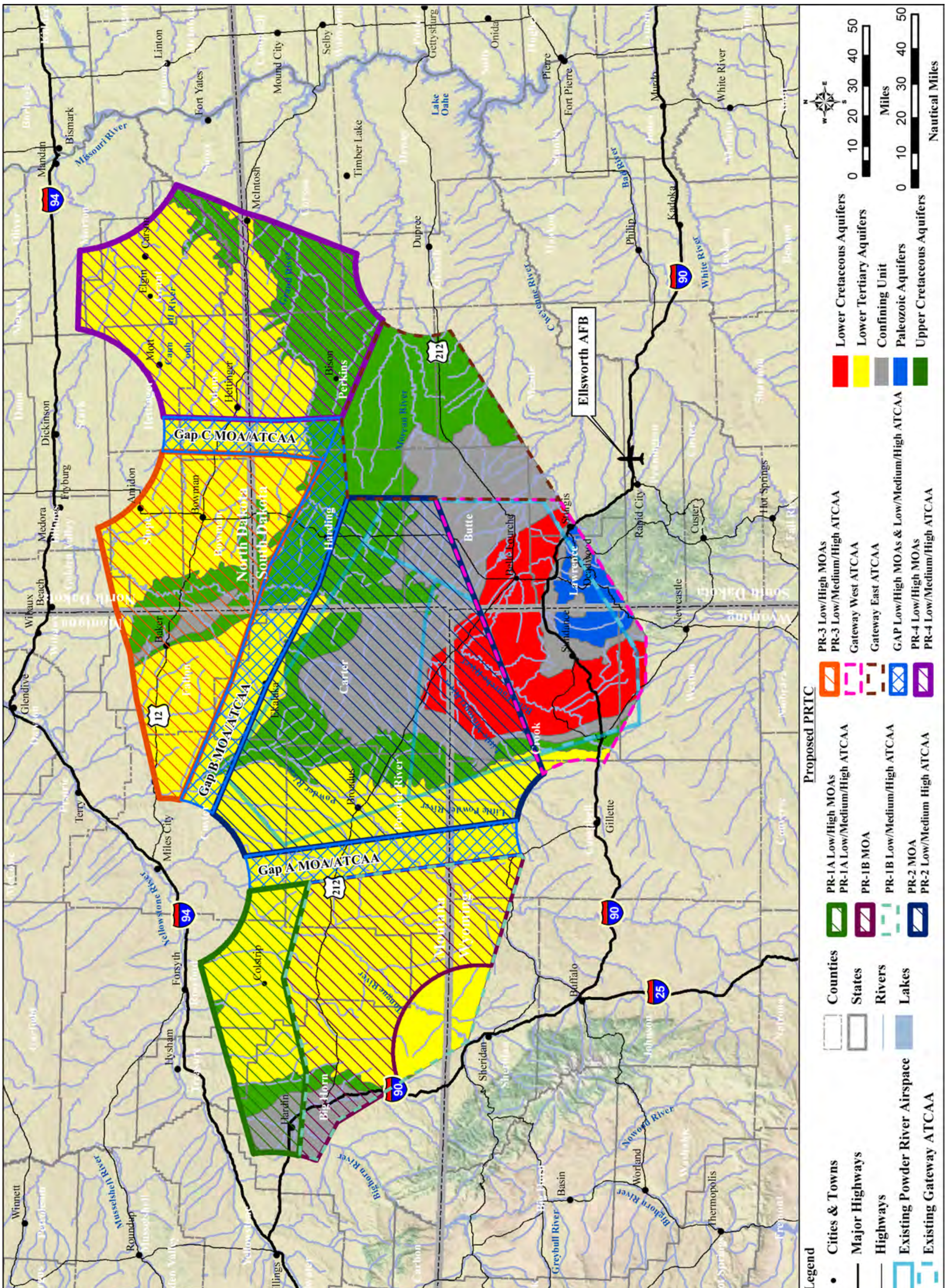


Figure 3.5-3. Aquifer

Migratory Bird Treaty Act (16 USC 703 et seq.) and EO 13186

The Migratory Bird Treaty Act governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. The take of all migratory birds is governed by the Migratory Bird Treaty Act's regulation that affects educational, scientific, and recreational purposes and requires harvest to be limited to levels that prevent overuse. The Migratory Bird Treaty Act also prohibits the export, selling, purchase, barter, or offering for sale, purchase or barter, any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit (50 CFR 21.11).

EO 13186 (effective January 10, 2001), outlines the responsibilities of federal agencies to protect migratory birds, in accordance with the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Acts, the Fish and Wildlife Coordination Act, ESA, and NEPA. This order specifies the following:

- The USFWS as the lead for coordinating and implementing EO 13186;
- Requires federal agencies to incorporate migratory bird protection measures into their activities; and
- Requires federal agencies to obtain permits from USFWS before any "take" occurs, even when the agency intent is not to kill or injure migratory birds.

Sikes Act (16 USC 670)

The Sikes Act applies to federal land under DoD control and requires military services to establish Integrated Natural Resources Management Plans (INRMPs) to conserve natural resources for their military installations. The INRMPs include evaluations of threatened and endangered species, other fish and wildlife resources, wetlands, migratory bird habitat, and forest lands. INRMPs are developed in cooperation with the USFWS and State Fish and Wildlife agencies.

3.6.3 Existing Conditions

3.6.3.1 Vegetation and Wetlands

The proposed PRTC airspace is located within the Great Plains-Palouse Dry Steppe Province ecoregion (Bailey 1995). This area is characterized primarily by mixed-grass and shortgrass prairies with scattered trees and shrubs, primarily sagebrush (*Artemisia* spp.) and rabbitbrush (*Chrysothamnus* spp.) (Bailey 1995). Typical grasses include buffalograss (*Buchloe dactyloides*), blue grama (*Bouteloua gracilis*), western wheatgrass (*Elymus smithii*), and needlegrass (*Stipa* spp.) (Bailey 1995;SD Game, Fish and Parks 2006). The region is primarily flat, but has occasional valleys and foothills that support woodlands such as bur oak, ponderosa pine, pine/juniper and riparian woodlands (dominated by cottonwoods [*Populus* spp.]). Table 3.6-1 lists the major vegetation types that underlie the ROI. Underlying soils are described in Section 3.5.3.3.

GRASSLANDS

The most extensive vegetation type within the project area ROI is grasslands covering 58 percent of the area and over 14,000,000 acres (Table 3.6-1). Figure 3.6-1 maps these vegetation types under the proposed PRTC airspace. The majority of the grasslands within the proposed project area lies in the ecotone between tall-grass and short-grass prairies and is characterized as mixed-grass prairies. The two most dominant vegetative associations are wheatgrass-needlegrass and blue grama-needlegrass-wheatgrass grasslands (Mac *et al.* 1998).

Typical northern plains grassland under the proposed PRTC airspace; primarily used for livestock grazing.

Table 3.6-1. Major Vegetation Types Underlying the Proposed PRTC Airspace

Habitat Type	*Acres*[1]	*% Area*
Grasslands Total	14,542,973	58
Mixed-grass and other prairie	13,750,503	
Introduced grassland (primarily hay/pasture)	792,470	
Shrubland & Steppe	5,542,632	22
Forest and Woodland	2,209,055	9
Cultivated Agriculture/Crops	2,078,986	8
Developed Areas	260,968	1
Barren and Sparsely vegetated	55,036	<1
Open Water	75,492	<1
Wetlands Total	376,763	1.5
Depressional/Herbaceous Wetlands	102,389	
Greasewood Flats/Woody/Riparian Wetlands	274,374	
TOTAL	**25,141,905**	**100**

Note: 1. Includes GAPs, MOAs, and ATCAAs that are part of each alternative. If MOAs and ATCAAs overlap, acreage is only counted once under the airspace.
Source: USGS 2007

Ninety-five percent of the grasslands present in the ROI composed of a diverse mix of herbaceous species including sand prairies, tallgrass prairies, mesic meadows, semi-desert grasslands, and foothills and piedmont grasslands. The remaining grasslands of the area are composed of introduced perennial and annual grasses and primarily used for haying and pastureland.

SHRUBLAND AND STEPPE

The second most extensive vegetation type within the project area includes shrubland and steppe and covers approximately 22.9 percent (5,542,632 acres) of the area (Figure 3.6-1). Steppe vegetation types are co-dominated by shrubs and grasses. The majority of these shrublands in the ROI support sagebrush-dominated (*Artemisia* spp.) and sagebrush-steppe communities. Sagebrush communities are variable in composition and structure depending on the soils, elevation, and moisture present. In general, the vegetation in sagebrush communities is widely spaced and has an understory dominated by bunchgrasses and forbs.

The expanse and quality of sagebrush communities across the United States have declined over the past few decades mainly due to fragmentation, alteration, and loss of habitat as a result of urbanization, agriculture, grazing practices, invasive species, and disruption of natural disturbance regimes such as fire (Connelly *et al.* 2004; Rowland 2004). Alteration of fire regimes and the related invasion of invasive plants, notably cheatgrass (*Bromus tectorum*), are believed to be the greatest threats to the health of sagebrush communities (USDA NRCS 2005). It has been estimated that about 50 percent of the historical range of sagebrush habitat remains today (USDA NRCS 2005; Shroeder *et al.* 2004).

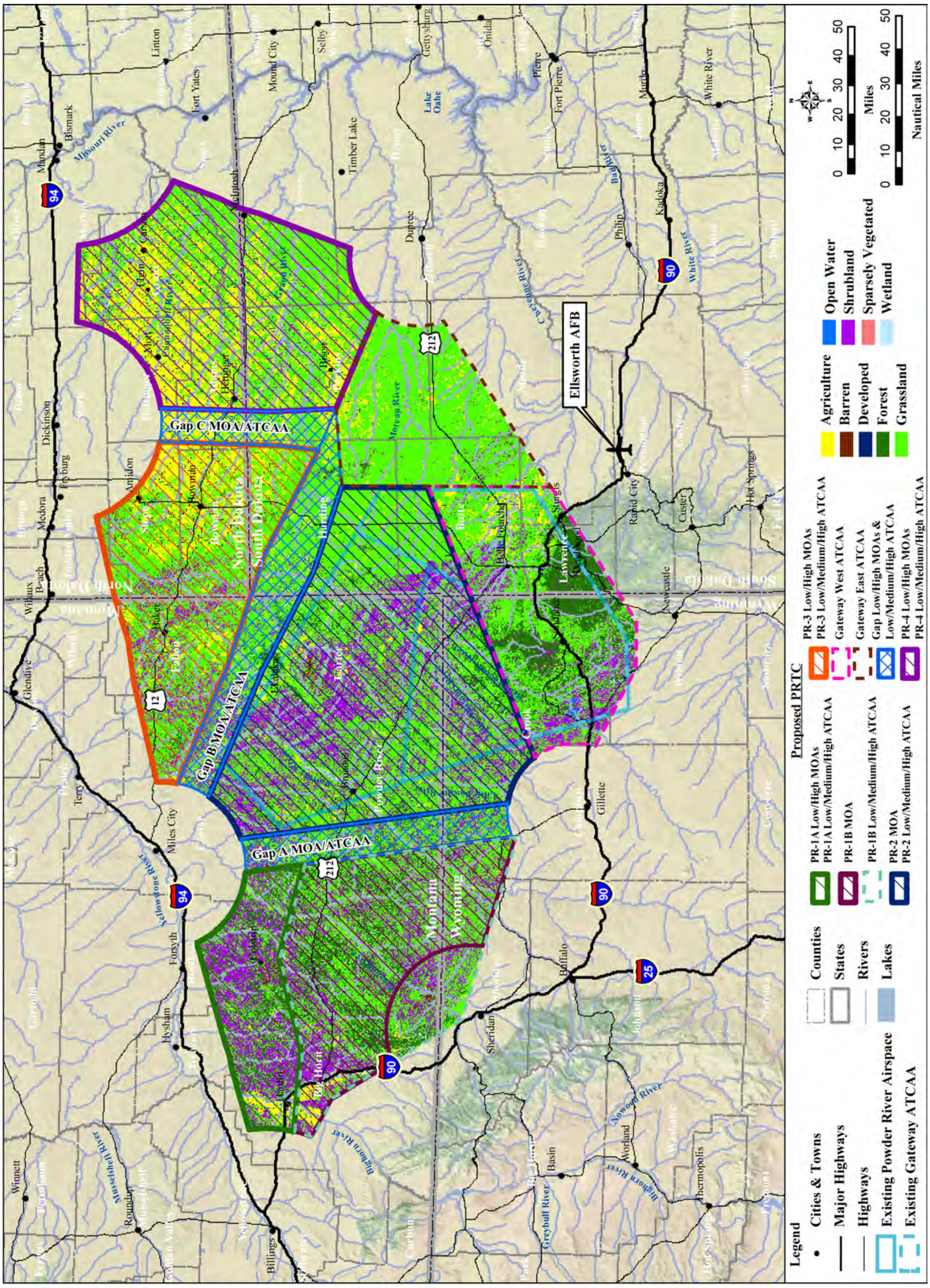


Figure 3.6-1. Vegetation

In the upper elevations of the region fire frequency has decreased, in some cases leading to the invasion of juniper (Juniperus spp.) and piñon pine (Pinus edulis) that outcompete herbaceous and shrub species upon which wildlife such as the greater sage-grouse depend. In some lower elevations, fire frequency has increased due to the spread of cheatgrass (Bromus tectorum) and other invasive grasses that burn readily and carry wildfires (USDA NRCS 2005). Cheatgrass is an annual species that can invade during the first season following a fire and is capable of fueling repeated fires at very short intervals. Frequent fires therefore prevent regeneration of sagebrush and other slower-growing shrubs, which can lead to a conversion of a shrub-dominated community to a community dominated by short-lived weedy grasses that offer limited forage value.

Forests and woodlands under the proposed PRTC include the Custer National Forest under portions of PR-1A and PR-1B.

FORESTS AND WOODLANDS

Forests and woodlands make up approximately 9 percent of the ROI (approximately 2,209,055 acres) and are composed of primarily wooded draws and ravines, ponderosa pine forests, limber pine-juniper woodlands, and various other deciduous and coniferous forests. Wooded draws and ravines support ash (*Fraxinus* spp.) and elm (*Ulmus* spp.) species with some areas containing Rocky Mountain juniper (*Juniperus scopulorum*). Forests cover a small (approximately 128,000 acres [0.5%]) proportion of the project area and are found scattered on discontinuous mountains, canyons, and plateaus up to 6,000 feet, primarily in the southern and western project area (Figure 3.6-1 Vegetation). The forests are dominated by ponderosa pine (*Pinus ponderosa*) in the overstory with associated midstory woody species including Rocky Mountain juniper, green ash (*Fraxinus pennsylvancia* var. *lanceolata*), and chokecherry (*Prunus virginiana*). The density of woody species varies depending on moisture availability and the fire history, with more frequent fires creating a more open savannah-like forest with a grassy understory. Typical understory plants include bluebunch wheatgrass (*Pseudoroegneria spicata*) and needle-and-thread (*Stipa comata*) (USDA USFS 1990).

AGRICULTURE

Cultivated agricultural areas (encompassing hay/pastureland, irrigated, and other cultivated cropland) cover approximately 8 percent of the ROI (2,078,986 acres) with major crops including wheat, sunflowers, alfalfa, hay, barley, and soybean fields (SDDA 2008; USDA 2007; NDDA 2000). Additional information on the socioeconomic agricultural impacts are found in Table 3.9.12 The availability of irrigation water is a limiting factor on agricultural production in the region. Dryland farming also occurs. Conversion of native grasslands to crops and pastureland is one of the primary reasons for a decline in diversity of wildlife habitat across the Great Plains, primarily east and south of the project area where more moisture is available. While croplands do not support the diversity of wildlife species that native habitat does, agricultural fields can provide open space, cover, and foraging habitat for a variety of wildlife species such as upland game birds, rodents, lagomorphs (rabbit species), introduced, and ubiquitous species (Brady 2007).

Agriculture and grasslands encompass over two-thirds of the vegetation under the proposed PRTC.

The majority of agricultural use in the project area on private land and public land leases is for livestock grazing. Grazing land use retains the open character of the landscape, can support native plant species, and allows forage and cover access for wildlife species. Agriculture and livestock are discussed in Section 3.8, *Land Use*.

Developed Areas

Developed areas, including commercial, industrial and residential developments, and other built up areas constitute about one percent of the area under the airspace. These are few and far between as the area is primarily rural and uninhabited in character.

Barren and Sparsely Vegetated Areas

Barren and sparsely vegetated areas include naturally barren areas such as badlands or other areas where characteristics of the soil or bedrock severely limit the growth of vegetation. Other barren areas include sandstone buttes, shale barren slopes, and exposed rocky outcrops such as the granite-metamorphic rocky outcrops in the Black Hills (NatureServe 2008).

Floodplains, Riparian Systems, and Other Wetlands

Floodplains. Floodplain forests within the ROI are riparian areas that occur along water bodies, usually along level ground, and vary in width from less than a mile to seven miles in the ROI. These systems include floodplains of medium and large rivers such as the Missouri River Basin and the Yellowstone River. Floodplains have alluvial soils and are subject to periodic flooding typically at 5 to 25 year intervals. Flooding is primarily driven by snowmelt in the mountains. Vegetative communities within these systems are variable ranging from floodplain forests dominated by cottonwood (*Populus* spp.), ash, elm, and willow (*Salix* spp.), to wet meadows dominated by graminoids (grasses and grass-like plants such as sedges [*Carex* spp.] and rushes [*Juncus* spp.]), to gravel/sand flats. In many cases these vegetative communities have been degraded due to groundwater depletion, lack of fire, or over-grazing (NatureServe 2008; Sullivan 1995).

Riparian Systems. Other riparian systems within the proposed airspace are differentiated from floodplains in that they are found as bands along more narrow rivers, along stream banks at higher elevations, or along seeps or isolated springs on hill slopes. These systems consist of a variety of vegetative communities including herbaceous-dominated systems, shrub-dominated areas within montane conifer or aspen forests, and tree-dominated systems within montane areas. The dominant shrubs within montane riparian areas include gray alder (*Alnus incana*), birch (*Betula* spp.), willow, and dogwood (*Cornus sericea*). At higher elevations along narrow valleys and canyons, dominant riparian tree species include Douglas-fir (*Pseudotsuga menziesii*), spruce (*Picea pungens* and *P. engelmannii*), aspen (*Populus tremuloides*), and Rocky Mountain juniper (NatureServe 2008).

Even though they occupy a small percentage of western lands, floodplains and riparian habitats are biologically rich, and therefore, disproportionately valuable for wildlife habitat. These areas provide an ecologically diverse transition between upland and aquatic systems and provide forage, cover, migration corridors, wind and sun protection, breeding habitat, and water sources for a variety of wildlife species. These areas, especially on slopes, are also subject to rapid changes such as resulting from flash floods and snow/soil movement events.

Wetlands

Wetlands are defined by the USACE and USEPA as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include marshes, bogs, and similar areas" (33 CFR 328.3[b]). Wetlands provide a variety of functions including groundwater recharge and discharge, floodflow attenuation, sediment stabilization, sediment and toxicant retention, nutrient cycling, and habitat for plants and fish and wildlife species. Three criteria are necessary to define wetlands: vegetation (hydrophytes), soils (hydric), and hydrology (duration of flooding or soil saturation).

This section describes the major wetland types that occur underneath the airspace of the ROI. Wetlands were mapped as covering 1.5 percent of the area under the proposed airspace. Some portions of the floodplains and riparian areas described above meet the delineation criteria and are considered wetlands as well, but were too small in scale to map. The most common types of wetlands that occur under the ROI are Western Great Plains Depressional Wetlands and Inter-Mountain Basins Greasewood Flats. These two wetland types cover less than one percent of the area under the proposed airspace; however, wetlands, as well as riparian systems and floodplains, have a disproportionately high value to wildlife and ecosystem function in this region.

Depressional/Herbaceous Wetlands. Approximately 102,389 acres of Western Great Plains Depressional wetlands are found under the ROI. The depressional wetlands include closed and open systems that are either freshwater or saline. Closed, freshwater systems have a perched water table, separate from the groundwater table, have an impermeable layer of clay or hydric soil, and are recharged by rainwater or runoff. These closed systems are usually dominated by a variety of herbaceous plants including graminoids and forbs (NatureServe 2008). Open freshwater systems include submergent and emergent marsh as well as wet meadows and wet prairies along lowland depressions and lake borders. They differ from the closed systems in that they are part of a larger watershed or are connected to the groundwater. Vegetative communities include emergent species such as cattails (*Typha* spp.), sedges, rushes, and spikerush (*Eleocharis* spp.) (NatureServe 2008). Saline systems often have a salt encrustation on the soil surface. These systems can be open or closed and are dominated by salt-tolerant and halophytic herbaceous species such as saltgrass (*Distichlis spicata*) and alkali sacaton (*Sporobolus airoides*), and are often intermingled with greasewood flats (NatureServe 2008).

Greasewood Flats/Woody Wetlands. Approximately 274,374 acres of greasewood flats and other woody wetlands occur underneath the ROI. Greasewood flats are found near drainages on stream terraces and flat areas or can grow in rings around playas, which form in the bottoms of undrained basins. These sites have saline soils, a shallow water table, and flood intermittently, but normally remain dry for most of the growing season. Vegetative communities are usually dense to open shrublands dominated by greasewood (*Sarcobatus vermiculatus*) and co-dominant species including sagebrush and saltbush (*Atriplex* spp.). In areas where water or snow remains the longest, grasses may be present in the understory including alkali sacaton, western wheatgrass (*Pascopyrum smithii*) and saltgrass (NatureServe 2008). Woody vegetation that grows in riparian areas was covered under Riparian Systems above.

Other types of wetlands which exist under the proposed airspace, but are too small to map at a regional scale, include fens, playas, wet meadows, seeps, and springs (USEPA 2008f).

OPEN WATER

Water provides breeding habitat and water sources for waterfowl and other wildlife.

Open water habitats constitute a very small percentage of the area under the proposed airspace and are important in sustaining many fish and wildlife species in the region. Open water occurs most frequently in the North Dakota and South Dakota portions under the proposed airspace. Shallow water habitats may be vegetated with submergent plants (e.g., pondweeds), which provide food and cover for aquatic vertebrates and invertebrates as well as waterfowl. Open water habitats also typically support emergent wetland or riparian vegetation around their margins and in very shallow areas. Migratory birds, particularly waterfowl, find open water in the Great Plains states invaluable for rest stops and foraging on long migration routes (see Section 3.6.3.2, *Wildlife*).

3.6.3.2 Wildlife

The major wildlife habitats that occur under the proposed airspace are summarized in Table 3.6-2. Eight primary habitats are present, each supporting its own distinctive array of wildlife species. Within each of these habitats there exist a matrix of microhabitats with subtle differences in plant composition and physiographic features. In addition, the ROI overlays a multitude of private, public, and tribal land ownership (see Section 3.8, *Land Use*). As a result, wildlife habitat management objectives and techniques vary from area to area according to the landowner. Given that the proposed project area covers a number of habitats in four states, the diversity of wildlife species is considerable. This section discusses the primary game and nongame wildlife species that occur under the project area. Table 3.6-3 summarizes representative species and their season of occurrence. Information on species of special concern and federally listed species is presented in Section 3.6.3.3.

Table 3.6-2. Wildlife Habitats that Occur Under the Proposed PRTC Airspace

Habitat Type	*Description*	*Habitat Value*	*Characteristic Wildlife*
Wetlands, Floodplains and Riparian Systems	Riparian areas along streams and rivers, floodplains, depressional wetlands, and greasewood flats	These areas have value for most life-stages of amphibians, as well as foraging, cover, breeding, and water sources for a variety of other wildlife species.	Mammals (mule and white-tailed deer, moose); amphibians; birds (waterfowl and breeding migratory)
Open Water	Lakes, rivers, streams, reservoirs, ponds.	Open water habitat in the study area has value for fish, most life-stages of amphibians, as well as foraging, breeding, and a water source for a variety of other wildlife including waterfowl and shorebirds.	Mammals (river otter); amphibians and reptiles (snapping turtle, frogs); birds (migratory and resident waterfowl, shorebirds, wading birds); fish; invertebrates
Grasslands	Mixed-grass prairies with varying amounts of shrub cover, shortgrass prairies, and rangelands, which can be dominated by introduced grasses such as cheatgrass.	Provides foraging, nesting, and migration habitat	Mammals (ungulates, prairie dogs and other rodents); birds (upland game birds, songbirds, raptors); reptiles (snakes, lizards)
Shrubland and Steppe	Sagebrush, saltbush, montane-foothill deciduous shrubland, northwestern great plains shrubland	Provide foraging, cover, and nesting habitat for a wide variety of species.	Birds (sharp-tailed grouse, songbirds, raptors ungulates (pronghorn, deer)
Forests and Woodlands	Ponderosa pine forests, bur oak, and pine/juniper woodlands,	Forested upland habitat in the study area has value for breeding, foraging, cover from predators, and shelter for a variety of wildlife species.	Mammals (elk, mule deer, black bear, mountain lion, bats); Birds (songbirds, woodpeckers), amphibians (tree frogs, salamanders)
Agriculture	Major crops include wheat, sunflowers, alfalfa, hay, barley, and soybean fields	Value for foraging and cover for a variety of wildlife species.	Upland game birds, rodents, and lagomorphs and ubiquitous species.
Developed Areas	Comprised mainly of buildings, paved surfaces, landscaped areas, and other infrastructure.	Developed areas in the study area are not important habitat for wildlife. Some wildlife use human structure for nesting or forage on garbage in developed areas.	Ubiquitous species such as small mammals (e.g., rodents), birds (e.g., mockingbird, grackle, eastern towhee)
Barren and Sparsely Vegetated	Rocky outcrops, cliffs, or sparsely vegetated grasslands and shrublands	Provide very little habitat value. Rocky outcrops and cliffs can provide refuge or nesting areas for some species.	Small mammals, lizards, raptors.

Table 3.6-3. Representative Game and Nongame Wildlife Species that Occur Under the Proposed PRTC Airspace

Wildlife Grouping	*Representative Species*[1]	*Season(s) of Occurrence*
Game Species		
Ungulates	White-tailed deer, mule deer, elk, moose, and pronghorn.	Generally year-round
Upland Game Birds	Sharp-tailed grouse, turkey, ring-necked pheasant, chukar, mourning dove	Generally year-round
Waterfowl	Merganser, green-winged teal, lesser scaup, snow goose, Canada goose, mallard, redhead, ring-necked duck, etc.	Year round: mallard, Canada goose; Summer: green-winged teal, lesser scaup; snow geese; redhead
Mammals	*Carnivores:* (e.g., black bear, mountain lion, fox, bobcat,; coyote, mink, weasel, badger) *Small mammals*: (e.g., , prairie dogs, cottontails, white-tailed jackrabbits, raccoon, muskrat, porcupine, beaver, skunk)	Generally year-round
Nongame Species		
Mammals	Northern pocket gopher, chipmunks, ground squirrels, mice, voles, rats *Bats:* (e.g., big brown bat, hoary bat)	Generally year-round
Birds	*Raptors:* (e.g., prairie falcon, red-tailed hawk, Swainson's hawk, sharp-shinned, golden eagle, barn owl, great-horned owl) *Woodpeckers:* (e.g., downy woodpecker, northern flicker, sapsuckers) *Other:* (e.g., meadowlark, longspur, sparrows, swallows, warblers, finches, black-billed magpie, chickadee)	Year -round: red-tailed hawk, prairie falcon, great-horned owl; woodpeckers, black-billed magpie, chickadee Winter: Sharp-shinned hawk Summer: golden eagle, barn owl, Swainson's hawk, woodpeckers, warblers, swallows, sparrows.
Amphibians	Plains spadefoot, boreal chorus frog, Great Plains toad, leopard frog, salamanders	Primarily spring-summer (outside hibernation season)
Reptiles	Eastern racer, plains gartersnake, bullsnake, common sagebrush lizard, greater short-horned lizard, painted turtle	Primarily spring-summer (outside hibernation season)

Notes: 1. This table does not include ESA-listed species or Species of Special Concern (see next section).
Sources: MT Natural Heritage Program 2007; Bailey 1995.

GAME SPECIES

Species considered "game species" by local state game and fish departments within the project area include ungulates, upland game birds, waterfowl, carnivores such as mountain lion, bear, and coyotes, and other mammals that are trapped including mink, fox, and raccoon.

White-tailed deer represent both a biological and an economic resource under the proposed PRTC.

Ungulates: Ungulate game species within the project area include mule deer, white-tailed deer, elk, pronghorn (commonly known as antelope), and moose. Mule deer occur throughout the project area in grasslands, riparian areas, foothills and montane shrublands, and aspen groves (MT Natural Heritage Program 2007; ND Game and Fish 2005). Their winter is spent primarily in lower elevations and mule deer move to higher elevations in the summer (Scribner 2006). Elk primarily inhabit coniferous forests interspersed with openings such as meadows and grasslands (MT Natural Heritage Program 2007). White-tailed deer are most often found in lower elevation river and creek bottoms where vegetation is dense (MT Natural Heritage Program 2007; ND Game and Fish 2005). Moose prefer wetter habitats and usually inhabit mountain meadows, river valleys, swamps, willow flats, and mature coniferous forests (MT Natural Heritage Program 2007). Because these habitats are limited in the ROI, moose are uncommon. Pronghorn are found throughout the project area mainly in open rolling sagebrush/grasslands with slopes of less than 10 percent (ND Game and Fish 2005, 2006; MT Natural Heritage Program 2007).

Other Game Species: Large carnivores such as black bears and mountain lions are hunted, primarily in western portions of MT and WY. Smaller game includes a variety of furbearing mammals and those considered "predatory" including coyote, badger, beaver, bobcat, mink, weasel, muskrat, porcupine, prairie dogs, squirrels, rabbits, red fox, raccoon, and skunk.

Upland game birds: A variety of upland game birds occur throughout the proposed project area. Most species, including sharp-tailed grouse, chukar, and ring-necked pheasant, are found in open grasslands and croplands (MT Natural Heritage Program 2007; ND Game and Fish 2005). Wild turkeys can be found in similar habitat as well as in open ponderosa pine forest and wooded river bottoms (MT Natural Heritage Program 2007; ND Game and Fish 2005). The greater sage-grouse is also present and is discussed in Section 3.6.3.3, *Special Status Species*.

Waterfowl: The proposed project area generally occurs under the convergence of several principal routes of both the Central Flyway and the Mississippi Flyway for migratory birds (Figure 3.6-2). The diversity of species crossing under the proposed airspace during migratory periods is large. Waterfowl known to occur in the area include the merganser, green-winged and cinnamon teal, scaups, snow goose, Canada goose, mallard, redhead duck, and ring-necked duck. These species are dependent upon wetlands and surface waters such as freshwater ponds, lakes, rivers, and marshes for their primary habitat during migration stopovers and for foraging (MT Natural Heritage Program 2007; ND Game and Fish 2005). Such habitats are typically located in river valleys and lower elevations within the ROI. Croplands and grasslands in the airspace may also be used by waterfowl and shorebirds for foraging.

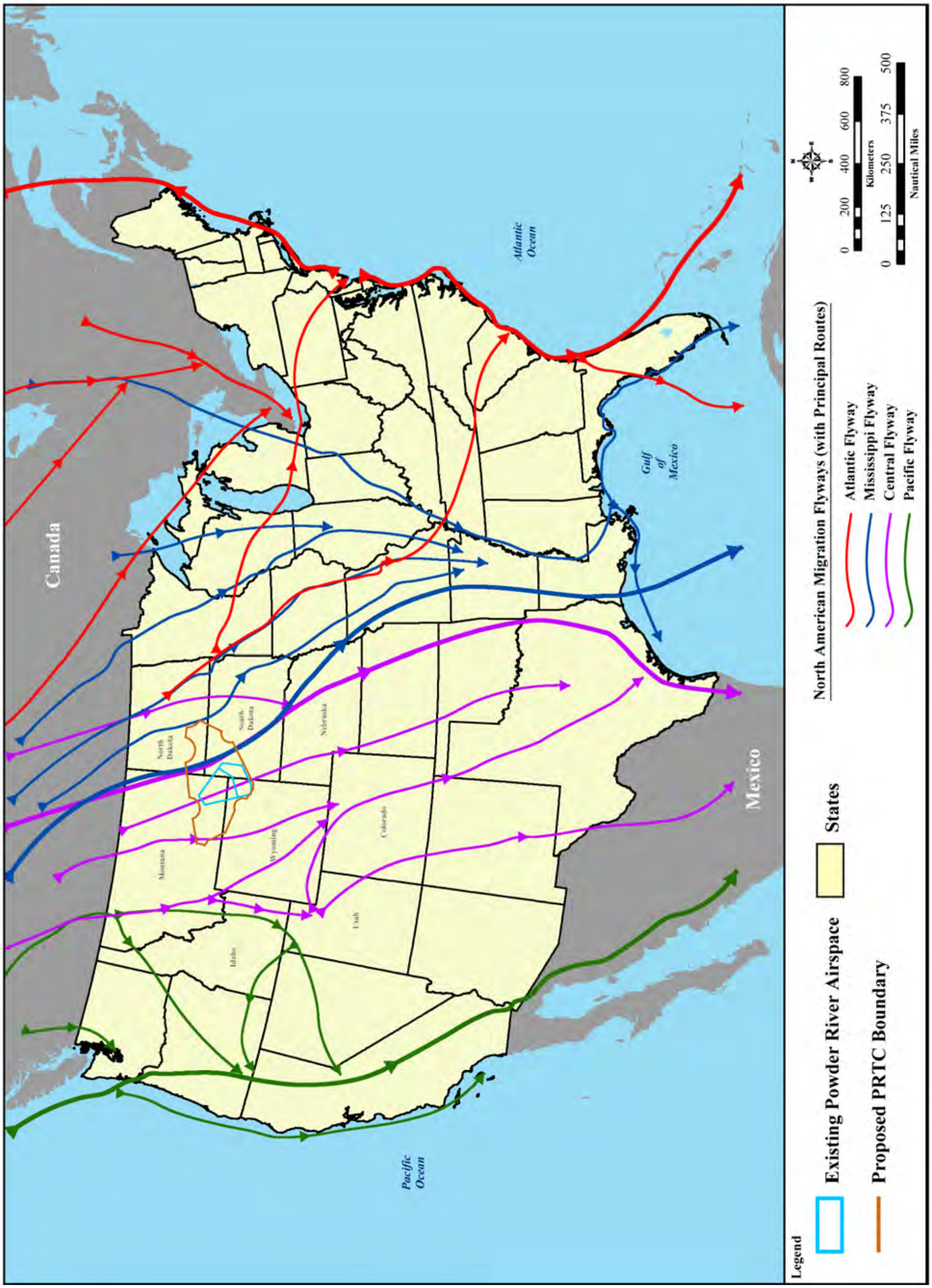


Figure 3.6-2. Migratory Flyways

NONGAME SPECIES

Typical nongame species include birds, bats and small rodents. Nongame bird species include raptors (hawks, owls, golden eagle) songbirds and other perching birds. All amphibian species are nongame and those present in the project area include salamanders, the Great Plains toad and the plains spadefoot. The eastern racer, greater short-horned lizard and the painted turtle are examples of reptiles that can be found within the project area.

3.6.3.3 Threatened, Endangered, and Other Special Status Species

FEDERALLY LISTED SPECIES

Five animal species that are listed under the ESA as threatened or endangered (three birds, one mammal, and one fish) and two ESA candidate bird species have been documented or have the potential to occur in suitable habitats within or near the ROI (Table 3.6-4). The federally listed bird species include the endangered interior least tern (*Sterna antillarum athalassos*), the threatened piping plover (*Charadrius melodus*), and the endangered whooping crane (*Grus americana*). The western distinct population segment of the yellow-billed cuckoo (*Coccyzus americanus*) and the greater sage-grouse (*Centrocercus urophasianus*) are candidate species.

The interior least tern and the piping plover are both found along sand, gravel and/or pebble beaches of rivers and lakes, primarily along the Missouri and Yellowstone Rivers, both of which fall just outside the airspace (Hagen *et al.* 2005). Some of the piping plover range overlaps the project area and, given the close proximity of suitable habitat, there is potential for these species to occur along tributaries within the ROI.

The central migration route of the whooping crane is the last naturally-occurring route of this species in the U.S. and has been mapped as crossing from northwest ND through central SD east of the proposed ROI (NatureServe 2008). The whooping crane is a seasonal migrant that uses wetland areas of ND and SD east of the proposed airspace for stopover and resting during these long migrations. The western yellow-billed cuckoo is also a long-distance migrant that uses riparian forested thickets in SD, and occasionally WY, for breeding (WY Game and Fish [WYGF] 2005).

The greater sage-grouse is dependent year-round upon sagebrush shrublands, which have been in decline in recent years. Consequently, sage-grouse population numbers have been decreasing for decades, thought to be due to reduction in suitable habitat (Connelly *et al.* 2004; Rowland 2004). In 1999, growing concern for the species lead to a petition to list the greater sage-grouse under the ESA. After review, the USFWS ruled in 2004 that listing was not warranted (McCarthy and Kobriger 2005). Subsequent recent review resulted in adding the greater sage-grouse to the federal candidate list on March 5, 2010. The species receives special management attention under USFS, BLM, and in all four states of the project area.

The historic range of the black-footed ferret (*Mustela nigripes*) included all four of the project area states. Having nearly been extirpated in the U.S. as a result of prairie dog extermination, the black-footed ferret has been successfully reintroduced to eight states as of 2008, including MT, WY, and SD. Although all of these populations are listed as endangered, some of them are managed as nonessential experimental. The black-footed ferret is found in shortgrass and mixed–grass prairies, and suitable habitat for reintroduction is defined as prairie dog towns that are generally greater than 80 acres or are part of a 1,000 acre or more complex of prairie dog colonies (WY Game and Fish 2005; USFWS 2008a). One of the recent reintroduction sites is located on the Northern Cheyenne Native American Reservation in southeast MT (USFWS 2008b), which is under the proposed PR-1B MOA.

Table 3.6-4. Federally Listed Species Known to Occur or with Potential to Occur under the Proposed PRTC Airspace (Page 1 of 2)

Common Name	*Scientific Name*	AIRSPACE STATES AND COUNTIES OF OCCURRENCE				*FED*[1]	*Expected Occurrence and Habitat*
		ND	*SD*	*MT*	*WY*		
Birds							
Piping plover	*Charadrius melodus*	All Counties – rare	Corson	Fallon, Custer?		T	Potential during migration, nesting occurs along Missouri and Cheyenne rivers and may occur along Moreau River. Uses sandbars, islands, shorelines.
Whooping crane	*Grus americana*	All counties - rare	Butte, Corson, Meade, Perkins, Pennington, Ziebach	Custer, Fallon, Yellowstone	Very rare migrant	E	Potential during migration. Uses sloughs, marshes, rivers, lakes, ponds, croplands, and pastures.
Interior least tern	*Sterna antillarum athalassos*	Morton, Sioux	Meade	Custer, Rosebud		E	Potential during migration, nesting occurs along Missouri and Cheyenne rivers and may occur along Moreau River. Uses sandbars, islands, shorelines.
Yellow-billed cuckoo	*Coccyzus americanus*				Crook, Sheridan	C	Cottonwood –riparian areas
Greater sage-grouse	*Centrocercus urophasianus*	Bowman, Slope, Golden Valley	Butte, Harding, with incidental observations in Perkins and Meade	Carter, Fallon, Custer, Powder River, Rosebud, Big Horn, Treasure	Campbell, Crook, Sheridan, Weston,	C	Dependent upon large stands of mature sagebrush year round for foraging and cover. Flat, open grassland needed for breeding (leks). Historically occurred across the entire ROI; eastern portion of range has subsided.

Table 3.6-4. Federally Listed Species Known to Occur or with Potential to Occur under the Proposed PRTC Airspace (Page 2 of 2)

		Airspace States and Counties of Occurrence					
Common Name	***Scientific Name***	***ND***	***SD***	***MT***	***WY***	***FED[1]***	***Expected Occurrence and Habitat***
Mammals							
Black-footed ferret	*Mustela nigripes*		Six parcels in western portion of state, includes Badlands and Wind Cave national parks	Four parcels in state, one in southeastern portion on N. Cheyenne Reservation		E, N/E in MT, WY, SD	Historical occurrence across ROI. All current populations have been re- introduced; suitable habitat includes prairie dog towns >80 acres or any towns part of a >1,000 acre complex of prairie dog colonies
Fish							
Topeka shiner	*Notropis topeka*		Corson (historical)			E	Historical occurrence only. All current populations are found in small streams within eastern SD, within the Big Sioux, Vermillion, and James River watersheds

Note: 1. Federal Listing as N/E = Nonessential Experimental, referring to reintroduced populations
"?" indicates uncertainty as to county occurrence.
Sources: USFWS 2006; USFWS 2007; USFWS 2008a; WY Natural Diversity Database (WYNDD) 2003; Montana Sage Grouse Work Group 2005; SD Wildlife Division, Department of Game, Fish and Parks 2008; McCarthy and Kobriger 2005.

The endangered Topeka shiner (*Notropis topeka*) occupies small prairie streams that have groundwater input. The current known populations have been found outside the ROI, with the closest populations being in eastern SD, within the Big Sioux, Vermillion, and James River watersheds (Shearer 2003). The USFWS species list includes a historical occurrence for the Topeka shiner in Corson County, SD; however, the species is no longer considered present.

Species of Special Concern

Eighty-six species of special concern to the states and other federal agencies (e.g., Bureau of Land Management [BLM], USFS) that are considered the highest priority for each state in the ROI (24 birds, 7 mammals, 8 fish, 8 reptiles and amphibians, and 38 plants) may occur in counties under the proposed ROI. Appendix K lists these species and the ROI states and counties in which they are found. Appendix K briefly describes the habitat requirements for each. General species groups that often receive special management consideration by federal and state wildlife agencies and/or have potential to be affected by aircraft training within the proposed airspace include bats and waterfowl. The bald eagle was previously listed for federal protection under the ESA; however, due to recovery the bald eagle was delisted in 2007. The bald eagle is now protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act

Bats: Three species of bats considered species of special concern in MT and WY are found in the project area. Townsend's big-eared bat (*Corynorhinus townsendii)* inhabits caves and abandoned mines near conifer and bottomland woodlands. The pallid bat (*Antrozous pallidus)* can be found in ponderosa pine forests and big sagebrush shrublands with rock outcrops. The spotted bat (*Euderma maculatum)* prefers open, arid habitats close to tall cliffs (MT Natural Heritage Program 2007).

Waterfowl: Waterfowl species of special concern include the common loon (*Gavia immer*), the horned grebe (*Podiceps auritus*) and the American white pelican (*Pelicanus erythrorhynchos*). The common loon is found in WY and often inhabits clear, secluded mid-elevation lakes typically less than four acres in size. The horned grebe is a passage migrant within the proposed airspace and can be found in most open water resources. The American white pelican is also considered a passage migrant and is often observed in lakes, marshes, and rivers (MT Natural Heritage Program 2007). Section 3.6.3.1 details the limited extent of water bodies in the ROI, so those water sources present are of considerable importance to waterfowl as well as other species.

Domestic Animals

The majority of agricultural use in the project area on private land and public land leases is for livestock grazing. Ranches and associated livestock grazing alone constitute approximately 78 percent of the land use in the ROI. Cultivated agricultural areas (encompassing hay/pastureland, irrigated, and other cultivated cropland) cover approximately 8 percent of the ROI (2,078,986 acres) with major crops including wheat, sunflowers, alfalfa, hay, barley, and soybean fields (SDDA 2008; USDA 2007; NDDA 2000).

Beef cattle, with some milk cows, represent the greatest proportion of livestock in the ROI, accounting for 71 percent of all livestock. Sheep and lambs account for 23 percent, horses account for 4.7 percent and the remaining 0.5 percent is comprised of hogs and pigs.

Livestock in the ROI counties represents a portion of the statewide livestock inventory for each of the four states. The beef cows in the ROI counties in MT comprise approximately 13.5 percent of the total inventory of beef cows in the state. The beef cow inventory in the ROI states of ND and WY also comprise 25 percent and 17 percent of the total inventory in the respective states. The number of milk cows in the ND ROI counties comprises over 33 percent of the total number of milk cows in the state. Livestock on the ROI farms is shown on Table 3.9.13.

3.7 Cultural and Historic Resources

3.7.1 Definition of the Resource

Cultural resources are prehistoric and historic sites, buildings, districts, or objects that are important to a culture or community. Cultural resources are generally divided into four categories: archaeological resources, architectural resources, traditional cultural resources, and cultural landscapes.

Archaeological resources occur in places where people altered the ground surface or left artifacts or other physical remains (e.g., arrowheads, glass bottles, pottery). Archaeological resources can be classified as either sites or isolates. Isolates generally cover a small area and often contain only one or two artifacts, while sites are usually larger in size, contain more artifacts, and sometimes contain features or structures. Archaeological resources can be either prehistoric or historic.

Architectural resources are standing buildings, dams, canals, bridges, windmills, oil wells, and other such structures. They are generally historic in affiliation.

Traditional cultural properties can include properties, sites, or other resources associated with the cultural practices or beliefs of a living community that link the community to its past and help maintain its cultural identity that are eligible or listed on the NRHP. Traditional cultural resources are areas that are associated with the cultural practices or beliefs of a living community that link the community to its past and help maintain its cultural identity that have not been evaluated for NRHP eligibility. Sacred sites are well known areas associated with cultural practices or beliefs of a living community. Most traditional cultural properties, resources, or sacred sites in MT, WY, SD, and ND are associated with Native Americans. Traditional cultural properties or resources may also be associated with other traditional lifeways, such as ranching. Traditional cultural properties or resources can include archaeological resources, locations of prehistoric or historic events, sacred areas, sources of raw materials used in the manufacture of tools and/or sacred objects, certain plants, or traditional hunting and gathering areas.

Cultural landscapes are geographic areas where cultural and natural resources and wildlife have been associated with historic events, activities, or people, or which serve as an example of cultural or aesthetic value. The four types of cultural landscapes are: historic sites (e.g., battlefields, properties of famous historical figures), historic designed landscapes (e.g., parks, estates, gardens), historic vernacular landscapes (e.g., industrial parks, agricultural landscapes, villages), and ethnographic landscapes (contemporary settlements, religious sites, massive geological structures). These categories are not mutually exclusive from each other or the other types of resources defined here (Birnbaum 1994).

The ROI for cultural resources is the area within which the proposed action has the potential to affect existing cultural resources. For the Proposed Action, the ROI is defined as the land under the training airspace proposed for use by B-1, B-52, and transient aircraft in day-to-day or LFE training.

3.7.2 Regulatory Setting

Archaeological and historic sites and structures are protected under a number of laws including the Antiquities Act of 1906, Historic Sites Act of 1935, Archaeological Resources Protection Act of 1979, and the National Historic Preservation Act (NHPA) of 1966, as amended. Under the NHPA and its implementing regulations, only significant cultural resources are considered when assessing the possible impacts of a federal undertaking or action. Significant archaeological, architectural, and traditional cultural resources include those that are listed or eligible for listing for inclusion on the National Register of Historic Places (NRHP). The significance of cultural resources is usually determined by using specific criteria as defined by the NHPA under 36 CFR 60.4, including association with an event or individual significant to the past, ability to contribute to scientific research, or ability to add to an understanding of history or prehistory. Cultural resources must exceed 50 years of age to be considered for listing on the NRHP. However, more recent resources such as Cold War-era buildings may warrant protection if they manifest “exceptional significance.” Traditional cultural resources can be evaluated for NRHP-eligibility, as well. Whether or not a traditional cultural resource is evaluated for NRHP eligibility, it may have special importance to the respective tribe, and as such, DoD has particular trust responsibilities to ensure its proper stewardship.

National Historic Landmarks are cultural resources of national historic importance and are automatically listed on the NRHP. Under the implementing regulations for Section 106 (36 CFR Part 800.10) for the NHPA, special consideration to minimize harm to National Historic Landmarks is required and both the Advisory Council for Historic Preservation and the Secretary of the Interior are consulted if any adverse effects are likely to occur to such resources. *National Monuments* were established under the Antiquities Act of 1906, which gives the President of the United States authority to restrict the use of public land owned by the federal government as parks or conservation lands by EO. National Monuments were “historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest”” (16 USC 431-433) that were identified for protection and federal management. National monuments that are historic in character and managed by the National Park Service are administratively listed on the NRHP. Devils Tower, now under the Gateway ATCAA, was the first national monument to be established on September 24, 1906.

Several laws and regulations address the requirement of federal agencies to notify or consult with Native American tribes or otherwise consider their interests when planning and implementing federal undertakings. In particular, on April 29, 1994, the President issued the *Memorandum on Government-to-Government Relations with Native American Tribal Governments*, which specifies a commitment to developing more effective day-to-day working relationships with sovereign tribal governments. In addition to the Memorandum, EO 13175 *Consultation and Coordination with Indian Tribal Governments* (November 6, 2000) reaffirms the U.S. Government’s responsibility for continued collaboration and consultation with Tribal Governments in the development of federal policies that have tribal implications, to strengthen the U.S. government-to-government relationships with Native American tribes, and reduce the imposition of un-funded mandates upon Native American tribes. This EO supersedes EO 13084 signed May 14, 1998.

The DoD Instruction 4710.02, *DoD Interactions with Federally-Recognized Tribes*, September 16, 2006, implements the DoD Native American and Alaska Native Policy, assigns responsibilities, and provides procedures for DoD interaction with federally-recognized tribes. Other laws and regulations requiring consultation with Native Americans include the NHPA of 1966, Native American Religious Freedom Act, and EO 13007. The NHPA requires agencies to consult with Native American Tribes if a proposed federal action may affect historic properties to which they attach religious and cultural significance. The Native American Religious Freedom Act sets the policy of the U.S. to “protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian…including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonies and traditional rites.”

EO 13007, *Indian Sacred Sites*, issued on May 24, 1996 requires that in managing federal lands, agencies must accommodate access and ceremonial use of sacred sites, which may or may not be protected by other laws or regulations, and must avoid adversely affecting the physical integrity of these sites.

3.7.2.1 Data Sources

Information on cultural resources within the ROI was derived from conducting background research to identify NRHP and the State Register of Historic Places properties beneath the affected airspace, National Historic Landmarks, National Battlefields, National Historic Trails, any cultural landscapes, ghost towns, historic forts, or historic ranches recorded or known within the same area, and Native American Reservations, sacred areas, or traditional use areas. State Historic Preservation Offices (SHPOs) were contacted at Cheyenne, WY; Helena, MT; Bismarck, ND; and Pierre, SD; and sources were reviewed on the National Register Information System, and the on-line SD State Register. Regional offices of the BLM and cultural resources managers associated with national forests under the airspace were also contacted. Information was solicited as well from Tribal Historic Preservation Offices associated with the four reservations that are under portions of the proposed airspace: the Crow Reservation, Northern Cheyenne Reservation, Standing Rock Reservation, and the Cheyenne River Reservation and from state historic preservation societies in WY, MT, ND, and SD. Other Native American Tribes contacted are listed in Table 3.7-1.

3.7.2.2 Native American Government-to-Government Consultation

In an ongoing effort to identify traditional cultural resources as well as to satisfy the requirements of various laws, regulations, and EOs, the Air Force is consulting with Native American tribes according to the Presidential Memorandum on Government-to-Government Relations with Native American Tribal Governments, EO 13175, and DoD Policy on Native American and Native Alaskan Consultation.

There are four Native American Reservations located under portions of the airspace -- the Northern Cheyenne Reservation, the Crow Reservation, the Standing Rock Reservation, and the Cheyenne River Reservation (Figure 3.7-1). Ellsworth AFB initiated Government-to-Government consultation with each of these tribes in April and May 2008 and in July and August 2009. In addition, 11 reservations outside of the airspace in MT, WY, ND, and SD were sent letters requesting information on concerns and initiating Government-to-Government consultation in June 2008 (Table 3.7-1). The Oglala Sioux and Rosebud Sioux Tribes responded that they would like to be included in the Government-to-Government consultation for the proposed action.

Table 3.7-1. Native American Groups Contacted

Crow Nation, Crow Reservation	Three Affiliated Tribes Business Council, Fort Berthold Reservation	Rosebud Sioux Tribe, Rosebud Reservation
Northern Cheyenne Tribe	Turtle Mountain Tribal Council, Turtle Mountain Reservation	Eastern Shoshone Tribal Council, Wind River Reservation
Standing Rock Reservation	Chippewa-Cree Business Committee, Rocky Boy's Reservation	Oglala Sioux Tribal Council, Pine Ridge Reservation
Cheyenne River Sioux Tribe, Cheyenne River Reservation	Fort Peck Tribal Executive Board, Fort Peck Native American Reservation	Confederated Salish and Kootenai Tribe, Flathead Native American Reservation
Spirit Lake Sioux Tribal Council, Spirit Lake Reservation	Arapaho Business Council, Wind River Reservation	Fort Belknap Community Council, Fort Belknap Reservation

Source: See Appendix M

Tribal scoping meetings were held at the Crow Agency on June 23, the Northern Cheyenne Tribal Council Chamber in Lame Deer, MT on June 24, the Standing Rock Reservation in McLaughlin, SD and Fort Yates, ND on July 11, and at the Cheyenne River Reservation at Dupree, SD on July 16, 2008. There were three primary areas of concern expressed by representatives during scoping meetings that relate to cultural resources. These are 1) the effects on Native American sacred areas and ceremonies by overflights and noise (mentioned by both the general public and by members of each of the four reservations), 2) visual effects to sites and sacred areas from overflights and chaff and flares, and 3) effects on sacred areas and historic sites from subsonic and supersonic noise.

Specific concerns associated with the Proposed Action included:

- The annual Crow Fair and Rodeo takes place at Crow Agency in August, which is an important event on the Crow Native American Reservation.
- There are also other sensitive times and areas on the Crow Reservation that the Crow request be avoided. The Crow also expressed concerns over impacts on tribal ceremonies.
- The Northern Cheyenne have concerns about ceremonies and calving with aircraft activity in airspace over their reservation. They also expressed concerns about noise, impacts on civil aviation, and impacts on the local economy.
- Calving and ceremonial times are a concern to the Standing Rock Native American Reservation, which primarily occur in the summer. One area they expressed concern about is west of Bullhead on the Grand River where Sundance ceremonies are held. The Standing Rock Tribe also expressed concerns over Bear Butte, Wind Cave, and Devils Tower, which they consider sacred areas. The Standing Rock Tribe also expressed concerns about weather patterns and flight safety (aircraft crashes).
- Members of the Cheyenne River Native American Reservation expressed concerns over use of airspace over the reservation between June and August for ceremonial purposes and during calving season. They expressed concerned over potential financial loss during calving season. Sacred/Ceremonial sites are located near Bear Butte, Thunder Butte, Slim Buttes, Inyan Karan Mountain, Devils Tower, and all reservation rivers. Concerns were expressed for ceremonial activities such as Vision Quests and Sundance activities.

Social Communities

A small Amish settlement is located 10 miles north of Ashland, MT under the proposed PR-1B MOA airspace. A small Hutterite Colony, called 40-Mile, is located about halfway between Sheridan, WY and Hardin, MT, also under the proposed PR-1B MOA. While these communities differ in their religious beliefs and cultural practices, both are farming communities that have descended from the Anabaptists. Both communities maintain communal lifestyles and remain largely isolated from the culture at large. The Amish and the Hutterites maintain material simplicity to varying degrees. Most Amish do not operate machinery or use modern technology. Pacifism is a basic tenet of Hutterite religion. Variation from baseline noise levels may be more disruptive to communities whose residents are not accustomed to machine or industrial noise.

3.7.3 Existing Conditions

The affected environment includes the lands and resources potentially affected by the Proposed Action. The affected airspace varies according to which of the alternatives is adopted, but would involve all areas beneath newly created or expanded MOAs and ATCAAs. The rich history of these areas are described briefly below.

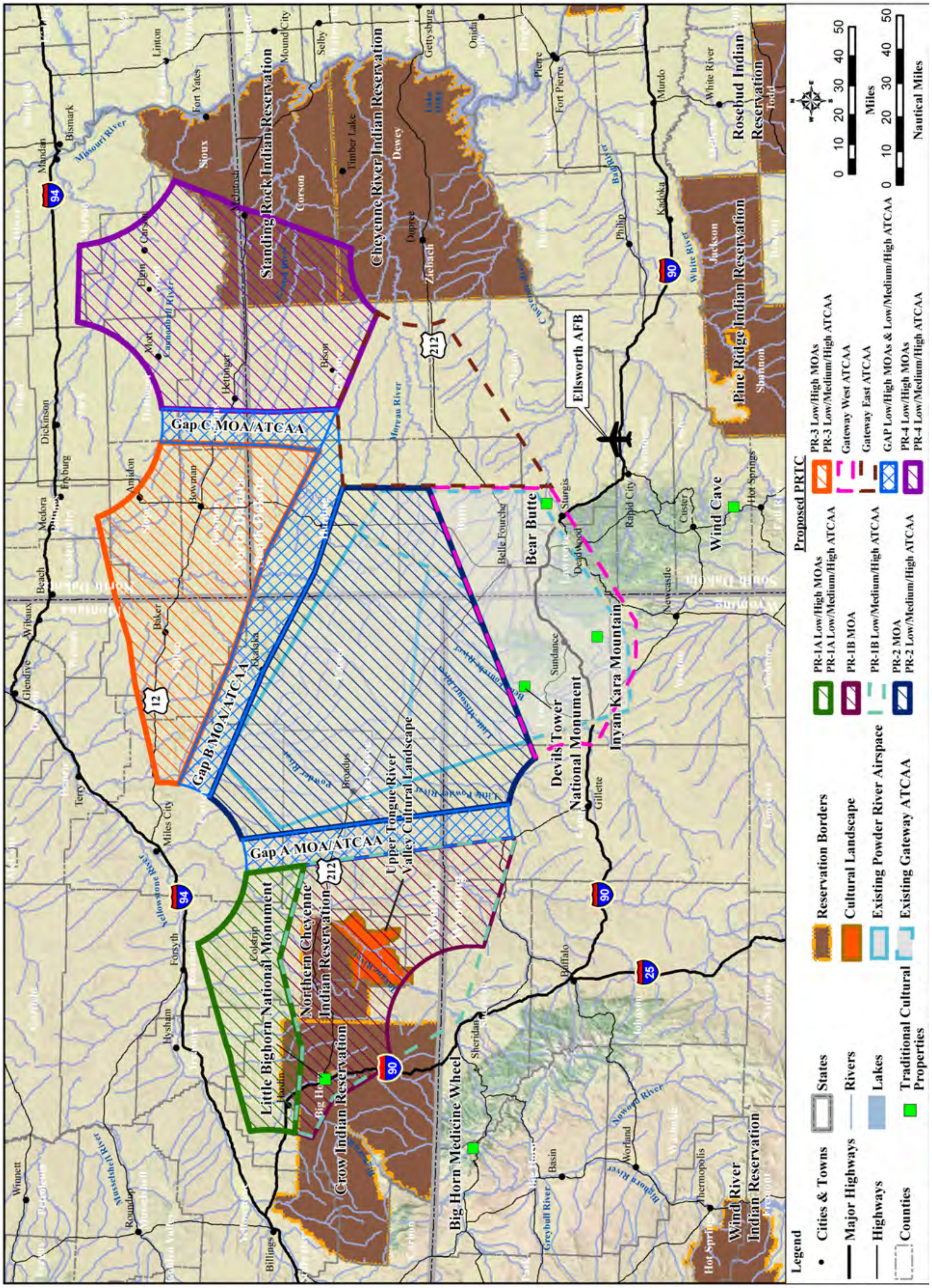


Figure 3.7-1. Native American Reservations and Identified Traditional Cultural Properties within the Affected Environment

3.7.3.1 Historic Setting

Historic setting is derived from written records and oral traditions from Western and Native American cultures.

PREHISTORY

In a conventional Western version of the 'prehistory' (i.e., the period before written evidence) of the ROI, Frison (1978) has suggested a cultural chronology for the high plains of North America. This chronology is presented here because most of the prehistoric complexes known in the project area are represented in Frison's chronology. Aside from the evidence of archaeology and written history, oral traditions of the Crow, Cheyenne, Sioux, and other Native American peoples of the high plains provide further useful information.

PALEOINDIAN PERIOD

The Paleoindian Period dates from approximately 12,000 B.C. to 6,000 B.C. The Paleoindian period includes a large number of apparently distinct human groups, which range from the earliest known recorded Clovis complex to the later and varied "Plano" groups. Evidence for Clovis period use of the project area is scant. Excavations at Paleoindian period sites indicate that later Paleoindian groups relied heavily on extinct species of bison for food and industrial items. Plant processing items (e.g., manos, metates, and pestles) are generally lacking at Paleoindian sites, suggesting that plants were used secondary to hunting for subsistence.

Gradually, the Paleoindian peoples began to rely more heavily on small game and wild plants for subsistence leading into what is known as the Archaic Period.

ARCHAIC

The Archaic Period is characterized in part by an increase in the archaeological record of ground stone tools and baking hearths - evidence of increased reliance of plant foods. Technologies were also adapted to changing climatic conditions and more permanent settlements are found. In the high plains, the Archaic Period is subdivided into Early Plains, Middle Plains, and Late Plains Archaic as described below.

The Early Plains Archaic dates from approximately 6,000 B.C. to 2,500 B.C. Bison hunting continued into this period (both extinct and modern forms). Evidence for the processing of plant foods is still scarce at Early Plains Archaic sites, but plant resources were likely gathered in season rounds. Simple manos and grinding slabs are occasionally found at Early Plains Archaic sites.

Frison's (1978) Middle Plains Archaic Period dates from approximately 2,500 B.C. to 500 B.C. and is associated with the widespread appearance of occupations throughout the northern Plains, even in areas that were previously devoid of human groups. In some areas of the northern Plains, such as north-central WY, archaeological evidence suggests an increased reliance on plant foods and their preparation. McKean Complex sites in WY also include flat sandstone grinding slabs and manos and roasting pits (HRA 1979). Bison continued to be an important resource during the Middle Plains Archaic.

Approximate dates for the Late Plains Archaic range from 1,000 B.C. to A.D. 700. This period is associated with communal bison hunting on the plains. Evidence for the preparation of plant resources is scarce during this period.

LATE PREHISTORIC PERIOD

The first 200 years or so of the Late Plains Archaic Period overlap with the Late Prehistoric Period. The Late Prehistoric Period dates from approximately A.D. 500 to A.D. 1700 and is associated with the introduction of the bow and arrow (Frison 1978, HRA 1979). Communal bison hunting reached its greatest expression, in terms of efficiency, during this period. There are hundreds of Late Prehistoric Period bison kill sites in the northern plains.

After moving westward from their original homeland in Minnesota, Cheyenne bands unified in the Black Hills of South Dakota in the mid 1700s. Bear Butte is sacred to the Cheyenne (as well as other tribes) The Sweet Medicine legends explain the origin of the Sacred Arrows, an event that took place at Bear Butte. The Sacred Arrows are the most sacred possession of the Cheyenne people (Rambow 2004). Ethnographic accounts suggest that the Cheyenne adapted to more of a nomadic lifestyle after moving to the Black Hills rather than the more sedentary, horticultural based lifestyle they originally practiced (Gunnerson and Gunnerson 1988). Cheyenne hunted bison on horseback and horses became an important part of their economy (Gunnerson and Gunnerson 1988). By the mid 1800s the Cheyenne encountered increased European-American emigration, warfare, and disease (Moore et al. 2001).

Sioux traditions place their origins near northern lakes east of the Mississippi River (DeMallie 2001). According to Sioux legend, before European contact, the Sioux practiced a seasonal round, and based dates of ceremonies on the equinoxes (Rosebud Sioux Tribe 2010). The Sioux practiced a semi-woodland culture before becoming a plains culture (Rosebud Sioux Tribe 2010). Other oral histories suggest that some Sioux bands moved west to hunt bison (DeMallie 2001). By the mid 1600s, Sioux economy focused on bison hunting. Sioux bands gathered during mid-summer or autumn in large groups to celebrate the Sun Dance and good fortunes. During other times of the year smaller groups disbanded and operated independently (Schusky 1975). By the mid 1800s the Sioux were a major power between the Black Hills and the Missouri River, and often warred with the Pawnee (Gunnerson and Gunnerson 1988).

Crow traditions place their origins near the Bear Paw Mountains and at the Three Forks of the Missouri River (Voget 2001). In the 1700s horses became central to Crow economy and the quest for wealth, status, and spouses. Bison was the major meat source for the Crow by the late 1700s; with the hunt significantly aided by horses (Voget 2001). After the introduction of the horse, the Crow were mobile for a good portion of the year (Curtis 1909). Traditional Crow religious practices include the sweat lodge, vision quest, and the Sun Dance. The Crow Sun Dance differs from that of other Plains tribes (Voget 2001).

PROTO-HISTORIC PERIOD

The Proto-Historic Period begins around 1700 and is generally considered to end with the arrival of the Lewis and Clark Expedition in 1805 (Wood and Associates 2003). The horse was introduced to northern Plains Native Americans during the beginning of this period. This changed bison hunting strategies, trading networks, and settlement patterns. Small amounts of European trade goods also appear in archaeological sites dating to this time period (HRA 1979a).

HISTORY

The historic Euroamerican occupation and settlement of the project area can be broken down into several periods, including early exploration and the fur trade, the gold rush and Native American/U.S. Government conflicts, and ranching/agricultural development.

In 1805 the Lewis and Clark expedition passed just north of the project area. From 1805 to the 1850s the Euroamerican presence in the region consisted of explorers and traders. The area was influenced by the fur trade out of Taos to the south and the Missouri River trade to the north. The fur trade was centered mainly on beaver pelts and reached its peak between 1820 and 1840. Because the fur trade was based on a single resource, it declined when areas were trapped out of beaver pelts and when the fashion changed from beaver hats to silk hats.

Westward movement continued along the Oregon Trail and other trails throughout the 1800s. These roads began informally, but as traffic to the area increased (especially during the gold rush) the roads began to see formal construction and upkeep. Steamboats began moving up the Missouri and Yellowstone Rivers in the 1850s. In the 1860s commercial steamboats began docking further up the rivers at forts there (Malone *et al.* 1991). Railroads have also been a significant factor in the history of the project area. Construction of the Union Pacific Railroad across WY in the late 1860s and the Northern Pacific routes across ND and MT in the 1880s (Muhn 1980) opened the lands now in the project area to permanent settlement. The railroad provided the necessary connection to eastern markets vital to ranching development.

One of the lasting effects of Euroamerican movement into lands previously occupied only by Native Americans was the disruption of Native American lifeways. Prior to the incursion of Euroamericans into their lands, Native Americans in the Plains generally relied upon hunting and gathering for survival. Overhunting of animals by Euroamericans and Native Americans to supply the demand for furs and pelts depleted the range of resources used by Native Americans for subsistence. This resulted in a settlement clustering effect around forts, where trading could occur and new forms of subsistence could be obtained. This clustering, in addition to the over-exploitation of formerly rich lands, brought Native Americans and Euroamericans into conflict for resources.

The Treaty of Fort Laramie was an agreement between the U.S. and representatives of the Lakota nation, Yankronai Sioux, Santee Sioux, and Arapaho signed in 1868 at Fort Laramie in the WY Territory, guaranteeing to the Lakota ownership of the Black Hills, and furthered land and hunting rights in SD, WY, and MT. The Powder River Country was to be henceforth closed to all Euroamericans. The treaty created the Great Sioux Reservation which included the current Standing Rock, Cheyenne River, Pine Ridge, and Rosebud reservations. The Missouri River formed the eastern boundary of the reservation which stretched west to the Black Hills. Unceded Native American Territory stretched further south and west (Figure 3.7-2).

Conflict was exacerbated by the Black Hills gold rush. Prospectors moved into the region illegally to begin mining in the 1860s. The Black Hills gold rush reached its peak in 1876 when the majority of the land in areas containing gold was claimed. Mining and other intrusions into the Great Sioux Reservation created tension and the U.S. government took action on the side of the Euroamericans. Though the best known clash of U.S. forces and tribal groups came in the form of the Battle of Little Bighorn on June 25 and 26, 1876, a variety of other battles took place within the affected environment. These battles, mostly from the 1860s to the 1880s were the result of Native American resistance (primarily Cheyenne and Sioux groups) to displacement from their lands. These battles are currently identified as part of the Great Sioux War and include:

- the battle of Powder River, located in southern MT (March 17, 1876);
- the battle of the Rosebud in southern MT (June 17, 1876);
- the battle of Slim Butte in SD (September 8, 1876);
- the battle of Wolf's Mountain, located in southern MT (January 7, 1877); and
- the battle of Lame Deer in southeastern MT (May 7, 1877).

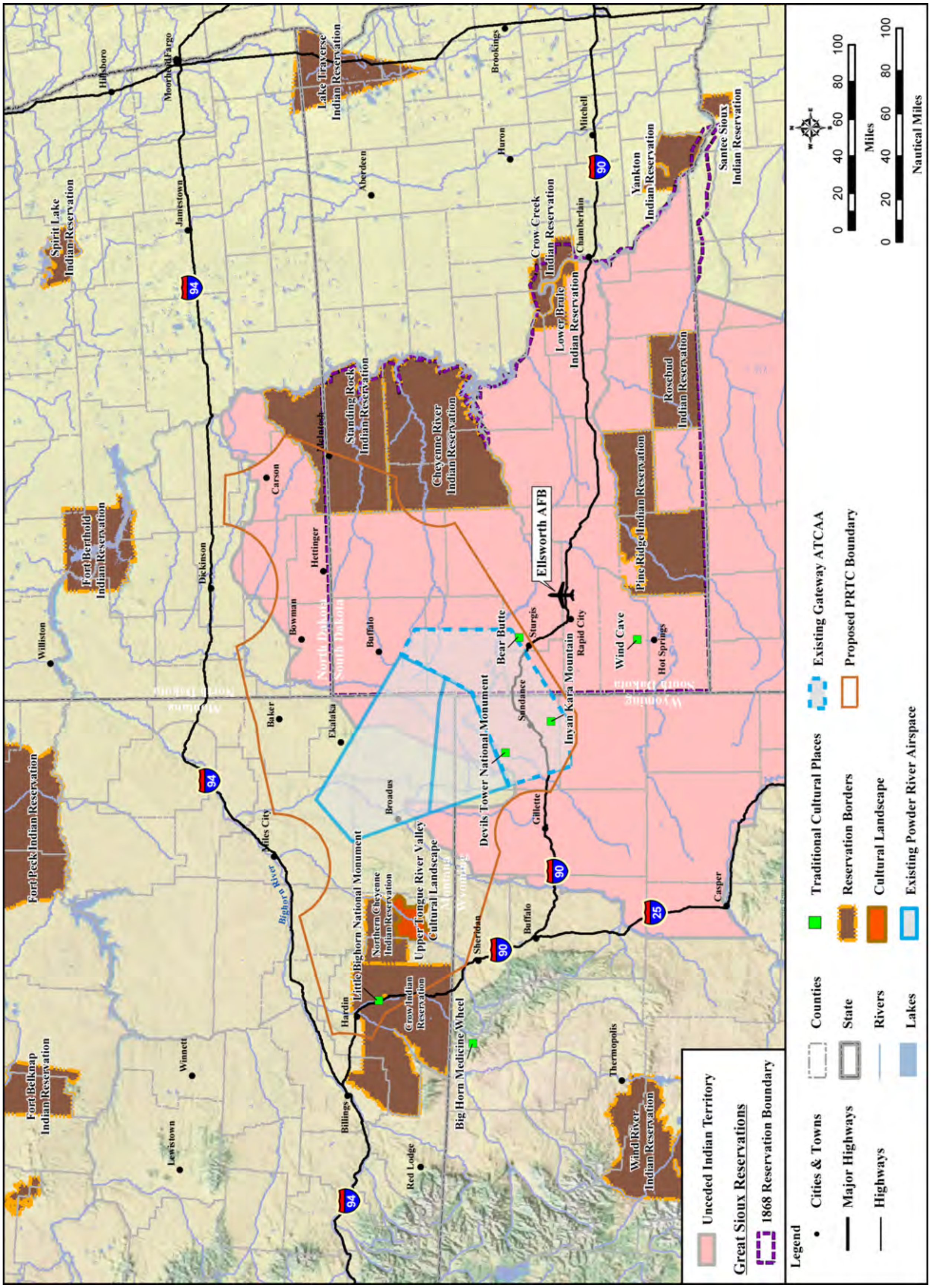


Figure 3.7-2. Native American Historic and Existing Lands in Relation to the Proposed PRTC

Continuing hostilities and the intense activity of Euroamericans working gold claims in the region resulted in the U.S. Congress enacting legislation which "in effect, abrogated the Fort Laramie Treaty" and constituted a taking of tribal property (448 U.S. 371 [1980]). U.S. government policies regarding reservations and the use of the military forced most of the northern Native American groups onto reservations by the early 1880s (Malone *et al.* 1991; Muhn 1980). The Battle of Wounded Knee in 1890 effectively ended organized Sioux and Cheyenne resistance.

Though mining continued in the Black Hills into the 21st century, the majority of the boom was over by the 1880s and the easily extracted gold was played out. This resulted in an exodus of many Euroamerican gold miners, leaving only those with large-scale operations and those that chose to stay for farming and ranching.

In 1889, five reservations were created by the Dawes Act, the Standing Rock Reservation, Cheyenne River Reservation, Lower Brule Reservation, Rosebud Reservation, and the Pine Ridge Reservation (see Figure 3.7-2). The boundaries of these five reservations permitted approximately 9 million acres, one half of the former Great Sioux Reservation, to be opened for ranching and homesteading.

The Crow Reservation was established in 1851 as a portion of Crow tribal lands. The Crow and Sioux-Cheyenne were traditional enemies and Crow scouts regularly supported U.S. Cavalry actions against the Sioux and related Cheyenne tribal groups. The Northern Cheyenne Reservation was established in 1884 following an 1878-1879 seven-month running fight by the Northern Cheyenne to return to a portion of their traditional lands after being relocated to Oklahoma.

With the end of Native American/U.S. government hostilities and the end of the gold rush, the livestock industry began to develop in earnest in the area proposed for the PRTC. The vast grass and sagebrush were valuable for fattening livestock. Cattle and sheep ranches were established in the 1870s and 1880s. Farming developed slowly in the project area due to the arid conditions that prevail in the region. The previous establishment of the livestock industry in areas with water (river drainages) prevented small farmers from settling in the area until the later 1880s and 1890s. With increased immigration to the U.S., good cheap land became scarce. Farmers began settling in more marginal areas in the early 1900s and relied on dry farming techniques. Increasing settlement by farmers in the region and the troubles of dry farming resulted in a push by private investors and government to establish systems of irrigation to support farmers. The 1902 Reclamation Act was intended to support the development of agriculture nationwide by making funds available to support such projects.

Approximately one-half of the Crow Reservation and all of the Northern Cheyenne Reservation are under the proposed PR-1B MOA. The Northern Cheyenne Health Service facilities are pictured.

Most of the development in the project area from the early 1900s to present has revolved around ranching, farming, and exploitation of energy resources in the forms of coal, oil, and natural gas (Muhn 1980).

Following the procedures of the Dawes Act, the remaining reservations were in turn greatly reduced in size, through the allocation of 320 acre parcels to heads of families and other measures which greatly reduced the land in Native American ownership, while attempting to force them to convert to farmers and craftsmen. "Surplus" land was then made available for homesteading, and often, allocated land was sold by its Native American owners. In some cases, even when homesteads were abandoned during the Dust Bowl era of the 1930s, the land ended up in federal control. Some tribal lands became part of the modern National Grasslands, Badlands National Park, and land controlled by the Bureau of Land

Management or other federal agencies, rather than reverting to the Native American nations. The sale of lands privately held by Native Americans and non-Native Americans (inholdings) continues in some areas into the 21st century.

Devils Tower National Monument, in northeastern WY, is under the existing Gateway ATCAA. The top of Devils Tower is at elevation 5,112 MSL. The floor of the Gateway ATCAA is 18,000 feet MSL.

3.7.3.2 Identified Cultural Resources

WYOMING

Fourteen properties are currently listed in the NRHP in Crook and Sheridan Counties, WY beneath the proposed PRTC airspace (Table 3.7-2). Twelve of these properties are under the existing Powder River airspace. They consist of archaeological sites, historic structures at Devils Tower National Monument, bridges, and historic buildings. No properties under the proposed PRTC airspace are located in Campbell or Weston Counties, WY. Devils Tower National Monument (Table 3.7-3) is beneath the existing Gateway ATCAA (see Figure 3.7-1) and also beneath the proposed Gateway ATCAA which begins at 18,000 feet MSL.

A search of ghost towns within the lands beneath the affected airspace in WY revealed the presence of four ghost towns. Several of the ghost towns contain standing wood/log structures associated with historic mining, ranching, stage or Pony Express routes, or railroad stations (Table 3.7-4). Most of the ghost towns have not been subjected to professional archaeological and/or architectural assessments and may be eligible for the National or State Registers pending further investigation by cultural resources professionals.

There is one historic ranch beneath the proposed airspace (Table 3.7-5). Ranch A is listed on the NRHP and deserves special consideration due to the large number of standing structures present at the site.

A historic vernacular landscape within the area beneath the affected airspace is present in the form of a historic trail (Table 3.7-6). The Texas Trail runs through Weston, Crook, and Campbell Counties.

Several traditional cultural properties and resources, have been identified within the lands beneath the affected airspace (Table 3.7-7). The areas of Devils Tower and Inyan Kara Mountain are considered sacred sites by Native American peoples of the region. There are also two traditional cultural resources whose status is being discussed in consultation with tribes. The first is located to the north of the town of Gillette on Forest Service land inside the project area. The second is located northwest of the town of Hulett. These unnamed traditional cultural resources are associated with multiple Tribes.

Inyan Kara Mountain, south of Devils Tower in northeast WY, is considered sacred by American Indian peoples of the area. The mountain is at 6,348 feet MSL and is under the existing Gateway ATCAA which has a floor of 18,000 feet MSL.

Table 3.7-2 NRHP Listed Resources Under Proposed PRTC Airspace (Page 1 of 6)

Site Name	*General Location*	*Alternative*[1]
WY		
Arch Creek Petroglyphs	Moorcroft	A, B, C
DXN Bridge over Missouri River	Hulett	Existing, A, B, C
EBF Bridge over Powder River	Leiter	A, C
Entrance Road—Devils Tower National Monument	Devils Tower	Existing, A, B, C
Entrance Station—Devils Tower National Monument	Devils Tower	Existing, A, B, C
Inyan Kara Mountain	Sundance	Existing, A, B, C
McKean Archaeological Site	Moorcroft	Existing, A, B, C
Old Headquarters Area Historic District	Devils Tower	Existing, A, B, C
Ranch A	Beulah	Existing, A, B, C
Sundance School	Sundance	Existing, A, B, C
Sundance State Bank	Sundance	Existing, A, B, C
Tower Ladder-Devils Tower National Monument	Devils Tower	Existing, A, B, C
Vore Buffalo Jump	Sundance	Existing, A, B, C
WY Mercantile	Aladdin	Existing, A, B, C
MT		
Baker Hotel	Fallon/Baker	A, B, C
Fallon County Jail	Fallon/Baker	A, B, C
Cross Ranch Headquarters	Powder River/Broadus	A, B, C
Bones Brother Ranch	Rosebud/Birney	A, C
Wolf Mountain Battlefields	Rosebud/Birney	A, C
Baldwin House	Big Horn/Lodge Grass	A, C
Battle of the Rosebud Site	Big Horn/Kirby	A, C
Boyum, John, House	Big Horn/Hardin	A, C
Burke, Thomas H., House	Big Horn/ Hardin	A, C
Cammock's Hotel	Big Horn/Lodge Grass	A, C
Chivers Memorial Church	Big Horn/Lodge Grass	A, C
Commercial District	Big Horn/Hardin	A, C
Drew, J.W., Grain Elevator	Big Horn/Lodge Grass	A, C
Ebeling, William, House	Big Horn/Hardin	A, C
Eder, Charles S., House	Big Horn/Hardin	A, C
First Baptist Church	Big Horn/Hardin	A, C
Haverfield Hospital	Big Horn/Hardin	A, C
Kopriva, Francis, House	Big Horn/Hardin	A, C
Lee Homestead	Big Horn/Decker	A, C
Little Bighorn Battlefield National Monument	Big Horn/Hardin	A, C
Lodge Grass City Jail	Big Horn/Lodge Grass	A, C
Lodge Grass Merchandise Company Store	Big Horn/Lodge Grass	A, C
Moncure Tipi	Big Horn/Busby	A, C
OW Ranch	Big Horn/Birney	A, C
Pease's George, Second Store	Big Horn/Lodge Grass	A, C
Ping, J.J., House	Big Horn/Hardin	A, C
Reno Apartments	Big Horn/Hardin	A, C
Residential District	Big Horn/Hardin	A, C
Ryan's, John, House	Big Horn/ Lodge Grass	A, C
Sharp's Jay, Store	Big Horn/Lodge Grass	A, C
Simmonsen's House	Big Horn/Lodge Grass	A, C

Table 3.7-2 NRHP Listed Resources Under Proposed PRTC MOA Airspace (Page 2 of 6)

Site Name	***General Location***	***Alternative***[1]
St. Joseph's Catholic Church	Big Horn/Hardin	A, C
Stevens, Dominic House	Big Horn/Lodge Grass	A, C
Sullivan Rooming House	Big Horn/Hardin	A, C
Sullivan, James J., House	Big Horn/Hardin	A, C
Trytten, J.M., House	Big Horn/Lodge Grass	A, C
Tupper, J. S., House	Big Horn/Hardin	A, C
ND		
Fort Dilts	Bowman/Rhame	A, B, C
Schade, Emma Petznick and Otto, House	Bowman/Bowman	A, B, C
H-T Ranch	Slope/Amidon	A, B, C
Mystic Theatre	Slope/Marmarth	A, B, C
Original Slope County Courthouse	Slope/Amidon	A, B, C
Adams County Courthouse	Adams/Hettinger	A, B
Cedar Creek Bridge	Adams/Haynes	A, B
U.S. Post Office – Hettinger	Adams/Hettinger	A, B
Hettinger County Courthouse	Hettinger/Mott	A, B
Neuburg Congregational Church	Hettinger/Mott	A, B
Stern, John and Fredricka (Roth), Homestead	Hettinger/Mott	A, B
Riverside	Hettinger/New England	A, B
Carson Roller Mill	Grant/Carson	A, B
Hope Lutheran Church	Grant/Elgin	A, B
Medicine Rock State Historic Site	Grant/Heil	A, B
SD		
Archaeological Site No. 39HN1	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN121	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN150	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN155	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN159	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN160	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN162	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN165	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN167	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN168	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN17	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN171	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN174	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN177	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN18	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN198	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN199	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN205	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN207	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN208	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN209	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN21	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN210	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN213	Harding/Ludlow	A, B, C

Table 3.7-2 NRHP Listed Resources Under Proposed PRTC MOA Airspace (Page 3 of 6)

Site Name	General Location	Alternative[1]
Archaeological Site No. 39HN217	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN218	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN219	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN22	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN227	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN228	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN232	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN234	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN26	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN30	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN484	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN485	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN486	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN487	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN5	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN50	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN53	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN54	Harding/Ludlow	A, B, C
Ashcroft, Thomas, Ranch	Harding/Buffalo	A, B, C
Blake Ranch House	Harding/Gustave	Existing, A, B, C
Emmanuel Lutheran Church and Cemetery	Harding/Ralph	A, B, C
Fowler Hotel	Harding/Buffalo	A, B, C
Giannonatti Ranch	Harding/Ludlow	A, B, C
Golden Valley Norwegian Church	Harding/Ralph	A, B
Johnson, Axel, Ranch	Harding/Reva	A, B, C
Lighting Spring	Harding/Ludlow	A, B, C
Little Missouri Bank Building	Harding/Camp Crook	Existing, A, B, C
Livingston, John and Daisy May, Ranch	Harding/Sorum	A, B, C
Peace Valley Evangelical Church and Cemetery	Harding/Ralph	A, B, C
Shevling, L.W., Ranch	Harding/Harding	Existing, A, B, C
Stokes, Oliver O., House	Harding/Harding	Existing, A, B, C
Vessey School	Harding/Haley	A, B, C
Belle Fourche Commercial District	Butte/Belle Fourche	Existing, A, B, C
Belle Fourche Dam	Butte/Belle Fourche	Existing, A, B, C
Belle Fourche Experiment Farm	Butte/Newell	Existing, A, B, C
Bolles, Charles, House	Butte/Belle Fourche	Existing, A, B, C
Butte County Courthouse and Historic Jail Building	Butte/Belle Fourche	Existing, A, B, C
Butte-Lawrence County Fairgrounds	Butte/Nisland	Existing, A, B, C
Ditchrider House	Butte/Nisland	Existing, A, B, C
Fruitdale School	Butte/Fruitdale	Existing, A, B, C
Fruitdale Store	Butte/Fruitdale	Existing, A, B, C
Gartner, Carl Frederick, Homestead	Butte/Newell	Existing, A, B, C
Gay, Thomas Haskins, House	Butte/Belle Fourche	Existing, A, B, C
Harris, Fred S., House	Butte/Belle Fourche	Existing, A, B, C
Hay Creek Bridge	Butte/Belle Fourche	Existing, A, B, C
Hoover Store	Butte/Hoover	A, B, C
Hoover, Alexander House	Butte/Hoover	A, B, C

Table 3.7-2 NRHP Listed Resources Under Proposed PRTC MOA Airspace (Page 4 of 6)

Site Name	*General Location*	*Alternative*[1]
Johnson, William, House	Butte/Fruitdale	Existing, A, B, C
Kenaston, William G., House	Butte/Newell	Existing, A, B, C
Langdon School	Butte/Nisland	Existing, A, B, C
Lincoln School	Butte/Belle Fourche	Existing, A, B, C
Minnesela Bridge	Butte/Belle Fourche	Existing, A, B, C
Newell Depot Bridge	Butte/Newell	Existing, A, B, C
Newell High School	Butte/Newell	Existing, A, B, C
Scotney, John Aaron, House	Butte/Belle Fourche	Existing, A, B, C
Small, Charles and Eleanor House	Butte/Belle Fourche	Existing, A, B, C
Snoma Finnish Cemetery	Butte/Fruitdale	Existing, A, B, C
Soper-Behymer Ranch	Butte/Belle Fourche	Existing, A, B, C
SD Department of Transportation Bridge No 10-109-360	Butte/Belle Fourche	Existing, A, B, C
SD Department of Transportation Bridge No. 10-270-338	Butte/Newell	Existing, A, B, C
Stonelake Bridge	Butte/Newell	Existing, A, B, C
Tri-State Bakery	Butte/Belle Fourche	Existing, A, B, C
Vale Bridge	Butte/Vale	Existing, A, B, C
Vale Cut Off Belle Fourche River Bridge	Butte/Belle Fourche	Existing, A, B, C
Vale School	Butte/Vale	Existing, A, B, C
Viken, Nicholas Augustus Homestead	Butte/Newell	Existing, A, B, C
Wide Awake Grocery Building	Butte/Belle Fourche	Existing, A, B, C
Archaeological Site No. 39MD81	Meade/Sturgis	A, B, C
Archaeological Site No. 39MD82	Meade/Sturgis	A, B, C
Bear Butte	Meade/Sturgis	A, B, C
Erskine School	Meade/Sturgis	A, B, C
Fort Meade District	Meade/Sturgis	A, B, C
Frozenman Stage Station	Meade/Bison	
Graf, Stephen and Maria, House	Meade/Sturgis	A, B, C
Raskob, Jacob and Elizabeth Ranch	Meade/Sturgis	A, B, C
SD Department of Transportation Bridge No. 47-151-389	Meade/Sturgis	A, B, C
Stromprude Trail Ruts	Meade/Bison	A, B
Sturgis Commercial Block	Meade/Sturgis	A, B, C
Sturgis High School	Meade/Sturgis	A, B, C
Tallent, Annie, House	Meade/Sturgis	A, B, C
Wenke, John G., House	Meade/Sturgis	A, B, C
Ainsworth, Oliver N., House	Lawrence/Spearfish	Existing, A, B, C
Baker Bungalow	Lawrence/Spearfish	Existing, A, B, C
Cook, Fayette, House	Lawrence/Spearfish	Existing, A, B, C
Corbin, James A. House	Lawrence/Spearfish	Existing, A, B, C
Court, Henry, House	Lawrence/Spearfish	Existing, A, B, C
Dakota Tin and Gold Mine	Lawrence/Spearfish	Existing, A, B, C
Deadwood Historic District	Lawrence/Deadwood	Existing, A, B, C
Dickey, Eleazer C. and Gwinnie, House	Lawrence/Spearfish	Existing, A, B, C
Dickey, Walter, House	Lawrence/Spearfish	Existing, A, B, C
Driskill, William D., House	Lawrence/Spearfish	Existing, A, B, C

Table 3.7-2 NRHP Listed Resources Under Proposed PRTC MOA Airspace (Page 5 of 6)

Site Name	General Location	Alternative[1]
Episcopal Church of All Angels	Lawrence/Spearfish	Existing, A, B, C
Evans, Robert H., House	Lawrence/Spearfish	Existing, A, B, C
Frawley Historic Ranch	Lawrence/Spearfish	Existing, A, B, C
Galena School	Lawrence/Lead	A, B, C
Halloran-Matthews-Brady House	Lawrence/Spearfish	Existing, A, B, C
Harvey, Jerome and Jonetta Homestead Cabin	Lawrence/Lead	Existing, A, B, C
Hewes, Arthur, House	Lawrence/Spearfish	Existing, A, B, C
Homestake Workers House	Lawrence/Spearfish	Existing, A, B, C
Keets, Henry, House	Lawrence/Spearfish	Existing, A, B, C
Knight, Webb, S., House	Lawrence/Spearfish	Existing, A, B, C
Kroll Meat Market and Slaughterhouse	Lawrence/Spearfish	Existing, A, B, C
Lead Historic District	Lawrence/Lead	Existing, A, B, C
Lown, William Ernest, House	Lawrence/Spearfish	Existing, A, B, C
The Mail Building	Lawrence/Spearfish	Existing, A, B, C
McLaughlin Ranch Barn	Lawrence/Spearfish	Existing, A, B, C
Mount Theodore Roosevelt Monument	Lawrence/Deadwood	Existing, A, B, C
Old Finnish Lutheran Church	Lawrence/Lead	Existing, A, B, C
Qullian, Thomas, House	Lawrence/St. Onge	Existing, A, B, C
Old Redwater Bridge	Lawrence/Spearfish	Existing, A, B, C
Riley, Almira, House	Lawrence/Spearfish	Existing, A, B, C
St. Onge State Bank	Lawrence/St. Onge	Existing, A, B, C
Spearfish City Hall	Lawrence/Spearfish	Existing, A, B, C
Spearfish Filling Station	Lawrence/Spearfish	Existing, A, B, C
Spearfish Fisheries Station	Lawrence/Spearfish	Existing, A, B, C
Spearfish Historic Commercial District	Lawrence/Spearfish	Existing, A, B, C
Old Spearfish Post Office	Lawrence/Spearfish	Existing, A, B, C
St. Lawrence O'Toole Catholic Church	Lawrence/Central City	Existing, A, B, C
St. Onge Schoolhouse	Lawrence/St. Onge	Existing, A, B, C
Toomey House	Lawrence/Spearfish	Existing, A, B, C
Uhlig, Otto L., House	Lawrence/Spearfish	Existing, A, B, C
Walsh Barn	Lawrence/Spearfish	Existing, A, B, C
Walton Ranch	Lawrence/Spearfish	Existing, A, B, C
Whitewood Historic District	Lawrence/Whitewood	Existing, A, B, C
Whitney, Mary, House	Lawrence/Spearfish	Existing, A, B, C
Wolzmuth, John, House	Lawrence/Spearfish	Existing, A, B, C
Woodmen Hall	Lawrence/St. Onge	Existing, A, B, C
Beckon, Donald, Ranch	Perkins/Zeona	A, B, C
Bethany United Methodist Church	Perkins/Lodgepole	A, B
Carr No. 60 School	Perkins/Lodgepole	A, B
Carr, Anna, Homestead	Perkins/Bison	A, B
Duck Creek Lutheran Church and Cemetery	Perkins/Lodgepole	A, B
Foster Ranch House	Perkins/Chance	A, B
Golden Rule Department Store	Perkins/Lemmon	A, B
Harriman, L. F., House	Perkins/Lemmon	A, B
Immanuel Lutheran Church	Perkins/Zeona	A, B, C
Lemmon Petrified Park	Perkins/Lemmon	A, B
Lemmon, G. E., House	Perkins/Lemmon	A, B

Table 3.7-2 NRHP Listed Resources Under Proposed PRTC MOA Airspace (Page 6 of 6)

Site Name	*General Location*	*Alternative*[1]
Richards Cabins	Perkins/Faith	A, B, C
Rockford No. 40 School	Perkins/Bison	A, B
Sittner Farm	Perkins/Meadow	A, B
Sorum Cooperative Store	Perkins/Sorum	A, B
Sorum Hotel	Perkins/Sorum	A, B
Spring Creek School	Perkins/Zeona	A, B, C
Veal, Thomas J., Ranch	Perkins/Chance	A, B
Antelope Creek Stage Station	Corson/Morristown	A, B
Fort Manuel	Corson/McIntosh	A, B
Grand River State Station	Corson/Morristown	A, B

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River A/B MOAs and ATCAAs.

Table 3.7-3 National Monuments Under Proposed PRTC Airspace

Site Name	*General Location*	*Status*	*Alternative*[1]
WY			
Devils Tower	Devils Tower	NRHP Listed	Existing, A, B, C
MT			
Little Bighorn Battlefield	Garryowen	NRHP Listed	A, C

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.
Source: NPS 2010

Table 3.7-4. Ghost Towns Under Proposed PRTC Airspace

Name	***County***	***Remains***	***Status***	***Alternative***[1]
WY				
Mineral Hill	Crook	Many original buildings	Not Listed	Existing, A, B, C
Moskee	Crook	Single standing building	Not Listed	Existing, A, B, C
Tinton	Crook	10-12 buildings remain	Not Listed	Existing, A, B, C
Old Upton	Weston	Many shacks, including the first jail	Not Listed	Existing, A, B, C
ND				
Amidon	Slope	Many original buildings (some still occupied)	Not Listed	A, B, C
Bucyrus	Adams	Many original buildings (some still occupied)	Not Listed	A, B
Gascoyne	Bowman	Many original buildings, houses, schools, general store	Not Listed	A, B, C
Griffin	Bowman	Old school house, general store	Not Listed	A, B, C
Marmarth	Slope	Many original buildings (some still occupied)	Not Listed	A, B, C
SD				
Astoria	Lawrence	Many original buildings	Not Listed	A, B, C
Balmoral (Preston)	Lawrence	Many original buildings	Not Listed	Existing, A, B, C
Bear Gulch I	Lawrence	Many original buildings	Not Listed	Existing, A, B, C
Carbonate	Lawrence	Many original buildings	Not Listed	Existing, A, B, C
Central City	Lawrence	Two blocks of old buildings	Not Listed	Existing, A, B, C
Crook City	Lawrence	Stone school house	Not Listed	Existing, A, B, C
Maitland	Lawrence	Many original buildings/ruins	Not Listed	Existing, A, B, C
Pluma	Lawrence	Mill ruins	Not Listed	A, B, C
Reed	Butte	School house	Not Listed	A, B, C
Savoy	Lawrence	Many original buildings	Not Listed	Existing, A, B, C
Terraville	Lawrence	Ruins	Not Listed	Existing, A, B, C
Tinton	Lawrence	10-12 buildings	Not Listed	Existing, A, B, C
Trojan	Lawrence	Portland Mine buildings, several small houses, stores	Not Listed	Existing, A, B, C
Whitewood	Lawrence	Many original buildings	NRHP Listed	Existing, A, B, C

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.
Source: United States Ghost Towns 2010

Table 3.7-5 Historic Ranches Under Proposed PRTC Airspace

Name	***General Location***	***Status***	***Alternative***[1]
WY			
Ranch A	Beulah	NRHP Listed	Existing, A, B, C
MT			
Cross Ranch Headquarters	Powder River/Broadus	NRHP Listed	A, B, C
Bones Brothers Ranch	Rosebud/Birney	NRHP Listed	A, C
Drew, J.W., Grain Elevator	Big Horn/Lodge Grass	NRHP Listed	A, C
Lee Homestead	Big Horn/Decker	NRHP Listed	A, C
OW Ranch	Big Horn/Birney	NRHP Listed	A, C
ND			
H-T Ranch	Slope/Amidon	NRHP Listed	A, B, C
SD			
Frawley Ranch	Lawrence	National Landmark (NRHP Listed)	Existing, A, B, C
Ashcroft, Thomas, Ranch	Harding/Buffalo	NRHP Listed	A, B, C
Blake Ranch House	Harding/Gustave	NRHP Listed	Existing, A, B, C
Giannonatti Ranch	Harding/Ludlow	NRHP Listed	A, B, C
Johnson, Axel, Ranch	Harding/Reva	NRHP Listed	A, B, C
Livingston, John and Daisy May, Ranch	Harding/Sorum	NRHP Listed	A, B, C
Shevling, L.W., Ranch	Harding/Harding	NRHP Listed	Existing, A, B, C
Gartner, Carl Frederick, Homestead	Butte/Newell	NRHP Listed	Existing, A, B, C
Soper-Behymer Ranch	Butte/Belle Fourche	NRHP Listed	Existing, A, B, C
Raskob, Jacob and Elizabeth Ranch	Meade/Sturgis	NRHP Listed	A, B, C
Viken, Nicholas Augustus Homestead	Butte/Newell	NRHP Listed	Existing, A, B, C
William Holst Farmstead	Meade/Vale	SD State Register Property	Existing, A, B, C
McLaughlin Ranch Barn	Lawrence/Spearfish	NRHP Listed	Existing, A, B, C
Veal, Thomas J., Ranch	Perkins/Chance	NRHP Listed	A, B
Walsh Barn	Lawrence/Spearfish	NRHP Listed	Existing, A, B, C
Beckon, Donald, Ranch	Perkins/Zeona	NRHP Listed	A, B, C
Carr, Anna, Homestead	Perkins/Bison	NRHP Listed	A, B
Foster Ranch House	Perkins/Chance	NRHP Listed	A, B
Walton Ranch	Lawrence/Spearfish	NRHP Listed	Existing, A, B, C

Source: NPS 2010

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.

Table 3.7-6. Historic Trails Under Proposed PRTC Airspace

Site Name	***Counties***	***Status***	***Alternative***[1]
WY			
Texas Trail	Weston, Crook, Campbell	Not Listed	Existing, A, B, C

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.

Source: NPS 2010

Table 3.7-7. Traditional Cultural Properties and Traditional Cultural Resources Under Proposed PRTC Airspace

Area Name	*General Location*	*Status*	*Alternative*
WY			
Devils Tower	Devils Tower	NRHP Listed	Existing, A, B, C
Inyan Kara Mountain	South of Sundance	NRHP Listed	Existing, A, B, C
Unnamed 1	North of Gillette	Not Listed	Existing, A, B, C
Unnamed 2	Northwest of Hulett	Not Listed	Existing, A, B, C
MT			
Battle of Wolf Mountain Site	Tongue River	NRHP Listed	A, C
Battle of Rosebud Creek Site	Kirby	NRHP Listed	A, C
Chalk Buttes	Ekalaka	Not Listed	Existing, A, B, C
SD			
Bear Butte	Sturgis	NRHP Listed	A, B, C

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.
Source: NPS 2010

MONTANA

Thirty-eight properties are currently listed on the NRHP in Fallon, Powder River, Rosebud, and Big Horn Counties (Table 3.7-2). They consist of battlefields and historic buildings.

Little Bighorn Battlefield National Monument falls under the proposed airspace. Though this property is also listed on the NRHP, it deserves special consideration due to its status as a National Monument. In addition, the battlefield itself is held as sacred by many Native Americans. A Sioux and Cheyenne monument, as well as historic markers, are part of the battlefield.

There are five historic ranches beneath the proposed airspace in MT that are listed on the NRHP.

Little Bighorn Battlefield National Monument is under the proposed Powder River 1 MOA. The MOA is proposed to permit training overflights to 500 feet AGL.

Three historic battlefields lie beneath the proposed project airspace. The Little Bighorn Battlefield is already a National Monument, and the Battle of Wolf Mountains (currently nominated for National Landmark status) and the Battle of Rosebud Creek are on the NRHP. The MT SHPO is currently processing a form to elevate all of the battlefields of the Great Sioux War to the NRHP (personal communication, Hampton 2008). These battlefields are also either current traditional cultural properties, or in consultation for recognition of that status.

The Tongue River Valley (Table 3.7-8), in Rosebud County, has been the focus of a project to document and nominate the cultural landscape to the NRHP. The area has been studied and nominated for this designation due to the number and preservation of sites from prehistoric contexts (over 1,700 sites), Great Sioux War battlefield context (Wolf Mountains Battlefield), and early ranching settlement contexts (Three Circle Ranch, SH Ranch, and others) (personal communication, Hampton 2008).

The Tongue River Valley in southeastern MT has been nominated as cultural landscape due to the large number and preservation of cultural sites. Proposed overflights would be down to 500 feet AGL.

Table 3.7-8. Cultural Landscapes Under Proposed PRTC Airspace in MT

Area Name	*General Location*	*Alternative*
Tongue River Valley	Ashland	A, C

Note: 1. Alternatives A and C described in EIS Section 2.4.

Two Traditional Cultural Properties have been specifically identified within the lands beneath the affected airspace (Table 3.7-7). The location of the Battle of Wolf Mountains, and the Battle of Rosebud Creek Site are both listed on the NRHP. The Chalk Buttes are an area considered sacred by Native American peoples of the region. In addition, as many as 48 cultural resources have been recorded which have ceremonial functions on the Northern Cheyenne Reservation (Deaver and Tallbull 2001). The recorded ceremonial sites include vision questing/fasting sites, sweat lodges, and memorials

NORTH DAKOTA

Fourteen properties are currently listed in the NRHP in Bowman, Slope, Adams, Hettinger, and Grant Counties, ND beneath the proposed PRTC airspace (Table 3.7-2). They consist of historic buildings and bridges. No properties under the proposed PRTC airspace are located in Golden Valley, Sioux, Morton, Stark, or Billings Counties, ND.

A search of ghost towns within the lands beneath the affected airspace in ND revealed the presence of five ghost towns. Several of the ghost towns contain standing wood/log structures associated with historic mining, ranching, stage or Pony Express routes, or railroad stations (Table 3.7-4). Most of the ghost towns have not been subjected to professional archaeological and/or architectural assessments and many may be eligible to the National or State Registers pending further investigation by cultural resources professionals.

There is one historic ranch beneath the proposed airspace (Table 3.7-5). The H-T Ranch is already listed on the NRHP, however, it deserves special consideration due to the large number of standing structures present at the site.

SOUTH DAKOTA

One hundred and seventy-three properties are currently listed in the National or State Register in Harding, Butte, Meade, Lawrence, Perkins, and Corson Counties, SD beneath the proposed PRTC airspace (Table 3.7-2). They consist of archaeological sites, historic buildings, bridges, monuments, stage stations and cemeteries. Eighty-two of these properties are under the existing Powder River training airspace. No National or State Register properties under the proposed PRTC airspace are located in Pennington and Ziebach Counties, SD.

Three National Landmarks are located beneath the existing Gateway ATCAA training airspace and under the proposed Gateway ATCAA (Table 3.7-9). All three of these sites are also listed on the NRHP. Bear Butte is a sacred area, the Frawley Ranch is a historic ranch, and the Deadwood Historic District is an area of historic structures and features. The Northern Cheyenne Tribe owns land near Bear Butte.

Bear Butte, on the southern edge of the existing Gateway ATCAA, in northwest South Dakota, is a Sioux and Cheyenne sacred area. Bear Butte is a prehistoric and historic location of annual tribal gatherings, and is also the birthplace of Crazy Horse.

Three properties beneath the PRTC airspace are listed on the SD State Register of Historic Places (Table 3.7-10). Two are composed of historic structures while the Thoen Stone and Site are the location of an inscribed stone detailing a doomed mining expedition in 1833.

Table 3.7-9. National Landmarks Under Proposed PRTC Airspace in SD

Site Name	*General Location*	*Alternative*
Bear Butte	Sturgis	A, B, C
Frawley Ranch	Whitewood	Existing, A, B, C
Deadwood Historic District	Deadwood	Existing, A, B, C

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.

Table 3.7-10. SD State Register Sites Under Proposed PRTC Airspace

Site Name	*Site Name*	*Alternative*
Sturgis City Auditorium	Meade/Sturgis	A, B, C
William Holst Farmstead	Meade/Vale	Existing, A, B, C
Thoen Stone and Site	Lawrence/Spearfish	Existing, A, B, C

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.

There are 15 ghost towns within the lands beneath the proposed PRTC airspace in SD. Several of the ghost towns contain standing wood/log structures associated with historic mining, ranching, stage or Pony Express routes, or historic railroad stations (Table 3.7-4). Most of the ghost towns have not been evaluated. Many may be eligible to the National or State Registers pending further investigation by cultural resources professionals.

Eighteen historic ranches are located under the proposed airspace. A number of these ranches have been found eligible (and not yet listed) or have not been evaluated for potential eligibility to the NRHP (Table 3.7-5). In addition, one of these properties, the William Holst Farmstead, is listed on the SD State Register.

One traditional cultural property has been identified within the lands beneath the affected airspace (Table 3.7-7). The area of Bear Butte is considered sacred by Native American peoples of the region.

3.8 Land Use

3.8.1 Definition of the Resource

The attributes of land use addressed in this analysis include general land use patterns, land ownership, land management plans, and special use areas. General land use patterns characterize broad types of uses within a large area, for example, agricultural, rangeland, forest, and urban, which may support various uses such as recreation, grazing, mineral production, commercial or residential development. Land ownership is a categorization of land according to type of owner; the major land ownership categories include private, federal, Native American, and state. Federal lands are described by the managing agency, which may include the USFWS, USFS, BLM, or DoD. Land management plans include those documents prepared by agencies to establish appropriate goals for future use and development. As part of this process, sensitive land use areas (e.g., Wilderness, Wild and Scenic Rivers) are often identified by agencies as being worthy of more rigorous management.

Recreation resources consider outdoor recreational activities that take place away from the residences of participants. This includes natural resource areas (such as BLM-managed land) and associated developed facilities (such as off-road vehicle trails and developed camp sites) that are designated or available for public outdoor recreational use. Cultural and historic sites and battlegrounds are lands with high recreational use.

The ROI for land use consists of about 44,689 square miles comprised of the lands under the current airspace (about 9,587 square miles) plus the land under an additional 35,102 square miles of expanded airspace (Table 3.8-1). This ROI is the land and land users under the proposed PRTC airspace. Of this land, 41 percent is in MT, 29 percent in SD, 16 percent in ND, and14 percent in WY.

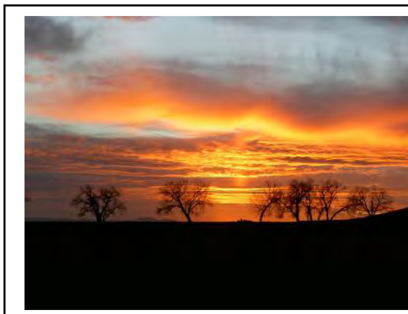
3.8.2 Regulatory Setting

The proposed airspace overlies a portion or all of 29 counties in four states, as listed in Table 3.8-1 (see Figure 3.8-1). Most counties are managed and governed by elected commissioners, and few have "home rule" charters. Land use controls (such as zoning) are generally only used within incorporated cities. Native American Reservations within the ROI have tribal sovereignty over their reservations and govern through tribal elections. Land uses on the reservations are determined by tribal decisions.

3.8.3 Existing Conditions

3.8.3.1 Landscape Character

Landscape character can be defined as a distinct, recognizable, and consistent pattern of natural and cultural elements in the landscape that makes one landscape different from another. A region's landscape character reflects the interactions between people and place, and often is significant to the formation of local identity.



The expansive nature and general solitude of the western big-sky landscape was seen as a quality of life feature by scoping participants.

The ROI extends over portions of the North American Great Plains. The natural landscape varies throughout, consisting of broad, high plains, badlands, rivers, and forested mountains. Wide open vistas and an expansive sky characterize the region. The ROI includes iconic natural formations such as the Badlands of SD and northeastern WY's Devils Tower. This natural landscape creates the physical setting for the region's landscape and land use which includes townships, communities, western landscapes, ranches, associated buildings, fences, mining, and energy production through wind farms.

As primarily rural areas, the portions of counties in the ROI under the existing and proposed airspace have a range in population density from 0.4 to 4.0 persons per square mile, with most areas counting fewer than three persons per square mile (see Socioeconomic section 3.9).

3.8.3.2 General Land Use Patterns

The ROI (also referred to as the "study area" in this land use section) is located in north central U.S. and characterized by wide open space and low population density. Major transportation routes in the study area include Interstate 94 to the north and Interstate 90 to the south, both traveling in an east/west direction. The primary state highways include US 12, US 212, US 85, and Highway 59. The area has widely spaced small communities, generally along the primary roads, providing a basic network for services and provisions. There are no towns with populations over 2,000 persons within the existing Powder River A or B MOAs. The proposed PRTC MOAs overlie the towns of Colstrip (population 2,346), and Hardin (population 3,514). Ranches, individual residences, and smaller communities are widely spaced throughout the region. Table 3.8-1 shows that seven counties underlie the existing Powder River airspace of about 9,748 square miles.

Table 3.8-2 presents generalized land use in the ROI. Figure 3.8-1 shows a generalized pattern of land use in the ROI based on vegetative and surface conditions. The region is mostly classified as rangeland (78 percent), predominantly used for cattle grazing. Grazing occurs on several of the vegetation types described in Section 3.6.3.1. At higher elevations, forests cover about 8 percent of the ROI, and provide the basis for a timber industry in the Black Hills of SD and eastern WY. Forested areas are also popular for dispersed outdoor recreation including hunting. Cultivated agriculture is the predominant land use in the ND portion of the ROI. These farms are typically medium- to large-scale operations producing grain crops such as wheat, hay, oats, and barley. Agriculture is also dominant along the Yellowstone and Little Bighorn Rivers in the far western part of the ROI. A small percentage of land in the ROI (1 percent) is developed or "urbanized." Urban land and water and barren lands account for less than 2 percent of the area. The existing Powder River airspace (underlying Powder River MOA A and B) has over 90 percent rangeland, very little cultivated agricultural land (less than 11 percent), small communities, and no land characterized as "urban."

The ROI has extensive subsurface mineral and energy resources spanning about 120 miles from Miles City, MT to Casper, WY. The Powder River Basin contains 58 percent of the assessed federal coal reserve. Of coal produced on federal land, 88 percent comes from the Powder River Basin (U.S. Department of Energy 2007). Associated with this coal are coal-bed methane gas reserves and, to a lesser extent, crude oil. Exploration and energy resource extraction are primary activities in the ROI along with other compatible surface uses. Above the surface, the nearly ever present winds form a basis for development of wind farms for renewable energy.

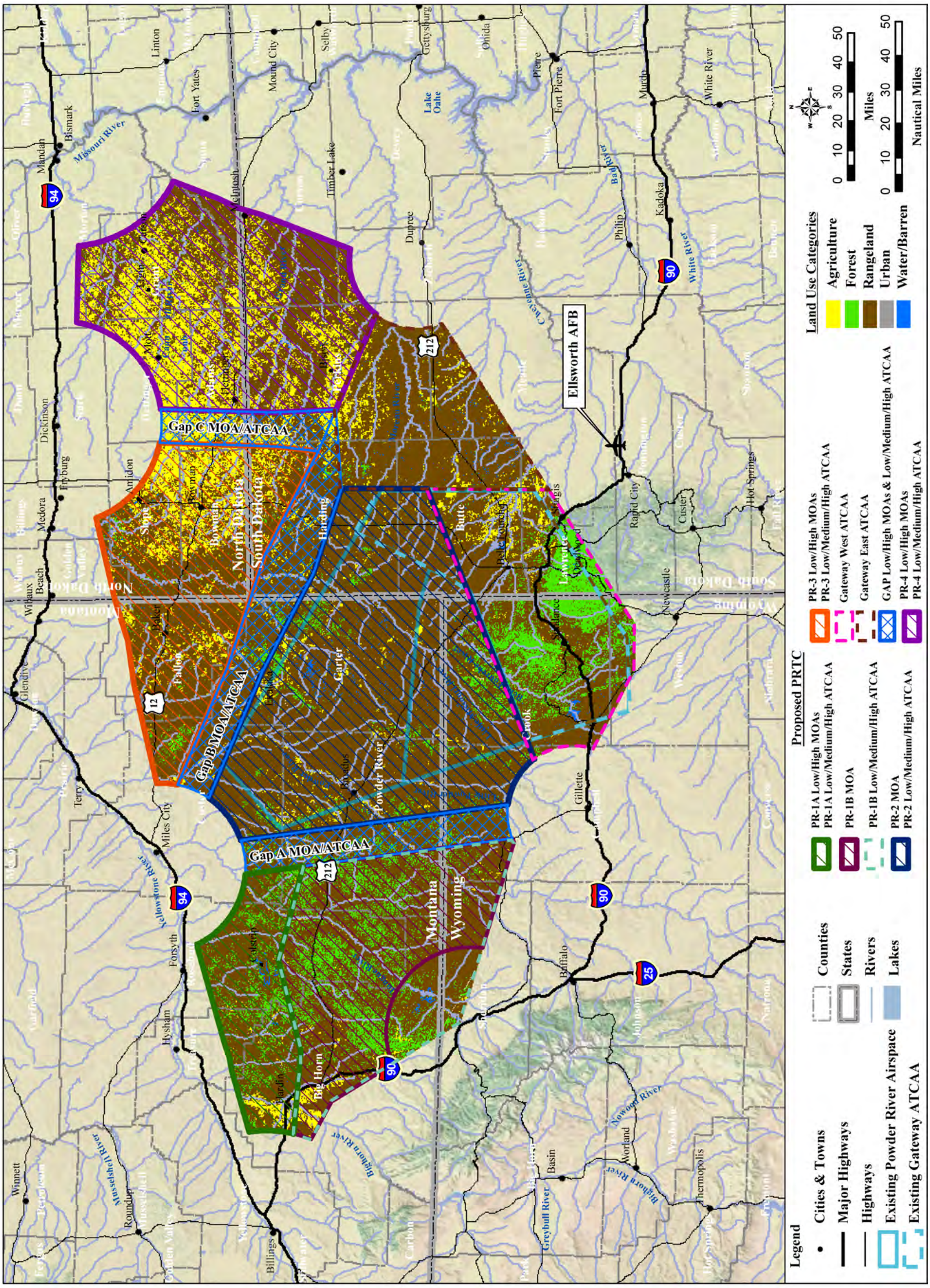


Figure 3.8-1. Generalized Land Use in the ROI

Table 3.8-1. Land Jurisdiction in ROI

County	*Current Powder River airspace (square miles)*	*Expanded PRTC (square miles)*	*% of Expanded PRTC Area*
MT	**4,040**	**14,368**	**40.9%**
Big Horn	-	2,638	**7.5%**
Carter	2,463	3,337	**9.5%**
Custer	325	1,626	**4.6%**
Fallon	-	1,370	**3.9%**
Powder River	1,252	3,296	**9.4%**
Rosebud	-	1,896	**5.4%**
Treasure	-	205	**<1%**
ND	**0**	**5,715**	**16.3%**
Adams	-	987	**2.8%**
Billings	-	30	**<1%**
Bowman	-	1,160	**3.3%**
Golden Valley	-	86	**<1%**
Grant	-	1,505	**4.3%**
Hettinger	-	588	**1.7%**
Morton	-	119	**<1%**
Sioux	-	296	**<1%**
Slope	-	942	**2.7%**
Stark	-	2	**<1%**
SD	**2,760**	**10,133**	**28.9%**
Butte	1,516	2,247	**6.4%**
Corson	-	895	**2.5%**
Harding	581	2,669	**7.6%**
Lawrence	294	579	**1.6%**
Meade	369	908	**2.6%**
Pennington	-	0	**0.0%**
Perkins	-	2,731	**7.8%**
Ziebach	-	104	**<1%**
WY	**2,787**	**4,886**	**13.9%**
Campbell	99	1,129	**3.2%**
Crook	2,688	2,830	**8.1%**
Sheridan	-	661	**1.9%**
Weston	-	266	**<1%**
Total	**9,587**	**35,102**	**100.0%**

Source: ESRI 2000.

Table 3.8-2. Generalized Land Use in the ROI (square miles)

	Water/ Barren	Urban	Rangeland	Forest	Agriculture	Total
Existing Powder River MOAs[1]	**286**	**0**	**8,087**	**734**	**480**	**9,587**
Proposed PRTC						
PR-1A MOA/ATCAA	14	16	1,477	349	103	1,959
PR-1B MOA/ATCAA[2]	18	24	3,758	779	130	4,708
PR-2 MOA/ATCAA	21	30	7,562	317	208	8,137
PR-3 MOA/ATCAA	22	82	3,318	64	1,013	4,499
PR-4 MOA/ATCAA	44	134	3,247	16	2,026	5,466
Gap A MOA/ATCAA	2	1	898	116	15	1,033
Gap B MOA/ATCAA	5	9	1,507	42	110	1,674
Gap C MOA/ATCAA	2	18	313	0	334	667
Gateway East ATCAA	33	12	2,537	14	212	2,808
Gateway West ATCAA	39	60	2,419	1,025	221	3,764
Total[3]	**200**	**386**	**27,036**	**2,722**	**4,372**	**34,716**

Notes: 1. Does not include estimated 200 square miles of other land uses.
2. ATCAA extends beyond MOA boundary.
3. Does not include estimated 386 square miles of other land uses.

Source: Landfire 2008

3.8.3.3 Ownership

Figure 3.8-2 shows land ownership in the ROI, and Table 3.8-3 quantifies the surface ownership underlying each of the proposed PRTC airspace elements. Over half the land under the existing Powder River A and B MOAs (about 55 percent), is privately owned. About 36 percent of the land is federal (public) land and about 9 percent is state-owned. State-owned land includes dispersed school sections (brown dots on Figure 3.8-2).

The expanded PRTC area includes a slightly different mix of ownership. The majority (72 percent) of the land under the proposed PRTC is privately owned. Most of the private land in the ROI has split estate ownership, with the surface held privately and the mineral and oil and gas rights held by the federal government. Much of the private land is used for grazing, agriculture, and some land is made available for hunting by the public. The federal government leases mineral rights, along with the surface use of private land needed to extract the resources.

Native American reservations account for 10 percent of the ROI and are concentrated under two proposed airspace units. All of the Northern Cheyenne and portions of the Crow Reservations are under the proposed PR-1A and PR-1B MOAs. Portions of the Cheyenne River Sioux and Standing Rock Reservations are under the proposed PR-4 MOA. Agriculture and grazing are dominant uses on these tribal lands. The Northern Cheyenne and Crow Reservations have extensive coal reserves.

About 14 percent of the land surface is federal land managed by the USFS or BLM. Both agencies manage lands for multiple purposes, including productive or consumptive uses such as energy production, timbering, hunting, and grazing, and non-consumptive uses such as dispersed recreation and resource conservation. The WY portion of the ROI is almost entirely federally-owned interspersed with state land. Private land is mostly along rivers and streams. State land (about 5 percent of the ROI) is interspersed in the private and federal lands. State land is typically used and managed like surrounding lands, with the states deriving tax revenues from productive uses.

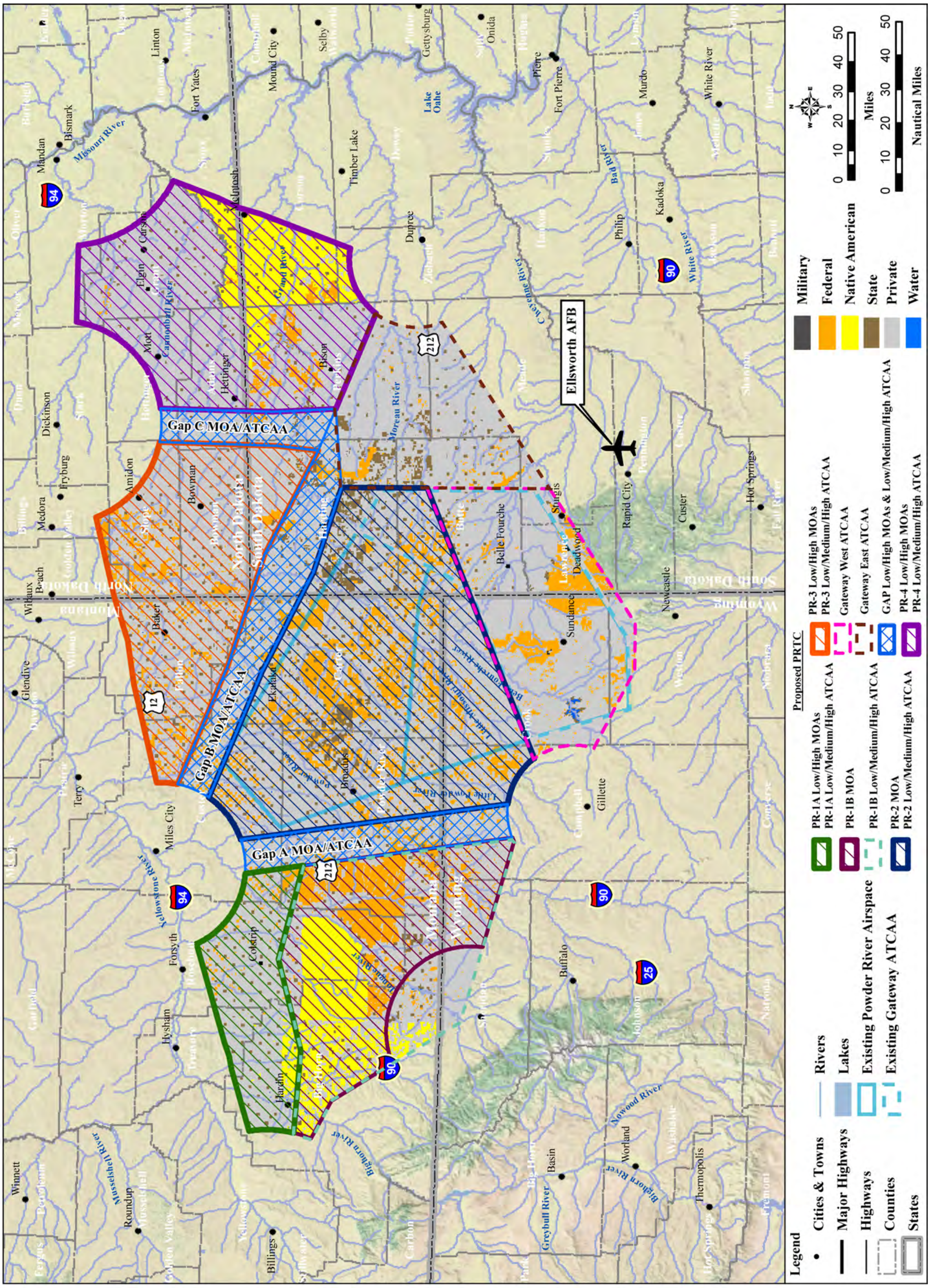


Figure 3.8-2. Land Ownership in the ROI

Table 3.8-3. Land Ownership in ROI (Square Miles)

	Private	State	Native American	Military	Federal Land	Total[1]
Existing Powder River MOAs	**3,217**	**532**	**0**	**0**	**2,097**	**5,846**[2]
Proposed PRTC						
PR 1A Low/High MOA and Low/Medium/High ATCAA	1,699	100	116	0	92	2,007
PR 1B Low/Medium/High ATCAA[2].	2,499	140	1,248	0	936	4,823
PR 1B MOA	1,890	114	1,168	0	908	4,080
PR 2 MOA and Low/Medium/High ATCAA	5,941	661	0	0	1,620	8,222
PR 3 Low/High MOA and Low/Medium/High ATCAA	3,739	229	0	0	571	4,539
PR 4 Low/High MOA and Low/Medium/High ATCAA	3,791	168	1,281	0	272	5,512
Gap A Low/High MOA and Low/Medium/High ATCAA	870	43	0	0	136	1,049
Gap B Low/High MOA and Low/Medium/High ATCAA	1,416	123	0	0	153	1,692
Gap C Low/High MOA and Low/Medium/High ATCAA	631	24	0	0	16	671
Gateway East ATCAA	2,506	236	0	0	99	2,841
Gateway West ATCAA	3,090	54	0	2	663	3,809
Totals[3]	26,182	1,778	2,645	2	4,558	35,165

Notes:
1. Excludes 41 square miles of water bodies (ownership not classified).
2. ATCAA extends MOA boundary.
3. Totals do not double count PR-1B MOAs

Source: USGS 2008

Under the existing Powder River MOAs, the BLM administers land within the Miles City Field Office in MT, a small portion of the land in the Buffalo and Newcastle Field Offices in WY, and the ND and SD Field Offices. Under the existing Powder River airspace, the USFS administers portions of the Custer National Forest, with segments in the Ashland and Sioux Ranger Districts. The Ashland Ranger District has one of the largest grazing programs in the nation, and is rich in coal and wildlife. The Sioux Ranger District, located in the southeast corner of MT and the northwest corner of SD, is comprised of hills or mesas of ponderosa pine rising above rolling grasslands. The area offers excellent antelope, mule deer, white-tail deer and game bird hunting. The area is rich in archeology, paleontology, produces some oil, and supports a sizable livestock population. One of the largest populations of Merlins (a small falcon) is found in the Sioux Ranger District (USDA USFS 2008).

Under the proposed PRTC, BLM administers a larger portion of the federal lands of these same administrative areas named above, and the mineral rights on most of the state and private land. The USFS manages additional units of the Custer National Forest in MT, the Thunder Basin National Grassland in WY, Black Hills National Forest (spanning WY and SD), Grand River National Grasslands in SD, and the Little Missouri National Grasslands in ND. These areas all offer recreational resources, particularly hunting and some fishing. Figure 3.8-3 shows the location of the national forest and grasslands in the ROI.

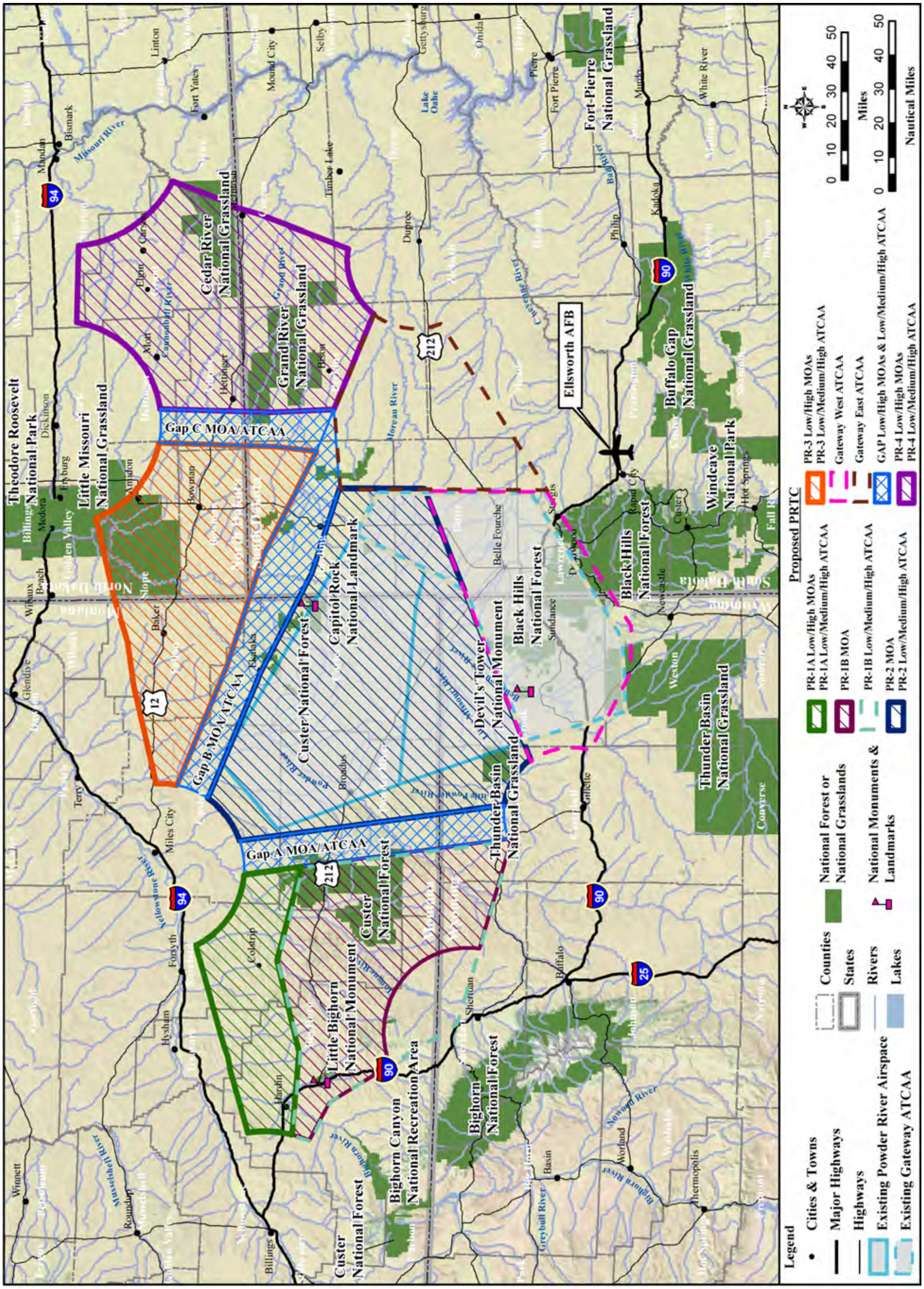


Figure 3.8-3 National Forest and Grasslands in the ROI

3.8.3.4 Ranching, Farming, and Rural Communities

Ranching and farming are well-established activities that define the regional character and economy since settlement by Americans of European descent. Ranching and farming have become important activities of Native Americans within the ROI. Agricultural operations tend to occur in rural regions. In the ROI, these regions tend to be quiet with wide open spaces with expansive vistas. Ranch operations include cattle round-ups for branding and shipping, horseback riding to maintain property in remote areas, and light aircraft for surveillance. Some ranchers and farmers consider the ability to maintain their operations with minimal outside intrusion to be a quality of life factor.

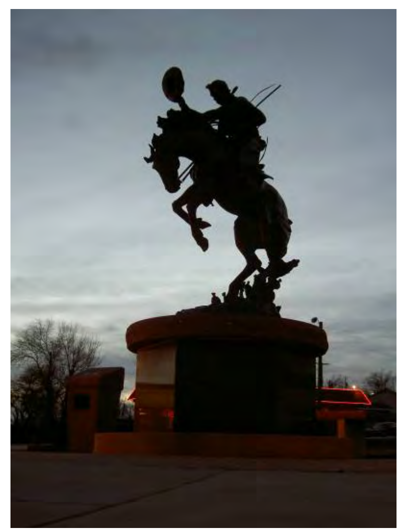
3.8.3.5 Special Use Areas

Some federal land within the ROI is managed and protected for particular resource values or attributes such as wilderness or wildlife preserves. The area also has units of the National Park system, State Parks, and National Monuments. Table 3.8-4 lists major special areas in the ROI with the primary attraction of the area. The ROI includes portions of the Custer and Black Hills National Forests, Thunder Basin National Grassland, Cedar River and Grand River National Grasslands. These areas are popular for recreation, including hunting, fishing, and birding. Both USFS and BLM designate areas or locations with specific attributes or resource value for special management. There are two classified National Landmarks in the USFS Sioux Ranger District, the Castles and Capitol Rock. The Castles, located in the Slim Buttes Unit in SD, are a massive limestone uplift that resembles a medieval castle. Capitol Rock, located in the Long Pines Unit in MT, is a massive white limestone uplift that resembles the Nation's capitol building.

There are no wilderness areas or wild and scenic river segments under the proposed airspace.

3.8.3.6 Recreation and Tourism

Access to and quality of recreation opportunities is important within the ROI. Activities such as off-road vehicles, hunting, fishing, hiking, horseback riding, and rock climbing occur on both public and private lands. Devils Tower National Monument, Badlands National Park, state parks, battlefields and other historic sites situated within the study area are revered as remote contemplative sites. People who choose to live in or visit this region often value its open space, isolation, and natural beauty.



The open spaces and this statue in Belle Fourche help explain the perspective of residents and visitors who value the western heritage of the area.

The ROI includes a wide range of recreational opportunities which provide both important social and economic benefits. The wide open spaces and remoteness of the study area provide settings with a high degree of solitude. Popular activities include camping, hunting (deer and antelope, waterfowl), fishing, nature viewing, hiking, motorized and non-motorized biking, off-road vehicle use, scenic driving, cross country skiing, and snowmobile use. Most public lands have specific off-road designations to provide safe, quality recreational opportunities while minimizing adverse impacts on sensitive resource values (Air Combat Command [ACC] 2007). Many Special Recreation Management Areas provide areas for specific activities in order to accommodate a wide range of public preferences, including those that seek quiet activities and those that generate noise as part of the activity. Hunting, as an organized public recreational activity, occurs on suitable private land throughout the ROI. For example, ND Department of Game and Fish has developed the Private Land Open to Sportsmen program, for leasing land for public pedestrian access as part of a wider conservation program. In addition, some private land owners throughout the ROI run commercial hunting operations as a source of income.

Table 3.8-4. Special Use Areas and Points of Interest in the ROI

Airspace	*Special Area*	*Attraction/Uses*
Existing Powder River airspace	Custer National Forest	Timber, recreation, hunting, fishing, grazing
Proposed PRTC		
PR-1A MOA/ATCAA	Little Bighorn Battlefield National Monument	Historic value. Tourism. Annual visitation ranges between 300,000 and 500,000 visits per year
	Custer National Forest	Timber, recreation, hunting, grazing
PR-1B MOA/ATCAA	Custer National Forest	Timber, recreation, hunting, grazing
PR-2 MOA/ ATCAA	Custer National Forest	Timber, recreation, hunting, fishing, grazing
	Thunder Basin National Grassland	Exceptional wildlife viewing, hunting, fishing,, undeveloped camping, livestock grazing
	Capitol Rock National Landmark	Massive limestone formation in prairie setting.
PR-3 MOA/ ATCAA	Little Missouri National Grassland	Recreation, hunting (particularly waterfowl), spectacular badlands landscape, hiking, camping, horseback riding, photography, canoeing, fishing, hunting, and backpacking
	Custer National Forest	Timber, recreation, hunting, fishing, grazing
PR-4 MOA/ ATCAA	Grand River National Grassland	Recreation, remote, wildlife /nature viewing, hunting (particularly waterfowl), cultural interest
	Cedar River National Grassland	Recreation, remote, wildlife /nature viewing, hunting (particularly waterfowl), cultural interest
Gap A MOA/ATCAA	Custer National Forest	Timber, recreation, hunting, fishing, grazing
Gap B MOA/ATCAA	Custer National Forest	Timber, recreation, hunting, grazing
Gap C MOA/ATCAA	Grand River National Grassland	Recreation, hunting (particularly waterfowl)
Gateway East ATCAA	Custer National Forest	Timber, recreation, hunting, grazing
Gateway West ATCAA	Black Hills National Forest	Timber industries; hunting and fishing; diverse recreation; developed campgrounds, scenic by-ways
	Custer National Forest	Timber, recreation, hunting, fishing, grazing
	Devils Tower National Monument	Climbing, spectacular rock formation, interpretive site
	Town of Sturgis	Annual Motorcycle rally

3.9 Socioeconomics

3.9.1 Definition of the Resource

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Economic activity typically encompasses employment, personal income, and regional industries. Changes to these fundamental socioeconomic components can influence other resources such as housing availability, utility capabilities, and community services.

The ROI for socioeconomics consists of 29 counties across rural southeastern MT, northeastern WY, southwestern ND, northwestern SD (Figure 3.9-1). Throughout this Socioeconomics section, the term ROI refers to these 29 counties in their entirety. The term affected area is the specific land area under the proposed PRTC airspace boundaries. There are eight counties in which over 90 percent of the counties' land area is included under the proposed airspace (see Table 3.9-1). Given the rural nature of the ROI, many of the population centers are small or are outside the airspace. The focus of this analysis is based on county-level data and combined county-level data from the affected counties. More detailed data, at the census block-group level, is available regarding certain demographic characteristics. Discussions of these demographic data are specific to those portions of the counties underlying the proposed airspace.

Socioeconomics includes population, employment, and economic activity, which sustains the communities under the proposed PRTC.

3.9.2 Existing Conditions

3.9.2.1 Population and Housing

Portions of the airspace associated with the proposed action have been in existence for many years. The existing Powder River A and B MOAs cover most of the area proposed for the PR-2 MOA. The PRTC changes being proposed would alter the current airspace configuration by expanding the total affected airspace to include counties underlying the proposed PR-1A MOA and ATCAA, PR-1B MOA and ATCAA, Gap A MOA and ATCAA, Gateway West ATCAA, Gateway East ATCAA, Gap B MOA and ATCAA, PR-4 MOA and ATCAA, Gap C MOA and ATCAA, and PR-3 MOA and ATCAA. Some areas under the proposed edges of the PR-2 MOA and ATCAA are outside the current Powder River A and B MOAs.

The Powder River A and B MOAs were configured to avoid densely populated and metropolitan or urban areas. The proposed PRTC by design tends to be also located over rural and less developed areas. While populated areas do occur within the boundaries of the PRTC affected airspace, these areas are typically scattered, relatively low in density compared to urbanized areas, and would be avoided during training to the maximum extent possible. The following information concentrates on the existing conditions in each county that could be affected under the proposed airspace. The information includes counties under the existing Powder River airspace which would continue to be affected by military aircraft training under either the proposed PRTC or No Action.

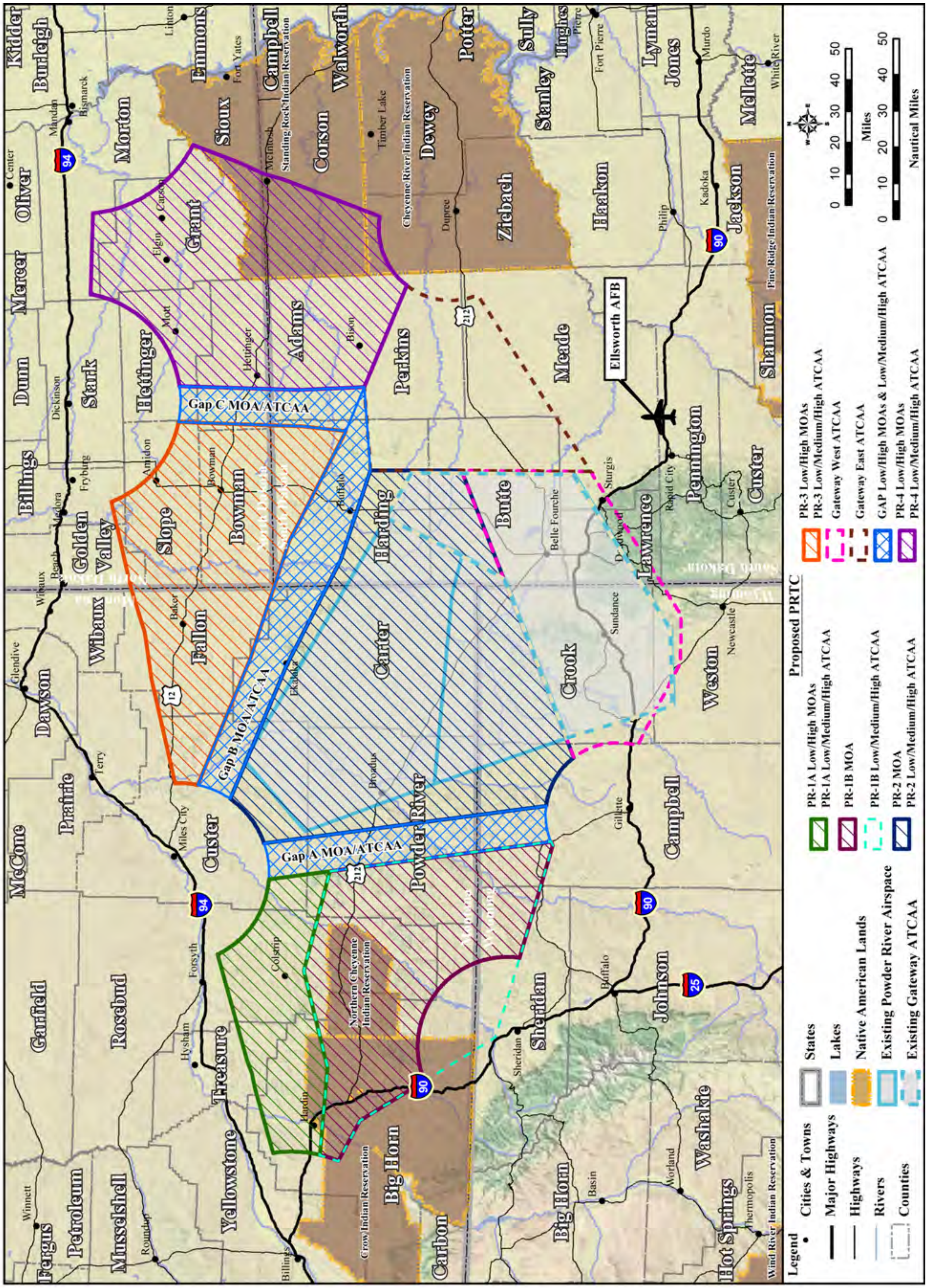


Figure 3.9-1. Counties Under or Around the Existing and Proposed Airspace

Table 3.9-1. Land Area under the PRTC Affected Airspace by County

County/State	*Affected Acres in County/State under Existing Powder River airspace*	*Affected Acres in County/State under Proposed PRTC*	*Percent of Total Affected Area under Proposed PRTC*	*Percent of County/State under Proposed PRTC*
MT[5]	2,688,390	9,193,600	40.93%	9.87%
Big Horn	-	1,686,400	7.5%	52.5%
Carter[1]	1,646,673	2,135,680	9.5%	99.7%
Custer[1]	288,041	1,040,640	4.6%	42.9%
Fallon	-	876,800	3.9%	84.5%
Powder River[1]	753,676	2,109,440	9.4%	100.0%
Rosebud	-	1,213,440	5.4%	37.7%
Treasure	-	131,200	0.6%	20.8%
ND[5]	0	3,657,600	16.28%	8.29%
Adams	-	631,680	2.8%	99.8%
Billings	-	19,200	0.1%	2.6%
Bowman	-	742,400	3.3%	99.4%
Golden Valley	-	55,040	0.2%	8.6%
Grant	-	963,200	4.3%	90.3%
Hettinger	-	376,320	1.7%	51.9%
Morton	-	76,160	0.3%	6.1%
Sioux	-	189,440	0.8%	26.2%
Slope	-	602,880	2.7%	77.3%
Stark	-	1,280	0.0%	0.1%
SD[5]	1,766,945	6,485,120	28.87%	13.35%
Butte[1, 2]	970,663	1,438,080	6.4%	99.2%
Corson	-	572,800	2.5%	35.3%
Harding[1, 3]	371,962	1,708,160	7.6%	99.7%
Lawrence[1, 4]	188,170	370,560	1.6%	72.4%
Meade[1, 4]	236,150	581,120	2.6%	26.1%
Pennington	-	-	0.0%	0.0%
Perkins[2]	-	1,747,840	7.8%	94.5%
Ziebach	-	66,560	0.3%	5.3%
WY[5]	1,783,723	3,127,040	13.92%	5.03%
Campbell[1]	63,172	722,560	3.2%	23.5%
Crook[1, 2]	1,720,551	1,811,200	8.1%	98.7%
Sheridan	-	423,040	1.9%	26.2%
Weston[1, 4]	-	170,240	0.8%	11.1%
Total Affected Area	6,239,058	22,463,360	100.00%	9.06%

Notes:
1. Portions of county under existing MOAs or ATCAAs.
2. Proposed training airspace 50 to 75 percent ATCAA.
3. Proposed training airspace 10 to 20 percent ATCAA.
4. Proposed training airspace all ATCAA.
5. Includes total affected area within the state.

Population Characteristics

Population data for the ROI are presented in Table 3.9-2. The total 2008 population for the 29 counties in the ROI was 355,681 persons, representing 12 percent of the total population of the four affected states of 2.9 million persons. This number of persons includes the population in all the counties in Table 3.9-1. Of these 355,681 persons, a total of approximately 54,403 persons would be under the expanded PRTC MOAs. This includes persons under the existing Powder River A/B MOAs. An estimated total of 84,420 persons would be located under the proposed PRTC MOAs and ATCAAs. This includes persons under the existing MOAs and ATCAAs.

Population change during the eight years, from 2000 to 2008, varied greatly across the affected counties. The population in many counties decreased during the time period (see Table 3.9-2). The Treasure County, MT population decreased 26 percent, while the population of Golden Valley County in ND decreased nearly 15 percent. Several other affected counties in ND and SD decreased in population by 10 percent or more. Some counties in the ROI also experienced moderate to high rates of population growth. The population in Campbell County, WY, increased over 23 percent. Other affected counties experienced population growth ranging from 0.9 percent to 10 percent. In general, there has been a concentration of rural population from smaller farms or communities to larger communities within the ROI.

Counties currently under the existing Powder River MOAs and ATCAAs which would continue to be under the proposed PR-2 MOA/ATCAA include portions of Carter, Custer, and Powder River in MT; Harding, Butte, and Lawrence in SD; and Campbell and Crook in WY. Table 3.9-3 presents the population under the existing Powder River A and B MOAs and the population under the proposed PR-1A, PR-1B, PR-2, PR-3, and PR-4 MOA/ATCAAs. Persons under the existing Powder River A and B MOAs (most of the proposed PR-2) are in areas of existing low-altitude overflight. Persons under the proposed PR-1A, PR-1B, PR-3, and PR-4 MOAs and associated Gap MOAs would be in areas where low-level overflight would occur to 500 feet AGL. Table 3.9-3 presents the estimated number of persons under the existing Gateway ATCAA which has a floor of FL180 (18,000 feet MSL). Persons under the proposed Gateway East and West ATCAAs are also estimated in Table 3.9-3. These individuals would not be expected to experience training aircraft in the proposed PRTC below 18,000 feet MSL.

Population density in the affected areas under the proposed MOAs ranged from 0.4 persons per square mile in Carter County to 31.9 persons per square mile in Pennington County (see Table 3.9-2). The average population density in the ROI counties including urban areas outside the affected area is 5.3 persons per square mile. Population density is 7.6 persons per square mile in the combined four-state area. Population density in the U.S. overall is 79.6 persons per square mile.

The rural nature of the affected area is evident by reviewing the detailed Census data for lands under the proposed PRTC airspace, as presented in Table 3.9-4. The average population density under the affected airspace is 2.8 persons per square mile, substantially lower than the 29-county ROI average density of 5.3 persons per square mile.

Table 3.9-2. Population and Population Change by ROI County

	Population		Percent Change, 2000-2008	Population Density, 2000 (per mile^2)
	2000	2008		
MT	902,195	967,440	7.2%	6.2
Big Horn	12,671	12,841	1.3%	2.5
Carter[1]	1,360	1,234	-9.3%	0.4
Custer[1]	11,696	11,149	-4.7%	3.1
Fallon	2,837	2,716	-4.3%	1.8
Powder River[1]	1,858	1,694	-8.8%	0.6
Rosebud	9,383	9,190	-2.1%	1.9
Treasure	861	637	-26.0%	0.9
ND	642,200	641,481	-0.1%	9.3
Adams	2,593	2,244	-13.5%	2.6
Billings	888	811	-8.7%	0.8
Bowman	3,242	3,019	-6.9%	2.8
Golden Valley	1,924	1,640	-14.8%	1.9
Grant	2,841	2,415	-15.0%	1.7
Hettinger	2,715	2,378	-12.4%	2.4
Morton	25,303	26,255	3.8%	13.1
Sioux	4,044	4,232	4.6%	3.7
Slope	767	675	-12.0%	0.6
Stark	22,636	22,575	-0.3%	16.9
SD	754,844	804,194	6.5%	9.9
Butte[1, 2]	9,094	9,593	5.5%	4.0
Corson	4,181	4,136	-1.1%	1.7
Harding[1, 3]	1,353	1,145	-15.4%	0.5
Lawrence[1, 4]	21,802	23,524	7.9%	27.3
Meade[1, 4]	24,253	23,989	-1.1%	7.0
Pennington	88,565	98,533	11.3%	31.9
Perkins[2]	3,363	2,900	-13.8%	1.2
Ziebach	2,519	2,542	0.9%	1.3
WY	493,782	532,668	7.9%	5.1
Campbell[1]	33,698	41,473	23.1%	7.0
Crook[1, 2]	5,887	6,457	9.7%	2.1
Sheridan	26,560	28,662	7.9%	10.5
Weston[1, 4]	6,644	7,022	5.7%	2.8

Notes:
1. Portions of county under existing MOAs or ATCAAs.
2. Proposed training airspace 50 to 75 percent ATCAA.
3. Proposed training airspace 10 to 20 percent ATCAA.
4. Proposed training airspace all ATCAA.

Source: U.S. Census Bureau 2009

Table 3.9-3. Population under Proposed PRTC Airspace by Airspace, 2000

	Population under Affected Airspace	***Percent of Affected Population***
Existing Powder River A/B MOA/ Powder River ATCAA[1]	2,528	7.01%
Existing Crossbow ATCAA/ Existing Gateway ATCAA[2]	33,535	92.99%
Existing Powder River Airspace	36,063	100.00%
PR-1A MOA/ATCAA	7,517	8.90%
PR-1B MOA/ATCAA[3]	9,578	11.35%
PR-2 MOA/ATCAA	3,261	3.86%
PR-3 MOA/ATCAA	6,964	8.25%
PR-4 MOA/ATCAA	9,897	11.72%
Gap A MOA/ATCAA	335	0.40%
Gap B MOA/ATCAA	1,373	1.63%
Gap C MOA/ATCAA	693	0.82%
Gateway East ATCAA	1,003	1.19%
Gateway West ATCAA	43,799	51.88%
Proposed Powder River Training Complex	84,420	100.00%

Notes: 1. Powder River ATCAA overlies Powder River A/B MOAs.
2. Crossbow ATCAA overlies Powder River ATCAA and existing Gateway ATCAA.
3. PR-1B ATCAA overlies and is slightly larger than PR-1B MOA; PR-1B MOA has an estimated 349 fewer persons than under the PR-1B ATCAA.

The estimated resident population under the proposed PRTC MOA and ATCAA airspace is 84,420 persons (Table 3.9-4). This estimate was derived using Census Tract and Block Group data from the 2000 Census. The 2000 Census is the latest data available at the Census Tract and Block Group level. The total populations of Carter County and Powder River County, MT; Adams County and Bowman County, ND; Butte County and Harding County, SD; and Crook County, WY are included under the affected airspace. An additional three counties have 90 percent or more of their respective populations included under the affected airspace. Table 3.9-3 presents estimated population under each of the proposed PRTC airspace units. Nearly all persons under the PR-2 MOA/ATCAA are currently under the existing Powder River A and B MOAs. Approximately three-quarters of the persons under the proposed Gateway East and West ATCAAs are currently under the existing Gateway ATCAA.

Lawrence County, under the existing Gateway ATCAA, is the most densely populated area under the airspace. The Gateway ATCAA overlies approximately 24.7 percent of the total population of Lawrence County.

Table 3.9-4. Population Under the Proposed PRTC Airspace by County (2000)

	Population under Affected Airspace	*Percent of Affected Population*	*Percent of Total County Population*	*Population Density under Affected Airspace (per mile^2)*
MT	22,625	26.8%	2.5%	1.6
Big Horn	10,187	12.1%	80.4%	3.9
Carter[1]	1,359	1.6%	99.9%	0.4
Custer[1]	254	0.3%	2.2%	0.2
Fallon	2,728	3.2%	96.2%	2.0
Powder River[1]	1,857	2.2%	99.9%	0.6
Rosebud	6,169	7.3%	65.7%	3.3
Treasure	71	0.1%	8.2%	0.3
ND	10,731	12.7%	1.7%	1.9
Adams	2,592	3.1%	100.0%	2.6
Billings	7	0.0%	0.8%	0.2
Bowman	3,237	3.8%	99.9%	2.8
Golden Valley	35	0.0%	1.8%	0.4
Grant	2,698	3.2%	95.0%	1.8
Hettinger	1,313	1.6%	48.4%	2.2
Morton	125	0.1%	0.5%	1.1
Sioux	156	0.2%	3.9%	0.5
Slope	567	0.7%	73.9%	0.6
Stark	1	0.0%	0.0%	0.3
SD	43,402	51.4%	5.7%	4.3
Butte[1, 2]	9,089	10.8%	99.9%	4.0
Corson	759	0.9%	18.1%	0.8
Harding[1, 3]	1,352	1.6%	99.9%	0.5
Lawrence[1, 4]	20,859	24.7%	95.7%	36.0
Meade[1, 4]	8,004	9.5%	33.0%	8.8
Pennington	-	0.0%	0.0%	-
Perkins[2]	3,292	3.9%	97.9%	1.2
Ziebach	48	0.1%	1.9%	0.5
WY	7,662	9.1%	1.6%	1.6
Campbell[1]	403	0.5%	1.2%	0.4
Crook[1, 2]	5,866	6.9%	99.6%	2.1
Sheridan	240	0.3%	0.9%	0.4
Weston[1, 4]	1,154	1.4%	17.4%	4.3

Notes:
1. Portions of county under existing MOAs or ATCAAs.
2. Proposed training airspace 50 to 75 percent ATCAA.
3. Proposed training airspace 10 to 20 percent ATCAA.
4. Proposed training airspace all ATCAA.

Source: U.S. Census Bureau 2008

Housing Characteristics

Housing supply in the ROI is presented in Table 3.9-5. The ROI had a total of 202,064 units in 2000 including urban areas outside the affected area. The 2000 Census is the latest data available for housing in these rural areas. Occupied housing units amounted to 182,115 units, resulting in a housing occupancy rate of about 90 percent. Owner-occupied units account for 70 percent of occupied units, with the remaining 30 percent occupied by renters. The 2000 Census median value of owner-occupied units in the ROI ranged from a low of $21,600 in Corson County, SD to a high in Campbell County, WY of $102,100. Vacancy rates widely vary throughout the ROI. The lowest vacancy rate is in Yellowstone County, WY at 4.5 percent while the highest vacancy rate is 34.7 percent in Harding County, SD. There is an estimated total of 33,398 housing units under the proposed PRTC, as presented in Table 3.9-6.

3.9.2.2 Economic Activity

Employment and Job Composition

Employment in the four states overall increased between 2000 and 2008 by amounts ranging from 5 percent to 11 percent. Employment growth in the ROI counties was not consistent. Several counties experienced a decline in employment ranging from a decrease of 1 percent in Corson County, SD and Weston County, WY to a decrease of 15 percent in Grant County, ND. The majority of counties in the ROI experienced at least nominal employment growth during this period. Sioux County, ND increased in employment approximately 3 percent. Slope County, ND experienced the greatest employment growth with an increase of 80 percent between 2000 and 2008 with the addition of 337 jobs for a total 2008 employment of 756 jobs.

Total employment characteristics of the ROI counties in their respective states are presented in Table 3.9-7. While individual counties may have higher or lower rates of unemployment, the average unemployment rate for the ROI counties was lowest in ND and WY with an average unemployment rate of 2.9 percent in 2008. The highest average unemployment rates were in MT and SD with an average unemployment rate of 4.3 percent and 3.5 percent, respectively. Unemployment in most of the individual counties decreased between 2000 and 2008. For those counties that experienced an increase in the unemployment rate, the increase was nominal, with the largest increase of 1.0 percentage point occurring in Grant County, ND.

Table 3.9-5. Housing Characteristics by ROI County (2000)

	Household Size, 2000	*Total Housing Units, 2000*	*Occupied Housing Units*	*Owner-Occupied Units*	*Renter-Occupied Units*	*Median Value of Owned Units*
MT	***2.45***	***412,633***	***358,667***	***247,723***	***110,944***	***$99,500***
Big Horn	3.17	4,655	3,924	2,535	1,389	$61,400
Carter[1]	2.47	811	543	406	137	$34,600
Custer[1]	2.36	5,360	4,768	3,349	1,419	$63,100
Fallon	2.45	1,410	1,140	882	258	$48,000
Powder River[1]	2.48	1,007	737	544	193	$59,800
Rosebud	2.81	3,912	3,307	2,218	1,089	$66,700
Treasure	2.41	422	357	255	102	$40,700
Yellowstone	2.43	54,563	52,084	36,026	16,058	$101,900
ND	***2.41***	***289,677***	***257,152***	***171,299***	***85,853***	***$74,400***
Adams	2.24	1,416	1,121	797	324	$37,500
Billings	2.43	529	366	281	85	$56,500
Bowman	2.32	1,596	1,358	1,078	280	$53,600
Golden Valley	2.38	973	761	594	167	$40,600
Grant	2.3	1,722	1,195	948	247	$23,500
Hettinger	2.3	1,419	1,152	963	189	$30,300
Morton	2.51	10,587	9,889	7,464	2,425	$74,800
Sioux	3.63	1,216	1,095	507	588	$48,000
Slope	2.45	451	313	272	41	$23,900
Stark	2.44	9,722	8,932	6,276	2,656	$70,400
SD	***2.5***	***323,208***	***290,245***	***197,940***	***92,305***	***$79,600***
Butte[1, 2]	2.55	4,059	3,516	2,575	941	$60,200
Corson	3.29	1,536	1,271	755	516	$21,600
Harding[1, 3]	2.5	804	525	386	139	$47,100
Lawrence[1, 4]	2.33	10,427	8,881	5,754	3,127	$87,700
Meade[1, 4]	2.66	10,149	8,805	6,006	2,799	$82,200
Pennington	2.49	37,249	34,641	22,930	11,711	$90,900
Perkins[2]	2.31	1,854	1,429	1,094	335	$33,200
Ziebach	3.4	879	741	440	301	$38,300
WY	***2.48***	***223,854***	***193,608***	***135,514***	***58,094***	***$96,600***
Campbell[1]	2.73	13,288	12,207	8,989	3,218	$102,900
Crook[1, 2]	2.51	2,935	2,308	1,845	463	$85,400
Sheridan	2.31	12,577	11,167	7,689	3,478	$102,100
Weston[1, 4]	2.42	3,231	2,624	2,045	579	$66,700

Notes:
1. Portions of county under existing MOAs or ATCAAs.
2. Proposed training airspace 50 to 75 percent ATCAA.
3. Proposed training airspace 10 to 20 percent ATCAA.
4. Proposed training airspace all ATCAA.

Source: U.S. Census Bureau 2008

Table 3.9-6. Housing under the Proposed PRTC Airspace (2000)

	Housing under Affected Airspace
MT	7,958
Big Horn	3,214
Carter[1]	550
Custer[1]	108
Fallon	1,114
Powder River[1]	749
Rosebud	2,195
Treasure	29
ND	4,638
Adams	1,157
Billings	3
Bowman	1,395
Golden Valley	15
Grant	1,173
Hettinger	571
Morton	50
Sioux	43
Slope	231
Stark	0
SD	17,736
Butte[1, 2]	3,564
Corson	231
Harding[1, 3]	541
Lawrence[1, 4]	8,952
Meade[1, 4]	3,009
Pennington	-
Perkins[2]	1,425
Ziebach	14
WY	3,065
Campbell[1]	148
Crook[1, 2]	2,337
Sheridan	104
Weston[1, 4]	477

Notes:
1. Portions of county under existing MOAs or ATCAAs.
2. Proposed training airspace 50 to 75 percent ATCAA.
3. Proposed training airspace 10 to 20 percent ATCAA.
4. Proposed training airspace all ATCAA.

Table 3.9-7. Employment Characteristics in ROI

	2000			**2008**		
	Civilian Labor Force	***Employment***	***Unemployment Rate***	***Civilian Labor Force***	***Employment***	***Unemployment Rate***
MT ROI Counties	90,986	86,896	4.5%	100,111	96,437	3.7%
ND ROI Counties	35,336	34,301	2.9%	37,985	36,858	3.0%
SD ROI Counties	82,126	79,896	2.7%	90,930	88,229	3.0%
WY ROI Counties	41,135	39,683	3.5%	49,785	48,526	2.5%

Source: U.S. Bureau of Labor Statistics 2008

Table 3.9-8 shows employment by industry in the ROI. Farm employment accounts for approximately 3.5 percent and 3.9 percent for the ROI counties in SD and WY in 2008, respectively. In the ROI counties in MT and ND, agriculture accounts for over 12 percent of total employment. Retail trade is another industry that comprises a large share of total employment in each of the ROI areas with a share of employment ranging between nearly 10 percent up to nearly 13 percent. State and local government accounts for over 19 percent in the ROI counties of MT. In the ROI counties in SD, state and local government comprises over 9.5 percent of total employment and over 13 percent in the counties in ND and over 12 percent in the ROI counties of WY (Table 3.9-8).

The industrial employment for the ROI counties is affected by the larger communities outside the potentially affected airspace but with portions of the counties potentially affected by the proposed MOA low-level airspace training boundaries. This means that employment for cities such as Miles City, Gillette, and Rapid City is represented in Table 3.9-8. As explained by participants at scoping meetings, employment under the airspace is generally more rural than the urban areas with more agricultural, recreational-oriented, and localized mining operations. Many scoping participants specifically noted the non-urban aspects of their lifestyle as key reasons why they chose to live in the rural areas of the potentially affected counties.

Table 3.9-9 presents a representative view of existing rural employment which reflects the scoping inputs. The employment distribution under these counties demonstrates the greater proportion of farm and forestry employment when compared with the overall ROI county employment in Table 3.9-8.

Income and Earnings

Per capita income and earnings per job for the ROI counties in each state in the years 2000 and 2007 are presented in Table 3.9-10. Per capita income in the WY ROI counties increased approximately 68 percent between 2000 and 2007 an increase of over $18,558. During the same time period, per capita income increased approximately 42 percent, an increase of nearly $8,385, in the ROI counties of SD.

Table 3.9-11 presents the distribution of the earnings by industry in the ROI counties. A large portion of the earnings in the region were generated through state and local government and retail trade. Mining is also a large source of earnings, particularly in the ROI counties of WY where earnings from the mining industry comprised over 31 percent of total earnings. Other staple industries include manufacturing, and construction.

Table 3.9-8. Distribution of ROI Employment by Industry (2007)

	ROI Counties, MT		*ROI Counties, ND*		*ROI Counties, SD*		*ROI Counties, WY*	
Total Employment	24,682	100.0%	42,073	100.0%	110,368	100.0%	62,408	100.0%
Farm employment	3,120	12.6%	5,075	12.1%	4,275	3.9%	2,157	3.5%
Forestry, fishing, related activities, and other	201	0.8%	-	0.0%	336	0.3%	467	0.7%
Mining	1,164	4.7%	940	2.2%	343	0.3%	10,449	16.7%
Utilities	-	0.0%	119	0.3%	574	0.5%	314	0.5%
Construction	1,002	4.1%	2,272	5.4%	8,401	7.6%	6,954	11.1%
Manufacturing	152	0.6%	2,369	5.6%	4,648	4.2%	1,547	2.5%
Wholesale trade	115	0.5%	1,839	4.4%	3,027	2.7%	1,973	3.2%
Retail Trade	2,346	9.5%	4,490	10.7%	13,851	12.5%	6,140	9.8%
Transportation and warehousing	443	1.8%	616	1.5%	2,850	2.6%	2,669	4.3%
Information	260	1.1%	634	1.5%	1,573	1.4%	458	0.7%
Finance and insurance	479	1.9%	1,172	2.8%	4,930	4.5%	1,420	2.3%
Real estate and rental and leasing	339	1.4%	638	1.5%	2,797	2.5%	1,990	3.2%
Professional and technical services	469	1.9%	712	1.7%	4,136	3.7%	2,619	4.2%
Management of companies and enterprises	36	0.1%	127	0.3%	366	0.3%	276	0.4%
Administrative and waste services	364	1.5%	731	1.7%	3,061	2.8%	1,693	2.7%
Educational services	84	0.3%	69	0.2%	1,415	1.3%	248	0.4%
Health care and social assistance	1,355	5.5%	1,096	2.6%	9,943	9.0%	3,457	5.5%
Arts, entertainment, and recreation	572	2.3%	491	1.2%	3,199	2.9%	668	1.1%
Accommodation and food services	1,411	5.7%	2,210	5.3%	11,219	10.2%	3,855	6.2%
Other services, except public administration	1,279	5.2%	2,036	4.8%	6,916	6.3%	2,926	4.7%
Government and government enterprises	5,829	23.6%	6,861	16.3%	17,499	15.9%	8,868	14.2%
Federal, civilian	927	3.8%	706	1.7%	3,009	2.7%	859	1.4%
Military	179	0.7%	478	1.1%	4,051	3.7%	508	0.8%
State and local	4,698	19.0%	5,663	13.5%	10,432	9.5%	7,501	12.0%

Note: Columns may not total as information is not available in some counties due to confidentiality of information but these jobs are included in the total employment.

Source: U.S. Bureau of Economic Analysis 2009a

Table 3.9-9. Representative County Employment under the Proposed PRTC MOAs by Industry (2007)

	Total	*Farm and Forestry*	*Mining, Manufacturing, and Construction*	*Trade and Transportation*	*Professional*	*Education and Health*	*Recreation*	*Government*
MT								
Big Horn	6,539	937	889	539	466	(D)	733	2,323
Carter	920	393	41	51	43	(D)	(D)	119
Fallon	2,240	398	(D)	310	105	158	132	272
Powder River	1,180	384	(D)	119	47	20	150	212
Rosebud	5,945	526	958	504	248	32	775	1,695
ND								
Adams	1,813	411	139	265	22	375	86	176
Bowman	2,551	417	387	433	288	255	122	264
Grant	1,813	674	48	163	(D)	226	66	194
Hettinger	1,712	531	43	191	(D)	161	(D)	205
Slope	521	292	12	16	10	(L)	(D)	35
SD								
Harding	1,062	321	118	72	19	49	(D)	120
Perkins	2,395	584	128	370	69	(D)	260	304
WY								
Crook	4,303	713	1,055	485	112	192	373	732
Representative County Totals	32,994	6,581	3,818	3,518	1,429	1,468	2,697	6,651
Representative County Percentages		20%	12%	11%	4%	4%	8%	20%

Note: 1. (D) Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.
(L) Less than ten jobs but the estimates for this item are included in the totals

Source: U.S. Bureau of Economic Analysis 2009a

Farm and forestry products are produced under the existing Powder River airspace and under the proposed PRTC.

Table 3.9-10. ROI Income and Earnings

	2000		2007	
	Per Capita Income	***Earnings per Job***	***Per Capita Income***	***Earnings per Job***
MT ROI Counties	$19,064	$20,557	$27,792	$27,681
ND ROI Counties	$21,385	$21,461	$31,980	$31,189
SD ROI Counties	$20,157	$20,311	$28,542	$26,966
WY ROI Counties	$27,261	$26,466	$45,819	$39,493

Source: U.S. Bureau of Economic Analysis 2009b

Persons employed at the Northern Cheyenne Health Center, designed to improve wellness for Native American residents, are part of the regional services employment..

Table 3.9-11. ROI Earnings Distribution by Industry in Thousands (2007)

	ROI Counties, MT		*ROI Counties, ND*		*ROI Counties, SD*		*ROI Counties, WY*	
Total Earnings	$821,310	100.0%	$1,450,781	100.0%	$3,786,766	100.0%	$2,958,838	100.0%
Farm earnings	$24,193	2.9%	$129,822	8.9%	$52,618	1.4%	$(11,467)	-0.4%
Forestry, fishing, related activities, and other	$3,270	0.4%	$-	0.0%	$9,430	0.2%	$10,528	0.4%
Mining	$96,356	11.7%	$93,980	6.5%	$22,003	0.6%	$928,047	31.4%
Utilities	$803	0.1%	$13,278	0.9%	$60,167	1.6%	$31,090	1.1%
Construction	$41,553	5.1%	$85,361	5.9%	$281,696	7.4%	$328,758	11.1%
Manufacturing	$5,091	0.6%	$141,341	9.7%	$235,224	6.2%	$97,262	3.3%
Wholesale trade	$3,640	0.4%	$81,309	5.6%	$145,885	3.9%	$131,624	4.4%
Retail Trade	$43,267	5.3%	$96,135	6.6%	$330,106	8.7%	$156,093	5.3%
Transportation and warehousing	$22,445	2.7%	$50,727	3.5%	$100,244	2.6%	$177,844	6.0%
Information	$8,709	1.1%	$25,654	1.8%	$74,408	2.0%	$19,985	0.7%
Finance and insurance	$18,563	2.3%	$42,234	2.9%	$185,643	4.9%	$55,529	1.9%
Real estate and rental and leasing	$5,074	0.6%	$8,961	0.6%	$48,594	1.3%	$31,923	1.1%
Professional and technical services	$14,841	1.8%	$34,228	2.4%	$155,505	4.1%	$133,258	4.5%
Management of companies and enterprises	$2,856	0.3%	$4,568	0.3%	$23,233	0.6%	$31,184	1.1%
Administrative and waste services	$4,410	0.5%	$21,169	1.5%	$73,384	1.9%	$43,645	1.5%
Educational services	$962	0.1%	$1,225	0.1%	$32,223	0.9%	$3,215	0.1%
Health care and social assistance	$43,747	5.3%	$34,563	2.4%	$498,108	13.2%	$132,920	4.5%
Arts, entertainment, and recreation	$8,417	1.0%	$4,075	0.3%	$84,634	2.2%	$11,339	0.4%
Accommodation and food services	$17,858	2.2%	$29,543	2.0%	$176,658	4.7%	$64,163	2.2%
Other services, except public administration	$20,419	2.5%	$40,481	2.8%	$130,877	3.5%	$82,041	2.8%
Government and government enterprises	$266,746	32.5%	$275,345	19.0%	$955,118	25.2%	$469,245	15.9%
Federal, civilian	$77,476	9.4%	$52,717	3.6%	$233,896	6.2%	$81,065	2.7%
Military	$7,453	0.9%	$18,515	1.3%	$301,402	8.0%	$19,446	0.7%
State and local	$181,817	22.1%	$204,066	14.1%	$419,820	11.1%	$368,734	12.5%

Note: Columns may not total as information is not available in some counties due to confidentiality of information but the earnings from these industries are included in the total earnings.

Source: U.S. Bureau of Economic Analysis 2009b

AGRICULTURE

Agriculture, represented by farm, forestry, and related activities, is an important component of the economy in the region under the proposed PRTC. Farming employment and related food processing and food service jobs comprise approximately 6 percent of the ROI's combined employment. A variety of agricultural commodities are produced on farms and ranches in the ROI, including hay and grass silage, wheat, barley, sugar beets, sunflower seeds, cattle, and sheep. In addition to its direct contributions to output and employment in the ROI, agricultural activity also supports a number of secondary industries, including those associated with farm equipment, feed, and fertilizer.

The U.S. Census of Agriculture, taken at 5-year intervals, provides a detailed description of agricultural operations and provides the most comprehensive published data on farm and ranch activity in the ROI. The most recent published agricultural census is dated 2007.

The 2007 Census of Agriculture identified a total of 12,745 farms and ranches in the ROI counties containing approximately 35.8 million acres of land (Table 3.9-12). The average farm in the ROI is 3,625 acres in size, ranging from an average of 444 acres in Lawrence County, SD to 6,334 acres in Harding County, SD. Cropland, including pastureland, comprises over 22 percent of the land in farms in the ROI and irrigated land comprises less than 1 percent of the land in farms. Pastureland and other uses account for 72 percent of land in farms in the ROI.

The 2007 Census of Agriculture provides numbers of livestock on farms by county, summarized within the ROI by state in Table 3.9-13. Beef cattle, with some milk cows, represent the greatest proportion of livestock in the ROI, accounting for 71 percent of all livestock. Sheep and lambs account for 23 percent, horses account for 4.7 percent and the remaining 0.5 percent is comprised of hogs and pigs.

Livestock in the ROI counties represents a portion of the statewide livestock inventory for each of the four states. The beef cows in the ROI counties in MT comprise approximately 13.5 percent of the total inventory of beef cows in the state. The beef cow inventory in the ROI states of ND and WY also comprise 25 percent and 17 percent of the total inventory in the respective states. The number of milk cows in the ND ROI counties comprises over 33 percent of the total number of milk cows in the state.

ENERGY RESOURCE DEVELOPMENT

MT, ND, SD, and WY all have large reserves of natural resources that are in demand for energy development. In particular, oil, natural gas, and coal are prevalent throughout the area and comprise a large part of the growth economies. Wind energy is also becoming more common as the technology is further developed and more wind farms are proposed in these states.

Natural gas, oil, and coal are produced throughout the region under the proposed PRTC airspace.

Eastern MT and western ND overlies the Williston-Basin which contains two of the 100 largest oil fields in the U.S. MT is also a leading producer of coal which is largely extracted from several surface mines in the Powder River Basin located on the MT-WY border (see Table 3.9-14). In 2008, MT was producing approximately 44.8 million short tons of coal with reserves of over 925 billion short tons (Energy Information Administration 2010). Large coal deposits are located on the Crow Native American Reservation in the Powder River Basin. The Crow Tribe is currently planning to extract the coal and build a coal-to-liquids plant to process the coal into diesel or other fuels as part of an economic development initiative (Brown 2008). As a result of the large coal deposits in the area, the city of Colstrip in Rosebud

County has the largest coal-fired power plant west of the Mississippi (personal communication, Atchison 2008).

Table 3.9-12. General Agricultural Data for ROI Counties (2007)

	Farms	*Land in Farms (Acres)*	*Average Size of Farm*	*Total Cropland (Acres)*	*Irrigated Land (Acres)*	*Market Value of Products*
MT	29,524	61,388,462	2,079	18,241,710	2,013,167	$2,803,062
Big Horn	695	2,899,620	4,172	383,588	231	$94,853
Carter[1]	308	1,698,363	5,514	267,216	7,104	$42,812
Custer[1]	411	2,127,013	5,175	186,726	31,352	$73,205
Fallon	296	978,818	3,307	247,773	1,536	$35,938
Powder River[1]	319	162,008	5,079	178,104	10,039	$40,960
Rosebud	478	2,714,024	5,678	238,852	34,623	$56,823
Treasure	101	461,790	4,572	36,103	20,344	$30,377
ND	426	626,663	1,471	407,315	-	$70,542
Adams	243	724,532	2,982	120,203	(D)	$23,750
Billings	353	720,756	2,042	371,877	920	$77,682
Bowman	243	570,210	2,347	231,840	896	$43,102
Golden Valley	528	1,058,178	2,004	510,893	1,895	$79,870
Grant	546	707,833	1,296	582,789	-	$93,560
Hettinger	836	1,165,098	1,394	548,569	6,616	$117,251
Morton	204	730,306	3,580	148,797	(D)	$32,319
Sioux	238	768,938	3,231	269,563	460	$47,645
Slope	865	837,143	968	529,062	1,009	$96,812
Stark	31,169	43,666,403	1,401	19,094,311	1,627	$6,570,450
SD	584	1,140,405	1,953	163,375	47,701	$55,443
Butte[1, 2]	392	1,283,038	3,273	372,883	1,193	$65,475
Corson	252	1,596,101	6,334	207,638	976	$163,695
Harding[1, 3]	301	133,503	444	30,531	3,775	$11,620
Lawrence[1, 4]	879	2,208,880	2,513	520,398	6,647	$78,408
Meade[1, 4]	655	1,185,055	1,809	280,265	7,893	$56,038
Pennington	432	1,829,157	4,234	427,292	611	$59,485
Perkins[2]	234	1,058,403	4,523	258,548	-	$37,481
Ziebach	11,069	30,169,526	2,726	2,576,017	1,550,723	$1,157,535
WY	633	2,345,915	3,706	170,423	4,023	$41,141
Campbell[1]	457	1,569,912	3,435	166,553	4,552	$43,983
Crook[1, 2]	599	1,224,625	2,044	91,424	56,325	$48,662
Sheridan	237	1,328,294	5,605	49,282	6,593	$26,501
Weston[1, 4]	29,524	61,388,462	2,079	18,241,710	2,013,167	$2,803,062

Notes:
1. Portions of county under existing MOAs or ATCAAs.
2. Proposed training airspace 50 to 75 percent ATCAA.
3. Proposed training airspace 10 to 20 percent ATCAA.
4. Proposed training airspace all ATCAA.
5. (D) = data withheld to avoid disclosing data for individual farms.

Source: U.S. Department of Agriculture 2009.

Table 3.9-13. Number of Livestock on ROI Farms (2007)

	Beef Cows	*Milk Cows*	*Hogs/Pigs*	*Sheep/Lambs*	*Horses/Ponies*
MT Counties	205,489	56	279	63,632	13,759
ND Counties	230,711	8,833	2,489	29,204	8,781
SD Counties	257,539	1,516	2,466	124,322	16,963
WY Counties	126,559	21	728	52,844	15,598

Source: U.S. Department of Agriculture 2009

Table 3.9-14. Statewide Reserves and Production of Energy Resources

Reserves	*Crude Oil (Million Barrels)*	*Dry Natural Gas (Billion Cubic Feet)*	*Natural Gas Liquids (Million Barrels)*	*Recoverable Coal at Producing Mines (Million Short Tons)*
MT	321	1,000	11	925
ND	573	541	55	1,225
SD	N/A	N/A	N/A	N/A
WY	556	31,143	1,121	7,010
Production	*Crude Oil (Thousand Barrels)*	*Natural Gas-Marketed (Million Cubic Feet)*	*Coal (Thousand Short Tons)*	*Total Energy (Trillion Btu)*
MT	2,220	112,529	44,786	1,215
ND	7,411	61,437	29,627	752
SD	141	1,644	N/A	144
WY	4,287	2,274,850	467,644	10,290

Source: Energy Information Administration 2010

MT has a number of wind farms that produce wind energy from large wind turbines located around the state. Currently, the state of MT has 272 wind turbines with the power capacity of over 375 megawatts of energy (American Wind Energy Association 2009).

In 2008, ND was ranked 7th in oil production out of 31 oil-producing states and two federal offshore areas (ND State Data Center 2009). In that same year, ND produced approximately 63 million barrels comprising 3.5 percent of the total production in the U.S. (ND State Data Center 2009). Bowman County is the largest producer of oil in ND in 2008 with production of approximately 16.4 million barrels. Billings County and Stark County were also large producers within the state with production of 4.4 million and 1.4 million, respectively.

Wind energy is becoming a growing source of energy in ND. As of 2009 there were 876 wind turbines in ND with a capacity of 1,202 megawatts. Additional wind energy projects are under construction with 33 wind turbines that are projected to add approximately 80 megawatts in power capacity (American Wind Energy Association 2009).

SD has fewer discovered fossil fuel reserves, such as oil and natural gas, than the other ROI states. Most of the electricity generated in SD is produced from coal power plants or hydroelectric power plants. As of 2009, SD had produced 141,000 barrels of crude oil and in 2006 produced 1,644 million cubic feet of natural gas. Sources of renewable energy utilized by the state of SD includes ethanol, wind, and geothermal.

As of 2009, SD has 197 wind turbine units with the capacity to produce over 313 megawatts. Additional wind turbines are under construction with a total of 66 wind turbines and the potential capacity of 99 megawatts once they are completed.

As compared to SD, WY has several large fossil fuel reserves. The Powder River Basin partially located in northeastern WY is the largest coal-producing region in the U.S. Natural gas from WY accounts for approximately one-tenth of the natural gas production in the U.S. and oil from WY accounts for approximately 3 percent of the total oil production in the U.S. In 2008, coal reserves in the state were approximately 7.01 billion short tons while crude oil reserves were 556 million barrels. At the same time, coal production was over 467 million short tons and crude oil production was over 4.2 million barrels (Table 3.9-14).

Wind energy is also being developed in WY as a renewable energy source. As of 2009 there were 777 wind turbines located throughout the state with the power capacity of over 1,101 megawatts. There are 184 additional turbines under construction with the potential capacity of 311 megawatts (Table 3.9-15).

Table 3.9-15. Statewide Wind Energy (2009)

	Units	*Power Capacity-Existing Projects (megawatts)*	*Power Capacity-Under Construction (megawatts)*
MT	272	375.03	-
ND	876	1202.53	75.9
SD	197	313.16	99.00
WY	777	1101.06	311.2

Source: American Wind Energy Association 2009

CIVIL AVIATION

Several economic and related factors contribute to the importance of civil aviation within the areas under the proposed PRTC. As described by participants at scoping, the rural nature of the area combined with the large agricultural operations, the growing energy industry, and the sheer distances involved make reliance on the airplane greater than might be experienced in other parts of the country.

This section focuses on the lower altitude civil aviation generally occurring below commercial traffic. Section 3.1, Airspace, provides expanded discussion of civil aviation at airports within the ROI and civil aviation flying in the proposed PRTC airspace.

There are 33 public airports and 30 private airfields reported under the proposed PRTC MOAs and ATCAAs. The private airfields include ranch and medical services. Table 3.9-16 summarizes the information on the public airports and private airfields and includes details on the reported based aircraft types. Section 3.1.3.3 presents the public airports and private airfields and regional airspace use. Many of the airports provide fuel and services to pilots transiting the area and most of the airports and airfields have permanently based aircraft at the airfields (Table 3.9-16).

Table 3.9-17 presents the estimated daily operations by airports and airfields under the existing (approximately the same area as PR-2) and proposed MOAs. Scoping comments referenced a number of pilots who flew private aircraft as part of their recreation. A review of FAA data did not identify a greater number of aircraft in the MOAs during the weekends as compared with weekdays. This means that the numbers of reported annual operations from public airports and private airfields presented in Table 3.9-17 are not concentrated on weekends but appear to be distributed evenly across the weekdays and weekends.

Table 3.9-16. Summary of Public Airports, Private Airfields, and Based Aircraft by Alternative (Page 1 of 2)

Proposed Airspace	*Total Airports and Airfields*	*Total Based Aircraft*	Aircraft Type					
			Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
Alternative A MOAs[1]								
Public Airport Totals Under and Near Alternative A	26	687	504	126	22	14	17	4
Public Airport Totals Under Alternative A	14	134	122	8	1	2	0	1
Private Airfield Totals Under and Near Alternative A	21	36	33	2	0	0	0	1
Private Airfield Totals Under Alternative A	12	19	16	2	0	0	0	1
Alternative A ATCAAs								
PR-1A/B, PR-2, PR-3, PR-4, and Gap ATCAAs Airports and Airfields included Under respective MOAs								
Airports and Airfields Under and Near Gateway ATCAAs (below)	16	269	205	36	4	4	10	10
Alternative B MOAs[2]								
Public Airport Totals Under and Near Alternative B	20	375	305	38	10	3	17	2
Public Airport Totals Under Alternative B	12	113	103	6	1	2	0	1
Private Airfield Totals Under and Near Alternative B	18	35	32	2	0	0	0	1
Private Airfield Totals Under Alternative B	11	19	16	2	0	0	0	1
Alternative B ATCAAs								
PR-2, PR-3, PR-4, and Gap Airports and Airfields included Under respective MOAs								
Airports and Airfields Under and Near PR-1A/B ATCAAs and Gap A ATCAA	9	313	200	88	12	11	0	2
Airports and Airfields Under and Near Gateway ATCAAs (below)	16	269	205	36	4	4	10	10
Alternative C MOAs[3]								
Public Airport Totals Under and Near Alternative C	15	449	320	100	14	12	0	3
Public Airport Totals Under Alternative C	8	77	68	6	1	1	0	1
Private Airfield Totals Under and Near Alternative C	16	29	26	2	0	0	0	1
Private Airfield Totals Under Alternative C	10	16	13	2	0	0	0	1

Table 3.9-16. Summary of Public Airports, Private Airfields, and Based Aircraft by Alternative (Page 2 of 2)

Proposed Airspace	*Total Airports and Airfields*	*Total Based Aircraft*	**Aircraft Type**					
			Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
Alternative C ATCAAs								
PR-1A/B, PR-2, PR-3, and Gap A and B ATCAA Airports and Airfields Under respective MOAs								
Airports and Airfields Under and Near PR-4 ATCAA and Gap C ATCAA	16	245	191	26	8	2	17	1
Airports and Airfields Under and Near Gateway ATCAAs (below)	16	269	205	36	4	4	10	10
Proposed Gateway ATCAAs[4]								
Public Airport Totals Under and Near Proposed Gateway ATCAAs	7	255	193	36	4	4	10	8
Public Airport Totals Under Proposed Gateway ATCAAs	5	121	106	8	0	0	0	7
Private Airfield Totals Under and Near Proposed Gateway ATCAAs	9	14	12	0	0	0	0	2
Private Airfield Totals Under Proposed Gateway ATCAAs	8	11	9	0	0	0	0	2

Notes:
1. Includes PR-1A/B, PR-2, PR-3, PR-4, and all Gap MOAs
2. Includes PR-2, PR-3, PR-4, and Gap B and Gap C MOAs
3. Includes PR-1A/B, PR-2, PR-3, and Gap A and Gap B MOAs
4. Included in all Alternatives

Table 3.9-17. Estimated Daily Traffic in the Proposed MOAs

	Daily Average Operations			
Proposed MOA	***FAA Reported Operations[1]***	***Public Airports under Airspace Reported Operations[2]***	***Private Airfields under Airspace Estimated Operations[3]***	***Estimated Total Daily Average Civilian Operations***
PR 1A/1B (includes Gap A)	25	34	2	61
PR-2 (Approximately existing airspace)	6	17	2	25
PR-3 (includes Gap B)	5	43	18	66
PR-4 (includes Gap C)	19	67	4	90

Notes; 1. Refer to data in Table 3.1-9
2. Refer to data in Table 3.1-6
3. Refer to data in Table 3.1-7

A large number of public airports and private airfields located under the affected airspace support ranchers, farmers, and others who often use small aircraft for agricultural aerial application (crop dusting), predator control, and checking on livestock and fences that are spread over large areas of land not easily accessible by vehicles. Some private airfields belong to hospitals or other emergency medical facilities as well as fire departments or federal agencies.

Civil aviation includes commercial aviation. FAA data captures all civil aviation and especially commercial aviation in Class A airspace. The data available for this EIS do not make it possible to separate commercial aircraft from other ATCAA traffic. During scoping for this EIS commercial airlines explained that they were normally above FL260. Data presented in Figures 3.1-17, 3.1-18, 3.1-23, and 3.1-24 demonstrate the concentrated traffic above FL260. Table 3.1-11 demonstrates that the medium ATCAA airspace above FL260 to FL370 and the higher ATCAA airspace above FL370 have 5 to 15 times as much civilian traffic as the airspace above FL180 to FL260. Commercial aviation regularly overflies the Powder River airspace and the proposed PRTC airspace at altitudes above FL260.

During public scoping meetings, participants explained how rural area aircraft are often used for emergency medical and firefighting purposes. Civil aircraft are used for aerial photography to monitor biological and wetland resources, for cloud seeding, and for related activities which require quick response to weather or related circumstances. Nearly all of the land under the proposed PRTC PR-2 MOA is currently under the Powder River A and B MOAs. A variety of procedures have been established by Ellsworth AFB to support emergency and related monitoring activities under the existing Powder River A and B MOAs. Communication has been the key to avoiding or reducing the potential for impacts.

Public airports throughout the ROI support general aviation and provide access for economic pursuits, which include oil, gas, agricultural, and hunting.

In cases of emergency, such as air ambulance or law enforcement, which require ATC clearance, the Air Force immediately responds to ATC direction and temporarily raises the floor of the Powder River A and/or B MOAs for B-1 and B-52 training to an altitude which permits emergency activity below the training aircraft. If necessary, to support the emergency activity, the Air Force terminates training within the airspace and either relocates for training or terminates training and returns to base.

Firefighting activities are covered under the existing Memorandum of Agreement between Ellsworth AFB and the Bureau of Land Management.

Related aircraft activities which require special conditions within the Powder River A or B MOAs include regional requirements for airspace use. In addition to fire monitoring and related emergency activities, state or federal agencies provide digital aerial photography for wetlands surveys and wildlife monitoring. This photography requires that aircraft be flown at specific altitudes over specific areas under specific visibility conditions. These seasonal activities can occur for one to two week periods. Ellsworth AFB airspace schedulers work with monitoring organizations to coordinate B-1 training operations and schedule MOA usage to support monitoring activities. This requires additional communication and scheduling. The requirement for civil aircraft involved in emergency and related services and military training aircraft is the need for communication. This permits B-1s and B-52s to relocate to another altitude in response to emergency conditions.

3.10 Environmental Justice and Protection of Children

3.10.1 Definition of the Resource

For the purpose of the environmental justice analysis, minority and low-income populations and the population of children are defined as:

- *Minority Populations*: All persons identified by the Census of Population and Housing to be of Hispanic or Latino origin, regardless of race, plus non-Hispanic persons who are Black or African American, Native American and Alaskan Native, Asian, Native Hawaiian and Other Pacific Islander, Some Other (i.e., non-white) Race or Two or More Races.
- *Low-Income Populations*: All persons who fall within the statistical poverty thresholds published by the U. S. Census Bureau in the Current Population Survey are considered to be low-income. For the purposes of this analysis, low-income populations are defined as persons living below the poverty level ($16,895 for a family of four with two children, adjusted based on household size and number of children), as reported in the 2000 Census. The percentage of low-income persons is calculated as the percentage of all persons for whom the Census Bureau determines poverty status, which is generally a slightly lower number than the total population of those who fall within the statistical poverty thresholds since it excludes institutionalized persons, persons in military group quarters and college dormitories, and unrelated individuals under 15 years old.
- *Children*: All persons identified by the Census of Population and Housing to be under the age of 18 years.

The ROI for environmental justice consists of 29 counties across four states where all or portions of the county underlie the proposed PRTC. The ROI refers to the aggregate 29 counties in their entirety. The affected area, by comparison, refers to the precise land area under the proposed PRTC airspace boundaries. Of the 29 counties containing affected lands, there are eight in which over 90 percent of the counties' land area is included under the proposed airspace (see Table 3.9-1).

Environmental justice data for the four states, the aggregate ROI, and the 29 individual counties will be used for comparison in identifying potential disproportionate environmental justice populations in the specific affected areas. For the purposes of this analysis, environmental justice data was assessed for the ROI, for the specific affected areas, and for each proposed PRTC airspace element.

3.10.2 Regulatory Setting

In 1994, EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (Environmental Justice)*, was issued to focus the attention of federal agencies on human health and environmental conditions in minority populations and low-income populations. This EO was also established to ensure that, if there were disproportionately high and adverse human health or environmental effects of federal actions on these populations, those effects would be identified and addressed. The environmental justice analysis addresses the characteristics of race, ethnicity and poverty status for populations residing in areas potentially affected by implementation of the proposed action.

In 1997, EO13045, *Protection of Children from Environmental Health Risks and Safety Risks* (*Protection of Children*), was issued to identify and address anticipated health or safety issues that affect children. The protection of children analysis addresses the distribution of population by age in areas potentially affected by implementation of the proposed action.

3.10.3 Existing Conditions

Environmental justice data for the four relevant states and 29 ROI counties are presented in Table 3.10-1. Minority persons account for 11.8 percent of the 29-county ROI population, compared to 10.5 percent for the combined four states of MT, ND, SD, and WY. Counties with the highest minority populations are those that contain substantial Native American reservations lands; these counties include Big Horn (65 percent minority) and Rosebud (37 percent) in MT, Sioux (86 percent) in ND, and Corson (63 percent) and Ziebach (74 percent) in SD. Native Americans comprise the predominant minority group in the ROI. The names and locations of the four affected Native American Reservations are displayed in Figure 3.7-1.

The population of the ROI is 12.4 percent low-income, meaning one out of every eight persons in the 29-county region lives below the U.S. designated poverty level. The population of the combined four states exhibits a comparable poverty status, with 12.6 percent of the population identified as low-income. The low-income population in the individual counties ranges from a low of 7.6 percent in Campbell County, WY, to a high of 49.9 percent in Ziebach County, SD.

Children under the age of 18 years constitute 26.9 percent of the 29-county ROI population, compared to 25.9 percent for the combined four-state region. There is an unusually wide variation in the youth population among the ROI counties, ranging from a low of 23.1 percent in Lawrence County, SD, to a high of 40.6 percent in Sioux County, ND. Nationally, the youth population typically accounts for 23 to 28 percent of a given county's population.

Table 3.10-1. Environmental Justice Data for the ROI by County

ROI Counties	*2000* Population	Minority Population		Low-Income Population		Youth Population	
		Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
MT	**902,195**	**94,372**	**10.5**	**128,355**	**14.6**	**230,062**	**25.5**
Big Horn	12,671	8,214	64.8	3,632	29.2	4,534	35.8
Carter	1,360	21	1.5	242	18.1	361	26.5
Custer	11,696	468	4.0	1,700	15.1	2,939	25.1
Fallon	2,837	47	1.7	349	12.5	724	25.5
Powder River	1,858	55	3.0	235	12.9	494	26.6
Rosebud	9,383	3,424	36.5	2,063	22.4	3,143	33.5
Treasure	861	38	4.4	125	14.7	239	27.8
ND	**642,200**	**53,051**	**8.3**	**73,457**	**11.9**	**160,849**	**25.0**
Adams	2,593	43	1.7	262	10.4	601	23.2
Billings	888	14	1.6	113	12.8	221	24.9
Bowman	3,242	47	1.4	259	8.2	780	24.1
Golden Valley	1,924	54	2.8	276	15.3	545	28.3
Grant	2,841	95	3.3	565	20.3	666	23.4
Hettinger	2,715	34	1.3	393	14.8	624	23.4
Morton	25,303	1,142	4.5	2,386	9.6	6,823	27.0
Sioux	4,044	3,467	85.7	1,564	39.2	1,630	40.3
Slope	767	3	0.4	130	16.9	194	25.3
Stark	22,636	714	3.2	2,691	12.3	5,781	25.5
SD	**754,844**	**90,259**	**12.0**	**95,900**	**13.2**	**202,649**	**26.8**
Butte	9,094	537	5.9	1,147	12.8	2,575	28.3
Corson	4,181	2,630	62.9	1,692	41.0	1,544	36.9
Harding	1,353	46	3.4	277	21.1	440	32.5
Lawrence	21,802	1,171	5.4	3,073	14.8	5,045	23.1
Meade	24,253	2,041	8.4	2,195	9.4	6,877	28.4
Pennington	88,565	12,768	14.4	9,967	11.5	23,565	26.6
Perkins	3,363	118	3.5	561	16.9	811	24.1
Ziebach	2,519	1,855	73.6	1,256	49.9	1,023	40.6
WY	**493,782**	**54,983**	**11.1**	**54,777**	**11.4**	**128,873**	**26.1**
Campbell	33,698	1,997	5.9	2,544	7.6	10,456	31.0
Crook	5,887	158	2.7	529	9.1	1,581	26.9
Sheridan	26,560	1,438	5.4	2,775	10.7	6,412	24.1
Weston	6,644	346	5.2	628	9.9	1,598	24.1

Source: U.S. Census 2000

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4.0 ENVIRONMENTAL CONSEQUENCES

This chapter presents an assessment of the potential environmental consequences of implementing the proposed Powder River Training Complex (PRTC).

The analysis presented in this chapter is based on overlaying the alternatives described in Chapter 2.0 upon the baseline or existing conditions presented in Chapter 3.0. Each of the environmental resources described in Chapter 3.0 is affected to a different degree and has a different method of analysis. Each resource section presented below defines the resource, includes the methodology for conducting the impact analysis, presents the issues and concerns that focused the analysis, and describes the potential direct and indirect consequences of implementing a PRTC alternative.

Cumulative effects of an alternative with other past, present, and reasonably foreseeable future actions within the region of influence (ROI) are presented in Chapter 5.0. Irreversible, irretrievable, short-term, and long-term effects are also discussed in Chapter 5.0.

4.1 Airspace/Air Traffic

The proposed PRTC would modify and add to the existing Powder River airspace to establish the PRTC in order to meet the defined need for improved training opportunities. The proposed PRTC would provide airspace to conduct local realistic training for Ellsworth and Minot Air Force Base's (AFBs). The Proposed PRTC would restructure and reconfigure the existing Powder River Military Operations Areas (MOAs) and associated Air Traffic Control Assigned Airspaces (ATCAAs), establish up to three additional MOA/ATCAA combinations, and include Gap MOAs and ATCAAs for Large Force Exercises (LFEs) which could be scheduled by Notice to Airmen (NOTAM) typically 1 to 3 days per quarter for an estimated 10 days per year. The linked up MOA/ATCAA airspaces would create a versatile, realistic training complex for LFEs. LFEs would permit approximately 20 bomber, fighter, and support aircraft to train with the tactics and skills the comprehensive team must have in combat.

The current Letter of Agreement between Ellsworth AFB and FAA has Powder River ATCAA defined as Flight Level (FL)180 to FL260 inclusive and the Crossbow ATCAA as FL270 to FL450 inclusive. Although this appears to create a 1,000 foot break, the FAA manages the airspace to not produce a gap between the ATCAAs. For the purpose of this EIS, and to make clear that the airspaces are continuous, this EIS describes the airspace as Low ATCAA FL180 to FL260, Medium ATCAA above FL260 to FL370, and High ATCAA above FL370 to FL600.

Proposed changes to the airspace would permit increased training flights dispersed throughout the MOAs and ATCAAs. PRTC would allow for almost a full range of required combat training missions such as dissimilar aircraft training and LFEs. The Proposed PRTC would also support use of defensive countermeasures and, during LFEs, supersonic flight above 20,000 feet above mean sea level (MSL) for B-1s and 10,000 feet above ground level (AGL) for fighter aircraft. Fighter aircraft capable of training at supersonic speeds would train with the bombers during LFEs.

4.1.1 Methodology for Analysis

Modifications to existing MOA airspace and establishment of new MOA airspace would require non-rulemaking action by the Federal Aviation Administration (FAA) (FAA 2004). Responsibilities, procedures for aircraft operations, air traffic control operations, and utilization of ATCAAs for the existing Powder River airspace are documented in Letters of Agreement between the scheduling military agency (28th Bomb Wing [28 BW] Ellsworth AFB) and the applicable Air Route Traffic Control Center (ARTCC). These Letters of Agreement are supplemental to the procedures in FAA Orders 7110.65 (Air Traffic Control) and 7610.4 (Special Military Operations). Appendix L presents the current Letter of Agreement for

Powder River airspace operations. No Letters of Agreement have been established for the proposed PRTC. These Letters of Agreement would be developed as part of the United States Air Force (Air Force) aeronautical proposal for the proposed PRTC airspace.

The potential environmental effects of implementing the proposed PRTC were assessed by considering the changes in airspace, airspace operations, and airspace use that could occur and relating those changes to current documented and estimated civil and military flight operations in the proposed airspace. The assessments considered compliance with Air Force Instruction (AFI) 13-201 (*Air Force Airspace Management)* and supplements thereto, as well as FAA evaluation of the proposed PRTC as it relates to the ROI and the National Airspace System.

FAA commercial and other civil aircraft traffic data, local airport reported data, and military usage were collected for each of the proposed MOA and ATCAA airspace units as presented in Section 3.1. Day-to-day training would occur in proposed MOA/ATCAA segments. Specific Air Force authorization would be required for supersonic flight (AFI 13-201).

Projected flight operations for each aircraft type within the proposed PRTC airspaces from Sections 2.4 through 2.9 are overlaid on airspace and air traffic baseline conditions described in Section 3.1. Each alternative is addressed in terms of the agency and public issues and concerns. Where agreed-to mitigations have been identified, those are described. The environmental consequences resulting from proposed training under each alternative are explained. All three action alternatives share several features. The proposed Gap MOAs and Gap ATCAAs boundaries would avoid civil aviation Victor Airways by a minimum of 5 nautical miles (NM). All other Victor airways adjacent to the airspace are avoided by a minimum of 4 NM. The remaining proposed MOA boundaries would avoid Victor Airway intersections by 20 NM or more.

In response to FAA and public concerns about Instrument Flight Rule (IFR) flights, the Powder River 1A (PR-1A), Powder River 3 (PR-3), Powder River 4 (PR-4), and all Gap MOAs are now proposed to have Low and High MOAs to facilitate IFR transit in the ROI. PRTC would include Low, Medium, and High ATCAAs above all MOAs. The following airspace may be activated for LFEs only: Gap MOAs and Gap ATCAAs; PR-1A, Powder River 1B (PR-1B) and Powder River 2 (PR-2), Medium and High ATCAAs above FL260, over PR-3 and PR-4; High ATCAAs above FL370 over Gateway West High, and Gateway East ATCAAs (see Table 2-16). The ATCAAs would be activated by the FAA and scheduled to avoid high use periods by civil aviation to the extent possible. Tables 2-10 and 2-11 describe the MOAs and ATCAAs, their altitudes, and time of use. Table 4.1-1 summarizes the PRTC airspaces and alternatives from Tables 2-10 and 2-11. In general, the proposed PR-1A, PR-1B, PR-2, PR-3, and PR-4 MOAs would be scheduled from Monday through Thursday from 7:30 a.m. to 12 noon local time and again from 6 p.m. to 11:30 p.m. The schedule on Friday would be from 7:30 a.m. to 12 noon. The airspaces could be scheduled other times by NOTAM. Although the airspace would be scheduled a total of 10 hours Monday through Thursday and four and one half hours on Friday, the actual MOA expected usage would typically be 3 hours per day except in the PR-2 MOA where usage would typically be 6 hours per day. Air Traffic Control (ATC) would be notified when training aircraft completed their missions in the respective MOAs.

Table 4.1-1 Proposed PRTC Airspace Designation and Use

Airspace			*Alternative*				*Proposed Use*	
	MOA	ATCAA	A	B	C	No Action	Day-to-Day and LFE[2]	LFE Only[3]
PR-1A Low MOA	X		X		X		X	
PR-1A High MOA	X		X		X		X	
PR-1B MOA	X		X		X		X	
PR-2 MOA	X		X	X	X	X[1]	X	
PR-3 Low MOA	X		X	X	X		X	
PR-3 High MOA	X		X	X	X		X	
PR-4 Low MOA	X		X	X			X	
PR-4 High MOA	X		X	X			X	
Gap A Low MOA	X		X		X			X
Gap A High MOA	X		X		X			X
Gap B Low MOA	X		X	X	X			X
Gap B High MOA	X		X	X	X			X
Gap C Low MOA	X		X	X				X
Gap C High MOA	X		X	X				X
PR-1A Low ATCAA		X	X	X	X		X	
PR-1A Medium ATCAA		X	X	X	X		X	
PR-1A High ATCAA		X	X	X	X			X
PR-1B Low ATCAA		X	X	X	X		X	
PR-1B Medium ATCAA		X	X	X	X		X	
PR-1B High ATCAA		X	X	X	X			X
PR-2 Low ATCAA		X	X	X	X	X[1]	X	
PR-2 Medium ATCAA		X	X	X	X	X[1]	X	
PR-2 High ATCAA		X	X	X	X	X[1]		X
PR-3 Low ATCAA		X	X	X	X		X	
PR-3 Medium ATCAA		X	X	X	X			X
PR-3 High ATCAA		X	X	X	X			X
PR-4 Low ATCAA		X	X	X	X		X	
PR-4 Medium ATCAA		X	X	X	X			X
PR-4 High ATCAA		X	X	X	X			X
Gateway West Low ATCAA		X	X	X	X	X[1]	X	
Gateway West Medium ATCAA		X	X	X	X	X[1]	X	
Gateway West High ATCAA		X	X	X	X			X
Gateway East Low ATCAA		X	X	X	X			X
Gateway East Medium ATCAA		X	X	X	X			X
Gateway East High ATCAA		X	X	X	X			X
Gap A Low ATCAA		X	X	X	X			X
Gap A Medium ATCAA		X	X	X	X			X
Gap A High ATCAA		X	X	X	X			X
Gap B Low ATCAA		X	X	X	X			X
Gap B Medium ATCAA		X	X	X	X			X
Gap B High ATCAA		X	X	X	X			X
Gap C Low ATCAA		X	X	X	X			X
Gap C Medium ATCAA		X	X	X	X			X
Gap C High ATCAA		X	X	X	X			X

Notes: 1. These airspaces extend over much of the same area currently within the Powder River airspace.
2. Normal use: Monday through Thursday, 7:30 a.m. to 12:00 noon and 6:00 p.m. to 11:30 p.m.; Friday, 7:30 a.m. to 12:00 noon; other times by NOTAM.
3. Large Force Exercise: 20 aircraft of various types training together from 1-3 days per quarter for a total of 10 days per year.

4.1.2 Issues and Concerns

The type, size, and configuration of individual airspace elements in a region are based upon, and are intended to satisfy, competing aviation requirements. Potential impacts could occur if air traffic in the region and/or the ARTCC were encumbered by changed flight activities associated with the PRTC proposal.

4.1.2.1 Summary of Public Concerns

Table 2-27 summarizes public and agency concerns expressed during scoping. Airspace or air traffic concerns expressed by the public during scoping meetings include 1) potential impacts on civil aviation in the proposed airspace, 2) radar and radio coverage in the proposed airspace; 3) the accuracy or availability of information regarding active MOAs; 4) agricultural applications and other commercial activity; 5) arrivals and departures from airfields and airports under, or on the periphery of, the proposed airspace; 6) identification of low-altitude avoidance areas and not flying low-level over livestock, people, or buildings; and 7) training aircraft staying within MOA boundaries. Specific concerns were expressed for weather modification programs, emergency flights, biological or water resource monitoring, ranch monitoring, and recreational activities such as gliders and skydiving in the airspace.

4.1.2.2 FAA Review and Other Times by NOTAM

When any significant change is planned, such as new or revised defense-related activities within an airspace area or a change in the complexity or density of aircraft movements, the FAA reassesses the airspace configuration. The FAA seeks to determine if such changes could adversely affect 1) ARTCC and/or facilities; 2) movement of other air traffic in the area; or 3) airspace already designated and used for other purposes supporting military, commercial, or general aviation.

The Air Force aeronautical proposal includes scheduled airspace other times by NOTAM. The FAA recognizes that the provision of other times by NOTAM permits access to a MOA 24 hours per day. The extent of civil airspace impacts would depend upon the specific hours during a 24-hour day in which one or more MOA segments would be active. Using the number of civil flights in Figure 3.1-10 permits an estimate of the civil aircraft operations during a 24-hour period. A comparison of the proportional recorded FAA MOA activity by 2-hour block from Figures 3.1-7, 3.1-8, and 3.1-9 with Table 3.1-10 permits an estimate of the civilian aircraft activity during the unscheduled MOA periods. Other times by NOTAM has the potential to impact additional flights during the 12 noon to 6 p.m. time period weekdays and during daylight hours on weekends. The estimated civilian operations impacted within the proposed MOAs during a typical week day ranges from 15 civil operations in PR-2 to 50 civil operations in PR-4 (see Table 4.9-2).

4.1.3 Environmental Consequences

Potential airspace and air traffic environmental consequences for each alternative are presented in this section. Alternative A represents the Proposed Action and provides the greatest amount of training airspace with the establishment of three new combinations, PR-1A/PR-1B, PR-3, and PR-4 MOAs and ATCAAs, associated Gap MOAs and ATCAAs, and Gateway ATCAAs, and the modification/expansion of the existing Powder River A/B MOAs into PR-2. Alternatives B and C would retain similarities with Alternative A. Each would include two new MOA combinations, and associated Gap MOAs rather than the three MOA and Gap MOA combinations of Alternative A. The Alternative A and Alternative C MOAs would provide for improved low-altitude terrain following training as compared with Alternative B. Proposed ATCAAs are the same for each alternative.

For all proposed MOA/ATCAA airspaces, one consistent impact would be the need for increased communication among all parties involved. The Air Force would schedule the MOAs, inform ATC that they have entered an activated MOA, and notify ATC when training was completed in the MOA. An IFR transiting civil aircraft pilot seeking to learn the status of the MOA would need to check the schedule, review any NOTAMs, contact ATC to learn if the MOA were activated, request the MOA altitude segment where the training was occurring, and either request an IFR routing below or above the activated MOA or proceed Visual Flight Rules (VFR) in the activated MOA. This additional communication requirement could result in annoyance and some climbing, descending, or re-routing for IFR traffic and similar avoidance for VFR pilots of an active MOA should a VFR civil pilot choose not to traverse an active MOA using see-and-avoid.

Civil aircraft flight schedules, efficient altitudes, and altitude selection to avoid turbulence could be impacted by an activated airspace. This section addresses environmental consequences, including emergency and special conditions associated with each PRTC alternative.

4.1.3.1 Alternative A: Proposed Action

MOAs and ATCAAs

The average annual baseline training hours estimated to be conducted primarily by B-1 and B-52 and transient military aircraft within the Powder River A and B MOAs and associated ATCAAs totaled 1,199 hours (Table 2-32). The Powder River A and B MOAs constitute most of the proposed PR-2 MOA/ATCAA. Under the Proposed Action, Alternative A, a total of 3,387 day-to-day and LFE training hours would be conducted annually in the proposed PRTC airspace (Table 2-17). The mission profiles in the MOAs/ATCAAs would be low-level to mid-altitude combat maneuvering and high-altitude staging for battlefield operations. The total hours of training represent 78 percent day-to-day training, primarily by B-1 and B-52 aircraft and 22 percent LFE training which would include a variety of aircraft types to replicate real world warfighting conditions. The proposal to allow supersonic flight by bombers during LFEs to 20,000 feet MSL and fighters to 10,000 feet AGL throughout the reconfigured airspace would require specific approval by the Air Force (AFI 13-201).

The 28 BW and 5th Bomb Wing (5 BW) propose to use training chaff and flares in the MOA/ATCAA airspace. These defensive countermeasures would be employed in accordance with current Air Force, Air Combat Command (ACC), and Ellsworth and Minot AFB regulations. The minimum release altitude for flares would be 2,000 feet AGL except during periods of extreme fire danger in a MOA when flare release would be discontinued. Projected annual deployed chaff bundles within the MOA/ATCAA airspace is 33,000 and approximately 3,300 flares are projected to be deployed (refer to Table 2-9). Any and all military training aircraft using PRTC would be briefed on all altitude and fire danger restrictions applying to defensive countermeasures if they intend to employ chaff or flares.

Coordination between the 28 BW, 5 BW, and FAA would let the ARTCC know that military aircraft were training with chaff and flares in the airspace. Specific operating procedures and constraints on the use of chaff and flares have proven effective and have not significantly impacted ATC systems. The Air Force would implement standing instructions to brief pilots training in the proposed PRTC airspace that only RR-188, RR-112, RR-179 chaff or MJU-23, M206, MJU-7, and MJU-10 flares would be permitted (with limitations) for training use within the PRTC MOAs and ATCAAs. Appendices C and D describe these defensive countermeasures.

Flares do not present any issues involving the management or use of airspace. The chaff used by 28 BW and 5 BW pilots does not adversely affect FAA radars when ARTCC is informed of chaff use. No significant airspace impacts would be expected to result from this proposed use of chaff and flares. Further information on impacts of chaff and flares is discussed in Section 4.3, *Safety*. Section 4.3 also addresses comments from scoping meeting participants about emergency and firefighting aircraft operations flight deconfliction.

4.1.3.1.1 Airspace Categories

The Proposed Action would result in changes within specific airspace. The proposed PRTC ATCAA segments would be within Class A airspace. The ATCAAs would be identified within the airspace and, when activated, the ATCAA segment would be airspace within which high-speed military aircraft could be expected to perform rapid maneuvers. Commercial traffic would not be routed through an active ATCAA by ARTCC. A non-activated ATCAA would be transited by commercial and other aviation under ARTCC routing as with any Class A airspace.

Class E airspace includes Victor Airways. Civil aircraft cannot fly IFR on a Victor Airway through an active MOA. There would be no changes in airspace categories, but when MOA altitude segments were activated for LFEs, the Victor Airway at these altitudes would be unavailable for IFR traffic. This means that when a Gap MOA was activated an estimated 10 times per year, the associated Victor Airway (example: Gap A MOA and V-254), would not be available for IFR traffic.

Some Class E Controlled and Class G Uncontrolled airspace within the ROI would become MOAs under the proposed PRTC. This would add the MOA airspace designation to aeronautical charts. IFR transit could occur above or below an activated MOA with direction from the applicable ATC. An active MOA is joint-use airspace and can be entered and traversed by VFR traffic using see-and-avoid while high-speed military aircraft are concurrently operating in the activated MOA.

The FAA non rule-making action to establish and chart the MOAs and establish the ATCAAs would create joint use airspace. When a MOA is activated, the usage of the airspace would allow civil aircraft operating under VFR only. When the MOAs or ATCAAs are not activated, the airspace would be treated as normal Class E, G, or A airspace.

4.1.3.1.2 Military Training Airspace

There would be no change to existing military training routes (MTRs). MTRs would continue to be available for high-speed military aircraft low-altitude navigation training. The MTRs are currently used infrequently for low-level navigation. That use is not expected to change with the proposed PRTC. The MTRs which lie partially beneath the proposed PRTC MOA airspace (IR-473, IR-485/492) were historically used for low-level penetration missions and are infrequently used in conjunction with current Powder River MOA activities. The use of these MTRs would likely continue at the present low rate because the training activities associated with these MTRs are independent from the proposed use of the PRTC airspace. Commentors at scoping meetings mentioned MTR low-level overflights outside of the Powder River airspace and referred to such overflights as "buzzing" over livestock, people, and buildings. MTR use, although infrequent, would continue for specific mission training. Alternative A would not impact the use of the MTRs.

Any location under a MOA would be expected to experience a low-level overflight at 2,000 feet AGL or below within one-quarter of a mile of the flight path approximately 6 to 9 times per year (see Section 4.9.3.1.5). B-1 random flight patterns are seen as the loops and circles on, for example, Figures 3.1-14, 3.1-15, and 3.1-16. These training patterns suggest that locations toward the center of an airspace could be overflown more and locations on the edges less than the annual average of 6 to 9 times. Usage of the current Powder River MOAs and ATCAAs would be expected to change with Alternative A. Alternative A would have an estimated 11,956 sortie operations conducted annually within the proposed MOAs and ATCAAs. Table 2-15 presents the projected Alternative A day-to-day airspace use and Table 2-32 presents baseline use. The availability of the Gap MOAs and ATCAAs and the ability to activate them as part of the overall PRTC creates new training opportunities and an expanded airspace for LFE training.

4.1.3.1.3 Civil Airspace Usage

Section 3.1 explains civil airspace usage throughout the ROI. This section addresses potential civil airspace impacts to Victor Airways, jet routes, and airports and airfields within the ROI.

The flexibility of being able to schedule multiple MOAs/ATCAAs would spread day-to-day training impacts over the proposed airspace. The current Powder River airspace is activated by NOTAM. The proposed PRTC schedule for days and hours of operation is included in Chapter 2.0 (Tables 2-10 and 2-11). This means that small airports and both commercial and general aviation operations would be able to review the schedule and any NOTAMs and plan for when a MOA would be scheduled for activation as described in Section 4.1.1. IFR traffic could not occur in an activated MOA segment. VFR traffic, permitted using see-and-avoid, was mentioned by scoping participants as being unsafe if low-level B-1 training aircraft could be encountered at any time within a MOA, especially at altitudes of 2,000 feet AGL or below. The Air Force would notify ATC when the B-1 was training in the MOA and would notify ATC when training was completed. This would permit ATC to use the MOA airspace for IFR civil aircraft use. Pilots could fly VFR in a MOA at any time using see-and-avoid procedures. The Air Force believes coordination of the airspace with FAA and Low and High MOAs in the PR-1A, PR-3, and PR-4 MOAs would accommodate civil aviation IFR operations where communication is not limited.

Victor Airways

During scoping, the public and agencies noted that much of the low-altitude traffic does not fly Victor Airways, but instead flies direct routing using Global Positioning System (GPS). Figures 3.1-14, 3.1-18, and 3.1-16 show considerable winter traffic below FL180 on V-254 and V-491. Figures 3.1-20, 3.1-21, and 3.1-22 show more summer traffic below FL180 flying direct, especially east-west, and through Billings. Low-altitude direct routing often has no radar and radio coverage to provide IFR vector route service in much of the area. Table 3.1-10 suggests that, based on reported public and private airport operations, the FAA data represents between 6 and 32 percent of the estimated traffic in the proposed MOAs below Class A airspace.

The Gap MOAs are designed to coincide with Victor Airways below FL180. As a result of scoping input, the Air Force proposed revised Gap MOA corridors to allow for the expanded route width generated by the great distances between navigational aids under the airspace. Based on FAA flight paths and reported local usage, the Gap MOA corridors cannot sufficiently mitigate the impact to the local aviation community because these corridors have limited communication and do not allow for direct routing. The public noted that the use of the Gap MOA/Victor Airway corridors would be severely limited by the minimum en route altitudes created by limited navigational aids. The minimum en route altitude requirements limit the options for traffic conflict resolution.

PRTC altitude requirements, combined with the en route altitude requirements for civil aviation, dictated by the distances between navigational aids, has the potential to add an estimated 2-hour ground delay and/or re-routing impact upon civil aviation not willing to fly VFR in an activated MOA or add an estimated 2 to 4 hour delay to fly IFR until a MOA was deactivated. The 2 to 4 hour delay estimate is based on the scheduled MOA times and takes into consideration that training aircraft would be expected to occupy the scheduled airspace not more than 3 hours per day during the scheduled hours.

The impact of requiring day-to-day IFR traffic to fly on Victor Airways could concentrate civil aircraft traffic in areas of limited or nonexistent radar coverage. The FAA has noted that radar coverage along

V-120 between Dupree, South Dakota (SD), and Miles City, Montana (MT), is nonexistent below 13,000 feet MSL (see Figure 3.1-5). Radar coverage south of V-120 along and west of V-491 does not exist below 16,000 feet MSL. In addition to limited radar coverage, the lack of radio frequency coverage restricts the ability to communicate with civil aviation flying within the PRTC proposed airspace. Radio frequency coverage is nonexistent below 18,000 feet MSL in a 50-NM area between Dupree, SD, and Miles City, MT. Inability to communicate with civil aircraft would force traffic volumes to be re-routed to the north or south of the airspaces. This re-routing would concentrate traffic and cause congestion over Dickinson, North Dakota (ND), and Rapid City, SD. The airspace consequences resulting from the absence of navigable routes and limited radar and radio frequency coverage could significantly impact civil aviation when PRTC MOA segments were activated for day-to-day training and would have greater impacts during LFEs when all the Victor Airways traversing the airspace would be unavailable for IFR flights.

Review of Scoping and FAA Inputs

The FAA and Air Force met following receipt of scoping comments to address how to reduce potential impacts to civil aviation. The FAA reviewed the Air Force's original aeronautical proposal and made the following observations:

1) there was no alternative in the original airspace proposal to provide for airspace below 10,000 feet MSL which could potentially be used by IFR traffic;
2) there were no specifics in the original airspace proposal about limiting the times and altitude for training;
3) there are existing communication inadequacies for civil aircraft traffic on Victor Airways below FL180, civil aircraft traffic en route, or civil aircraft seeking to traverse an activated PRTC.

The FAA reviewed the four Victor Airways that transect the proposed PRTC ATCAAs (refer to Figure 3.1-5). The FAA determined that the original Air Force proposal would have potential for adverse impacts on civil aviation airspace use for the following reasons:

1) MOA boundaries were planned to avoid impacts to civil aviation Victor Airways. A small segment of V-247 transects the southwest corner of the proposed the PR-1 MOA;
2) The other three PRTC MOAs avoid federal "Victor" airways by 5 NM internal and 4 external NM and avoid any major Victor Airway intersections by 20 NM. The Gap A, B, and C MOAs each mirror a portion of a Victor Airway. These Gap MOAs are designed to adjoin abutting MOA airspace for large force exercises, planned for, at most, once per quarter, for a total of 1 to 3 days. The Gap MOAs would not be activated on a daily basis. The limited radar and radio communication in much of the proposed airspace results in civil aviation "widening out" the Victor corridors or flying GPS or an IFR direct routing. This reduces the likelihood of a number of aircraft being concentrated in a narrow corridor. The Gap MOAs without communication and radar enhancements would result in a concentration of civil aircraft during day-to-day MOA activation; and
3) The Gap MOAs are designed to be activated for LFEs to avoid impacting traffic into the larger airports in the area (i.e., Billings and Miles City, MT; Sheridan and Gillette, Wyoming [WY]; Dupree and Rapid City, SD; and Bismarck and Dickinson, ND). The Gap MOAs do not include provision for the communication and radar coverages when activated for LFEs. An LFE effectively shuts down all IFR aircraft traffic in a large area of MT, ND, SD, and WY during 4 hours an estimated 1 to 3 LFE days per quarter (or a total of 10 LFE days per year).

In response to the FAA and scoping concerns, the Air Force revised the Proposed Action Alternative A, Alternative B, and Alternative C to reduce potential impacts upon civil aviation. The revised proposal elements specifically address the concerns:

1) The Air Force's aeronautical proposal provides for Low and High PR-1A, PR-3, PR-4, and all Gap MOAs. This is specifically designed to permit activation and de-activation of a MOA in support of civil aviation flying IFR.
2) The Air Force proposal was revised to present specific days and times per day when the proposed MOAs would be scheduled. In addition, the Air Force proposal presents the expected daily use of 3 hours per day for all MOAs except for 6 hours per day for PR-2. If the Proposed Action, Alternative A, airspace were activated the entire time period scheduled from Monday through Thursday and Friday mornings, the number of civilian operations projected to be impacted using data from Table 3.1-10 and from Figures 3.1-8 through 3.1-10, is estimated to be 0.60*[53+25+52+83] = 128 civil operations per day.
3) The Air Force recognizes that there is limited communication and radar coverage in much of the area proposed for PRTC. The addition of Low and High MOAs and communication when training aircraft leave the airspace can reduce the impacts from lack of communication and radar coverage. The Air Force recognizes that communication will need to be improved to provide for military training in the PR-3 and PR-4 MOAs.
4) The southwest corner of the proposed PR-1B was adjusted to avoid V-247.
5) Each Gap MOA was reviewed for radar coverage and the width of the Gap MOAs was "widened out" to reduce the likelihood of a number of aircraft being concentrated in a narrow corridor. The proposed distances from major airports such as Billings, Bismarck, Gillette, Dickinson, and Miles City to the MOAs were increased to support airport traffic.
6) The proposed LFE would activate the entire airspace for a limited number of hours each LFE day. The LFE schedule would be issued in advance by NOTAM. IFR aircraft would be unable to transit the airspace. Since the aeronautical proposal presents the daily duration of an LFE as 4 hours, the actual number of IFR flights impacted in the entire proposed PRTC airspace by an LFE day, based upon FAA data, reported public airport operations, and estimated private airfield operations would average 76 civilian operations per day (from Table 4.9-2). These 76 civilian operations would consist of flights unable to fly IFR and unable or unwilling to fly VFR in the active MOAs. The civilian flights could incur an estimated 2 to 4 hour delay while the entire PRTC airspace was activated.

Jet Routes

As described in Sections 3.1.3.3.2 and 3.1.3.5, there is extensive commercial overflight above FL260 and especially above FL300. This includes daily east-west en route traffic as well as traffic on Canadian (CAN) routes. Hundreds of commercial air carrier flights traverse the proposed PRTC airspace on a daily basis, primarily above FL260. The proposed PRTC ATCAAs cover a large area along the heavily-traveled transcontinental routes between the nation's Midwest and eastern population centers and the Pacific Northwest. International traffic between Vancouver or Calgary and the eastern and southern U.S. also traverses this area. As noted in Section 3.1.3.3.2, several hundred commercial air carrier flights use the proposed PRTC airspace on a daily basis on several published jet routes including J-16, J-34, J-90, J-151, and J-204 which traverse the PRTC proposed airspace (see Figure 3.1-5).

In addition to existing Jet Routes, severe weather avoidance routes between the San Francisco Bay area and airports in the northeast traverse the proposed PRTC airspace. Weather avoidance routes include

CAN 1, 2, 3, 5, and 7, and the BAE 1 national playbook re-routes. These routes are the most common off-load routes used to mitigate thunderstorms in the Great Plains and the Ohio Valley. These severe weather avoidance routes are typically used between 80 and 100 days per year with peak traffic in excess of 400 flights per day, nearly all above FL300. Inability to access these routes for severe weather avoidance would have a detrimental impact upon New York traffic flow and would also significantly impact Mid-West hub operations at Minneapolis, Chicago O'Hare, and Detroit metro airports.

As presented in Table 2-13, 99 percent of the training operation of B-1 aircraft would be below FL260. This would be expected to result in little to no impact to traffic on jet routes, CAN routes, or other high-altitude routes. A comparison of Figures 3.1-10, 3.1-11, and 3.1-12 shows that the preponderance of commercial flight is above FL260. Table 2-13 demonstrates that B-52 training would be above FL260 approximately 500 annual hours of training time.

Nearly all B-1 training could occur below an ARTCC-capped ATCAA at FL260, but B-52 training would need to occupy airspace above FL260. Military aircraft are not normally fitted with collision avoidance systems. In existing Powder River ATCAAs, the ARTCC designates a 2,000 foot block above and below a B-52 training in a 2,000 foot block to ensure safety. A 6,000 foot ATCAA airspace block within the flight paths depicted on Figures 3.1-17, 3.1-18, 3.1-19, and 3.1-20 would have the potential to impact high altitude commercial traffic. Proposed PRTC ATCAAs are stacked to permit avoidance of high-altitude commercial flights. The Air Force proposes activation of High ATCAAs above FL370 during 10 days per year of LFEs. Medium ATCAAs above FL260 to, but not including, FL370 for PR-3, PR-4, and Gateway East are also proposed during 10 days of LFEs per year. B-1 training would have minimal impact upon ATCAA altitudes above FL260 although B-52 and LFE training has the potential for substantial impact.

FAA has determined that, without access to PRTC airspace above FL300, re-routed high-altitude aircraft would be placed into sectors already busy with normal traffic flow. Traffic Management Initiatives would need to be implemented to mitigate the impacts of concentrating re-routed aircraft to avoid an activated PRTC airspace. Traffic management initiatives include capping aircraft at specific altitudes and providing miles-in-trail restrictions, which would result in backlogs of aircraft waiting to depart.

During LFE training, estimated to be up to 4 hours per day, 10 days per year, there would be B-1, B-52, tanker, and transient fighters using the airspace above FL260. The Air Force would work with FAA to identify times when fewer commercial aircraft would be scheduled to use the airspace above FL260. Scheduling the airspace for LFE exercises to the extent possible around commercial schedules would reduce potential for a significant impact to airspace users.

Table 3.1-11 demonstrates the average daily traffic traversing the proposed ATCAAs. The traffic in the Low ATCAA is typically 10 to 20 percent of the traffic in the Medium plus High ATCAAs. A consideration of Figures 3.1-11 and 3.1-12 demonstrate that average daily traffic counts per hour above FL260 are substantially lower from 4 a.m. through 12 noon than for the remainder of the day and evening. FAA data show that an LFE during the 4-hour period from 6 a.m. to 10 a.m. on a representative day, counting the PR-1A, PR-1B, PR-2, PR-3, PR-4, and Gateway ATCAAs, could be expected to affect an average of 43 civil aircraft flights in segments in the ATCAAs above FL260. This represents the total number of airspace segments traversed and includes single flights traversing multiple proposed PRTC airspaces. In contrast, a 4-hour period from 2 p.m. to 6 p.m. could affect an average of 244 civil flights in airspace segments above FL260. Airspace of the scope that is being proposed by PRTC has the potential to impact the national airspace with the potential to affect locations which include, but are not limited to, Seattle, Oakland, Kansas City, Chicago, Cleveland, Washington, D.C., and New York City. The FAA data suggest that LFE impacts to commercial and other civil aircraft would be perceived as significant to the impacted carriers, although impacts could be kept to a minimum through airspace scheduling.

FAA Denver ARTCC has a Letter of Agreement (LOA) with Ellsworth AFB regarding the existing Crossbow ATCAA activation schedule. This LOA allows for use of the Crossbow ATCAA below FL270 and limits use above FL270. Although not explicitly included in the Proposed Action (Chapter 2.0), Letters of Agreement would need to be executed with all affected ARTCCs to address what would otherwise be significant impacts to commercial aircraft operations and the ARTCC would mitigate impacts to commercial and general aviation.

Airports and Airfields

Public airports under or near the proposed PRTC airspaces are presented on Figure 3.1-6. These airports are depicted on aeronautical charts. The aeronautical charts identify a 3 NM airport perimeter by 1500 feet AGL avoidance area over the Belle Creek and Broadus public airports.

During scoping meetings, the public and agencies expressed concerns that the PRTC would significantly impact public airports and private airfields under the proposed airspace and civil aircraft traffic within the proposed airspace. These concerns included the inability for radar to track aircraft and the limited radio frequency coverage in rural areas. Concerns included the inability to know in advance the hours of airspace activation and the low-level training of the B-1 aircraft, which could occur anywhere throughout the airspace at any time the airspace was activated. An activated MOA would render airports under an active MOA inaccessible to IFR traffic. When a MOA was activated, IFR flight could not occur and VFR access would be by see-and-avoid. The FAA has noted that some airports not under the airspace could face access limitations. For example, Dickinson, ND, is daily served by 10 to 12 commercial flights from Denver, Colorado, as well as cargo operations to and from Bismarck and Minot, ND. The original Air Force proposal conflicted with ILS32, GPS14, GPS32, and very high frequency omni-directional radio range (VOR), an instrument approach proceedings into Dickinson. When the PR-4 Low MOA is activated, IFR traffic would not be able to access Hettinger, Lemmon, Mott, or Bison. Table 4.1-1 provides estimated impacts at airports under or on the periphery of the proposed PRTC for Alternative A, B, and C and describes adjustments in the Air Force revised Proposed Action to reduce potential impacts.

The Colstrip airport under the proposed PR-1A supports mining operations and the community of Colstrip.

Colstrip, MT, supports large scale open pit mining operations and has civil aviation activity in support of mining operations. Under the original proposed action, if the PR-1 MOA was activated, the Colstrip airport would have been inaccessible to IFR traffic. FAA reviewers noted that Colstrip traffic flow potentially impacted includes GPS RWY 6, GPS RWY 24, CISPU 1 departure, and CONUK 1 departure. The Air Force's revised aeronautical proposal has Low and High PR-1A MOAs to support IFR traffic into Colstrip. Sheridan, WY, flights potentially affected include GPS RWY 14, VOR RWY 14, ILS RWY 32, and RNAV (GPS) RWY 32. The Sheridan, WY avoidance area in PR-1B has been expanded in the Air Force revised aeronautical proposal to support access to the airport. The Forsythe MT, GPS RWY 26 and NDB RWY 26 have the potential to be impacted by the proposed airspace. A 20 NM distance measuring equipment (DME) arc is incorporated into the Air Force revised aeronautical proposal to provide for the VOR/DME RWY 16 holding pattern at Gillette, WY. A 35 NM DME arc was established to the east of Billings to provide for airport access.

The initially proposed PR-4 MOA/ATCAA was noted by FAA as encroaching upon the southwest quadrant of the Bismarck, ND Municipal Airport approach control and conflicted with a series of instrument approach procedures into Bismarck. Bismarck instrument approach conflicts would include ILS 13, ILS 31, GPS 3, and GPS 21. The PRTC Proposed Action was revised by the Air Force to move the proposed airspace away from Bismarck and Low and High PR-4 MOAs and Low, Medium, and High ATCAAs were included in the revised aeronautical proposal to support Bismarck access.

All or portions of, five small airfields (Belle Fourche, Black Hills, Upton, Sturgis, and Hulett) lie under the proposed PRTC Gateway ATCAA (Figure 3.1-6). These airports, some of which are under the existing Gateway ATCAA, would be unaffected by ATCAA operations which occur at 18,000 feet MSL or higher. Table 4.1-2 includes public airports under or near the PRTC alternatives. The relative location of each airport is described and the potential consequences identified. A comparison of Table 4.1-2 and Table 3.1-3 shows the relative location of public airports. Private airfields under the proposed MOAs are listed by MOA on Table 3.1-4. Private airfields under a MOA would have comparable impacts to those of public airports. During the typical day when a Low MOA was activated, aircraft could launch, land, or transit the MOA VFR using see-and-avoid. IFR traffic could not be supported when a Low MOA was activated.

Table 4.1-2. Public Airport Consequences Summary (Page 1 of 6)

Airport	Designation	Estimated Annual Operations[1]	Location	Environmental Consequences		
				Alternative A	*Alternative B*	*Alternative C*
Baker, MT	BHK	7,000	Under PR-3 MOA	Under PR-3 MOA; no IFR when Low MOA active	Under PR-3 MOA; no IFR when Low MOA active	Under PR-3 MOA; no IFR when Low MOA active
Beach, ND	20U	1,170	North of PR-3 MOA	Within area with limited radio/ radar; potential secondary effects from increased traffic	Within area with limited radio/ radar; potential secondary effects from increased traffic	Within area with limited radio/ radar; potential secondary effects from increased traffic
Belle Creek, MT	3V7	550	Under existing Powder River MOAs and proposed PR-2 MOA	No expected change from existing conditions	No expected change from existing conditions	No expected change from existing conditions
Belle Fourche, SD	EFC	12,112	Under Gateway ATCAA	No impact on traffic up to FL180	No impact on traffic up to FL180	No impact on traffic up to FL180
Billings, MT	BIL	92,319	West of PR-1A and PR-1B	PR-1A MOA/ ATCAAs adjusted to avoid traffic pattern	PR-1A ATCAAs adjusted to avoid traffic pattern	PR-1A MOA/ ATCAAs adjusted to avoid traffic pattern
Bismarck, ND	BIS	46,472	Northeast of PR-4 MOA	PR-4 MOAs adjusted to avoid traffic pattern	PR-4 MOAs adjusted to avoid traffic pattern	PR-4 ATCAAs above FL180 not expected to impact approach control
Bison, SD	6V5	5,500	Under PR-4 MOA	Under PR-4 MOA; no IFR when Low MOA active	Under PR-4 MOA; no IFR when Low MOA active	Under PR-4 ATCAA; no local impacts to traffic below FL180
Black Hills, SD	SPF	192,320	Under Gateway ATCAA	No impact on traffic up to FL180	No impact on traffic up to FL180	No impact on traffic up to FL180

Table 4.1-2. Public Airport Consequences Summary (Page 2 of 6)

Airport	Designation	Estimated Annual Operations	Location	Environmental Consequences: Alternative A	Alternative B	Alternative C
Bowman, ND	BPP	4,140	Under PR-3 MOA	Under PR-3 MOA; no IFR when Low MOA active	Under PR-3 MOA; no IFR when Low MOA active	Under PR-3 MOA; no IFR when Low MOA active
Bowman, ND	BPP	4,140	Under PR-3 MOA	Under PR-3 MOA; no IFR when Low MOA active	Under PR-3 MOA; no IFR when Low MOA active	Under PR-3 MOA; no IFR when Low MOA active
Broadus, MT	00F	5,350	Under existing Powder River MOAs and proposed PR-2 MOA	No expected change from existing conditions	No expected change from existing conditions	No expected change from existing conditions
Colstrip, MT	M46	5,750	Under PR-1A MOA	No IFR traffic during Low MOA activation	Under PR-1A ATCAA; IFR traffic under FL180 when ATCAA activated	No IFR traffic during Low MOA activation
Dickinson, ND	DIK	8,613	North of intersection between PR-3 and PR-4 MOAs	In an area of low communication; some crowding could occur on northern routes during PRTC activation; IFR traffic to south limited to V-491; se-and-avoid cross-country GPS traffic in PRTC area when Low MOAs activated; V-491 to south not accessible to IFR during LFE	In an area of low communication; some crowding could occur on northern routes during PRTC activation; IFR traffic to south limited to V-491; see-and-avoid cross-country GPS traffic in PRTC area when Low MOAs activated; V-491 to south not accessible to IFR during LFE	In an area of low communication; some crowding could occur on northern routes during PRTC activation; IFR traffic to south on V-491 or southeast below FL180 not impacted; no cross-country GPS traffic in PRTC area when Low MOAs activated
Ekalaka, MT	97M	2,028	Under Gap B MOA	LFE activation of Gap MOA impacts IFR and through traffic on V-120	LFE activation of Gap MOA impacts IFR and through traffic on V-120	LFE activation of Gap MOA impacts IFR and through traffic on V-120
Elgin, ND	Y71	160	Under PR-4 MOA	Under PR-4 MOA; no IFR when Low MOA active	Under PR-4 MOA; no IFR when LOW MOA active	Under PR-4 ATCAA; no local impacts to traffic below FL180

Table 4.1-2. Public Airport Consequences Summary (Page 3 of 6)

Airport	Designation	Estimated Annual Operations	Location	Environmental Consequences: Alternative A	Alternative B	Alternative C
Faith, SD	D07	2,700	East side of Gateway ATCAA south of PR-4 MOA	Outside of direct impact area; IFR traffic to west on V-120; IFR north could not occur in activated PR-4 Low MOA; traffic to north could re-route through Bismarck or V-491; traffic to southwest under Gateway ATCAA could occur below FL180; all other traffic as under normal conditions	Outside of direct impact area; IFR traffic to west on V-120; traffic to north under FL180 with activated PR-4 ATCAA; traffic to southwest under Gateway ATCAA could occur below FL180; all other traffic as under normal conditions	Outside of direct impact area; IFR traffic to west on V-120; IFR north could not occur in activated PR-4 Low MOA; traffic to north could re-route through Bismarck or V-491; traffic to southwest under Gateway ATCAA could occur below FL180; all other traffic as under normal conditions
Fort Smith, MT	5U7	3,100		Outside airspace; PR-1B MOA affects traffic to northeast	PR-1 ATCAA not expected to impact traffic	Outside airspace; PR-1B MOA affects traffic to northeast
Gillette, WY	GCC	22,218	South of PR 2 MOA/ATCAA	Traffic to north on V-254 traverses Gap A MOA/ ATCAA; traffic impacted during LFE; traffic to other areas to north could not traverse active MOAs	Traffic to north and northwest could fly under PR-1A/1B ATCAA below FL180	Traffic to north on V-254 traverses Gap A MOA/ATCAA; traffic impacted during LFE; traffic to other areas to north could not traverse active MOAs
Glen Ullin, ND	D57	860		Outside airspace; PR-4 MOA affects traffic to south	Outside airspace; PR-4 MOA affects traffic to south	PR-4 ATCAA not expected to impact traffic
Hardin, MT	F02	6,600	Under PR 1 MOA/ATCAA	No IFR traffic during Low MOA activation	Under PR-1 ATCAA; IFR traffic under FL180 when ATCAA activated	No IFR traffic during Low MOA activation
Harding (Buffalo), SD	9D2	2,300	Under Gap B MOA/ATCAA	LFE activation of Gap MOA impacts IFR and through traffic on V-120	LFE activation of Gap MOA impacts IFR and through traffic on V-120	LFE activation of Gap MOA impacts IFR and through traffic on V-120

Table 4.1-2. Public Airport Consequences Summary (Page 4 of 6)

Airport	Designation	Estimated Annual Operations	Location	ENVIRONMENTAL CONSEQUENCES		
				Alternative A	Alternative B	Alternative C
Hettinger, ND	HEI	4,450	Under west side of PR-4 MOA	Under PR-4 MOA; no IFR when Low MOA active	Under PR-4 MOA; no IFR when Low MOA active	Under PR-4 ATCAA; no local impacts to traffic below FL180
Hulett, WY	W43	400	Under Gateway ATCAA	No impact on traffic up to FL180	No impact on traffic up to FL180	No impact on traffic up to FL180
Lemmon, SD	LEM	12,500	Under PR-4 MOA	Under PR-4 MOA; no IFR when Low MOA active	Under PR-4 MOA; no IFR when Low MOA active	Under PR-4 ATCAA; no local impacts to traffic below FL180
Mandan, ND	Y19	24,740		Outside airspace; PR-4 MOA encroaches on southwest approach	Outside airspace; PR-4 MOA encroaches on southwest approach	PR-4 ATCAA not expected to impact approach
McIntosh, SD	8D6	70	East edge of PR-4 MOA	Under PR-4 MOA; no IFR when Low MOA active	Under PR-4 MOA; no IFR when Low MOA active	Under PR-4 ATCAA; no local impacts to traffic below FL180
Miles City, MT	MLS	11,200	Intersection of V-2/V-465, V-120, and V-254 northwest of PR-2 MOA/ATCAA	No direct impact; IFR traffic limited to Victor Airways to south and southeast when Low MOAs activated; potential increased traffic as civil aircraft avoid activated MOAs; see-and-avoid cross-country GPS to south when Low MOAs activated	GPS and IFR traffic to south and southwest under FL180 when PR-1 ATCAA activated; see-and-avoid traffic to south or southeast during LFE	No direct impact; IFR traffic limited to Victor Airways to south and southeast when Low MOAs activated; potential increased traffic as civil aircraft avoid activated MOAs; see-and-avoid cross-country GPS to south when Low MOAs activated
Mott, ND	3P3	1,690	Under PR-4 MOA	Under PR-4 MOA; no IFR when Low MOA active	Under PR-4 MOA; no IFR when Low MOA active	Under PR-4 ATCAA; no local impacts to traffic below FL180

Table 4.1-2. Public Airport Consequences Summary (Page 5 of 6)

Airport	Designation	Estimated Annual Operations	Location	Environmental Consequences		
				Alternative A	Alternative B	Alternative C
Newcastle, WY	ECS	4,500	South of Gateway ATCAA	Outside of direct impact area; traffic to north under activated ATCAA could occur below FL180; all other traffic as under normal conditions	Outside of direct impact area; traffic to north under activated ATCAA could occur below FL180; all other traffic as under normal conditions	Outside of direct impact area; traffic to north under activated ATCAA could occur below FL180; all other traffic as under normal conditions
Rapid City, SD	RAP	40,896	Southeast of Gateway ATCAA	Outside of direct impact area; traffic to north to remain below FL180 when Gateway ATCAA activated; IFR traffic on V-491 could not traverse Gap C MOA/ATCAA during LFE	Outside of direct impact area; traffic to north to remain below FL180 when Gateway ATCAA activated; IFR traffic on V-491 could not traverse Gap C MOA/ATCAA during LFE	Outside of direct impact area; traffic to north to remain below FL180 when Gap C ATCAA or PR-4 ATCAA activated; IFR traffic on V-491 could not traverse Gap C MOA/ATCAA during LFE
Sheridan, WY	SHR	41,832	South of PR-1B MOA/ATCAA	V-247 not usable when PR-1 MOA activated; no IFR traffic to north when Low MOA activated; PR-1B MOA adjusted so that traffic to northwest and southeast skirts PR-1B MOA	Traffic to north and northwest could fly under PR-1A/1B ATCAA below FL180	V-247 not usable when PR-1 MOA activated; no IFR traffic to north when Low MOA activated; PR-1B MOA adjusted so that traffic to northwest and southeast skirts PR-1B MOA
Sturgis, SD	49B	23,000	Under southeast edge of Gateway ATCAA	No impact on traffic up to FL180	No impact on traffic up to FL180	No impact on traffic up to FL180

Table 4.1-2. Public Airport Consequences Summary (Page 6 of 6)

Airport	Designation	Estimated Annual Operations	Location	Environmental Consequences: Alternative A	Alternative B	Alternative C
Tillitt (Forsyth), MT	FOR	9,170	North of PR-1 MOA/ATCAA	Outside of direct impact area; no IFR traffic directly south when PR-1A Low MOA activated; some increased congestion as traffic avoids activated MOAs by flying V-2/V-465; all other traffic as under normal conditions	Outside of direct impact area; traffic not affected below FL180 during PR-1A and PR-1B ATCAAs activation	Outside of direct impact area; no IFR traffic directly south when PR-1A Low MOA activated; some increased congestion as traffic avoids activated MOAs by flying V-2/V-465; all other traffic as under normal conditions
Upton, WY	83V	8	Under Gateway ATCAA	No impact on traffic up to FL180	No impact on traffic up to FL180	No impact on traffic up to FL180

Note: 1. From **Table** 3.1-6

4.1.3.1.4 Other Civilian Use

Local public airports and private airfields are used for a variety of civil aircraft activities within the ROI. Agricultural support activities, including aerial applications, ranch and farm oversight and time-sensitive delivery of equipment are typical regional aircraft activities. Aerial applications typically occur below 500 feet AGL, although return flights to base locations can occur at higher altitudes. Aerial applications frequently occur in the morning and/or in the more calm meteorological conditions to ensure appropriate distribution of the materials. Low-level B-1 flights which could occur at any time within an activated MOA were of concern to public commentors and could place significant limitations on the timing of aerial applications. Meteorological conditions and business requirements could require commercial applicators to perform required treatments whether or not a MOA is activated for B-1 training. Although general aviation could fly VFR in an activated MOA, the normal fixed wing and rotary wing aircraft commuting to and from aerial application areas and participating in aerial applications have very limited experience with high-speed military aircraft at altitudes between 500 and 2,000 feet AGL and are usually at or very near gross weight capacity. Scheduling of the respective Low MOAs and reporting when the Low MOA was activated would help agriculture applicators. Agricultural applicators may still perceive a low-level B-1 or other military aircraft as having a potentially significant impact on their operations.

Time-sensitive delivery of equipment parts or personnel can be critical to ensure replacement parts or specialized personnel are available for needed agricultural, mining, or other machinery. Civil aviation IFR transport could be required whether or not a MOA is activated. Public scoping comments included concerns that activated MOAs could interfere with delivery of time-sensitive materials. During the one to three hours on a weekday when a Low MOA was activated, time-sensitive deliveries could be delayed if they required IFR access. ATC could work with the Air Force to deactivate a MOA to route a time-sensitive IFR delivery above or below training military aircraft.

The scheduling of MOAs could help with other civilian use; however, the infrequent, but random appearance of low-level, high-speed large military aircraft could be seen as significantly impacting aerial applications and time-critical deliveries during the time on weekdays when a Low MOA was used for training.

Emergency and Related Services

Public scoping comments included concern that military aircraft training in the PRTC airspace could impact life-flight, firefighting, weather modification aircraft, and other general aviation pilots who considered sharing an active MOA with high-speed military aircraft below 3,000 feet AGL to be unsafe even under “see-and-avoid” conditions. Health care providers based at Bismarck, ND, regularly provide air ambulance and medical doctors to communities for health services. Healthcare providers typically fly IFR at altitudes above 10,000 feet MSL. As is currently the case with the Powder River airspace and would be the case throughout the PRTC, if an emergency, such as a life-flight, were required, the Air Force would immediately shift aircraft or end training in airspace requiring life-flight transport to accommodate the emergency.

In cases of emergency, such as air ambulance, law enforcement, or firefighting, which require ATC clearance, the Air Force would immediately respond to ATC direction and relocate. Should emergency activity require more airspace than a Low MOA, the Air Force would cease training within the MOA and either relocate to an alternate airspace for training or terminate training and return to base. No new MOA could be activated for a relocated training aircraft because an airspace could only be activated with a 2-hour advance notice by NOTAM.

Related aircraft activities which require special conditions could include regional requirements for airspace use. In addition to fire monitoring and related emergency activities, the USFWS and state agencies provide digital aerial photography for wetlands surveys and wildlife monitoring. This photography requires that aircraft be flown at specific altitudes over designated areas under specific visibility conditions at designated times of the year. These activities can occur during specific seasons for one to two week periods. Uncertainty with the Air Force’s initial proposal resulted in the concern that access would not be possible and significant impacts to monitoring could occur. The clarified Air Force proposal includes working with monitoring organizations to coordinate B-1 training operations and schedule MOAs to support monitoring activities. Communication, Low and High MOAs, and scheduling would minimize potential impact to monitoring aircraft. The primary impact to civil aircraft involved in emergency and related services and to military training aircraft would be the need for communication and the possible requirement for military aircraft to relocate to another activated MOA in response to emergency conditions.

Commercial Carriers

Adequate communication exists for commercial carriers flying in Class A airspace. The inadequacy of communication within the proposed PRTC MOAs could affect commercial carriers accessing or transiting below Class A airspace. Commercial carriers currently transiting or accessing the airspace provide regular service to Billings, Bismarck, Dickinson, Gillette, Rapid City, and Sheridan. These airports are all outside the proposed PRTC. The inadequate communication throughout much of the PRTC airspace results in commercial carriers using more airspace than might otherwise be anticipated for IFR traffic. This results in aircraft more spread out, especially along the Bismarck-Billings corridor and in the areas around PR-2, PR-3, and the western portions of PR-4. The Gap MOA boundaries and the PRTC proposed airspace distance setbacks have been increased in the revised Air Force proposal from what was originally presented at scoping to support civil aircraft flying in areas with inadequate radio frequency and/or radar coverage.

Other General Aviation

Scoping participants considered low-level flights, which could occur any time a MOA was scheduled, to be a significant impact to civil aviation.
Photo courtesy of A.S. Elliott

During public scoping meetings, concern was expressed by general aviation pilots operating especially below 10,000 feet MSL in the proposed MOAs. Pilots who commented during scoping were concerned about limited radar and communication and the inability to be notified when the airspace was activated for training and when the airspace was no longer activated. As noted above under Victor Airways, there is limited radar or radio coverage in much of the area. General aviation which uses altitudes below 10,000 feet MSL includes farm and ranch VFR flight operations, hunting support, and recreational flying. Although pilots can fly VFR in an activated MOA, participants at scoping meetings expressed concern with flying see-and-avoid in an active MOA. Concern was expressed by scoping meeting participants that uncertainty regarding B-1 overflights would impact their flight activities, if they chose not to fly in an active MOA, by a delay of two to four hours or re-routing. In general, these activities occur at altitudes below radar and below radio frequency coverage. The fact that the Air Force would have high-speed military training aircraft which could be anywhere when a MOA is scheduled and the uncertainty of B-1 training flights altitudes which could occur randomly below 2,000 feet AGL were seen by scoping participants as potentially significant impacts upon their general aviation activities throughout the ROI. The Air Force revised aeronautical proposal stratifies most new proposed MOAs in Low and High stacks and specifies weekday hours when the MOAs would be scheduled. This is designed to permit an Air Force training mission to be in a Low MOA for specific training and then to perform continued training in a High MOA or Low ATCAA. The Air Force would inform ATC when training aircraft activated and completed training in the Low MOA so that the Low MOA could be deactivated and used for IFR traffic. This revised proposal is directly designed to respond to public and agency concerns and would be expected to reduce time when a Low MOA was active.

Scoping comments revealed concerns that the large area of the MOAs would deter general aviation pilots from flying through the MOAs, whether they were active or not. The limited radar and radio frequency coverage were cited as problems with the airspace. The combined PRTC is made up of four MOA combinations, which could be activated on a scheduled basis each weekday. General aviation pilots commented at scoping that they considered an active MOA airspace unsafe even under see-and-avoid conditions. If the general aviation pilot chooses not to traverse an active MOA, the pilot could detour around the active MOA. The distances and flight time would suggest that most pilots would choose a ground hold for the period of time the Low MOA was active.

A comparison of actual MOA traffic from FAA on Figures 3.1-14, 3.1-15, 3.1-20, and 3.1-21 shows that much of the MOA traffic flies direct point-to-point. The aircraft tracks do not generally follow the Gap MOA corridors except V-491. This means that civil aircraft seeking to fly IFR would request ATC clearance in an unactivated MOA segment, delay, or divert around airspaces to avoid an active MOA. The revised Air Force proposal with scheduling, stacked MOAs, and real-time ATC information would reduce potential IFR delays. Some general aviation pilots would see the ATC information as inaccessible, the risk of flying VFR too great, and the limited communication for IFR flight to result in a significant impact to general aviation.

Glider and Sky Diving Operations. Gliders and soaring operations in the PRTC proposed MOA areas may be affected. Soaring and sky diving operations occur on an infrequent basis with the majority typically on the weekends when military training would not normally occur. Gliders tend to operate below 10,000 feet MSL. There is no restriction on a glider operating VFR in these areas; however, a pilot should be alert since military training activities may include low altitudes and abrupt maneuvers. MOAs and their scheduled hours of use are depicted on aeronautical charts. NOTAMS are available to general aviation users when the MOAs are active outside of the published hours of use. The NOTAMs should be checked for activity during glider or sky diving preflight. Aeronautical charts also depict where skydiving and glider operations regularly occur. Military pilots training in the proposed MOAs would be briefed of known glider activity that may occur in the area. See-and-avoid procedures are the responsibilities of all pilots. Any delay or change in airspace which could affect plans for soaring or sky diving would be seen by participants as an annoyance. Furthermore, Ellsworth and Minot AFBs airspace managers would:

- Plan to avoid known glider activities/events.
- Provide a briefing item to aircrews warning of glider/sky diving activity.
- Inform the glider community about procedures and safety in the airspace as requested.

Training aircraft would not normally schedule airspace from Friday afternoon through the weekend. There would be no significant adverse impacts expected to glider or sky diving operations in the regional airspace with participants reviewing military training schedules and military training pilots briefed to avoid areas and times of glider/sky diving activity.

Other Questions. Existing wind generation towers and other flight obstacles are published on aeronautical charts. Should any towers or commercial wind-based energy systems be constructed within the airspace in excess of 200 feet in height they would be subject to FAA tower visibility and lighting requirements. These requirements would be necessary regardless of the existence of a MOA. The MOAs are of sufficient size that training military aircraft would be able to avoid electromagnetic effects from wind generation towers. Additional communication with Ellsworth AFB would be required to support weather modification programs in an active MOA. Military training pilots would be briefed where weather modification activity could occur and would use see-and-avoid techniques to work with weather modification activities.

4.1.3.1.5 FAA Airspace Usage Data

FAA flight paths are presented on Figures 3.1-13 through 3.1-24 for aircraft winter and summer traffic throughout the proposed PRTC airspace. B-1 training aircraft in the Powder River airspace can be seen as the twisting and curving lines within the proposed PR-2 on Figures 3.1-14, 3.1-15, 3.1-16, 3.1-19, 3.1-20, and 3.1-21. General aviation and commercial flight paths are normally straight lines in the Figures. With the proposed PRTC, the twisting and curving lines visible in PR-2 (existing Powder River A and B MOAs) would also be seen in the proposed PR-1A/B, PR-3, and PR-4 MOA/ATCAA airspaces. B-1 aircraft would train for approximately 1.5 to 2 hours within a MOA/ATCAA combination. During this time, a B-1 could be at 2,000 feet AGL or below traveling at speeds of approximately 540 knots for 15 to 20 minutes.

Changes in the Air Force proposal from that presented at scoping are designed to reduce potential impacts on civil aviation. Changes include increasing the distance from the edges of MOAs and ATCAAs from major airports, stacking MOAs and ATCAAs to allow release of a Low or High MOA to support IFR traffic, providing advance schedule of airspace usage, stacking ATCAAs to support high altitude overflight, providing real-time information to ATC when training aircraft have completed activity within an airspace such as a Low MOA, and modifying Gap MOAs to have greater widths and allow for limited communication. These changes in the revised Air Force aeronautical proposal are designed to reduce potential impacts to civil aviation. Table 4.1-3 summarizes the daily number of civilian operations estimated to be impacted by PRTC Alternatives A. The estimated civilian operations are summarized from Table 3.1-10 and include FAA data for representative days, public airport reported annual operations divided by the number of days in a year, and estimated private airfield operations determined by the reported based aircraft and the number of operations per year for public airports.

Monday through Thursday daily aircraft affected represent the estimated daily civilian operations in the MOAs proportioned to the FAA data. MOA scheduling would impact approximately 60 percent of the daily civil aircraft operations on Monday through Thursday and approximately 20 percent of the daily civil aircraft operations on Friday morning.

Table 4.1-3 Estimated Monday through Thursday MOA Civilian Traffic Affected by PRTC Alternatives

Proposed MOA	*Daily Average Civilian Operations[2]*	*PRTC Alternative*			*No Action[1,3]*
		A[1]	**B[1]**	**C[1]**	
PR-1A/1B	53	32		32	
PR-2	25	15	15	15	7
PR-3	52	32	32	32	
PR-4	83	50	50		
Day-to Day Total	213	129	97	79	7

Notes:
1. MOAs scheduled: Monday through Thursday, 7:30 a.m. to 12:00 noon and 6:00 p.m. to 11:30 p.m.; Friday, 7:30 a.m. to 12:00 noon; other times by NOTAM. MOA scheduling would impact approximately 60 percent of the daily civil aircraft operations on Monday through Thursday and approximately 20 percent of the daily civil aircraft operations on Friday morning based on time distribution of flights from Figures 3.1-8, 3.1-9, and 3.1-10.
2. From Table 3.1-10.
3. Represents operations in proposed PR-2.

FAA airspace usage data as summarized on Figures 3.1-7 through 3.1-9 demonstrates the limited communication and radar tracking in much of the airspace below Class A airspace. Many more public airport operations are reported than are tracked by FAA. The FAA data suggest that there is no substantial difference between the numbers of aircraft flying IFR in the proposed PRTC airspace on weekdays or on weekends.

The FAA usage data can be directly used to identify potential impacts to commercial and other aircraft traversing the proposed PRTC. The FAA data demonstrate that average daily commercial flight activity is 4 to 12 flights in the proposed Low ATCAAs below FL260. Above FL260, Table 3.1-11 demonstrates that the average daily traffic can range from 25 to 82 in the proposed Medium ATCAAs and from 26 to 82 in the proposed High ATCAAs. Impacts can be avoided or reduced below FL260, and to avoid significant impacts to commercial high-altitude traffic, the ARTCC is expected to schedule hours for high altitude training to avoid heavy commercial and high civil use hours.

If PRTC is approved by the FAA, the expanded MOA airspace would be well-publicized and documented on aeronautical charts. MOA activation, including Gap MOAs, would be on a scheduled basis or otherwise by NOTAM. The Air Force scheduling and communication efforts with the FAA could provide deconfliction of the PRTC airspace units for military training. Ongoing interaction between Ellsworth AFB and state and federal agencies would help ensure continued compatibility of military and commercial/civil aviation in the affected environment of PRTC airspace. All pilots using aeronautical charts would be aware of the changed configuration of this special use airspace (SUA).

Impacts to civil aircraft are greater above FL260 where over 500 daily flight operations occurred during the FAA data collection period. On a daily training basis, very few B-1, but a substantial number of B-52 training flights could occur above FL260.

4.1.3.1.6 LFE IMPACTS

Impacts to non-military aircraft would be greater on an LFE day than on a normal training day. The LFE encompasses the entire airspace and utilizes more military aircraft. An LFE would propose to activate all or a substantial portion of the PRTC MOAs and ATCAAs, including Gap MOA/ATCAAs for 1 to 3 days a maximum of once per quarter, an estimated 2 to 4 hours daily. These LFEs would include approximately 20 aircraft of various types performing combined training within the airspace as they would in a real-world conflict. The two to four hour daily LFE use of the entire airspace would place restrictions on civil aircraft seeking to fly IFR or seeking to avoid flying VFR through active MOAs as well as commercial overflights in Class A airspace. Avoidance could be accomplished by scheduling civil aircraft flights within the proposed PRTC to avoid the MOA activation times, ground holding, diverting to another airport for a period of two to four hours while LFE training occurred, or diverting around the activated airspace. Local aircraft activities in the region under the airspace would have to fly VFR see-and-avoid or remain on the ground during the hours of LFE training. Section 4.9.3.1.2 calculates that an average of 76 civilian MOA flights would be impacted by re-routing, ground hold, rescheduling, or flying VFR through an active PRTC during each day of Alternative A LFE training.

Table 4.1-4 presents the estimated daily LFE MOA impacts for each alternative. Each day's LFE is estimated to occur within the normally scheduled airspace period. It is anticipated that the airspace would actually be activated for the LFEs for a four-hour period (see Tables 2.10 and 2.11). Figures 3.1-8 through 3.1-10 show that 30 percent of civilian flights occur during a typical four-hour period. The scheduling of the airspace activation for an LFE could be at a time period with lower potential impacts upon commercial traffic, especially above FL260. Figures 3.1-11 and 3.1-12 present the hours when commercial overflights are more and less likely in the proposed ATCAAs.

Table 4.1-4 Estimated LFE Daily MOA plus Gap MOA Civil Operations Affected by PRTC Alternatives

Proposed MOA	*Daily Average Traffic*[2]	*PRTC Alternative*			*No Action*[3]
		A[1]	**B**[1]	**C**[1]	
PR-1A/1B (includes Gap A)	61	19		19	
PR-2	25	8	8	8	
PR-3 (includes Gap B)	66	20	20	20	
PR-4 (includes Gap C)	90	27	27		
LFE Total	242	74	55	47	0

Notes: 1. LFEs assumed to be 10 days per year conducted 4 hours per day during normal MOA scheduled times.
2. From Tables 3.1-10 and 3.1-11.
3. LFEs training cannot be adequately performed in the existing Powder River airspace.

ATCAA airspace activation for LFE training could significantly impact en route commercial traffic above FL300. Jet route and related route impacts are described in Section 4.1.4.1.3. PRTC LFE airspace activities could significantly impact regional commercial flight activities through ground delays and have a ripple effect at other commercial airports. A review of FAA airspace data in Figures 3.1-10, 3.1-11, and 3.1-12 suggests that there could be specific hours when ATCAA airspace would be made available for LFE training with some, but not significant, impacts to commercial traffic in Class A airspace. Section 4.1.3.1.3 explains that proper scheduling of a 4-hour period could impact an estimated 43 to 244 commercial or other high-altitude flights through re-routing around the LFE-activated PRTC.

4.1.3.1.7 DECONFLICTION MEASURES

The Air Force would employ the mitigation measures listed in Section 2.12 during regular training and LFEs to aid with deconfliction and address impacts. Section 4.1.3.1.3 summarizes the changes to the Air Force aeronautical proposal designed to reduce impacts upon civil aviation.

4.1.3.2 Alternative B

4.1.3.2.1 AIRSPACE CATEGORIES

Alternative B includes all Alternative A ATCAAs and the PR-2, PR-3, and PR-4 MOAs. Alternative B also includes Gap B MOA/ATCAA, and Gap C MOA/ATCAA. The Gap MOAs/ATCAAs would be activated during LFEs as explained under Alternative A. As with Alternative A, categories for airspace would not be impacted by establishing MOAs and ATCAAs in support of PRTC Alternative B.

4.1.3.2.2 MILITARY TRAINING AIRSPACE

Alternative B would modify the existing Powder River A and Powder River B MOAs to become the PR-2 MOA. There would be no change to PR-2 from what was described for Alternative A. ATCAAs would be the same as described for Alternative A. Alternative B does not include PR-1A or PR-1B MOAs or the Gap A MOAs. The total volume of airspace would be reduced from Alternative A, and the terrain conditions of the PR-1A and PR-1B MOAs would not be available under Alternative B. The PR-3 and PR-4 MOAs would have somewhat reduced airspace impacts when compared with Alternative A. Any location under Alternative B MOA would be expected to be overflown an average of 6 to 9 times per year within one quarter mile of the flight path at an altitude of 2,000 feet AGL or below. A comparison of Table 2-17 with Table 2-23 demonstrates that Alternative B would result in fewer overall sortie operations conducted annually within the airspace when compared with Alternative A. Alternative B would result in an estimated 10,474 sortie operations conducted annually within the proposed MOAs and ATCAAs as compared with 11,956 sortie operations conducted within the MOAs and ATCAAs under Alternative A. Training within the PRTC Alternative B MOAs/ATCAAs would be similar to baseline training in the Powder River A and B MOAs and the consequences would be comparable to those described under Alternative A for the PR-2, PR-3, PR-4, and associated Gap MOAs. Alternative B training would include low-level to high-altitude combat maneuvering and staging for LFEs as described under Alternative A.

4.1.3.2.3 CIVIL AIRSPACE USAGE

Victor Airways

Impacts to Victor Airways would be comparable to Alternative A except that fewer Victor Airways would be impacted. V-120 and V-491 would have the same impacts as under Alternative A (see Figure 3.1-5). Victor Airways V-247 and V-254 below FL180 would not be impacted by Alternative B. V-254 traffic would be parallel to the Alternative B PR-2 MOA with an internal distance of 4 miles from the eastern border of the PR-2 MOA. Civil aircraft would be able to traverse north-south under the proposed PR-1 MOA as depicted on Figures 3.1-13, 3.1-14, 3.1-15, 3.1-19, 3.1-20, and 3.1-21. Impacts to aircraft within the proposed PR-2, PR-3, or PR-4 MOAs not currently using Victor Airways or the aircraft on other Victor Airways would be as described for Alternative A.

If the Alternative B airspace were activated the entire time period scheduled from Monday through Thursday, the total daily number of civilian operations projected to be impacted from Table 4.1-3 is estimated to be 97 civil operations.

Jet Routes

Alternative B would have no change in ATCAA use from those described for Alternative A. Jet route impacts would be as described for Alternative A. This includes potential impacts to commercial traffic above FL300, potential impacts to both jet routes and CAN routes.

Airports and Airfields

Airports and airfields under the PR-2 MOA, PR-3 MOA, or PR-4 MOA would be impacted by military flight training as described for Alternative A. Airports under PR-2 are already under the Powder River A and B MOAs. Airports and airfields under the Gap B MOA and Gap C MOA would be impacted during LFEs as described under Alternative A. Table 4.1-1 summarizes the impacts to airport and airfields for Alternative B.

Airports at Hardin and Colstrip would not have a MOA above them. The ATCAA above those airports would be at FL180. IFR traffic between those airports and Miles City, Gillette, Sheridan, Billings, and airports under the PR-1A and PR-1B ATCAAs would be able to fly IFR below FL180 even during the time when the ATCAA was activated. Communication would be required by pilots at these airports to ascertain the activation status of the PR-1A or PR-1B ATCAAs and to ascertain the activation status of other Alternative B MOAs/ATCAAs if their flight plans took them through the Alternative B airspace. This communication would be the primary impact to the western side of the airspace.

4.1.3.2.4 Other Civilian Use

Commercial Carriers

Commercial carriers or time-sensitive deliveries operating on the western side of the airspace under the PR-1A or PR-1B ATCAAs would be able to fly IFR below FL180 during the time the ATCAAs were activated. This could result in some commercial carriers being required to fly at less efficient altitudes than would otherwise be desired during an activated ATCAA.

Commercial carriers operating on the eastern side of the airspace including service in conjunction with the PR-2, PR-3, and PR-4 MOAs/ATCAAs would face the same consequences as those described under Alternative A. Of particular concern would be the lack of radio frequency communication and radar coverage in the PR-2, PR-3, and western part of the PR-4 MOAs. This lack of coverage could affect corridors between Miles City, Dickinson, Bismarck, and Faith as well as through the Gap B and C MOAs/ATCAAs.

Other General Aviation

Other general aviation throughout the Alternative B PR-2, PR-3, PR-4 and associated Gap MOAs would be impacted as described for Alternative A. This includes the inability to fly IFR within activated MOAs and ground hold or re-routing of civil aviation pilots choosing not to fly VFR in an activated MOA.

All general aviation activities under the PR-1A, PR-1B, and the Gap A ATCAAs (when activated for LFEs) would be able to fly IFR or VFR below FL180 as under existing conditions (see Figures 3.1-14, 3.1-18, 3.1-19, and 3.1-20). General aviation under the PR-2 MOA would face comparable flight conditions as experienced under the existing Powder River A and B MOAs.

General aviation and aerial application impacts under Alternative B within the PR-2 MOA, PR-3 MOA, and PR-4 MOA, would be as described for Alternative A. Alternative B skydiving and glider effects within PR-2, PR-3, and PR-4 MOAs would be as described for Alternative A. There would be no impacts to agricultural operations with Alternative B under the PR-1A or PR-1B ATCAAs or under the Gap A ATCAA.

Skydiving and glider activity, where it occurs under the PR-1A or PR-1B ATCAAs would not be impacted at altitudes below FL180.

Weather modification program effects to the east side of the Alternative B airspace would be as described for Alternative A.

Emergency and Related Services

Emergency services, including life flight, fire support, and other emergency support, would be given priority under Alternative B as described under Alternative A. Such emergencies would require communication with ATC and Ellsworth AFB. Air Force training activities would be adjusted to allow for the emergency uses. The adjustment could include relocating to another airspace or canceling missions and returning to base, depending upon the extent of the emergency. Conditions would be as described for Alternative A.

Related services include natural resource photography and monitoring, which would be conducted during specific times under specific meteorological conditions. As described under Alternative A, the Air Force would work with the appropriate agencies to schedule training activities in support of these ongoing monitoring operations.

4.1.3.2.5 FAA Airspace Usage Data

FAA airspace usage data from Figures 3.1-7 through 3.1-12 were used to project potential air traffic impacts under Alternative B. For Alternative B, FAA data, reported public airport operations, and estimated private airfield operations would average 97 civilian flight operations in MOAs impacted during an average training day (from Table 4.1-3). Air traffic impacts above FL180 would be the same as those described for Alternative A. Potential impacts to commercial traffic above FL300 would be as described for Alternative A. Air traffic below FL180 in the Alternative B PR-2, PR-3, and PR-4 MOAs would be the same as described for Alternative A. Traffic in the Billings-Miles City-Gillette triangle below FL180 would not be impacted by the activation of the PR-1A and PR-1B ATCAAs. This means that ATC would continue to support IFR traffic transiting the airspace below FL180 and the airports at Hardin and Colstrip under the PR-1A and PR-1B ATCAAs.

4.1.3.2.6 LFE Impacts

Table 4.1-4 presents the estimated Alternative B MOA LFE impacts. The LFE ATCAA impacts would be the same as those described for Alternative A. Impacts to civil traffic in MOAs during an LFE day would be comparable to those described for Alternative A in Section 4.1.3.1.6 with the exception that LFE training below FL180 would not occur beneath the PR-1A, PR-1B, and Gap A ATCAAs. An LFE day under Alternative B would impact an estimated 54 civilian flight operations in the MOAs. Impacts would be as described for Alternative A. Civilian MOA flights could be impacted by re-routing, ground holds, rescheduling, or flying VFR through an active MOA.

4.1.3.2.7 Deconfliction Measures

The Air Force would employ the same measures listed in Section 2.12 to aid with deconfliction and address impacts.

4.1.3.3 Alternative C

4.1.3.3.1 Airspace Categories

Alternative C includes all Alternative A ATCAAs. Alternative C MOAs include the PR-1A, PR-1B, PR-2, and PR-3 MOAs, and the Gap A and Gap B MOAs. The Gap MOAs/ATCAAs would be activated during LFEs as explained under Alternative A. PR-4 and Gap C MOAs would not be included in Alternative C.

Categories for airspace would not be impacted by establishing MOAs and ATCAAs in support of PRTC Alternative C.

4.1.3.3.2 Military Training Airspace

The existing Powder River A and Powder River B MOAs would be modified to become the PR-2 MOA under Alternative B as described for Alternative A. ATCAAs would be the same as described for Alternative A. The total volume of airspace would be less for Alternative C than for Alternative A. Terrain conditions for training in the PR-1A and PR-1B MOAs would be available for superior, low-altitude training under Alternative C.

Table 2-29 presents the combined day-to-day and LFE military training activity under Alternative C. Alternative C would result in an estimated 10,478 sortie operations conducted annually within the proposed MOAs and ATCAAs as compared with 11,956 sortie operations conducted within the MOAs and ATCAAs under Alternative A. Training within the PRTC Alternative C MOAs/ATCAAs would be similar to current training in the Powder River airspace and the consequences would be comparable to those described under Alternative A including low-level overflight frequency with the exception of PR-4 MOA and the Gap C MOA. Military training would include all Alternative C MOAs and ATCAAs for low-level to high-altitude combat maneuvering for LFEs a maximum of once per quarter.

4.1.3.3.3 Civil Airspace Usage

Victor Airways

Impacts to Victor Airways on the central and west sides of the proposed PRTC airspace would be comparable to those described for Alternative A. The PR-4 ATCAA would be above FL180 for Alternative C and V-491 traffic would be able to continue IFR below FL180. PR-1A, PR-1B, PR-2, and PR-3 MOA impacts would be as described for Alternative A. Traffic on Victor Airway V-491 would not be expected to be impacted by Alterative C.

If the Alternative C airspace were activated the entire time period scheduled from Monday through Thursday, the total daily number of civilian operations projected to be impacted using Table 4.1-3 is estimated to be 79 civil operations.

Jet Routes

Jet route impacts for Alternative C would be as described for Alternative A. This includes potential impacts to commercial traffic above FL300 and potential impacts to both jet routes and CAN routes.

Airports and Airfields

Alternative C impacts under the PR-1A, PR-1B, PR-2, PR-3, and associated Gap MOAs would be as described for Alternative A. This means that impacts to Hardin and Colstrip airports would be as described under Alternative A. During Low MOA activation, IFR traffic could not occur within the PR-1A or PR-1B MOAs. Air traffic within the Billings-Miles City-Gillette triangle would be impacted as described for Alternative A.

Alternative C does not include the PR-4 MOA or the Gap C MOA. This means that airports and airfields at Mott, Elgin, Hettinger, Lemmon, McIntosh, and Bison would not be under a MOA. Traffic to and from these communities could occur under IFR or VFR below FL180 even if the PR-4 ATCAA were activated. Traffic into and out of Bismarck, Dickinson, and local smaller airports would not be impacted below FL180. Traffic on V-491 between Dickinson and Rapid City under the Gap C ATCAA and the Gateway ATCAA would be able to transit the area IFR or VFR below FL180 even when the ATCAA was activated.

This could result in some pilots flying at less efficient altitudes than desired. Table 4.1-1 summarizes IFR and other impacts for public airports under Alternative C.

Communication with ATC and/or Ellsworth AFB would be required by pilots operating from these airfields to ascertain the activation status of the PR-4 ATCAA or of Alternative C MOAs if flight plans took them through the PRTC. This communication and the altitude limitation of FL180 during PR-4 ATCAA activation would be the primary impacts to the eastern side of the airspace.

4.1.3.3.4 Other Civilian Use

Commercial Carriers

Commercial carriers operating on the eastern side of the airspace under the PR-4 ATCAA would be able to fly IFR below FL180 during the time the PR-4 ATCAA was activated. Commercial carriers using V-491 would also be able to fly below FL180 during the time that the PR-4 ATCAA was activated. This altitude limitation could result in some commercial carriers being required to fly at less efficient altitudes than would otherwise be desired. Commercial carriers on the western side of the airspace operating within the Billings-Miles City-Gillette triangle would be impacted as described under Alternative A. Radio frequency communication and radar coverage limitations throughout the PR-2 and PR-3 MOA/ATCAAs and along the northern edge of the Alternative C airspace would continue to impact aircraft access as described under Alternative A. This limited radio and radar coverage would affect airports and air traffic under or adjacent to the PR-2 and PR-3 MOAs/ATCAAs as well as the Gap B MOA/ATCAA. Commercial carriers operating in the PR-2 and PR-3 MOAs and on the Gap A and Gap B MOA/ATCAA under Alternative C would be impacted as described under Alternative A.

Other General Aviation

Other general aviation throughout the Alternative C MOAs would be impacted as described under Alternative A for the PR-1A, PR-1B, PR-2, PR-3, and associated Gap MOA/ATCAA. This includes the inability to fly IFR within activated MOAs, limitations on radio communication capabilities to determine real-time MOA conditions, and uncertainty regarding where and when low-level B-1 training would occur throughout the MOAs during scheduled training in the MOAs. Under Alternative C, the PR-4 MOA would not be created and all general aviation activities under LFE-activated PR-4 and Gap C ATCAAs would be able to function below FL180 as under existing conditions. Alternative C aerial application and skydiver/glider impacts within the PR-1A, PR-1B, PR-2, and PR-3 MOAs would be as described for Alternative A. Agricultural aerial applications under the Alternative C PR-4 ATCAA or Gap C ATCAA would not be impacted. There would be no impacts to agricultural operations with Alternative C under the PR-4 ATCAA or under the Gap C ATCAA. Skydiving and glider activity, where it occurs under the PR-4 ATCAA would not be impacted at altitudes below FL180.

Weather modification programs under the Alternative C PR-4 ATCAA below FL180 would not be impacted. Weather modification activities where they occur within the PR-1A, PR-1B, PR-2, or PR-3 MOAs would be as described for Alternative A. Additional communication would be required to coordinate with weather modification programs. Military training pilots would be briefed where weather modification activity could occur and would use see-and-avoid techniques to work with weather modification activities. Activity below FL180 would not be impacted under the PR-4 ATCAA. Any weather modification or similar activities in PR-1A, PR-1B, PR-2, PR-3, or associated Gap MOAs and ATCAAs would be impacted as described for Alternative A.

Emergency and Related Services

Emergency services, including life flight, fire support, and other emergency support, would be treated the same under Alternative C as under Alternative A. Such emergencies would require communication with ATC and adjustment in Air Force training and other activities to allow for the emergency. That adjustment could include relocating to another airspace or canceling missions and returning to base, depending upon the extent of the emergency. Related services include natural resource photography and monitoring, which would be conducted during specific times under specific meteorological conditions. The Air Force would work with the appropriate agencies to schedule MOAs and training activities in support of these ongoing monitoring operations.

4.1.3.3.5 FAA Airspace Usage Data

FAA airspace usage data from Figures 3.1-7 through 3.1-12 were used to project potential air traffic impacts under Alternative C. The difference between the Alternative A day-to-day annual missions in the ATCAAs and the Alternative C day-to-day annual missions in the ATCAAs would not substantially change the potential impacts to commercial traffic above FL300. High altitude air traffic impacts in Class A airspace would be the same as those described for Alternative A.

Air traffic below FL180 in the Alternative C PR-1A, PR-1B, PR-2, and PR-3 MOAs would be the same as described for Alternative A. Traffic in the Bismarck-Faith-Dickinson area below FL180 would not be impacted by the activation of the PR-4 ATCAA. This means that Mott, Elgin, Hettinger, Lemmon, McIntosh, and Bison under the PR-4 ATCAA would continue to support IFR traffic within and transiting the airspace below FL180.

Table 4.1-3 contains the estimated number of civilian flights impacted in the MOAs during a normal training day. FAA data, reported public airport operations, and estimated private airfield operations result in an estimated 79 civilian operations impacted for Alternative C. Impacts would be as described under Alternative A.

4.1.3.3.6 LFE Impacts

Alternative C LFE impacts in the ATCAAs would be as described for Alternative A. Table 4.1-4 presents the estimated Alternative C MOA LFE impacts. An average LFE day under Alternative C would impact an estimated 47 civilian operations (see Table 4.1-4). The LFE ATCAA impacts would be the same as those described for Alternative A with the exception that LFE training below FL180 would not occur beneath the PR-4 or Gap C ATCAAs. Impacts to civil traffic during an LFE day would be comparable to those described for Alternative A in Section 4.1.3.1.6 and could include re-routing, ground holds, rescheduling, or flying VFR through an active MOA.

4.1.3.3.7 Deconfliction Measures

The Air Force would employ the same measures listed in Section 2.12 and summarized in Section 4.1.3.1.5 to aid with deconfliction and address impacts.

4.1.3.4 No Action

Under the No-Action Alternative, no change in baseline conditions would occur. The 28 BW and 5 BW would continue to conduct B-1 and B-52 flight training in the Powder River A/B MOAs, and Powder River, Gateway, Crossbow, and Black Hills ATCAAs as permitted under the existing letter of agreement. This means that Powder River A and B MOA effects would be comparable to those described for Alternative A PR-2. Annual sortie-operations in the existing Powder River MOAs/ATCAAs would be expected to occur as under projected baseline conditions. Chaff and flares are not authorized and would not be employed in the airspace. Supersonic activities are unauthorized in the MOAs/ATCAAs and would not be conducted. The structure and management of Powder River A/B MOAs and associated ATCAAs would continue to provide limited and not realistic training to the aircrews of the 28 BW and 5 BW.

4.2 Noise

4.2.1 Methodology

Subsonic and supersonic noise levels were calculated for each PRTC alternative using approved noise metrics and approved Air Force noise level calculation methodologies. Subsonic aircraft noise levels referenced in this section were calculated using the computer programs SEL_CALC and MR_NMAP. Supersonic noise levels were calculated using the programs PCBOOM and BOOMAP. Noise metrics, impact calculation methodologies, and studies relevant to estimation of noise impacts are discussed in greater detail in Appendix H.

4.2.2 Issues and Concerns

Specific issues and concerns about aircraft noise and sonic booms that were identified during scoping included the following:

- Annoyance, startle effect, and activity interference associated with subsonic and supersonic aircraft overflights
- Interference with sleep resulting from late-night overflights and/or day-time overflights (for day-time sleepers, such as night shift workers at the Colstrip power plant)
- Speech interference
- Learning interference
- Health impacts
- Land uses including hunting, fishing, recreation and outdoor activities, such as rock climbing, agricultural activities
- Safety impacts associated with livestock operations such as calving, branding, and weaning and/or reactions of domesticated animals to noise (e.g., stampedes, horses bucking)
- Impacts to structures
- Interference with tribal ceremonies and culturally-sensitive sites such as Devils Tower, Wind Cave, and Bear Butte
- Socioeconomics and rainfall
- Stress effects on task performance
- Disrupting the natural quiet of the area
- Impacts to domestic and wild animals (such as dogs, deer, etc.), including threatened and endangered species in the ROI (such as sage grouse and several species of raptors)

4.2.3 Environmental Consequences

This section explains the environmental consequences from aircraft overflights. The PRTC would be capable of supporting a higher number of Ellsworth AFB and Minot AFB training sorties, as well as LFEs that would include approximately 20 aircraft of various types.

4.2.3.1 Alternative A: Proposed Action

As described in Section 2.5.2, *Airspace Operations*, the Proposed Action would involve replacement of the existing Powder River airspace with the larger PRTC. The total number of sortie-operations flown in the proposed PRTC would be greater than had previously been flown in the Powder River airspace and supersonic flight would be allowed, subject to altitude restrictions.

4.2.3.2 Subsonic Noise

The analysis addressed operations of all aircraft expected to use the proposed PRTC airspace including Ellsworth-based B-1 aircraft, Minot-based B-52 aircraft, and transient aircraft from numerous other installations. Section 3.2.3.1 describes subsonic noise. Noise impacts were calculated by comparing estimated day-night average sound levels (DNL) for each alternative against baseline noise levels, as described in Section 3.2.3. Potential effects of noise are diverse and several categories of noise impacts are discussed in this section, as well as in sections of this Environmental Impact Statement (EIS) devoted to other resource areas (such as Sections 4.6 *Biological*, 4.7 *Cultural*, 4.8 *Land Use*, 4.9 *Socioeconomics,* and 4.10 Environmental Justice).

4.2.3.3 Supersonic Noise Analysis

The sonic boom environmental effects under Alternatives A, B, and C have been computed. The analysis is based on the entire airspace being used, with opposing forces typically staging in PR-1A and PR-1B at one end, and PR-4 at the other, then proceeding in general west to east and east to west direction and conducting combat primarily in PR-2 and PR-3. While the entire airspace is modeled, it is expected that the central portion in PR-2, PR-3, and Gap B MOAs would experience more supersonic activity than the east or west ends, as this is where the opposing forces would most often be expected to engage.

Two general types of supersonic operations are proposed. One is air combat by fighter aircraft. This would involve up to 100 sorties per year of transient aircraft, consisting of primarily F-16s and would be expected to include other military fighter aircraft such as the F-22. The second type of operation is evasive maneuvers by B-1 aircraft.

4.2.3.4 Fighter Supersonic Operations

Fighter aircraft may attain supersonic speeds during LFE air combat training events. This can occur as aircraft approach an engagement, at times during an engagement, and during break at the end of an engagement. The events occur in an elliptical region centered along a line between setup points. The cumulative sonic boom exposure is modeled by BOOMAP, a statistical model based on long term sonic boom monitoring in a number of airspaces. BOOMAP has been run for 100 sorties per year, consisting of a 50/50 mix of F-16 and F-22 aircraft. To account for the expected higher activity in the central portion, operations were modeled with three overlapping maneuver ellipses. Sixty percent of operations were placed in a central ellipse that covers PR-2 and PR-3 and Gap B, and parts of adjacent airspace units. The other two ellipses, each with 20 percent of operations, are at the west and east ends. Figure 4.2-1 shows the three ellipses.

The calculated boom environment, as C-weighted Day-Night Average Sound Level (CDNL) and numbers of booms per year for each airspace unit, are shown in Table 4.2-4. The maximum CDNL in the center of the airspace is 36 C-weighted decibel (dBC), where there would be about six booms from fighters per year. The booms would occur during the LFE, four times a year for a period of two to three days each. There would be one to two booms calculated to be experienced throughout this area during each LFE. The boom environment away from the center would be less, about 10 decibels (dB) lower and one tenth as many booms near the edge. There is a calculated 10% to 20% chance that, during each LFE, a boom from a fighter would be heard near the edge of the airspace.

4.2.3.5 B-1 Supersonic Operations

Supersonic events by the B-1 are expected to consist of evasive dashes. If pursued by an opposing fighter, the B-1 would accelerate to supersonic speed, and then decelerate after the fighter gives up pursuit. During LFEs, an estimated 60 such operations per year would be expected, with supersonic duration of about 30 seconds for each operation. Details of the maneuver vary, and particularly depend on whether the aircraft dives or remains at constant altitude. Two maneuver profiles have been analyzed, which bracket the expected range of expected maneuvers in terms of intensity of sonic boom impacts. Sonic booms from these maneuvers have been computed using PCBOOM.

- Profile 1, where the aircraft dives at a 5 degree angle, beginning around 25,000 feet MSL. It exceeds Mach 1 at 23,500 feet, and reaches a maximum speed of Mach 1.1 30 seconds later. It then decelerates, falling below Mach 1 before reaching 20,000 feet MSL. Deceleration from Mach 1.1 to 1.0 takes about 5 seconds.
- Profile 2, where the aircraft accelerates in level flight at 25,000 feet MSL. Acceleration from Mach 1.0 to 1.05 takes about 30 seconds. Deceleration back to Mach 1 takes 2 to 3 seconds.

One aspect of these maneuvers is that they involve low supersonic Mach numbers. A sonic boom will reach the ground only if the aircraft speed exceeds a cutoff Mach number that is usually greater than 1. For level flight at 25,000 feet MSL in the standard atmosphere with ground elevation at 4,000 feet MSL the cutoff Mach number is 1.08. Under standard conditions, Profile 2 booms would not reach the ground, and only part of Profile 1 booms would reach the ground. The atmosphere varies, however, and this variation is important in determining cutoff conditions. A tail wind at altitude reduces cutoff Mach number, increasing propagation to the ground, while a headwind at altitude increases cutoff Mach number, reducing propagation to the ground. Variations in the atmosphere were accounted for by analyzing calendar year 2009 wind data at 25,000 feet for Rapid City, SD, the nearest reporting station (NOAA 2009). Table 4.2-1 shows the percent of time that wind speed was in various ranges. These data are based on all 731 upper air soundings conducted in the year.

Table 4.2-1. Distribution of Wind Speed at FL250

Wind Speed, knots	*Percent of time*
0-10	2.8
10-20	9.0
20-30	12.3
30-40	19.3
40-50	17.6
50-60	11.6
60-70	11.1
70-80	6.3
80-90	4.2
90-100	3.4
100-110	1.1
110-120	0.7
120-130	0.4

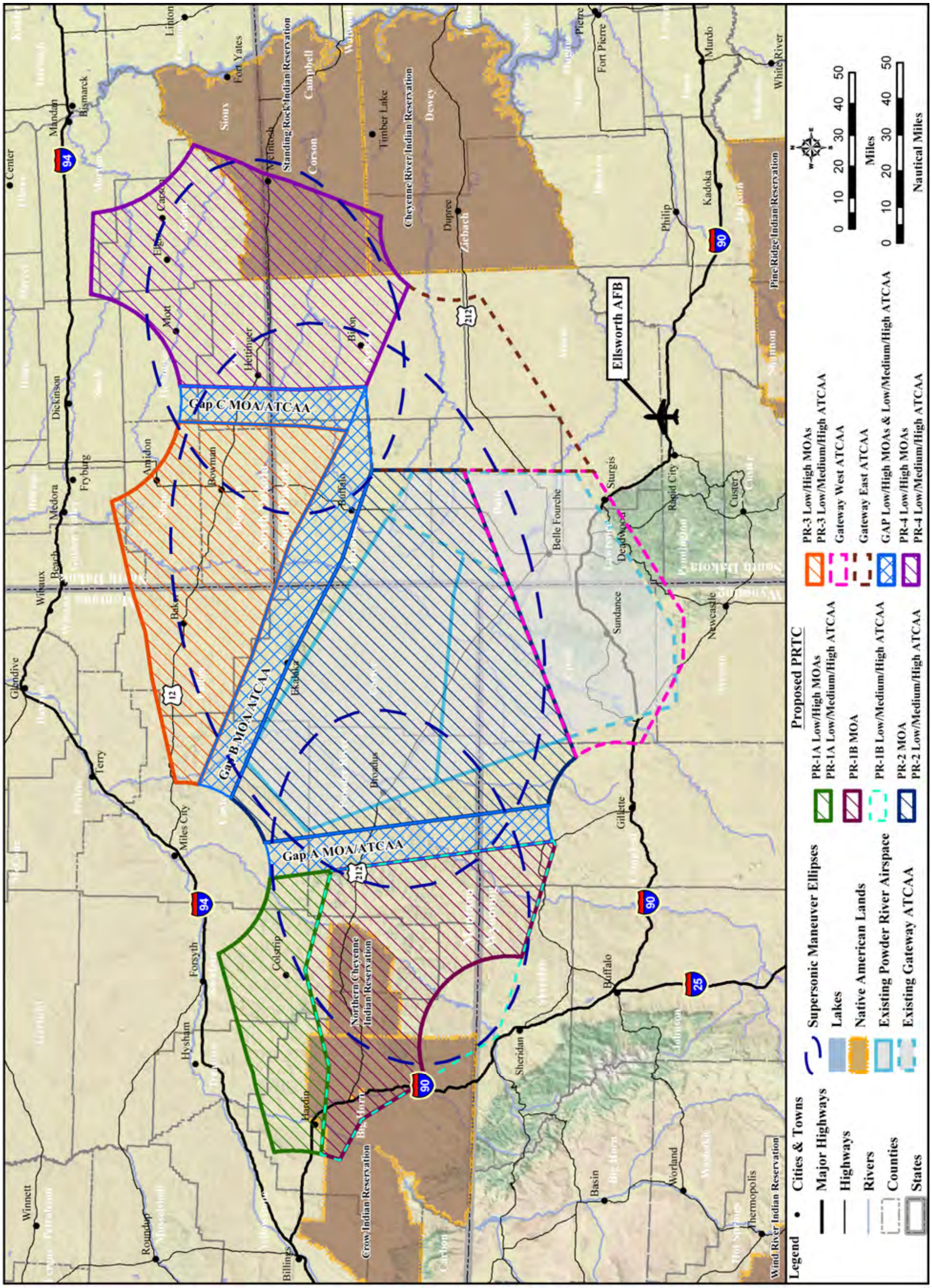

Figure 4.2-1. Supersonic Maneuver Ellipses

Wind direction varies, as does the flight direction for the evasion maneuver. Allowing for this difference in direction, a distribution of head/tail winds was prepared. PCBOOM was run for each head/tail wind speed range. The area of each footprint, square miles exposed to various boom overpressures, was obtained. The areas from each footprint were weighted by the percent time for the wind, to obtain square miles per boom. The final areas were then scaled by 60 operations per year and the area of the airspace to obtain the probability of a boom impacting any particular location in each year. For this analysis, all B-1 supersonic events were assumed to take place in the central portion of the airspace, PR-3, PR-4 and Gap B, and booms were modeled as occurring anywhere in that region. Table 4.2-2 shows the annual probability of boom exceeding various levels for each of the two profiles. For comparison, the probability of fighter boom in the center of the airspace is shown.

Some B-1 supersonic operations may occur outside of the central portion of PRTC, so actual probabilities would be slightly lower than those presented in Table 4.2-2, and there would be some (at a lesser rate) in the other regions. Note that the occurrence of B-1 booms is rare, both as compared to fighter booms and on an absolute basis. The probability of a person anywhere on the ground experiencing a B-1 boom is about once every six years, as compared to an average of six fighter booms per year toward the center of the airspace.

The average boom, when a boom is heard, will be 1.6 psf for B-1 Profile 1, 0.7 psf for B-1 Profile 2, and 0.8 psf for fighters. Louder booms would be heard less frequently. Approximately 1,300 acres (2 square miles) could experience a sonic boom of 4.0 psf and smaller acreage could experience a higher focus boom. A boom of 5.0 psf or greater would be heard an average of once every 150 years for B-1 Profile 1 and an average of once every 17 years from fighters. Fighter booms away from the airspace would be less frequent, as discussed in 4.2.3.4. The likelihood of significant damage from a sonic boom is thus very low, although it could occur. Any claims from Air Force-related damage would begin by contacting Ellsworth AFB Public Affairs.

Communities in northeast WY, such as Sundance, and west central SD are under the Gateway ATCAA where supersonic training could occur during LFEs.

The cumulative exposure from B-1 supersonic operations is smaller than that from fighters. CDNL for B-1 exposures in Table 4.2-2 is 26 dBC for Profile 1 and 16 dBC for Profile 2. Combining 26 dBC with the 36 dBC fighter exposure yields a total of 36.4 dBC. The cumulative CDNL values in Tables 4.2-4, shown to the nearest dB, are the same for the total environment as for fighters alone.

Expected Supersonic Events

The majority of the estimated 6 sonic booms during 10 days of LFEs would be primarily the result of fighter aircraft. For the purposes of this analysis, the number of expected sonic booms to be experienced at any location is rounded up to approximately one per LFE day. Table 4.2-4 lists the maximum CDNL and number of sonic boom events expected to occur each year under each of the proposed airspace units, including sonic booms generated by both B-1 and transient fighter aircraft.

Table 4.2-2. Probability (per year) of Sonic Boom at Any Location Near the Center of PRTC

PSF	*B-1 Profile 1 (Dive Maneuver)*	*B-1 Profile 2 (Level Acceleration)*	*Fighter Aircraft (Air Combat Maneuvering)*
0	0.1689	0.1433	6.0000
1	0.0999	0.0185	1.1234
2	0.0448	0.0022	0.3876
3	0.0136	0.0006	0.1782
4	0.0086	0.0002	0.0955
5	0.0065	0.0001	0.0565
6	0.0054	0.0001	0.0358
7	0.0050	0.0000	0.0238
8	0.0042	0.0000	0.0165
9	0.0024	0.0000	0.0118
10	0.0014	0.0000	0.0087
11	0.0009	0.0000	0.0065
12	0.0006	0.0000	0.0050
13	0.0004	0.0000	0.0039
14	0.0003	0.0000	0.0031
15	0.0002	0.0000	0.0025
16	0.0000	0.0000	0.0020

Noise Impact Analysis

Several categories of noise impacts that could potentially be associated with the Proposed Action are discussed below.

ANNOYANCE

Annoyance is a common response to noise. An individual's response to noise is impossible to predict accurately and depends on several acoustic and non-acoustic factors including, but not limited to, how the individual feels about the noise source and the activity the person is engaged in at the time the noise occurs (Newman and Beattie 1985). Extensive social surveys have found that the percentage of exposed *populations* that become "highly annoyed" after being exposed to a particular *time-averaged* noise level is predictable. This relationship has been studied for both the A-weighted Day-Night Average Sound Level (DNL) metric used to describe subsonic aircraft noise levels and CDNL used to describe impulsive noise events such as sonic booms (Schultz 1978; Finegold *et al.* 1994; Stusnick *et al.* 1992; Committee on Hearing Bioacoustics and Biomechanics 1981). The findings of these studies are summarized in Table 4.2-3. The projected CDNL under the PRTC MOAs is calculated to be 36 dBC.

Table 4.2-3. Relation Between Noise Level Metrics DNL and CDNL and Annoyance

DNL	*CDNL*	*Average Percent Population Highly Annoyed*
45	***42***	***0.83***
50	***46***	***1.66***
55	51	3.31
60	56	6.48
65	60	12.29

Source: Finegold et al. 1994; Stusnick et al. 1992; Committee on Hearing Bioacoustics and Biomechanics 1981

The Air Force-approved noise models MR_NMAP, PCBOOM, and BOOMAP were used to model noise impacts associated with subsonic and supersonic operations, respectively. Table 4.2-3 shows subsonic and supersonic aircraft noise levels under baseline conditions and the Proposed Action. Under the Proposed Action, wherever ATCAA airspace overlies MOA airspace, noise generated in the MOA airspace dominates overall noise levels such that noise generated by aircraft operations in the ATCAA would not quantitatively add to the overall Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) in areas beneath the airspace.

Neither the Onset Rate-Adjusted Day Night Average Sound Level (DNL_{mr}) nor the CDNL associated with PRTC training would be above 55 DNL or 52 CDNL for any airspace. Decreases in DNLmr would occur in areas beneath existing Powder River MOAs. Increases would occur in areas not located beneath existing MOAs, where noise is estimated to be below DNL 45 dB. A DNL increase in excess of 5 dB would be expected to be noticed by residents and could be perceived as a significant increase in noise by residents or visitors. In areas where the DNL_{mr} is less than 45 dB, noise from individual aircraft over flights would be noticed, but less than 1 percent of the populations would be expected to become highly annoyed (Schultz 1978; Finegold, et al.,1994) .

A summary of impacts presented in Table 4.2-4 is provided below:

- **Powder River A MOA (Under existing Powder River A):** Under the Proposed Action, the DNLmr noise level would decline by 2 dB from 49 dB to 47 dB in areas beneath this currently existing MOA. This decrease in noise level would occur because the total area of airspace across which air operations would be spread consists of a larger volume of airspace than under projected baseline conditions. The number of overflights per day exceeding Sound Exposure Level (SEL) of 65 dB would increase by 0.2 from 0.2 to 0.4. This means that 4 out of 10 days there would be overflights which would exceed 65 dB SEL. These overflights would occur randomly and could be anywhere in the airspace.

  An average approximately one sonic boom during each LFE day could be experienced anywhere beneath the airspace where no sonic booms have been experienced in recent years and CDNL would be 36 dBC. The sonic booms would typically be distant thunder-like sound. The sharp crack-crack experienced by a receptor directly in the line of the air pressure change would be infrequent at any given location. B-1 supersonic event would result in sonic booms that would be heard, on average, once every six years at any given location in the airspace, with an average amplitude of 1.6 psf. Each boom could result in approximately 1,300 acres experiencing an overpressure of 4 psf or greater. Sonic booms could result in annoyance to persons exposed to the boom and focused booms could result in damage to structures.

- **Powder River B MOA (Under existing Powder River B):** The DNL_{mr} noise level under this airspace unit would minimally decline by 2 dB from 49 dB to 47 dB. The number of overflights per day exceeding 65 dB SEL would remain approximately the same (roughly 1 every other day on average). The number of sonic booms would increase from 0 to approximately one per LFE day (10 days) per year and CDNL would be 36 dBC.

- **Gateway East and West ATCAAs (Existing Gateway ATCAA):** Noise levels beneath the Gateway East and West ATCAAs would remain below 45 dB DNLmr. The increased number of aircraft overflights would be noticed by, and may be annoying to, some residents. However, the average noise level would remain below the United States Environmental Protection Agency (USEPA) identified level of 55 dB DNL as the threshold below which adverse impacts would not be expected to occur. Overflights exceeding 65 dB SEL would remain at approximately 0.4 per day.

The number of sonic booms would be approximately one per year and CDNL in each airspace unit would be as shown in Table 4.2-4.

Table 4.2-4. Existing and Alternative A Military Aircraft Noise Levels

		BASELINE[1]				ALTERNATIVE A			
Proposed Airspace	***Existing Special Use Airspace***	***L_{dnmr}***	***Number of events/ day SEL_r > 65 dB***	***CDNL***	***Sonic Booms Per Year***	***L_{dnmr}***	***Number of events/ day SEL_r > 65 dB***	***Center of Airspace CDNL***	***Sonic Booms Per Year***
PR-1A MOA/ATCAA	None	<45	-	-	-	46[2]	0.3	20	0.6
PR-1B MOA/ATCAA	None	<45	-	-	-	46[2]	0.3	30	2.4
PR-1B ATCAA[3]	None	<45	-	-	-	<45	0.2	30	2.4
Gap A MOA/ATCAA	None	<45	-	-	-	<45[2]	0.1	34	3.6
PR-2 MOA/ATCAA	Powder River A MOA/Powder River ATCAA	49	0.6	-	-	47[2]	0.4	36	6.0
	Powder River B MOA/ Powder River ATCAA	49	0.8	-	-	47[2]	0.4	36	6.0
	Gateway ATCAA	<45[4]	0.4	-	-	47[2]	0.4	36	6.0
	None	<45	-	-	-	47[2]	0.4	36	6.0
Gap B MOA/ATCAA	None	<45	-	-	-	<45[2]	0.1	35	4.8
PR-3 MOA/ATCAA	None	<45	-	-	-	47[2]	0.4	31	3.6
Gap C MOA/ATCAA	None	<45	-	-	-	<45[2]	0.0	34	3.6
PR-4 MOA/ATCAA	None	<45	-	-	-	47[2]	0.3	32	2.4
Gateway East ATCAA	None	<45	-	-	-	<45[4]	0.3	29	1.2
Gateway West ATCAA	Gateway ATCAA	<45[4]	0.4	-	-	<45	0.3	25	0.6
	None	<45	-	-	-	<45	0.3	25	0.6

Notes:
1. Estimated baseline noise levels under airspace.
2. Dominated by aircraft operations in the MOA; overlying ATCAA noise contributions do not add to overall L_{dnmr} noise level beneath the SUA.
3. Areas overlain by PR-1B ATCAA only
4. Calculated military aircraft noise is below the DNL ambient sound of below 45 dB.

A – Ambient noise levels. See Table 3.2-2, Estimated Baseline Noise Levels Under Airspace.

Table 4.2-5 lists the number of overflight events per day with Onset Rate-Adjusted Sound Exposure Level (SEL_r)above 65, 75, and 85 dB that a person located in several representative locations would be likely to hear under baseline conditions and Alternative A. The locations selected for analysis are shown in Figure 3.2-3. The number of events exceeding a SEL_r of 65 dB per day would between <0.1 and 0.4 at all locations studied. In other words, events exceeding 65 dB SEL_r would occur no more than once every other day on average.

Table 4.2-5. Average Frequency of Military Aircraft Noise Events at Selected Representative of Noise-Sensitive Locations Under Alternative A (Page 1 of 2)

ID#	General Description	Baseline Airspace	Baseline # Events Per Day Exceeding 65 dB SEL	Baseline # Events Per Day Exceeding 75 dB SEL	Baseline # Events Per Day Exceeding 85 dB SEL	Proposed Airspace	Proposed # Events Per Day Exceeding 65 dB SEL	Proposed # Events Per Day Exceeding 75 dB SEL	Proposed # Events Per Day Exceeding 85 dB SEL
1	Inya Kara Mountain	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
2	Devils Tower [2]	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.2	<0.1
3	Little Bighorn Battlefield National Monument [3]	None	n/a	n/a	n/a	PR-1A MOA/ATCAA	0.3	0.2	<0.1
4	Bear Butte	None	n/a	n/a	n/a	Gateway West ATCAA	0.3	0.1	<0.1
5	Thunder Basin National Forest (northern section)	None	n/a	n/a	n/a	PR-2 MOA/ATCAA	0.4	0.2	<0.1
6	Thunder Basin National Forest (southern section)	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
7	Black Hills National Forest	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
8	Custer National Forest (western section)	None	n/a	n/a	n/a	PR-1B MOA/ATCAA	0.3	0.2	<0.1
9	Custer National Forest (central section)	Powder River A	0.6	0.2	<0.1	PR-2 MOA/ATCAA	0.4	0.2	<0.1
10	Custer National Forest (southeastern section)	none	n/a	n/a	n/a	Gateway East ATCAA	0.3	0.1	<0.1
11	Little Missouri National Grassland	none	n/a	n/a	n/a	PR-3 MOA/ATCAA	0.4	0.2	<0.1
12	Grand River National Grassland	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.3	0.2	<0.1
13	Crow Native American Reservation (Crow Agency, MT)	none	n/a	n/a	n/a	PR-1B MOA/ATCAA	0.3	0.2	<0.1
14	Northern Cheyenne Native American Reservation (Lame Deer, MT)	none	n/a	n/a	n/a	PR-1B MOA/ATCAA	0.3	0.2	<0.1
15	Standing Rock Native American Reservation	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.3	0.2	<0.1
16	Cheyenne River Native American Reservation	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.4	0.2	<0.1
17	Hardin, MT	none	n/a	n/a	n/a	PR-1A MOA/ATCAA	0.3	0.2	<0.1
18	Colstrip, MT	none	n/a	n/a	n/a	PR-1A MOA/ATCAA	0.3	0.2	<0.1

Table 4.2-5. Average Frequency of Military Aircraft Noise Events at Selected Representative of Noise-Sensitive Locations Under Alternative A (Page 2 of 2)

ID#	General Description	Baseline Airspace	Baseline # Events Per Day Exceeding 65 dB SEL	Baseline # Events Per Day Exceeding 75 dB SEL	Baseline # Events Per Day Exceeding 85 dB SEL	Proposed Airspace	Proposed # Events Per Day Exceeding 65 dB SEL	Proposed # Events Per Day Exceeding 75 dB SEL	Proposed # Events Per Day Exceeding 85 dB SEL
19	Broadus, MT [4]	Powder River A MOA	0.6	0.2	0.1	PR-2 MOA/ATCAA	0.4	0.3	<0.1
20	Ekalaka, MT	none	n/a	n/a	n/a	PR-2 MOA/ATCAA	0.4	0.3	<0.1
21	Baker, MT	none	n/a	n/a	n/a	PR-3 MOA/ATCAA	0.4	0.2	<0.1
22	Elgin, ND	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.3	0.2	<0.1
23	Bowman, ND	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.3	0.2	<0.1
24	Bison, SD	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.3	0.2	<0.1
25	Buffalo, SD	none	n/a	n/a	n/a	Gap B MOA/ATCAA	0.1	<0.1	<0.1
26	Sundance, WY	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
27	Belle Fourche, SD	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1

Notes:
1. Because several of the listed noise-sensitive areas are very large, locations were selected from within the designated areas that are near the center of proposed airspace units.
2. Devils Tower published aircraft avoidance area is 5 NM horizontally and 18,000 feet AGL
3. Little Bighorn Battlefield published aircraft avoidance area is ¾ nautical mile horizontally and 2,000 feet AGL.
4. Broadus, MT published aircraft avoidance area is 3 NM horizontally and 1,500 feet AGL

Sleep Disturbance

Several studies have been carried out on the relationship between aircraft noise and behavioral arousals or awakenings from sleep. The results of these studies have often been contradictory and depend on a number of situation-specific factors, including but not limited to depth of sleep, background noise levels, familiarity with surroundings, and previous exposure to aircraft noise. As recommended by sleep interference studies, a conservative approach was used in estimating sleep interference impacts for this proposed action.

The USEPA identified an indoor DNL of 45 dB as being necessary to protect against sleep interference at a frequency that would be considered problematic (USEPA 1974). Standard frame homes have an outdoor-to-indoor noise reduction of about 20 dB, so an outdoor sound level of 65 dB DNL is an appropriate lower threshold for this category of impact (USAF 1999). There are some areas overflown by the proposed PRTC where home construction may be less than standard and may not provide attenuation up to 20 dB. Under the Proposed Action, noise levels would not exceed 65 dB DNL under any of the proposed Special Use Airspace (SUAs).

In locations where the DNL sound level does not exceed 65 dB, individual overflights may still cause awakenings. The probability of awakening can be approximately predicted based on indoor SEL resulting from an aircraft overflight (Federal Interagency Committee on Aviation Noise 1997, Federal Interagency Committee on Noise 1992). When exposed to indoor SEL noise levels of 45 (assumed equivalent to 65 dB outdoor noise level), roughly 1 percent of subjects were awakened. As indicated in Table 4.2-4, areas beneath the proposed airspace would experience between less than 0.1 and 0.4 overflight events exceeding a SEL of 65 dB per day. Table 3.2-1 lists SEL_r associated with aircraft configurations at various overflight altitudes. An indoor SEL of 113 dB would be the highest indoor noise level expected to occur under the Proposed Action. This noise level would occur only directly beneath the aircraft flight path and only as the result of B-1 maneuvers that make up a small portion of the total mission time. Persons affected by indoor SEL of 113 dB would be expected to be awakened. Overflight noise of this intensity would be expected to occur once or twice per mission. The relatively low population density of the ROI (see Table 3.9-4) would make the occurrence of an overflight maneuver impacting a residence rare.

Sonic booms would be experienced under the airspace approximately 6 times per year, as described in Table 4.2-4, an average of approximately one during each LFE day. CDNL would be well below levels considered compatible with sleeping indoors. Individual sonic booms could result in additional awakenings.

Relatively few aircraft sorties occur during late-night hours (10 p.m. to 7 a.m.) when most people are asleep. People sleeping during the day may be exposed to overflight events exceeding a SEL of 65 dB as noted in Table 4.2-4. Each location under the airspace would be expected a noise 65 dB or greater less than once a training day on average.

Speech Interference

Noise can interfere with activities that involve listening, such as conversation, watching television, and listening to the radio. Conversation in a normal voice (assumed to be 70 dB) at a distance of 2 meters (6.56 feet) can be held with 95 percent sentence intelligibility in a steady noise environment of 60 dB (USEPA 1981). In noise environments exceeding this level, the speaker and listener must either move closer together or raise their voices in order to maintain sentence intelligibility. Aircraft overflight noise events nearing or exceeding this level may cause a reduction in sentence intelligibility. Under the Proposed Action, noise events that would potentially disrupt speech would occur relatively infrequently and would be of a brief duration.

Effects on Learning

It has been demonstrated that chronic exposure of children to high aircraft noise levels, as would occur near an airport, may impair learning (Shield and Dockrell 2008). DNLmr beneath all PRTC airspace units would be low enough that schools would be considered a compatible land use. While intense overflight noise events would occur under the Proposed Action, these events would be infrequent (less than one per day exceeding 65 dB SEL) and would not be expected to affect the ability of students to learn. Teachers have noted that a sudden noise event during a class, whether an overflight or a sonic boom, will disrupt the class and require a few minutes to return to academics. Impacts of noise on children are also discussed in Section 4.10, *Environmental Justice*.

Impacts to Health (auditory and non-auditory)

Hearing loss is generally defined as the loss of ability of the ear to hear sounds below a specified level. Hearing threshold shifts can be permanent or temporary. The USEPA has established 70 dB for a 24-hour exposure period as the average noise level standard required to protect 96 percent of the population from a permanent threshold shift (USEPA 1978). Because the DNL is weighted with a 10 dB penalty for late-night events, actual un-weighted noise levels experienced would be lower than the DNL value reported. DNLmr beneath the proposed SUAs (listed in Table 4.2-4) would not exceed 70 dB and would not be over a long duration. No long-term permanent threshold shifts would be expected to occur as a result of implementation of the Proposed Action.

Non-auditory noise-induced health impacts on humans (e.g., cardiovascular problems, birth weight effects, mortality rates) have not been found to occur at time-averaged noise levels of less than 75 dB. No long-term impacts to human health are expected to occur (see additional information on direct safety impacts of noise in Section 4.3.2.7, *Noise Impacts on Safety)*.

LAND USES

Increases in noise levels do not directly affect land use, but land uses could potentially change in an area if noise levels were to make existing land uses untenable or undesirable. After extensive study of several categories of noise impacts (e.g. health, activity interference, annoyance), the USEPA established 55 dB DNL as the threshold below which adverse impacts would not be expected to occur (USEPA 1974). A DNL value of 65 dB is widely used as the threshold above which residences are not considered to be compatible without incorporation of special noise attenuation measures. This threshold is a compromise between acceptable noise and economic practicality. A primary consideration in establishment of this threshold was the USEPA-established goal of maintaining indoor living environments at or below 45 dB. Frame homes with some open windows have an outdoor-to-indoor noise reduction of about 20 dB, so an exterior level of 65 dB means that 45 dB will be achieved indoors. Weather conditions in the ROI lead most residents to keep windows and doors closed through much of the year, so a higher outdoor-to-indoor noise reduction than 20 dB would be expected. Higher levels of outdoor-indoor noise attenuation are achieved in houses with heavier construction or with special acoustic design features. Structural noise attenuation does not provide benefits to people while they are out-of-doors.

Agriculture, rangeland, and open space make up approximately 99% of the area beneath the proposed PRTC. Agriculture (including livestock production) and agriculture-related activities (e.g., harvesting) are considered to be fully compatible with noise levels up to 75 dB DNL (Air Force 1999). Effects of noise on individual livestock species are discussed in Section 4.6, *Biological Resources,* and Section 4.9, *Socioeconomics*.

The ROI supports excellent opportunities for hunting, fishing, and tourism. These activities may be temporarily disrupted by aircraft noise, but disruptions would be relatively infrequent. It is not expected that noise would strongly affect the way in which the area is regarded by potential hunters, fishermen, and tourists. All these activities currently occur under the existing Powder River A and B MOAs. Single event overflights or sonic booms could result in annoyance to individual hunters, fishermen, or tourists. Further discussion of noise and recreational activities is included in Section 4.9, *Land Use.*

NOISE IMPACTS TO SAFETY

Safety issues associated with noise are discussed in Section 4.3, *Safety*. As discussed in this section, noise levels associated with the proposed aircraft training operations, are not expected to result in hearing loss or any other human health and safety impacts.

Horses, cattle, and other large livestock sometimes “spook” at sudden-onset sounds such as the noise created by low-altitude, high-speed aircraft. These reactions can be particularly hazardous to the animals and people in close proximity to the animals, while the animals are penned in a relatively small area, as is the case during branding and weaning operations. In the existing Powder River A/B MOAs, when notified by a rancher that branding or weaning operations are underway the 28 BW establishes temporary avoidance areas to prevent direct overflight. This practice would continue throughout the PRTC airspace under the proposed action or an alternative. When contacted, Ellsworth AFB would request locations and timing of noise sensitive operations and establish temporary avoidance areas to protect ground assets from low-level overflight impacts. Because sonic booms are affected by meteorological conditions, it is not possible to prevent sonic booms from reaching the ground in a specific area, although knowledge of specific branding times could be included in LFE planning and scheduling.

Low-altitude aircraft overflights also have the potential to startle people at sensitive times, such as while they are driving, riding horses, or rock-climbing. Any safety hazard associated with this type of startle event would be difficult to predict and would be highly dependent on situation-specific factors. Safety procedures associated with usage of explosives for mining are designed to prevent inadvertent explosions caused by vibrations, such as those caused by aircraft overflight. Overpressures in open areas could be sufficient to disturb loose rock or other materials. This could have the potential to impact safety (see Section 4.3). Locations under ATCAAs and not under MOAs, such as Devils Tower and Bear Butte, would not be subject to low-level overflights.

NOISE IMPACTS TO STRUCTURES

Sonic booms could be experienced anywhere under the proposed airspace an average of approximately once per day during the 10 LFE days per year. There would be a potential for sonic booms to damage structures or other items as summarized in Table 4.2-6. At 1 pound psf, the probability of a window breaking ranges from one in a billion (Sutherland 1990) to one in a million (Hershey and Higgins 1976). At 10 psf, the probability of breakage is between one in a hundred and one in a thousand (Haber and Nakaki 1989). Damage to plaster is in a comparable range but depends on the condition of the plaster. Adobe faces risks similar to plaster, but assessment is complicated by adobe structures being exposed to weather, where they can deteriorate in the absence of any specific loads (Sutherland 1989). Typical outdoor structures such as buildings, windmills, radio towers, etc., are resilient and routinely subject to wind loads far in excess of sonic boom pressures. Foundations and retaining walls, which are intended to support substantive earth loads, are not typically at risk from sonic booms below 4 psf. Fighter aircraft flying supersonic between 10,000 and 12,000 feet AGL could produce comparable overpressures (Figure 2.6). Fighter aircraft would fly supersonic below FL180 approximately four percent of the time. Nearly all the B-1 supersonic events would be between 15,000 and 20,000 feet AGL. Table 4.2-7 shows probabilities of booms that exceed various overpressures. The probability of a 5 psf boom is about one in 16 years. As demonstrated in Table 4.2-6, such an overpressure has the potential to cause damage to structural and free-standing items such as bric-a-brac. The Air Force follows established procedures for claims against the government in cases where damage is claimed to result from sonic booms or other Air Force activities.

Table 4.2-6. Possible Damage to Structures from Sonic Booms

Sonic Boom Overpressure Nominal (psf)	*Item Affected*	*Type of Damage*
0.5 - 2	Plaster	Fine cracks; extension of existing cracks; more in ceilings; over door frames; between some plaster boards.
	Glass	Rarely shattered; either partial or extension of existing cracks.
	Roof	Slippage of existing loose tiles/slates; sometimes new cracking of old slates at nail hole.
	Damage to outside walls	Existing cracks in stucco extended.
	Bric-a-brac	Those carefully balanced or on edges can fall; fine glass, such as large goblets, can fall and break.
	Other	Dust falls in chimneys.
2 - 4	Glass, plaster, roofs, ceilings	For elements nominally in good condition, failures show that would have been difficult to forecast in terms of their existing localized condition.
4 - 10	Glass	Regular failures within a population of well-installed glass; industrial as well as domestic greenhouses.
	Plaster	Partial ceiling collapse of good plaster; complete collapse of very new, incompletely cured, or very old plaster.
	Roofs	High probability rate of failure in slurry wash in nominally good state; some chance of failures in tiles on modern roofs; light roofs (bungalow) or large area can move bodily.
	Walls (out)	Old, free standing, in fairly good condition can collapse.
	Walls (in)	Internal ("party") walls known to move at 10 psf.
Greater than 10	Glass	Some good window glass will fail when exposed to regular sonic booms from the same direction. Glass with existing faults could shatter and fly. Large window frames move.
	Plaster	Most plaster affected.
	Ceilings	Plaster boards displaced by nail popping.
	Roofs	Most slate/slurry roofs affected, some badly; large roofs having good tile can be affected; some roofs bodily displaced causing gale-end and wall-plate cracks; domestic chimneys dislodged if not in good condition.
	Walls	Internal party walls can move even if carrying fittings such as hand basins or taps; secondary damage due to water leakage.
	Bric-a-brac	Some nominally secure items can fall; e.g., large pictures, especially if fixed to party walls.

Source: Haber and Nakaki 1989

Table 4.2-7. Sonic Boom Peak Overpressures (psf) for B-1, F-16, and F-22 Aircraft at Mach 1.2 Level Flight

Aircraft Type[1, 4]	ALTITUDE (FEET AGL)[2]						
	10,000	***15,000***	***16,000***	***21,000***	***25,000***	***30,000***	***40,000***
B-1	10.21	7.21	6.81	5.31	4.51	3.81	3.03
F-16	4.24	2.95	2.78	2.13	1.78	1.48	1.13
F-22[3]	5.37	3.75	3.53	2.71	2.27	1.88	1.44

Notes:
1. Overpressure is at Mach 1.2, straight and level flight; produced using PCBOOM 4 computer program; assumed standard U.S. atmospheric conditions. Boom exposure for fighters was computed with BooMap, which accounts for aircraft maneuvers. B-1 boom exposure was computed using PCBOOM for actual planned maneuvers and accounting for atmospheric variability.
2. Overpressure values provided here are intended to provide a general picture of overpressures resulting from B-1 supersonic flight. Actual overpressure would vary based on maneuvers (climb/descent, turns, accel/decel) and specific weather conditions (winds, vertical temperature / pressure profile). Aircraft maneuvers result in concentration of sonic boom energy ("focus booms") that may exceed overpressure shown here, or defocusing that may result in lower overpressures.
3. F-15, F-22, and F/A-18 overpressures are comparable.
4. B-1 supersonic flight would be limited to 20,000 feet MSL minimum and fighter supersonic flights would be limited to 10,000 feet AGL minimum. Supersonic flights would only be permitted during LFEs.

NOISE IMPACTS TO CULTURAL RESOURCES

Impacts of noise on cultural resources are discussed in Section 4.7, *Cultural Resources*. Cultural resources, as defined under 36 Code of Federal Regulations (CFR) Part 800.16, include several categories of historically or culturally-important structures and sites. While many historical structures may have incipient damage and may be more sensitive to noise impacts than other structures, these structures are routinely currently exposed to loads resulting from high winds and other natural forces. Sonic boom or low-level overflights could produce overpressures of sufficient magnitude to damage historic structures under the airspace. Impacts to structures may be more severe if the structure is in poor condition.

Aircraft overflight noise could potentially disrupt Native American tribal or individual activities. Consultation with Native American tribes is underway to identify sensitive locations and times. Additional discussion on this topic can be found at Section 4.7, *Cultural Resources*.

The natural quiet of a cultural or historic site may be one element of its cultural value. Aircraft overflights may disrupt this natural quiet. Disruptions would be expected to be relatively infrequent and would not be expected to affect the way in which most people perceive the area as a whole. Individuals could see the noise or visual intrusion as an annoyance and an impact upon the experience value of the historic or cultural site.

EFFECTS ON SOCIOECONOMICS

Effects of noise on socioeconomics are discussed in Section 4.9, *Socioeconomics*. Concerns were raised during scoping about how aircraft noise would affect the economy and, especially, the tourism industry in the affected area, which centers on hunting, fishing, and sight-seeing. In the highly unlikely event of a sonic boom or low altitude overflight occurring at a critical time in a hunt, the hunter could be annoyed. At levels below 55 dB DNL, aircraft noise would not typically be expected to elicit strong community reaction and is generally not considered to be an important factor in determining people's attitudes towards the area affected by the noise (Committee on Hearing, Bioacoustics, and Biomechanics 1977).

Startle effects from sudden low-level overflight and associated noise was cited by scoping participants as a concern. B-1 or B-52 low-level flight 2,000 feet AGL or below would overfly one-quarter of a mile each side of the flight path between 2 and 4 percent of the ground area under the MOAs each training day. This means that, on average, any specific location under the airspace could expect to be overflown between five and nine times a year (see Section 4.9.3.1.5). Any given location could be overflown more or less than average during a year. Noise and startle effects would be infrequent but could be perceived as significant by overflown persons.

During scoping, members of the public expressed concern that sonic booms might interfere with the formation of clouds, thereby reducing rainfall and affecting crop production. Cloud formation depends on the amount of moisture in the air, together with local temperature and pressure at the cloud layer. Aerodynamic loads (lift and drag; pressure on the wings) on an aircraft in flight have a localized effect on temperature and pressure. These loads are sometimes made visible by local condensation. The resulting vapor cloud is actually a condensation cloud in low-pressure expansion regions. The effect is transient, reacting to the local pressure and returning to normal after the aircraft passes. The pressure field of an aircraft (either subsonic or supersonic) does not remove moisture or change atmospheric conditions and aircraft noise under the Proposed Action would not be expected to have any direct or indirect impact on rainfall.

Performance Effects Resulting From Noise-Related Stress

Aircraft overflights that would occur under the Proposed Action would have the potential to cause startle responses in exposed persons. Several studies have been conducted on the relationship between noise-induced stress and performance loss (see Appendix H). These studies have found that intermittent sounds, such as flyover noise, are more likely to disrupt performance than continuous sounds of the same level and that the level of impact is strongly linked to the type of task and the sensitivity of the individual performing the work. Noise events would be infrequent under the PRTC airspace with less than 1 event per day exceeding an SEL of 65 dB expected to be experienced at any location. Although such events could be momentarily startling, they would not be expected to substantially impact performance of a specific task.

Noise Impacts to Animals

The effect of noise on domestic and wild animals was a concern expressed by public commenters. The impact of noise on animals is discussed in Section 4.6, *Biological Resources,* Section 4.9, *Socioeconomics,* and Section 4.8, *Land Use*.

For domestic animals, public concern generally focuses on adverse effects on the use of or economic value of the animals. Since over three-quarters of the total land area beneath the proposed PRTC is grazing and agriculture, ranchers expressed concern regarding damage that could occur if livestock were panicked by noise or sonic booms. Ranchers were particularly concerned about the impact of overflights during calving, branding, weaning, or other penning operations. Stampeding of penned livestock after low-level aircraft overflight has been known to lead to injury, escape of large domestic stock animals, and damage to fences (Air Force 1994). Existing avoidance areas have been established for seasonal ranching activities under the Powder River A and B MOAs. Avoidance areas would be established in the PRTC to minimize the likelihood of physical injury to livestock due to initial reactions to overflight noise. Open communication between ranchers and the Air Force would be important to ensuring that appropriate avoidance procedures are enacted. When the Air Force knows of such activities, the avoidance areas are part of the aircrew briefing described in Section 2.2.1.3.

A majority of studies conducted to date have shown little or no effect of aircraft noise on the long-term health and productivity of cattle. After compilation of the results of studies of milk production in cows exposed to aircraft overflights, no connection between noise and milk yield was found (Air Force 1994).

Studies on spontaneous abortions in cattle have been inconclusive, with the majority of studies indicating no relationship between aircraft noise and spontaneous abortions (Air Force 1994).

Horses may exhibit behavioral reactions to aircraft overflights, but typically habituate to the stimulus over time (Air Force 1994). To date, no linkage has been established between aircraft noise and spontaneous abortions or other long-term health effects in horses (LeBlanc *et al* 1991).

Studies of aircraft noise effects on weight gain, food intake, and reproduction rates of swine have indicated little or no effect. Exposure of swine to aircraft noise frequently resulted in increased heart rates, hypertension, and electrolyte imbalances, but these effects typically subsided after the noise levels were reduced (Air Force 1994).

Domestic fowl may panic when exposed to sudden, intense aircraft noise and this panic can lead to bruising and other damage to the birds, which could reduce marketability (Air Force 1994). These effects are more likely to occur when birds are densely crowded and when they are naïve to aircraft noise. Egg productivity has not been found to be affected by aircraft overflight noise, even when the birds were exposed to noise levels of 130 dB (Air Force 1994).

Domestic dogs and cats may become excited or stressed by aircraft overflight noise. However, no permanent effects on dogs or cats are expected to occur as a result of overflights.

Response of wild animals to noise differs markedly between species (Manci *et al* 1988). It has been found that many species habituate to noise over time (Manci *et al* 1988). Military aircraft operations in areas where no military aircraft operations had occurred previously may cause behavioral responses in exposed animals (startle response, fleeing the sound source, or becoming temporarily motionless). Responses to overflight noise would be expected to diminish as the exposed animals grow more accustomed to the stimulus. Effects of noise on wildlife, including threatened and endangered species, are described in section 4.6, *Biological Resources*.

Areas Not Currently Beneath SUAs: Areas not currently beneath SUAs are typically overflown by aircraft at high altitudes. Low-altitude military overflights are infrequent and would only occur on MTRs. Ambient noise levels in these areas are typically low, estimated to be below 45 dB DNL. Under the Proposed Action, aircraft-generated noise levels beneath portions of PR-2 that are currently within Powder River A/B MOAs would decrease from 49 to 47 dB DNLmr. Noise levels in areas of PR-1A/B, PR-2, PR-3, and PR-4 MOA/ATCAA included in Powder River A/B MOAs would increase from less than 45 dB DNL to a calculated 47 dB DNLmr. Noise levels beneath Gap A, Gap B, Gap C MOA/ATCAA from aircraft would remain below 45 dB DNLmr as would areas beneath ATCAAs only. Subsonic military aircraft operations in the ATCAAs would occur at such high altitudes that they would not affect the overall DNL_{mr} noise level on the ground. Noise level changes from less than 45 dB DNL to greater than 45 dB DNL could be noticed and could be annoying to some people. However, noise levels would remain below the USEPA identified level of 55 dB DNL. Depending on the airspace, Table 4.2-4 calculates the number of sonic booms experienced at any given location to increase from 0 to 6 per year or approximately one per LFE day, and CDNL would be 36 dBC toward the center of the airspace. Increases in noise levels in these areas could produce annoyance to residents and frequent visitors, but infrequent sonic booms would not be expected to result in impacts to human health.

4.2.3.6 Alternative B

Noise impacts of Alternative B would be the same as Alternative A except that it would not include creation of the PR-1A/B MOAs or the Gap A MOA. Aircraft operations in SUAs other than PR-1A/B MOA or Gap A MOA would be the same as described under Alternative A, and the sortie operations would be conducted in PR-1A/B MOA and Gap A MOA. Subsonic and supersonic noise levels beneath airspace units would be the same as described in Table 4.2-4 with the exception of areas beneath the proposed

PR-1A/B ATCAA and Gap A ATCAA. Noise levels beneath each of the PRTC airspace units under Alternative B are displayed in Table 4.2-8. Noise impacts would be similar in nature but slightly less intense than the impacts that would occur under Alterative A in airspace units where the noise levels differ between the two alternatives.

Table 4.2-8. Existing and Alternative B Military Aircraft Noise Levels

Proposed Airspace	Existing Special Use Airspace	Baseline[1]				Alternative B			
		L_{dnmr}	Number of events/ day SEL_r > 65 dB	CDNL	Sonic Booms Per Year	L_{dnmr}	Number of events/ day SEL_r > 65 dB	Center of Airspace CDNL	Sonic Booms Per Year
PR-1A ATCAA	None	<45	-	-	-	<45	0.2	18[2]	0.3
PR-1B ATCAA	None	<45	-	-	-	<45	0.2	30	2.4
Gap A ATCAA	None	<45	-	-	-	<45	<0.1	33	3.6
PR-2 MOA/ATCAA	Powder River A MOA	49	0.6	-	-	47[2]	0.4	36	6.0
	Powder River B MOA	49	0.8	-	-	47[2]	0.4	36	6.0
	Gateway ATCAA	<45[4]	0.4	-	-	47[2]	0.4	36	6.0
	None	<45	-	-	-	47[2]	0.4	36	6.0
Gap B MOA/ATCAA	None	<45	-	-	-	<45[2]	0.1	35	4.8
PR-3 MOA/ATCAA	None	<45	-	-	-	47[2]	0.4	31	4.3
Gap C MOA/ATCAA	None	<45	-	-	-	<45[2]	<0.1	34	3.6
PR-4 MOA/ATCAA	None	<45	-	-	-	47[2]	0.3	32	2.4
Gateway East ATCAA	None	<45	-	-	-	<45[4]	0.3	29	1.2
Gateway West ATCAA	Gateway ATCAA	<45[4]	0.4	-	-	<45	0.3	25	0.6
	None	<45	-	-	-	<45	0.3	25	0.6

Notes: 1. Estimated baseline noise levels under airspace.
2. Calculated military aircraft noise is below the ambient sound level of 28 to 44 dB.
A – Ambient noise levels. See Table 3.2-2, Estimated Baseline Noise Levels Under Airspace.

Table 4.2-9 lists the number of overflight events per day with SEL_r above 65, 75, and 85 dB that a person located in several representative locations beneath PRTC would be likely to hear under baseline conditions and Alternative B. The locations selected for analysis are shown in Figure 3.2-3. The number of events exceeding a SEL_r of 65 dB per day would be between <0.1 and 0.4 at all locations studied. The number of events would differ from the number of events under Alternative A only in locations located beneath PR-1A/B and Gap A ATCAAs.

Table 4.2-9. Average Frequency of Military Aircraft Noise Events at Selected Representative of Noise-Sensitive Locations Under Alternative B (Page 1 of 2)

ID#	General Description	Baseline Airspace	Baseline # Events Per Day Exceeding 65 dB SEL	Baseline # Events Per Day Exceeding 75 dB SEL	Baseline # Events Per Day Exceeding 85 dB SEL	Proposed Airspace	Proposed # Events Per Day Exceeding 65 dB SEL	Proposed # Events Per Day Exceeding 75 dB SEL	Proposed # Events Per Day Exceeding 85 dB SEL
1	Inya Kara Mountain	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
2	Devils Tower [2]	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.2	<0.1
3	Little Bighorn Battlefield National Monument [3]	None	n/a	n/a	n/a	PR-1A ATCAA	0.2	0.1	<0.1
4	Bear Butte	None	n/a	n/a	n/a	Gateway West ATCAA	0.3	0.1	<0.1
5	Thunder Basin National Forest (northern section)	None	n/a	n/a	n/a	PR-2 MOA/ATCAA	0.4	0.2	<0.1
6	Thunder Basin National Forest (southern section)	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
7	Black Hills National Forest	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
8	Custer National Forest (western section)	None	n/a	n/a	n/a	PR-1B ATCAA	0.2	0.1	<0.1
9	Custer National Forest (central section)	Powder River A	0.6	0.2	<0.1	PR-2 MOA/ATCAA	0.4	0.2	<0.1
10	Custer National Forest (southeastern section)	none	n/a	n/a	n/a	Gateway East ATCAA	0.3	0.1	<0.1
11	Little Missouri National Grassland	none	n/a	n/a	n/a	PR-3 MOA/ATCAA	0.4	0.2	<0.1
12	Grand River National Grassland	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.3	0.2	<0.1
13	Crow Native American Reservation (Crow Agency, MT)	none	n/a	n/a	n/a	PR-1B ATCAA	0.2	0.1	<0.1
14	Northern Cheyenne Native American Reservation (Lame Deer, MT)	none	n/a	n/a	n/a	PR-1B ATCAA	0.2	0.1	<0.1
15	Standing Rock Native American Reservation	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.3	0.2	<0.1
16	Cheyenne River Native American Reservation	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.4	0.2	<0.1
17	Hardin, MT	none	n/a	n/a	n/a	PR-1A ATCAA	0.2	0.1	<0.1
18	Colstrip, MT	none	n/a	n/a	n/a	PR-1A ATCAA	0.2	0.1	<0.1

Table 4.2-9. Average Frequency of Military Aircraft Noise Events at Selected Representative of Noise-Sensitive Locations Under Alternative B (Page 2 of 2)

ID#	General Description	Baseline Airspace	Baseline # Events Per Day Exceeding 65 dB SEL	Baseline # Events Per Day Exceeding 75 dB SEL	Baseline # Events Per Day Exceeding 85 dB SEL	Proposed Airspace	Proposed # Events Per Day Exceeding 65 dB SEL	Proposed # Events Per Day Exceeding 75 dB SEL	Proposed # Events Per Day Exceeding 85 dB SEL
19	Broadus, MT [4]	Powder River A MOA	0.6	0.2	0.1	PR-2 MOA/ATCAA	0.4	0.3	<0.1
20	Ekalaka, MT	none	n/a	n/a	n/a	PR-2 MOA/ATCAA	0.4	0.3	<0.1
21	Baker, MT	none	n/a	n/a	n/a	PR-3 MOA/ATCAA	0.4	0.2	<0.1
22	Elgin, ND	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.3	0.2	<0.1
23	Bowman, ND	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.3	0.2	<0.1
24	Bison, SD	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.3	0.2	<0.1
25	Buffalo, SD	none	n/a	n/a	n/a	Gap B MOA/ATCAA	0.1	<0.1	<0.1
26	Sundance, WY	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
27	Belle Fourche, SD	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1

Notes: 1. Because several of the listed noise-sensitive areas are very large, locations were selected from within the designated areas that are near the center of proposed airspace units.
2. Devils Tower published aircraft avoidance area is 5 NM horizontally and 18,000 feet AGL
3. Little Bighorn Battlefield published aircraft avoidance area is ¾ nautical mile horizontally and 2,000 feet AGL.
4. Broadus, MT published aircraft avoidance area is 3 NM horizontally and 1,500 feet AGL

4.2.3.7 Alternative C

Alternative C would not involve creation of the PR-4 MOA or the GAP C MOA, but would be the same as Alternative A in all other respects. Aircraft operations in SUAs other than beneath PR-4 ATCAA or Gap C ATCAA would be the same as described under Alternative A. No sortie-operations would be conducted in the PR-4 MOA or Gap C MOA. Subsonic and supersonic noise levels beneath airspace units would be the same as described in Table 4.2-4 with the exception of areas beneath PR-4 ATCAA and Gap C ATCAA. Noise levels beneath each of the PRTC airspace units under Alternative C, are displayed in Table 4.2-10. The average number of overflights exceeding SEL_r 65, 75, and 85 dB per day at several representative locations beneath PRTC are listed in Table 4.2-11. A map showing the representative locations analyzed can be found at Figure 3.2-3. Noise impacts would be similar in nature but slightly less intense than the impacts that would occur under Alterative A in the airspace units where noise levels would differ between the two alternatives.

Table 4.2-10. Existing and Alternative C Military Aircraft Noise Levels

Proposed Airspace	Existing Special Use Airspace	Baseline[1]				Alternative A			
		L_{dnmr}	Number of events/ day SEL_r > 65 dB	CDNL	Sonic Booms Per Year	L_{dnmr}	Number of events/ day SEL_r > 65 dB	Center of Airspace CDNL	Sonic Booms Per Year
PR-1A MOA/ATCAA	None	<45	-	-	-	46[2]	0.3	20	0.6
PR-1B MOA/ATCAA	None	<45	-	-	-	46[2]	0.3	30	2.4
PR-1B ATCAA[3]	None	<45	-	-	-	<45	0.2	30	2.4
Gap A MOA/ATCAA	None	<45	-	-	-	<45[2]	0.1	34	3.6
PR-2 MOA/ATCAA	Powder River A MOA	49	0.6	-	-	47[2]	0.4	36	6.0
	Powder River B MOA	49	0.8	-	-	47[2]	0.4	36	6.0
	Gateway ATCAA	<45[4]	0.4	-	-	47[2]	0.4	36	6.0
	None	<45	-	-	-	47[2]	0.4	36	6.0
Gap B MOA/ATCAA	None	<45	-	-	-	<45[2]	0.1	35	4.8
PR-3 MOA/ATCAA	None	<45	-	-	-	47[2]	0.4	31	3.6
Gap C ATCAA	None	<45	-	-	-	<45[2]	<0.1	33	3.6
PR-4 ATCAA	None	<45	-	-	-	<45	0.3	30	1.2
Gateway East ATCAA	None	<45	-	-	-	<45[4]	<0.1	29	1.2
Gateway West ATCAA	Gateway ATCAA	<45[4]	0.4	-	-	<45	0.3	25	0.6
	None	<45	-	-	-	<45	0.3	25	0.6

Notes: 1. Estimated baseline noise levels under airspace.
2. Calculated military aircraft noise is below the ambient sound level of 28 to 44 dB.
A – Ambient noise levels. See Table 3.2-2, Estimated Baseline Noise Levels Under Airspace.

Table 4.2-11. Average Frequency of Military Aircraft Noise Events at Selected Representative of Noise-Sensitive Locations Under Alternative C (Page 1 of 2)

ID#	General Description	Baseline Airspace	Baseline # Events Per Day Exceeding			Proposed Airspace	Proposed # Events Per Day Exceeding		
			65 dB SEL	75 dB SEL	85 dB SEL		65 dB SEL	75 dB SEL	85 dB SEL
1	Inya Kara Mountain	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
2	Devils Tower [2]	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.2	<0.1
3	Little Bighorn Battlefield National Monument [3]	None	n/a	n/a	n/a	PR-1A MOA/ATCAA	0.3	0.2	<0.1
4	Bear Butte	None	n/a	n/a	n/a	Gateway West ATCAA	0.3	0.1	<0.1
5	Thunder Basin National Forest (northern section)	None	n/a	n/a	n/a	PR-2 MOA/ATCAA	0.4	0.2	<0.1
6	Thunder Basin National Forest (southern section)	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
7	Black Hills National Forest	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
8	Custer National Forest (western section)	None	n/a	n/a	n/a	PR-1B MOA/ATCAA	0.3	0.2	<0.1

Table 4.2-11. Average Frequency of Military Aircraft Noise Events at Selected Representative of Noise-Sensitive Locations Under Alternative C (Page 2 of 2)

ID#	General Description	Baseline Airspace	Baseline # Events Per Day Exceeding 65 dB SEL	Baseline # Events Per Day Exceeding 75 dB SEL	Baseline # Events Per Day Exceeding 85 dB SEL	Proposed Airspace	Proposed # Events Per Day Exceeding 65 dB SEL	Proposed # Events Per Day Exceeding 75 dB SEL	Proposed # Events Per Day Exceeding 85 dB SEL
9	Custer National Forest (central section)	Powder River A	0.6	0.2	<0.1	PR-2 MOA/ATCAA	0.4	0.2	<0.1
10	Custer National Forest (southeastern section)	none	n/a	n/a	n/a	Gateway East ATCAA	0.3	0.1	<0.1
11	Little Missouri National Grassland	none	n/a	n/a	n/a	PR-3 MOA/ATCAA	0.4	0.2	<0.1
12	Grand River National Grassland	none	n/a	n/a	n/a	PR-4 ATCAA	0.3	0.2	<0.1
13	Crow Native American Reservation (Crow Agency, MT)	none	n/a	n/a	n/a	PR-1B MOA/ATCAA	0.3	0.2	<0.1
14	Northern Cheyenne Native American Reservation (Lame Deer, MT)	none	n/a	n/a	n/a	PR-1B MOA/ATCAA	0.3	0.2	<0.1
15	Standing Rock Native American Reservation	none	n/a	n/a	n/a	PR-4 ATCAA	0.3	0.2	<0.1
16	Cheyenne River Native American Reservation	none	n/a	n/a	n/a	PR-4 ATCAA	0.3	0.2	<0.1
17	Hardin, MT	none	n/a	n/a	n/a	PR-1A MOA/ATCAA	0.3	0.2	<0.1
18	Colstrip, MT	none	n/a	n/a	n/a	PR-1A MOA/ATCAA	0.3	0.2	<0.1
19	Broadus, MT [4]	Powder River A MOA	0.6	0.2	0.1	PR-2 MOA/ATCAA	0.4	0.3	<0.1
20	Ekalaka, MT	none	n/a	n/a	n/a	PR-2 MOA/ATCAA	0.4	0.3	<0.1
21	Baker, MT	none	n/a	n/a	n/a	PR-3 MOA/ATCAA	0.4	0.2	<0.1
22	Elgin, ND	none	n/a	n/a	n/a	PR-4 ATCAA	0.3	0.2	<0.1
23	Bowman, ND	none	n/a	n/a	n/a	PR-4 ATCAA	0.3	0.2	<0.1
24	Bison, SD	none	n/a	n/a	n/a	PR-4 ATCAA	0.3	0.2	<0.1
25	Buffalo, SD	none	n/a	n/a	n/a	Gap B MOA/ATCAA	0.1	<0.1	<0.1
26	Sundance, WY	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
27	Belle Fourche, SD	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1

Notes:
1. Because several of the listed noise-sensitive areas are very large, locations were selected from within the designated areas that are near the center of proposed airspace units.
2. Devils Tower published aircraft avoidance area is 5 NM horizontally and 18,000 feet AGL
3. Little Bighorn Battlefield published aircraft avoidance area is ¾ nautical mile horizontally and 2,000 feet AGL.
4. Broadus, MT published aircraft avoidance area is 3 NM horizontally and 1,500 feet AGL

4.2.3.8 No-Action

Under the No-Action Alternative, the PRTC would not be charted and a large percentage of sorties would continue to be carried out at remote locations. The existing Powder River airspace would remain in place and training sorties would be at projected baseline conditions as the base returns to a peacetime operational tempo. No intentional supersonic operations would take place in the existing Powder River airspace. Unintentional supersonic flight may occur as B-1 aircrews undergo intensive training maneuvers. Pilots quickly reduce speed after becoming aware of having exceeded the speed of sound. Noise conditions under No-Action would be as described in Table 3.2-3.

4.3 Safety

4.3.1 Methodology

Numerous federal, civil, and military laws and regulations govern operational safety. Individually and collectively these laws and regulations prescribe measures, processes, and procedures required to ensure safe operations and to protect the public, military, and property.

PRTC elements with a potential to affect safety are evaluated to determine the degree to which such elements increase or decrease safety risks. Communication, flight, ground, and bird-aircraft strike safety are assessed for the potential to increase risk. The 28 BW capability to manage risk by responding to emergencies is described. Any changes in the uses and handling requirements for explosive materials are identified and addressed. Analysis of flight risks correlates Class A mishap rates and Bird/Wildlife Aircraft Strike Hazards (BASH) with projected airspace utilization.

4.3.2 Issues and Concerns

Safety concerns were expressed at scoping meetings about increasing the amount of airspace used for low altitude military training flights and the limited communication available to general aviation pilots. Aircraft accidents and the adequacy of disaster response, especially fire response, were noted as concerns during public scoping. Potential concerns associated with electronic emissions and wake vortices were expressed. Concerns were noted about the use of chaff and flares in the proposed PRTC expanded airspace.

4.3.3 Environmental Consequences

4.3.3.1 Alternative A: Proposed Action

4.3.3.1.1 Communication Safety

The Proposed Action would add additional low-altitude airspace to the ROI. The existing Powder River A and B MOAs which constitute the large majority of the proposed PR-2 MOA currently have low-level B-1 training. During public scoping meetings, some general aviation pilots expressed the opinion that the existing MOA airspace is unsafe under “see-and-avoid” conditions. Some pilots commented that they could not adequately communicate with the FAA during a flight to learn whether the MOA was actively being used for military training.

There is no proposal for increased radio frequency coverage or radar coverage for the proposed PRTC airspace where coverage is lacking. General aviation pilots would have several methods to receive status updates as to the activation of a PRTC MOA via NOTAMS or on-line. General aviation pilots could call Ellsworth AFB Airspace Management Office prior to departure to determine the status or obtain a pre-flight briefing from the FAA flight services operators.

Based upon the limited airspace radio frequency and radar coverage, public commenters have stated that the PRTC, without communication and radar improvements, has the potential to significantly impact civil aviation safety. Low-level overflights in the PR-3 and PR-4 MOAs would not be expected to be authorized until adequate communication is available. Changes to the Proposed Action to somewhat mitigate safety impacts include setbacks from major airports and adjusting the widths of Gap MOAs.

Limited communication would continue to impact the airspace around the proposed PR-2, PR-3, the eastern portion of PR-1A/1B, and the western portion of PR-4. The existing Powder River A and B MOAs (most of the PR-2) do not have adequate communication for ATC to support airborne civil aviation.

4.3.3.1.2 Flight Safety

All 28 BW training in the local airspace would noticeably increase with four PRTC MOAs. Flight safety associated with a Class A safety mishap is directly related to the experience with the training airframes and the expected duration of training within the airspace.

Supersonic Events

Supersonic events in and of themselves create no specific flight safety hazard. Commenters at scoping meetings asked whether a supersonic event could impact safety of a light aircraft in flight. The likelihood of an air pressure variation from a sonic boom during the 10 days of LFEs per year actually intersecting an aircraft flying VFR in an active MOA would be so slight as to be not quantifiable. Even if such an extremely unlikely event were to occur, potential pressure changes as high as 10 psf or more would be within the structural design of an aircraft. Aircraft are regularly exposed to pressure changes in excess of those generated by a supersonic event, for example, a light single-engine Cessna 150 has a wing loading of 10 lbs/sq ft and a twin-engine Cessna 414 has a wing loading in excess of 40 lb/sq ft. No in-flight impacts would be expected.

Class A Mishaps

As described in Section 3.3.2, the overall probability of a B-1 Class A mishap is 0.0000084, or one chance in 840,000. This equates to a lifetime mishap rate of 4.32 per 100,000 hours. B-1s were involved in twenty-two Class A mishaps between 1984 and 2007. Risks of a Class A mishap remain unchanged from current conditions. Accident rates for B-52 aircraft are lower, with 98 Class A mishaps from 1955 to 2007. The B-52 has flown over 7 million hours with an accident rate of 1.27 per 1,000 hours. Table 4.3-1 presents existing and projected Class A mishap data associated with the increased training within the proposed PRTC. The increased frequency of mishaps in the larger airspace is the result of mathematical calculations associated with the additional training use of the airspace during day-to-day and LFE training.

Table 4.3-1. Projected Class A Mishaps for PRTC Alternatives

	Aircraft		
	B-1	***B-52***	***F-16***[2]
Lifetime Mishap Rate per 100,000 Flight Hours[1]	4.32	1.27	3.98
Baseline Annual Hours in Powder River Airspace	875.0	300.0	24.0
Baseline Years Between Projected Mishaps	26.5	262.5	1046.9
Alternative A Projected Annual Hours	2360.0	712.5	163.0
Alternative A Years Between Projected Mishaps	9.8	110.5	154.1
Alternative B Projected Annual Hours	1990.0	678.0	162.0
Alternative B Years Between Projected Mishaps	11.6	116.1	155.1
Alternative C Projected Annual Hours	1990.0	678.0	161.0
Alternative C Years Between Projected Mishaps	11.6	116.1	156.1

Note: 1. Lifetime thru Fiscal Year (FY) 07; B-52 Calendar Year (CY) 55-FY 08, B-1 CY84-FY07
2. Representative transient aircraft.
Source: Air Force Safety Center 2009

Bird-Aircraft Strike

The increased training flight activity over a larger area would be expected to increase the total number of bird strikes. There would be no expected change in the incidence rate of bird-aircraft strikes other than from the increased amount of training operations. As described in Section 3.3.3.4, an average of 1 to 2 bird strikes occurred in the Powder River training airspace per year between 1999 and 2008 with the majority being in the Powder River B MOA. The PR-3 and PR-4 Low MOAs are in the Central and Mississippi flyways and would have a higher potential for bird strikes than the PR-1A, PR-1B, or PR-2 MOAs. Based upon the increased training activity described in Section 2.5.2, the estimated average annual bird strikes would be 3 to 6 in the proposed PRTC. Use of the Aviation Hazard Advisory System, the Bird Avoidance Model and pilot briefings prior to sorties (see Section 2.2.1.3.4) would continue to identify avoidance areas and provide a method to minimize risks from bird strikes in any new airspace regardless of the alternative selected.

ATCAA Usage

For the existing Powder River airspace, there is an existing agreement between Ellsworth AFB and FAA with limits on ATCAA time and altitudes of use. The FAA has noted that a comparable agreement to the Powder River airspace agreement will be required for altitudes and timing of PRTC ATCAA use for military training. The proposed PRTC has the potential to significantly impact commercial and other aircraft overflight of the area. An agreement would be required with the respective ARTCCs to avoid re-routing of commercial aircraft into already congested airspace or the need to execute flow control on commercial airports at least from Chicago and New York to the Pacific Northwest.

During LFEs, specific scheduled time for high-altitude training would need to be coordinated with ARTCC to ensure safe transit by commercial and other aircraft using high-altitude corridors. The Air Force will coordinate with FAA to have in-place agreements with the ARTCC regarding the timing, altitudes, and duration of LFE training. The ATCAA altitudes have the potential to significantly impact the national airspace. FAA has stated that there would be a need to evaluate airspace users to determine when or if ATCAA airspace, especially above FL300, would be available for LFEs.

Airports

The Billings airport requires a buffer to the east to allow for low-level approach and higher altitude climbing and descending. The revised proposed PR-1A and PR-1B avoid encroaching on the Billings airport operations and prevent significant impacts to the safe operation of the airport. Similar low-altitude approach setbacks have been added to support the Bismarck and Dickinson, ND, airports.

Civil aviation operations from airports under an activated MOA would not be able to fly IFR. If such aircraft launched and flew VFR using GPS in an activated MOA, they would fly using see-and-avoid techniques. This is what occurs in the current Powder River A and B MOAs. If pilots sought to convert from VFR to IFR to account for weather or other conditions, they could have difficulty communicating with ARTCC in much of the proposed PRTC. Civil aviation pilots expressed the opinion that such constraints upon their operations and the uncertainty associated with B-1 training schedules and altitudes create a significant impact to regional civil aviation safety in the PR-1, PR-3, and PR-4 MOAs. The Air Force changed the aeronautical proposal to provide specific airspace scheduled hours during the morning and late afternoons Monday through Thursday and Friday morning. The specific schedule combined with stacking the PR-1A, PR-3, PR-4, and Gaps with a Low MOA and a High MOA are designed to reduce the impact on IFR civilian aircraft.

The proposal to expend chaff in the PRTC airspace would not be expected to create any flight safety issues. The only type of chaff which would be permitted would be RR-188, RR-112, RR-179, or equivalent and configured so as to reduce interference with FAA radar. Some improved FAA radars have the ability to detect and track all chaff. Because chaff might be detected by improved FAA radars chaff would be deployed only after receiving clearance from the Frequency Management Authority. The frequency clearance would include specific delivery restrictions to insure chaff operations would not interfere with other users of the frequency spectrum.

Wake Vortices

The trail of disturbed air that follows an aircraft is called a wake vortex. Larger aircraft and lower altitudes and longer wingspans produce a greater potential for a wake vortex effect. Aircraft vortices represent a safety issue raised during scoping. As aircraft move through the air, they create vortices from their wing tips. These vortices, collectively called wake turbulence, trail immediately behind the aircraft for thousands of feet while diminishing in strength farther from the aircraft.

The strength of wing tip vortices depends upon the amount of lifting force an aircraft is required to generate in order to fly. The heavier the aircraft, the more lifting force required, and therefore the stronger the vortices. At cruising altitudes, wake turbulence directly behind the aircraft can cause handling difficulties for following aircraft, especially when a small aircraft trails a larger aircraft. FAA regulations dictate safe following distances and procedures to avoid wake turbulence, both in flight and during landing or takeoff. For aircraft en-route, the FAA Aeronautical Information Manual has specified separation minimums of 5 nm between a Heavy Aircraft (such as a Boeing 757) and any smaller aircraft which is following or crossing behind at the same level or less than 1,000 ft below. No special longitudinal wake turbulence separations based on time are required (FAA 2010).

Aircraft flying closer to the ground create wake turbulence, which trails behind the aircraft generally moving downward and lessening in intensity. Depending upon a variety of factors, including the wingspan, speed, altitude, and aircraft mass, a wake vortex can vary from a light breeze to a strong, brief wind turbulence and can dissipate quickly near the ground or last for a minute or more at altitude. This creates an interface between flight safety and ground safety.

Nearly all of the proposed PR-2 MOA is the existing Powder River airspace A and B MOAs. There have not been any reports of wake vortex problems from training by B-1 and other aircraft in the existing Powder River A or B MOAs. The B-1 operates for an estimated 20 to 30 minutes below 2,000 feet AGL during each training sortie. At this altitude, the B-1 could produce a strong, brief wind turbulence. Most structures are designed to accommodate such turbulence. Rare, rapid turns or a pull-up maneuver by a B-1 flying below 1,000 feet AGL can result in wing vortex wind velocities greater than 27 mph at 22 feet AGL behind and below the aircraft. These infrequent high-energy wing vortices, although extremely improbable, could damage a ranch windmill structure. Structures, objects, persons, wildlife, and livestock in the area underlying the proposed airspace are frequently subject to average winds and wind gusts that match potential B-1 wing vortex wind speeds. The Air Force has a procedure for damage claims which begins by contacting Ellsworth Public Affairs with details of any claim.

4.3.3.1.3 Ground Safety

Operations and maintenance procedures conducted by 28 BW personnel at Ellsworth AFB would not change from current conditions. All activities would continue to be conducted in accordance with applicable regulation, technical orders, and Air Force Occupational Safety and Health standards.

Chaff and Flares

One aspect of the proposed PRTC action which could create new or unique ground safety issues is the use of defensive flares in the airspace. Currently, expenditure of chaff and flares is not permitted in the existing Powder River MOAs and ATCAAs. Under the Proposed Action, defensive chaff and flare training use in the expanded PRTC MOA/ATCAA airspace would be permitted under certain conditions. Chaff, although ejected from the aircraft by a pyrotechnic charge, is not explosive. As described in Appendix C, the composition of chaff is similar to those components found in the earth's crust, and presents no human health or safety risk. Through numerous studies, chaff has never been found to be specifically harmful to domestic animals or wildlife (Appendix C). Chaff residual materials are described in Section 2.4.6.3. An average of one piece of residual plastic, felt, or wrapper material would fall on 115 acres per year. These residual pieces would not constitute a safety risk, but could be an annoyance if such a plastic piece were found on the ground and identified.

Use of flares in the proposed PRTC airspace would be conducted in accordance with ACC and Ellsworth AFB regulations. Use of flares within the PRTC would incorporate the following management practices:

- All aircrew/units planning flare employment in the PRTC airspace will contact 28 Bomb Wing Operations Office for current flare restrictions.
- Current flare restrictions will be briefed to all aircrew planning on employing flares, the day of the sortie, and prior to flight operations in PRTC.
- When not further restricted, minimum altitude for flare release within the boundaries of PRTC airspace in training areas other than government-owned or controlled property would not be below 2,000' AGL. (ACC supplement to AFI 11-214, 22 December 2005).
- When 28 Bomb Wing Operations Office determines fire danger to be extreme (via National Fire Danger Reporting System) flare use will be temporarily suspended in the affected PRTC airspace unit.
- Air Force public affairs would work with local fire departments underlying the airspace to educate them on flare deployment and use. This education would include distributing flyers to fire departments describing flare residual materials and dud flares.
- Current flare restrictions will be checked no earlier than 24 hours prior to PRTC entry time. When mission planning is done well in advance, an additional call will be required within 24 hours of airspace entry to ensure the most recent restrictions are attained. The Air Force would continue to cooperate with local fire agencies for mutual aid response to wildland fires.

The burn-time of a flare is approximately 5 seconds and the flare would burn out within approximately 500 feet (see Appendix D). This provides an approximate 1,500-foot margin of safety to keep burning material from contacting the ground. The potential for a flare-initiated fire is very small.

There are four types of flare failures. A failure can occur if a flare does not ignite and remains in the aircraft, does not burn the prescribed duration or temperature, ignites but is not dispersed, or does not ignite after ejection (a dud flare). Historic data on range clean-ups where flare use is intensive in a relatively constrained geographic area (such as Barry M. Goldwater Range in Arizona and Utah Test and Training Range) indicate that of all flares expended, an estimated 0.01 percent were actually found on the ground as duds (Air Force 2001e). Based on expected use, these overall reliability data indicate that of the estimated approximately 3,300 flares proposed for use each year (Section 2.5.5), approximately one dud flare in every three years could fall to the ground somewhere under the entire airspace comprising PRTC.

Instructions will be provided by Ellsworth AFB to fire departments and other organizations within on the identification of a dud flare and a contact at Ellsworth AFB if a suspected dud flare is found. The risk from dud flares is minimal (Air Force 2001e). It is extremely unlikely that a dud flare could fall from an aircraft and strike an individual on the ground. Should such an extremely remote accident occur, it could result in injury or death. With a dud rate on the ground of approximately 0.01 percent, and a population of fewer than two persons per square mile, the possibility of such an accident is so remote that it is very near zero. Although the risk of combustion of such a dud on the ground is low, it could be ignited by a hot (400 degrees Fahrenheit [°F]) fire or by friction from a strike with something like a power saw or a bullet. On a military range, a dud flare is treated as unexploded ordnance. The basic rule for the public to follow if a dud flare were found is to identify its location, do not touch it or experiment with it, and notify a local safety authority of its location. The authority, in turn, will notify Ellsworth AFB which has the personnel and facilities to handle dud flares, should they be encountered

Capability for fire response is located on Ellsworth AFB and the impacted communities. The Ellsworth AFB Fire Department is party to mutual aid support agreements with the nearby communities. Ellsworth AFB and the Montana Bureau of Land Management have a Memorandum of Understanding establishing training temporary flight restrictions to support firefighting activity (BLM-MOU-MT925-1001 approved 7 October 2009). All of these agreements will continue in effect. Air Force personnel will cooperate with local agencies for mutual aid response to fires, and develop an education program for fire departments beneath the airspace to include information on flares.

Flares proposed for use for defensive training in the PRTC include M-206, MJU-7 A/B, MJU-10/B, and MJU-23/B flares. Table 4.3-2 presents the residual materials deposited on the surface following deployment of each flare type. The MJU-23/B is used by the B-1. The majority of the residual flare materials that fall after deployment of a flare have surface area to weight ratios that would not produce any substantial impact when the residual flare piece fell to the surface. The one item that could fall with enough force to impact an object on the ground is the Safe & Initiation device with a weight of 0.7 ounces. The Safe & Initiation device would strike the earth with approximately the same force as a large hailstone and could cause injury in the extremely unlikely event an individual were struck on an unprotected head with no hat. With the frequency of flare use and the average population density of fewer than two persons per square mile, such an event would be unmeasurably unlikely.

Table 4.3-2. Residual Material Deposited on the Surface Following Deployment of One Flare

	Flare Type			
Material	***M-206***	***MJU-7/B***	***MJU-10/B***	***MJU-23/B***
End Cap	One 1 inch x 1 inch x 1/4 inch plastic or nylon	One 2 inch x 1 inch x 1/4 inch plastic or nylon	One 2 inch x 2 inch x 1/4 inch plastic or nylon	One 2 3/4 inch diameter x 1/4 inch thick round plastic disc
Piston	One 1 inch x 1 inch x 1/2 inch plastic or nylon	One 2 inch x 1 inch x 1/2 inch plastic or nylon	One 2 inch x 2 inch x 1/2 inch plastic or nylon	One approximately 2 3/4 inch diameter x 1/2 inch aluminum (or plastic) piston
Spacer	One or two 1 inch x 1 inch felt	One or two 2 inch x 1 inch felt	One or two 2 inch x 2 inch felt	One 1/2 inch thick x 2 3/4 inch diameter rubber shock absorber sealant, two (1/8 inch x 2 3/4 inch diameter) felt discs, up to four 1 inch x 10 inch felt strips
Wrapping	One up to 2 inch x 17 inch piece of aluminum-coated stiff duct-tape type material	One up to 3 inch x 17 inch piece of aluminum-coated stiff duct-tape type material	One up to 4 inch x 17 inch piece of aluminum-coated stiff duct-tape type material	One up to 4 1/2 inch x 20 inch piece of aluminum-coated stiff duct-tape type material
Safe & Initiation Device	N/A	One 2 inch x 1 inch x 1/2 inch nylon and plastic spring device	One 2 inch x 1 inch x 1/2 inch nylon and plastic spring device	One 2 inch x 1 inch x 1/2 inch nylon and plastic spring device

The residual materials would not be expected to result in a safety impact. If a rancher or recreationist were to find a piece of residual flare material on the ground, and identified it as a piece of plastic or material from a deployed flare, the individual could be annoyed.

Emergency Ground Activity

Any ground safety emergency that involves a life-flight would continue to be supported by stopping military training in the affected airspace. Section 4.1 describes actions to provide for life-flight, firefighting, or other emergencies.

Supersonic Events

Supersonic overpressures could impact physical items beneath the airspace (Table 4.2-5). Fighter aircraft are proposed to be supersonic at or above 10,000 feet AGL and B-1s at or above 20,000 feet MSL. Table 4.2-6 (Section 4.2.3.5) presents the possible damage to structures from overpressures above 4.0 psf. Bric-a-brac balanced on shelf edges, such as on mantles or book cases, could fall and break. If a person were inside or near such damaged or falling objects, the persons could be injured. The random nature of training flights and the infrequent quarterly LFE sonic events would not be expected to cause frequent safety impacts. Scoping concerns included the desire for fair compensation for property damage. In the event of damage, there is an established procedure for claims which begin by contacting Ellsworth AFB Public Affairs.

Ranch Operations

Sudden onset sounds can cause reactions to penned livestock. Communication of ranch seasonal branding operations identifies avoidance areas to reduce the potential for impacts.
Photo courtesv of A.S. Elliott

Horses, cattle, and other large livestock, as well as exotics, such as ostriches, sometimes “spook” and create a safety hazard at sudden-onset sounds, especially sounds accompanied by visual effects created by low-altitude, high-speed aircraft. These reactions can be hazardous to the animals. Range cattle and calves can be especially subject to being spooked by low flying aircraft or by sudden noise when the animals are penned in a relatively small area, such as during weaning and branding activities. Typically, a sonic boom without any follow-on visual cues is not as likely to cause as much reaction as a sudden loud overflight noise accompanied by a visual stimulus. Should cattle or calves stampede during such an event, the cattle or calves could be seriously injured or killed and fencing could be damaged. The 28 BW coordinates with ranchers beneath the existing Powder River A and B MOAs and seeks to establish temporary avoidance areas around ranches while branding and weaning operations are known to be underway. The success of such avoidance areas is dependent on communication. Ellsworth AFB has a contact program with airspace schedulers and pilot briefings include avoidance areas. This approach, when sensitive ranching operations are scheduled and the locations are known by airspace schedulers, has the potential to mitigate by avoidance impacts to ranching operations.

Low-Level Overflight

During scoping meetings, commenters expressed concern that the startle effect of low-level high-speed aircraft could affect the safety of livestock, riders on horses, and recreationists. Low-altitude aircraft overflights have the potential to startle people at sensitive times, such as while they are driving, riding horses, or rock-climbing. Any safety hazard associated with this type of startle event would be difficult to predict and would be highly dependent on situation-specific factors. Existing low-level training occurs within the existing Powder River A and B MOAs and there were reports during scoping meetings of individuals being startled if they had not observed the aircraft before the overflight.

The low-level training activity could occur anywhere within a proposed MOA, such as PR-1A, PR-1B, PR-2, PR-3, or PR-4, during daily scheduled training or under the Gap MOAs during LFEs where such overflight does not regularly occur. Low-altitude training would not have a specified altitude but would occur during Monday through Thursday and Friday morning scheduled airspace training times. The MOA land areas and training time were used to calculate the average annual number of times any specific location could be directly overflown within one quarter of a mile by a military aircraft flying 2,000 feet AGL or below. Any area under the proposed airspace would have a low-level overflight an average of 6 to 9 times a year. This is an annual average and the number of actual overflights experienced by any specific location could be more or fewer (see Section 4.9.3.1.5). Should an event occur, the resulting safety impacts to a recreationist on a horse which could be spooked or a rancher working cattle in open range could be seen as significant by the individual experience the low-level overflight.

Electronic Emissions

Safety procedures associated with usage of explosives for mining are designed to prevent inadvertent explosions caused by vibrations or electronic emissions, such as those caused by aircraft overflight. Significant impacts could result from inadvertent and/or premature setting off of mining explosives or otherwise impacting mining operations. No current procedure is in place for the Air Force to communicate with mining operations within the proposed PRTC to ascertain the radio frequencies used for mining operations. The radio frequencies and electronic emissions of training aircraft would need to be compared with the mining operations and procedures will need to be developed and implemented regarding stand-off distance, intensity of electronic emissions, radio frequencies used, and low-altitude overflight to prevent significant impacts. Safety impacts to mining operations could be significant without establishing and implementing such procedures.

Towers

Section 4.9.3.1 discusses avoidance areas for towers and FAA requirements for structures which exceed specific heights and could pose a hazard to aircraft. Such structures are mapped and avoided by civil and military pilots.

4.3.3.2 Alternative B

Alternative B includes all of the ATCAAs from Alternative A and the PR-2, PR-3, and PR-4 MOAs. The Gap B MOA and Gap C MOA are also included in Alternative B. This means that Alternative B contains no PR-1A, PR-1B, or Gap A MOAs.

4.3.3.2.1 Communication Safety

There would be no increased radio or radar communication or tracking capability within the PR-2 or PR-3 MOAs. This means the communication safety impacts in PR-2, PR-3, the western portion of PR-4, and the associated Gap MOAs would be the same as with Alternative A. Civil aircraft could fly from Miles City to the south and west below FL180 and airports under the PR-1A/1B ATCAAs, such as Colstrip, would not need additional communication. Civil aircraft could transit the area below the PR-1A/1B ATCAAs and Gap A ATCAA using IFR, VFR, and GPS navigation below FL180 even when the ATCAAs were activated. Communication impacts would not be expected in the area under the PR-1A/1B or Gap A ATCAAs.

4.3.3.2.2 Flight Safety

ATCAAs and high-altitude commercial and other jet traffic impacts would be the same as those described for Alternative A. Civil aircraft flight safety risks in PR-2, PR-3, and PR-4 MOAs would be the same as described for Alternative A. Civilian aircraft would be able to fly VFR using GPS navigation under see-and-avoid conditions in an active MOA, but would not be able to fly IFR in an activated MOA. The PR-3 and PR-4 MOAs would be stacked into Low and High to support IFR traffic, but the lack of communication and tracking would not support IFR flights. Safety risks and potential impacts within the PR-2, PR-3, PR-4, and associated Gap MOAs would be the same as described for Alternative A.

Class A mishap safety risks would not be somewhat less than those described for Alternative A (see Table 4.3-1). Bird aircraft strikes would not be expected in the area under the PR-1A, PR-1B or the Gap A ATCAAs because most bird aircraft strikes occur well below FL180. The number of bird aircraft strikes in PR-2, PR-3, and PR-4 MOAs and associated Gap MOAs would be comparable to those for Alternative A, or approximately 2 per year. Continued use of the Aviation Hazard Advisory System, the Bird Avoidance Model and pilot briefings prior to sorties would provide a method to minimize risks from bird strikes under Alternative B.

Flight safety impacts under Alternative B are comparable to those for Alternative A within all PRTC proposed airspaces with the exception of the airspace under the PR-1A, PR-1B or the Gap A. Under those ATCAAs, flights below FL180 could fly IFR or VFR without low-level bomber training in the airspace. There would be a need for civil aircraft to communicate to learn activities status of ATCAAs or adjacent MOAs. Flights above FL180 could be affected if the ATCAA were activated. In general, under the PR-1A/1B ATCAAs and the Gap A ATCAA, there would be no significant environmental impacts to flight safety.

Emergency procedures for air ambulance, fire, or related emergency activities under Alternative B would be treated the same as described for Alternative A. These flight safety requirements would apply to areas where Alternative B included low-level MOAs. No special emergency procedures would be expected to apply to areas under the PR-1A, PR-1B or the Gap A.

4.3.3.2.3 Ground Safety

Alternative B low-altitude safety risks from overflight would not be expected under the PR-1A, PR-1B, or Gap A ATCAAs because there would be no PR-1A, PR-1B, or Gap A MOAs. Impacts to recreational or ranching activities under PR-3 and PR-4 MOAs and associated Gap B and C MOAs would be as described for Alternative A. Low-altitude safety risks for the proposed PR-2 would be comparable to those experienced under existing conditions. The identification of seasonal ranch activities and the establishment of seasonal avoidance areas could reduce potential impacts to ranch activities as described in Alternative A. Wake vortex effects under PR-2, PR-3, and PR-4 MOAs and associated Gap MOAs would be as described for Alternative A. The proposed PR-2 MOA currently has low-level B-1 training and there have not been reports of wake vortex impacts.

Flare usage and chaff and flare residual materials within the PR-2, PR-3, and PR-4 MOAs and the ATCAAs would be under the same conditions and as described for Alternative A. The estimated dud distribution and distribution of residual chaff and flares materials would be approximately the same as described for Alternative A, with some reduction of chaff and flare materials under the PR-1A, PR-1B or the Gap A. Flare fire risk would remain extremely low throughout the airspace. The use of flares above FL180 in the PR-1A, PR-1B, and Gap A ATCAAs and the prohibition of their use during extreme fire conditions would effectively result in no potential for a flare-caused fire under those ATCAAs.

There would be no low-altitude flights or electronic emissions from training aircraft below FL180 under the PR-1A, PR-1B or the Gap A. Military aircraft training at these altitudes would not be expected to cause electronic triggering or surface vibration impacts to mining operations in the Colstrip area or under the PR-1A, PR-1B or the Gap A. Communication with mining operators would still be required to ensure safety. Infrequent sonic booms above FL180 could still be felt under PR-1A, PR-1B or the Gap A and overpressures of 4 psf could be experienced infrequently (see Section 4.2.3.5).

4.3.3.3 Alternative C

Alternative C includes all of the ATCAAs from Alternative A and the PR-1A, PR-1B, PR-2, and PR-3 MOAs. The Gap A and Gap B MOA extension are included in Alternative C. This means that Alternative C does not include a PR-4 MOA or Gap C MOA.

4.3.3.3.1 Communication Safety

There would be no increased radio or radar communication or tracking capability within the Alternative C airspace. This means the communication impacts in the PR-1A, PR-1B, PR-2, PR-3 MOAs, and the Gap A and the Gap B MOAs would be same as with Alternative A. Communication and radar coverage have limited ability to contact low-level civil aircraft in the existing Powder River A and B MOAs which constitute most of the proposed PR-2 MOA. Civil aircraft flying from Dickinson to the southeast and from airports under the PR-4 ATCAA, such as Hettinger, could use VFR and GPS navigation below FL180. Communication impacts would not be expected in the area under the PR-4 or Gap C ATCAAs.

4.3.3.3.2 Flight Safety

Alternative C would not have military training airspace or associated impacts under the PR-4 or Gap C ATCAAs. Alternative C would have the same ATCAAs and the same high-altitude commercial and other jet traffic impacts as those described for Alternative A. Class A mishap safety risks would not be discernibly different from those described in Alternative A. Civil aircraft flight safety risks in the PR-1A, PR-1B, PR-2, PR-3, Gap A, and Gap B MOAs would be the same as described for Alternative A. Civilian aircraft would not be able to fly IFR in an activated MOA although they could choose to fly using VFR under see-and-avoid conditions in activated MOAs. Safety risks and potential impacts within the MOAs would be the same as described for Alternative A.

Bird aircraft strikes would not be expected in the area under the PR-4 ATCAA or the Gap C ATCAA because most bird aircraft strikes occur well below FL180. The number of bird aircraft strikes in the Alternative C MOAs would be comparable to those for Alternative A, or approximately 2 to 3 per year. Continued use of the Aviation Hazard Advisory System, the Bird Avoidance Model and pilot briefings prior to sorties would continue to provide a method to minimize risks from bird strikes under Alternative C. Flight safety impacts under Alternative C are comparable to those for Alternative A within all airspaces except under the PR-4 ATCAA and the Gap C ATCAA where there would be no MOAs (see Table 4.3-1). There would be a need for civil aircraft pilots to ascertain the activation status of overlying ATCAAs or adjacent MOAs for safe flight above FL180. In general, under the Alternative C PR-4 ATCAA and the Gap C ATCAA there would be no environmental impacts to civil aircraft operations.

Alternative C emergency procedures for air ambulance, fire, or related emergency activities would be treated the same as described for Alternative A. These flight safety requirements would apply to areas where Alternative C included low-level MOAs.

4.3.3.3.3 Ground Safety

Alternative C would not have low-altitude overflight safety risks under the PR-4 or Gap C ATCAAs. Low-altitude safety risks from overflight to recreational or ranching activities under the PR-1A, PR-1B, PR-2, PR-3, Gap A, and Gap B MOAs would be as described for Alternative A. The identification of seasonal ranch activities and the establishment of seasonal avoidance areas could reduce potential impacts to ranch activities as described in Alternative A. Wake vortex impacts under the PR-1, PR-2, and PR-3 MOAs and Gap A and Gap B MOAs would be as described for Alternative A. There have been no wake vortex impact claims within the PR A or B MOAs (most of the proposed PR-2).

Flare usage and discharge of chaff and flare residual materials within the PR-1, PR-2, PR-3, Gap A, and Gap B MOAs would be the same as described for Alternative A. The estimated dud distribution and distribution of residual chaff and flares materials would be approximately the same as described for Alternative A, with some reduction of chaff and flare materials under the PR-4 ATCAA and Gap C ATCAA when compared with Alternative A. Flare fire risk would remain extremely low throughout the airspace. The use of flares above FL180 in the PR-4 ATCAA and the Gap C ATCAA and prohibition of their use in an airspace during extreme fire danger as determined by the National Fire Danger Rating System would effectively result in no potential for a flare-caused fire under those ATCAAs.

Alternative C mining impacts and the need to establish safety procedures, especially within the PR-1A and PR-1B MOAs, would be as described for Alternative A. Supersonic event safety impacts would be as described for Alternative A.

4.3.3.4 No-Action

No changes to 28 BW training airspace would occur under the No-Action Alternative. Under the No-Action Alternative, the PRTC would not be charted and a large percentage of sorties would continue to be carried out at remote locations. The existing Powder River airspace would remain in place and sorties flown in the airspace would be at projected baseline conditions as the base returns to a peacetime operational tempo.

This means that B-1 and B-52 training would occur in the Powder River A and B MOAs and associated ATCAAs. Low-level overflight effects, communication requirements regarding MOA activation, and other consequences would continue in the existing airspace.

4.4 Air Quality

4.4.1 Methodology

Air emissions resulting from the Proposed Action and the Action Alternatives were evaluated in accordance with federal, state, and local air pollution standards and regulations. Air quality impacts from a proposed activity or action would be significant if they:

- Increase ambient air pollution concentrations above any National Ambient Air Quality Standard (NAAQS);
- Contribute to an existing violation of any NAAQS;
- Interfere with or delay timely attainment of NAAQS; or
- Impair visibility within any federally mandated Federal Class I area.

The approach to the air quality analysis was to estimate the increase in emission levels due to implementation of the Proposed Action and action alternatives.

The air quality impact analysis evaluated both direct and indirect emissions associated with the Proposed Action and action alternatives. There are no construction activities associated with the Proposed Action. The analysis of aircraft emissions associated with the proposed training focuses on aircraft operations that occur below 3,000 feet (914 meters) AGL. Below 3,000 feet AGL is the average depth of the mixing layer where emissions released into this layer could affect ground-level pollutant concentrations. Emissions that are released above the mixing layer generally would not be expected to appreciably affect ground-level air quality.

An action would be addressed for a significant impact to air quality if project emissions would exceed applicable federal, state, and local regulations. For inert pollutants such as particulate matter less than 10 microns in diameter (PM_{10}), the effects are generally limited to a few miles downwind from a source. The effects for ozone (O_3) may extend much farther downwind than for inert pollutants. O_3 is formed in the atmosphere by photochemical reactions of previously emitted pollutants called precursors. O_3 precursors are mainly nitrogen oxides (NO_x) and photochemically reactive volatile organic compounds (VOCs). In the presence of solar radiation, the maximum effect of precursor emissions on O_3 levels usually occurs several hours after they are emitted and many miles from the source.

The potential effects of proposed greenhouse gas (GHG) emissions are by nature global and cumulative. Currently, there are no formally adopted or published National Environmental Policy Act (NEPA) thresholds of significance for GHG emissions. Given the global nature of climate change and the fact that B-1 and B-52 aircraft would expend the same fuel commuting for lesser training, there is no net impact expected to national GHG emissions. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact.

4.4.2 Issues and Concerns

Air quality is generally in attainment throughout the four-state region encompassed by the proposed PRTC. Scoping commenters expressed concern with air quality around mining operations such as at Colstrip. Commenters also expressed concern that jet aircraft exhausts could affect visibility. Concerns were also expressed that aircraft emissions could affect public health either independently or in conjunction with other emission generators, such as coal. Questions were also raised about the effects of chaff or flares upon air quality.

4.4.3 Environmental Consequences

4.4.3.1 Alternative A

Air quality impacts associated with Alternative A were determined by comparing the net change in emissions between current baseline operations and future proposed operations within the PRTC. Proposed flights within PRTC were evaluated by assuming engines were operating in military mode, which is a higher fuel burning and emitting setting than actually anticipated (see power setting in Table 3.2-1). Alternative A operational data were derived from Section 2.5. The emission factors used to calculate combustive emissions from proposed aircraft operations were obtained from the *Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations* (Air Force Institute for Environment, Safety, and Occupational Health Risk Analysis 2003). Emission factors for flares were obtained from USEPA AP-42, Chapter 15 Signals and Simulators (USEPA 2008).

According to USEPA's General Conformity Rule in 40 CFR Part 51, Subpart W, any proposed federal action that has the potential to cause violations in a NAAQS nonattainment or maintenance area must undergo a conformity analysis. A conformity analysis is not required if the Proposed Action or Alternative Action occurs within an attainment area.

Table 4.4-1 presents estimates of the annual criteria pollutant emissions that would occur within each state air basin. Portions of the Northern Cheyenne and Crow Reservations are within the Lame Deer and Sheridan nonattainment areas for PM_{10} (Section 3.4.3). As quantified in Table 4.4-1, the PM_{10} emissions from the proposed action in Montana would not exceed the applicable general conformity *de minimis* thresholds of 100 tons per year. Therefore, a conformity analysis is not required.

Section 169A of the Clean Air Act (CAA) provides special protection to air quality within Mandatory Federal Class 1 areas. As indicated in Section 3.1.2, the nearest Mandatory Federal Class 1 areas to Alternative A training operations are: (1) Wind Caves National Park, SD, located approximately 30 miles south of the PR-1BMOA, and (2) Badlands National Park, SD, located about 42 miles southeast of the PR-1B MOA. Alternative A training activities would occur far enough away from the Federal Class 1 areas, are intermittent, and occur at elevations that are well above ground level, such that Alterative A would not produce air quality impacts to these Class 1 areas. Additionally, PR-1 traverses through the Northern Cheyenne Native American Reservation, MT, which has been designated by the state as a Prevention of Significant Deterioration (PSD) Class 1 area.

Alternative A would not produce significant impacts to visibility within the Northern Cheyenne Native American Reservation, as (1) the expected PM_{10} emissions that would occur over that region are quite small (about 1.35 tons per year), (2) the proposed aircraft emissions would be transient and intermittent in nature, and (3) proposed aircraft emissions would be adequately dispersed over a large region and would occur at elevations significantly greater than ground levels. Thus, Alternative A would not substantially impact visibility within the Northern Cheyenne Native American Reservation or the other Mandatory Federal Class 1 areas, and it would not be expected to result in air quality impacts to any potentially affected Class 1 areas.

There are no current regulations for GHGs under the CAA that are directly applicable to the proposed action. GHG emissions, discussed below, use draft Council on Environmental Quality (CEQ) guidance to quantitatively consider local GHG emissions. There would be no National emission GHG change with any alternative, including the No-Action Alternative, because B-1 and B-52 training would occur under all alternatives.

Table 4.4-1. Annual Local Criteria Pollutant Emissions from Alternative A (tons/year)

State	*VOC*	*CO*	*NO_x*	*SO_X*	*PM_{10}*	*$PM_{2.5}$*
MT						
Total Emissions From Proposed Action	1.39	5.04	67.21	36.70	12.25	12.25
Net Change from Existing Conditions	1.15	3.32	40.63	22.16	8.80	8.80
ND						
Total Emissions From Proposed Action	0.52	2.03	27.73	15.12	4.79	4.79
Net Change from Existing Conditions	0.52	2.03	27.73	15.12	4.79	4.79
SD						
Total Emissions From Proposed Action	0.54	1.97	26.28	14.34	4.79	4.79
Net Change from Existing Conditions	0.51	1.73	22.48	12.26	4.30	4.30
WY						
Total Emissions From Proposed Action	0.54	1.08	14.15	7.74	2.67	2.67
Net Change from Existing Conditions	0.43	0.26	1.57	0.83	1.02	1.02
Total Change in Emissions	**2.6**	**7.3**	**92.4**	**50.4**	**18.9**	**18.9**
General Conformity Threshold [1]	*100*	*100*	*100*	*100*	*100*	*N/A*

Note: 1. Based on USEPA's General Conformity Rule.

Local GHGs emitted would include (1) carbon dioxide (CO_2), (2) methane, and (3) nitrous oxide (N_2O). Table 4.4-2 shows annual emissions for aircraft combustive emissions and calculates a total carbon dioxide equivalent (CO_2e). These data show that the proposed training under Alternative A would increase local GHG emissions relative to the existing conditions found in Table 3.4-4. B-1 and B-52 aircraft would continue to fly to remote ranges for limited training and the national GHG emissions would not be expected to change. The ratio of annual average local CO_2e emissions from the operations proposed under Alternative A to the CO_2e emissions associated with net sources in the U.S. in 2007 would be approximately 0.016/6,088 million metric tons, or about 0.0003 percent of the U.S. CO_2e emissions inventory (USEPA 2010 Greenhouse Gas Inventory Report 2009). Since local GHG emissions from Alternative A would equate to such a minimal amount of the overall U.S GHG emissions inventory, and there would be no net change in the national GHG emissions, Alternative A would not substantially contribute to global climate change. Therefore, GHG emissions from the operation of Alternative A would not be expected to result in significant impacts to the environment.

Table 4.4-2. Annual Local GHG Emissions from Alternative A (metric tons/year)

State	*CO_2*	*Methane (CH_4)*	*N_2O*	*CO_2e*
MT	12,992.47	0.36	0.37	12,941.45
Net Change from Existing Conditions	7,116.98	0.20	0.18	7,003.48
ND	5,492.65	0.15	0.18	5,492.03
Net Change from Existing Conditions	5,492.65	0.15	0.18	5,492.03
SD	5,068.87	0.14	0.15	5,060.14
Net Change from Existing Conditions	4,228.91	0.12	0.12	4,211.25
WY	2,686.87	0.07	0.07	2,675.02
Net Change from Existing Conditions	(120.87)	(0.00)	(0.02)	(162.57)
Total Change in Local Emissions[1]	**16,717.68**	**0.46**	**0.46**	**16,544.19**

Note: 1. No change in National emissions

The estimated GHG emissions from this alternative are included herein for informational purposes. As discussed in Section 3.1.2, the Draft Council on Environmental Quality guidance suggests a quantitative and qualitative assessment be prepared for proposed actions which emit 25,000 metric tons or more of CO_2e on an annual basis. As shown in Table 4.4-2, the estimated local annual emission increases that would result from Alternative A would not exceed 25,000 metric tons per year and there would be no net increase in national GHG emissions.

Alternative A would emit Toxic Air Contaminants (TACs) and a scoping question was asked whether such TACs could potentially impact public health. Toxic Air Contaminants generally are subsets of VOC and PM_{10} emissions. The data in Table 4.4-1 show that Alternative A would generate an increase of 21.5 tons of VOC and PM_{10} emissions for a combined total of 27.49 tons over an area of 35,200 square miles (Table 2-12). Since emissions would occur over such a large region, at various altitudes, and would be intermittent, training aircraft would produce minimal (essentially unmeasurable) Toxic Air Contaminants at any ground level location. As a result, air emissions caused by Alternative A would not produce impacts to public health.

The Lame Deer PM_{10} non-attainment area is in Rosebud County, MT, south of Colstrip. The total increase in PM_{10} emissions in MT for the proposed PRTC is estimated to be 8.80 tons per year. The area represented by Rosebud County is approximately 16.4 percent of the total proposed airspace area in MT. B-1 and B-52 aircraft are projected to fly below 3,000 feet AGL approximately 18.7 percent of total PR-1A, PR-1B, and PR-2 MOA/ATCAA training time. This means that approximately 1.65 tons of PM_{10} per year would be the Alternative A annual emissions contribution in Rosebud County. This amount of annual emissions would not be expected to increase the number of PM_{10} exceedance days experienced in the Lame Deer PM_{10} non-attainment area.

The Sheridan PM_{10} non-attainment area is in Sheridan County, WY, and is partially under the proposed PR-1B MOA. The total PM_{10} emissions increase in WY for the proposed PRTC is 1.02 tons per year. The area represented by Sheridan County is approximately 18.9 percent of the total proposed airspace area in WY. B-1 and B-52 aircraft are projected to fly below 3,000 feet AGL approximately 18.7 percent of total PR-1A, PR-1B, and PR-2 MOA/ATCAA training time. This means that approximately 0.19 tons of PM_{10} per year would be the Alternative A annual emissions contribution in Sheridan County. This amount of annual emissions would not be expected to increase the number of PM_{10} exceedance days experienced in the Sheridan PM_{10} non-attainment area.

Environmental concerns associated with flare use were air quality and ash deposition. Studies on ash components have been performed by measuring residual materials after flares were ignited in a controlled experiment. Constituents from combustion were identified to calculate whether flare emissions or flare ash could result in an environmental impact.

Modern flares proposed for use in PRTC do not contain lead although some earlier flares had lead in the firing mechanism. Some flares contain trace amounts of chromium in the firing mechanism. A statistical model was used to calculate emissions concentrations of chromium to estimate what it would take to achieve a level of toxicity of chromium as a result of flare use. The model calculated that 1.6 million flares would have to be released annually below 400 feet over a 765 square mile training range before the level of chromium emissions would become a health risk (Air Combat Command [ACC] 1997). No location in the world has this combination of flare numbers, altitude, and training area. ACC uses fewer than 400,000 flares annually in all applications worldwide, and the number of defensive flares proposed for the PRTC is approximately 3,300. The number of flares is smaller, the minimum altitude is higher, and the training area is larger for the PRTC than what would be required for flare emissions to constitute a health risk. Flare emissions are not now, nor is it feasible that they could become, a health hazard.

There are also trace quantities of boron in flare ash. The amount of flare ash that would be required to raise the boron concentration to triple the background level of the upper inch of one acre of soil was estimated to annually require flare ash from approximately 4,000 flares. It would be impossible for training aircraft to deposit 4,000 flares on one acre of land in a year (ACC 1997). Flare burning and flare ash are extremely unlikely to result in measurable air quality or physical effects to the environment.

Alternative A would not affect air quality attainment within the four-state region. The analysis purposefully used military power on the engines at all times which results in conservatively higher estimates of projected emissions than could be achieved. Engines do not run at military power during an entire mission. Flare burning emissions were calculated in the total emissions.

Consequently, Alternative A aircraft training activities are not expected to produce emissions that would significantly affect air quality or visibility within the four-state region.

4.4.3.2 Alternative B

Air quality impacts associated with Alternative B were determined by comparing the net change in emissions between current baseline operations and Alternative B proposed operations within the PRTC. Emissions from proposed flights were evaluated with engines operating in military mode. Operational data were derived from Section 2.6. Chaff and flare emissions were estimated using Section 2.6 usage numbers.

The nearest Mandatory Federal Class 1 areas to Alternative B training operations are: (1) Wind Caves National park, located approximately 30 miles south of the PR-1B MOA, and (2) the Northern Cheyenne Native American Reservation is approximately 15 miles west of the PR-2 MOA. Alternative B training activities would occur far enough away from the Federal Class 1 areas, are intermittent, and occur at elevations well above ground level, such that Alternative B would not be expected to result in any air quality impacts to the Class 1 areas.

Table 4.4-3 presents estimates of the annual PRTC emissions that would occur within each state air basin. These data show that Alternative B operations would produce annual emissions that would not exceed the applicable general conformity *de minimis* threshold of 100 tons per year. Therefore, Alternative B would not be expected to result in significant air quality impacts within the four-state region.

Table 4.4-3. Annual Local Criteria Pollutant Emissions from Alternative B (tons/year)

State	*VOC*	*CO*	*NO_X*	*SO_X*	*PM_{10}*	*$PM_{2.5}$*
MT						
Total Emissions From Proposed Action	0.81	3.05	41.12	22.45	7.32	7.32
Net Change from Existing Conditions	0.57	1.33	14.54	7.91	3.87	3.87
ND						
Total Emissions From Proposed Action	0.52	2.05	28.08	15.30	4.83	4.83
Net Change from Existing Conditions	0.52	2.05	28.08	15.30	4.83	4.83
SD						
Total Emissions From Proposed Action	0.55	1.99	26.52	14.46	4.82	4.82
Net Change from Existing Conditions	0.52	1.74	22.72	12.38	4.33	4.33
WY						
Total Emissions From Proposed Action	0.21	0.74	9.69	5.30	1.82	1.82
Net Change from Existing Conditions	0.10	(0.08)	(2.90)	(1.61)	0.17	0.17
Total Change in Emissions	**1.72**	**5.04**	**62.44**	**33.98**	**13.20**	**13.20**
General Conformity Threshold [1]	*100*	*100*	*100*	*100*	*100*	*N/A*

Note: 1. Based on USEPA's General Conformity Rule.

Alternative B training activities would produce local GHG emissions due to aircraft operation. The local GHGs emitted by proposed operations would include (1) CO_2, (2) methane, and (3) N_2O. Table 4.4-4 shows annual local GHG emissions for aircraft combustive emissions and calculates the total CO_2e emissions. These data show that the proposed training under Alternative B would increase local GHG emission relative to the existing conditions although, as described in Alternative A, the national GHG emissions would not change as B-1 and B-52 aircraft commuted to other locations for training. The ratio of local annual average CO_2e emissions from the operations proposed in Alternative B to the CO_2e emissions associated with net sources in the U.S. in 2007 is approximately 0.011/6,088 million metric tons, or about 0.0002 percent of the U.S. CO_2e emissions inventory (USEPA 2009). Local GHG emissions from Alternative B would equate to a minimal amount of the overall U.S GHG emissions inventory and would not produce a net increase in GHG emissions. GHG emissions from the operation of Alternative B would produce less than significant impacts to the environment with respect to climate change.

The data in Table 4.4-3 show that Alternative B would generate an increase of 14.92 tons of VOC and PM_{10} emissions for a combined total of 20.88 tons. Alternative B would not include overflights within any non-attainment area. Since proposed PRTC emissions would occur over a large region and would be intermittent in nature, they would produce minimal Toxic Air Contaminants at any ground level location. Alternative B would not be expected to result in significant impacts to public health.

As with Alternative A, Alternative B training activities are not expected to produce emissions that would significantly affect air quality or visibility impacts within the four-state region.

Table 4.4-4. Annual Local GHG Emissions from Alternative B (metric tons/year)

State	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
MT				
Total Emissions From Proposed Action	7,950.57	0.22	0.26	8,025.01
Net Change from Existing Conditions	2,075.09	0.06	0.07	2,087.05
ND				
Total Emissions From Proposed Action	5,520.23	0.16	0.18	5,572.68
Net Change from Existing Conditions	5,520.23	0.16	0.18	5,572.68
SD				
Total Emissions From Proposed Action	5,071.12	0.14	0.16	5,118.94
Net Change from Existing Conditions	4,231.16	0.12	0.14	4,270.05
WY				
Total Emissions From Proposed Action	1,822.37	0.05	0.06	1,839.37
Net Change from Existing Conditions	(985.37)	(0.03)	(0.03)	(998.22)
Total	**10,841.11**	**0.31**	**0.35**	**10,931.55**

4.4.3.3 Alternative C

Air quality impacts associated with Alternative C were determined by comparing the net change in emissions between current baseline operations and Alternative C operations within the PRTC. Emissions from proposed flights were evaluated with engines operating in military power throughout the missions although aircraft do not run at military power for an entire mission. Operational data were derived from Section 2.7. Chaff and flare emissions were derived from Section 2.7 usage numbers.

The nearest Mandatory Federal Class 1 areas to the project region are 1) the Wind Caves National park, located approximately 30 miles south of the PR-1B MOA; 2) Badlands National Park, SD, located about 42 miles southeast of the PR-1B MOA; and 3) The Northern Cheyenne Native American Reservation is a state-designated Class 1 area and is approximately 15 miles west of the PR-2 MOA . Alternative C training activities would occur far enough away from the Federal Class 1 areas, are intermittent, and occur at elevations well above ground level, such that Alternative C would not produce air quality impacts to those Class 1 areas.

Alternative C includes the Lame Deer PM_{10} and portions of the Sheridan PM_{10} non-attainment areas. Environmental effects for these areas would be as described for Alternative A. Table 4.4-5 presents estimates of the annual PRTC emissions that would occur within each air basin/state. These data show that Alternative C flight operations would produce annual emissions that would not be expected to result in any significant impacts as described for Alternative A. Therefore, Alternative C would not be expected to result in significant air quality impacts within the four-state region.

Table 4.4-5. Annual Criteria Pollutant Emissions from Alternative C (tons/year)

State	*VOC*	*CO*	*NO_X*	*SO_X*	*PM_{10}*	*$PM_{2.5}$*
MT						
Total Emissions From Proposed Action	1.43	5.29	71.15	38.83	12.76	12.76
Net Change from Existing Conditions	1.19	3.58	44.57	24.29	9.30	9.30
ND						
Total Emissions From Proposed Action	0.14	0.72	10.64	5.78	1.53	1.53
Net Change from Existing Conditions	0.14	0.72	10.64	5.78	1.53	1.53
SD						
Total Emissions From Proposed Action	0.26	1.00	13.70	7.48	2.38	2.38
Net Change from Existing Conditions	0.22	0.76	9.90	5.40	1.89	1.89
WY						
Total Emissions From Proposed Action	0.32	1.14	15.20	8.31	2.80	2.80
Net Change from Existing Conditions	0.21	0.33	2.61	1.39	1.15	1.15
Total Change in Emissions	**1.76**	**5.38**	**67.72**	**36.87**	**13.88**	**13.88**
General Conformity Threshold [1]	*100*	*100*	*100*	*100*	*100*	*N/A*

Note: 1. Based on USEPA's General Conformity Rule.

Alternative C training activities would produce local GHG emissions due to aircraft operations although there would be no national change in GHG emissions as described in Alternative A. The local GHGs emitted by proposed operations would include (1) CO_2, (2) methane, and (3) N_2O. Table 4.4-6 shows annual local GHG emissions and calculates the total CO_2e emissions. These data show that the proposed training under Alternative C would increase local GHG emission relative to the existing conditions. Total national GHG emissions would not be expected to change as B-1 and B-52 aircraft commuted to distant ranges for limited training. The ratio of local annual average CO_2e emissions from the operation of Alternative C to the CO_2e emissions associated with net sources in the U.S. in 2007 is approximately 0.012/6,088 million metric tons, or about 0.0002 percent of the U.S. CO_2e emissions inventory (USEPA 2009). Since local GHG emissions from Alternative C would equate to such a minimal amount of the overall U.S GHG emissions inventory, they would not substantially contribute to global climate change. Therefore, GHG emissions from the operation of Alternative C would not be expected to result in any significant impacts to the environment.

Table 4.4-6. Annual Local GHG Emissions from Alternative C (metric tons/year)

State	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
MT				
Total Emissions From Proposed Action	13,704.88	0.39	0.44	13,834.63
Net Change from Existing Conditions	7,829.40	0.22	0.25	7,896.66
ND				
Total Emissions From Proposed Action	2,259.21	0.06	0.07	2,280.66
Net Change from Existing Conditions	2,259.21	0.06	0.07	2,280.66
SD				
Total Emissions From Proposed Action	2,679.51	0.08	0.09	2,704.84
Net Change from Existing Conditions	1,839.55	0.05	0.06	1,855.96
WY				
Total Emissions From Proposed Action	2,883.85	0.08	0.09	2,911.15
Net Change from Existing Conditions	76.11	0.00	0.00	73.55
Total	**12,004.27**	**0.34**	**0.39**	**12,106.83**

The data in Table 4.4-5 show that Alternative C would generate an increase of 15.64 tons of VOC and PM_{10} emissions for a combined total of 21.62 tons. Since proposed PRTC emissions would occur over a large region and would be intermittent, they would produce minimal Toxic Air Contaminants at any ground level location. As a result, Alternative C would not be expected to result in any significant impacts to public health. Alternative C aircraft training activities are not expected to produce emissions that would significantly affect air quality or visibility in the region.

4.4.3.4 No-Action Alternative

The No-Action Alternative would not establish the PRTC. The No-Action Alternative represents continued use of the existing Powder River airspace for training at baseline levels. Use of remote complexes for training would continue to expend a substantial number of flying hours and would be expected to produce levels of GHG and other emissions comparable to those described for Alternative A. No different operational activities would occur due to the No Action Alternative. Therefore, the No-Action Alternative would not produce any new air quality impacts. No-Action would produce the same level of GHG emissions, as described for Alternatives A, B, or C.

4.5 Physical Sciences

4.5.1 Methodology

Physical sciences include topography, geology, soils, and water. In any area of the arid west, any potential effects to water availability and water quality would be of concern to agencies and the public. Adherence to applicable regulations under the various project actions is assessed in this section. Impacts are assessed if there is a potential to reduce water availability to existing users, endanger public health or safety by creating or worsening health hazards or physical resource safety conditions, or to violate laws or regulations adopted to protect or manage water resources. An impact to water resources would be considered significant to monitoring agencies if the impact adversely affected water quality or endangered public health by creating or worsening adverse health hazard conditions or violated established laws or regulations that have been adopted to protect or manage water resources of an area.

The water divisions of the states MT, ND, SD, and WY and the U.S. Army Corps of Engineers (USACE) are the regulatory agencies that govern water resources in the ROI. State agencies have adopted the USEPA's applicable environmental rules and regulations. The Clean Water Act (CWA) of 1977 regulates pollutant discharges to waters of the U.S.

Protection of unique geologic features and minimization of soil erosion in relation to potential geologic hazards and soil limitations are considered when evaluating impacts to earth resources (soils and geology).

Impacts to soil resources can result from earth disturbance that would expose soil to wind or water erosion. Analysis of physical resources typically includes examination of the potential effects that an action may have on the resource and assessment of the significance of any potential impacts. Analysis of impacts to soil resources examines the suitability of locations for any proposed construction.

4.5.2 Issues and Concerns

Soils impacts are expected to be minimal under the proposed PRTC action as there are no construction or ground-disturbing activities included in the Proposed Action. Potential impacts to water resources would be highly unlikely given the low occurrence of water bodies in the ROI. Under all alternatives, chaff and flare use would be introduced to areas of the ROI that have not previously had such defensive training. The potential impacts to physical resources from this use are discussed in this section.

4.5.3 Environmental Consequences

4.5.3.1 Alternative A - Proposed Action

The primary constituents of chaff are silica and aluminum. These are the most common elements in the earth's crust and in soils. The component of chaff that has the potential to affect soil or water chemistry is aluminum, which tends to break down in acidic and highly alkaline environments. Aluminum is the most abundant metallic element in the earth's crust and is a common constituent of soils. Modern chaff is composed primarily of very fine glass fibers coated with aluminum to achieve its radar-reflective properties (Arfsten *et al.* 2002). Chaff also contains trace amounts of iron, copper, magnesium, and zinc. Chaff fibers are coated with stearic acid in order to prevent clumping during deployment (Arfsten *et al.* 2002). Stearic acid (octadecanoic acid) is a saturated fatty acid derived from animal and vegetable fats and oils (Heryanto *et al.* 2007). Stearic acid has been used in the development of drug delivery systems because it is considered to be inert, inexpensive, and biocompatible, as well as of a low toxicity.

Laboratory and field analyses (Air Force 1997) indicate that the pH of water in the soil or in a water body is the primary factor that determines the stability of the aluminum coating of chaff. The coating is the most soluble and likely to release aluminum if the soil or water pH is less than 5.0 (extremely acidic) or greater than 8.5 (strongly alkaline). In arid conditions such as those found in the ROI, soil pH tends to be neutral to alkaline, and there is usually not enough water in the soils of this region to react with the aluminum (Air Force 1997). As discussed in Section 3.5.3.3 Soils, 99 percent of the soils in the ROI have a pH between 5.0 and 8.5, outside the normal range for chaff coating to release aluminum into the soil. The low percentage of soils in the ROI with a pH within the range to react with the chaff coating aluminum in combination with the low soil water content, results in conditions that would be extremely improbable for detectable aluminum concentrations to be produced from chaff particles that weather on the ground. Analysis to detect chaff concentration in aquatic and soil environments, where chaff has been deployed for decades, was unable to detect any but a few chaff particles. This is because chaff on the ground rapidly breaks down to silica and aluminum, the two most common elements of the earth's crust, and becomes indistinguishable from native soils (Air Force 1997)

Confined aquatic habitats could be affected if there were a potential for significant accumulation and decomposition of chaff fibers. Water areas compose less than 0.86 percent (Section 3.8.3) of the ROI to be exposed to chaff and flare release under the Proposed Action. Because chaff would be broadly distributed with low density in any one area, it is unlikely that chaff would be detectable or significantly accumulate within confined water bodies. Water bodies in the ROI are neutral to slightly alkaline in pH similar to soils, and outside the pH range necessary to degrade the aluminum coating. Chaff particles that fell on surface water would be chemically stable and subject to mechanical degradation. No impact to water bodies would be anticipated, even in a highly unlikely event such as an entire clump of undispersed chaff falling into a small, confined water body. Additional discussion of chaff and flare impacts to wetlands is included in *Biological Sciences*, Section 4.6 and Appendices C and D.

Existing chaff mechanically breaks down quickly into silica and aluminum. Under normal pH, the decomposition of aluminum in chaff is extremely slow. Only under very high or low pH could the aluminum in an undispersed clump of chaff become soluble and potentially toxic (Air Force 1997). Few organisms would be present in water bodies with such extreme pH levels. Given the small amount of diffuse or aggregate chaff material that could possibly reach water bodies and the moderate pH of regional water bodies, water chemistry would not be expected to be affected.

Flares are magnesium which burns quickly to create a target for heat-seeking missiles. The magnesium in flares would be toxic only at extremely high levels, a situation that is unlikely as flare use would not be repeated or concentrated in localized areas (see Section 4.4.3.1). Flare ash would disperse over wide areas; thus, no impact to local soils and water systems is expected from the magnesium in flare ash. The probability of an intact dud flare falling to the ground during training is extremely low (0.01 percent of flares deployed was estimated in Utah and Arizona) (Air Force 2001). The probability of an intact flare falling into an aquatic system is much smaller, given the very low proportion of water bodies in the ROI. Therefore, no effect of flares on water quality would be expected.

Chaff and flare plastic and wrapper residual materials are typically inert and not expected to impact soils or water bodies. Section 2.4.6.3 describes these residual materials. Overall, no significant impacts to soil and water resources in the ROI are expected from implementation of the Proposed Action.

4.5.3.2 Alternative B

Alternative B would expand existing airspace, increase airspace operations, and introduce the use of chaff and flares into new training areas similar to the Proposed Action. Alternative B primarily differs from the Proposed Action, Alternative A, by not including the proposed PR-1A, PR-1B, or Gap A MOAs, which would reduce local low-level training airspace as compared with Alternative A. Chaff and flares would be used for training in the ATCAAs. The total number of chaff bundles and flares deployed annually under Alternative B would be expected to be approximately the same as under Alternative A. Soil and water consequences from chaff and flare use would be as described for Alternative A. Impacts are expected to be similar to those for the Proposed Action and less than significant.

4.5.3.3 Alternative C

Alternative C would also expand existing airspace, increase airspace operations, and introduce the use of chaff and flares into new training areas similar to the Proposed Action. This alternative differs from Alternative A in that it would include no PR-4 MOA and no Gap C MOA and result in a reduction in local low-level training area as compared with Alternative A. The total number of chaff and flares units deployed annually would be expected to be approximately the same as under Alternative A. Impacts would not differ measurably from those of the Proposed Action. Thus, Alternative C is not expected to affect soil or water resources differently from the Proposed Action in any measurable way, and impacts would be less than significant.

4.5.3.4 No Action Alternative

The effects to physical resources under the No Action Alternative would be the same as current conditions. No defensive chaff and flares training would occur. No changes to physical resources would occur under this alternative.

4.6 Biological Sciences

4.6.1 Methodology

Assessing impacts to biological resources and the significance of those impacts is based upon federal and state determinations of: 1) the importance (legal, commercial, recreational, ecological, or scientific) of the resource, 2) the rarity of a species or habitat regionally, 3) the sensitivity of the resource to proposed training activities, 4) the proportion of the resource that would be affected relative to its occurrence in the region, and 5) the duration of the impact. Federal or state agencies consider impacts to biological resources to be greater if priority species or habitats are adversely affected, if substantial effects occur over relatively large areas, and/or if disturbances cause reductions in population size or distribution of a priority species.

4.6.2 Issues and Concerns

Impacts to biological resources from the Proposed Action may result from operational effects from the use of chaff and flares, low-level overflights, sonic booms, and/or bird-aircraft collisions. All effects on wildlife species would be expected to be initially greatest in areas not formerly included within the active airspace, until a period of habituation can occur and the animals begin to associate no threat with overflights and other training activities.

The potential sources of impacts to wildlife from aircraft overflights include the visual effect of the overflying aircraft and the associated noise. Approximately 87 percent of the sortie-operations for the Proposed Action would take place at altitudes greater than 2,000 feet AGL, which is higher than the altitudes associated with most documented reactions to visual stimuli by wildlife (Lamp 1989, Bowles 1995). Low-level startle effects and noise effects, along with other potential impacts, are presented below.

4.6.3 Environmental Consequences

4.6.3.1 Alternative A - Proposed Action

CHAFF

Defensive countermeasures that would be used under all alternatives include the dropping of chaff and flares. Once the chaff reaches the ground, the primary potential effects on wildlife include ingestion or inhalation of fibers, and direct body contact. Dispersed chaff consists of very fine strands of aluminum-coated silica fibers that are thinner than human hair. In general, chaff is released at high altitudes, drifts over very large areas, and is greatly dispersed before falling to the Earth's surface. The average deposition of chaff and flare residual materials would be approximately one piece per 115 acres annually. Chaff fiber deposition would be estimated to average approximately 0.0049 ounce (0.14 grams) per acre per year. Winds at the deployment altitude of chaff would affect drift and deposition. In rare cases, a bundle of chaff may fall to the ground without being dispersed.

Chaff fibers are comprised of aluminum-coated silica fibers and contain trace amounts of iron, copper, magnesium, and zinc. See Section 4.5, *Physical Resources*, for a discussion on the activity of aluminum in soils and water bodies. Application of chaff at rates described above would not result in a measurable increase in elemental aluminum in the soils. There is no evidence of chaff affecting vegetation, and, under current condition of the soils, mobility within the soils and increased vegetation uptake of aluminum is not expected to occur. Aluminum is one of the most abundant materials in the earth's crust and the addition of aluminum from chaff would not have a measurable effect on the abundance or availability of aluminum in soils or vegetation.

Analyses of chemical components of chaff indicate that chaff fibers may only be toxic in large amounts under certain conditions. Under project alternatives, these chemicals would be deposited in the environment at rates that are not only sub-toxic but also undetectable. A study completed in 1977 for the U.S. Navy found no evidence that chaff was acutely toxic to six species of aquatic organisms within the Chesapeake Bay (Arfsten *et al*. 2002). Chaff fibers are not expected to dissolve in fresh water bodies unless they fall into acidic waters. Even in this case, concentrations of aluminum would not be expected to become toxic. Because chaff would be broadly distributed with low density across the ROI, it is unlikely that chaff would be detectable or significantly accumulate within a particular wetland. Given this and the mild pH (neither excessively acid nor excessively alkaline) in regional water bodies, water quality for biological resources would not be expected to be adversely affected by the increased use of chaff within the ROI. For further discussion of activity of aluminum in soils see Section 4.5.

Ingestion of chaff by either ranch animals or wildlife is expected to also be negligible. Several studies have been conducted on cattle and goats that showed they would avoid eating clumps of chaff that were placed directly into their food, and only consumed chaff when coated with molasses and thoroughly mixed with food. Those animals that did ingest the chaff showed no signs of health effects (Barrett and MacKay 1972). It has been suggested that ingestion of chaff by waterfowl could be possible, with possible health effects including blockage or reduced function of the gizzard. However, no data on ingestion of chaff by waterfowl is available and no known deaths of waterfowl have occurred from ingesting chaff (Air Force 1997). Given that the chaff deposition is expected to be approximately 0.00469 ounce per acre annually from training operations, adverse effects from ingestion are not expected and impacts would be less than significant.

Inhalation of chaff fibers is not expected to have negative effects on terrestrial wildlife. Studies on inhalation of chaff fibers by humans and livestock demonstrated that chaff fibers are too large for inhalation and are expelled through the nose or swallowed (Air Force 1997). Based on calculations of the application rate of chaff under the proposed action and alternatives, the probability of an individual animal (livestock or wildlife) or person encountering single filaments or fragments of chaff or groups of filaments is highly unlikely.

External contact with chaff is not expected to be significant due to the flexible nature and softness of the chaff fibers. Studies conducted at Nellis AFB in 1997 reported finding no difference in animal abundance and nesting activity in areas where chaff were present. Chaff was not found in rodent burrows or in nesting material of bird nests (Air Force 1997).

FLARES

Toxicological studies on flare residual materials indicate that no chemical effects are expected for biological resources. The amount of magnesium dispersed from flares (as the combustion product magnesium oxide) is too small to result in levels that would be associated with acute exposure (Air Force 1997a; see Section 4.4.3.1, *Air Quality*). The concentration of flare ash residue at any location would be undetectable under normal circumstances due to dispersal of the minimal amount of residue produced by a burning flare deployed in the airspace. No impacts would be expected to state-listed species dependent on small aquatic habitats, including the northern redbelly dace and the northern leopard frog, which are found in bogs, small ponds, and lakes.

The probability of a dud flare hitting the ground is extremely low (estimated rate of 0.01 percent of flares deployed). Given that wetlands occur on less than one percent of the project area, the likelihood of an intact dud flare landing in a wetland is even lower. If this event did occur, there would be minimal to no effects of the metallic magnesium from the flare on the wetland. Magnesium is already a significant natural component of the earth and the amount from a flare would be comparably insignificant (Air Force 1997). Due to the low concentrations of flare residue and the extremely low probability of flare residue coming in contact with wildlife, flare releases are expected to have minimal and less than significant effects on wildlife.

CHAFF AND FLARE RESIDUAL MATERIALS

Pieces of plastic, Mylar, and/or paper fall to the earth with each bundle of chaff or flare deployed. Such materials are inert and are not likely to be seen by species as food. Some species of bird and rodents (e.g., pack rats) often select shiny material for their nests. Studies conducted at Nellis AFB in 1997 reported finding no difference in animal abundance and nesting activity in areas where chaff and flare residual materials were present. Flare residual materials were not found in rodent burrows, pack rat nests, or in nesting material of bird nests (Air Force 1997). Behavioral responses from wildlife as a result of the presence of chaff and flares are also not expected to be significant. Flares would not be released below 2,000 feet AGL and would likely not be a visible intrusion, even at night, to nocturnal wildlife on the ground. While defensive flares released at night can be bright, the light usually lasts approximately 5 seconds.

AIRCRAFT OVERFLIGHT AND SONIC BOOM NOISE

Low-level flights and infrequent supersonic events create noise and startle effect to species on the ground. An estimated 2 to 4 percent of the land area under the proposed PRTC would be overflown each training day (see Section 4.9.3.1.5). The proposed airspace could experience approximately one sonic boom per day during the 10 days of LFEs per year (see Section 4.2.3.5). Supersonic activity would be the same under all alternatives. Additional information on noise levels and effects can be found in Section 4.2, *Noise*. Section 4.8, *Land Use*, addresses effects of noise on livestock. The majority of studies have been conducted on domestic animals because of noise damage claims for injury or losses in domestic livestock (Manci *et al*. 1988).

Potential general issues related to noise effects on wildlife or livestock include the following:

- Possible startle response injury due to trampling or uncontrolled running or flight.
- Increased expenditure of energy, particularly during critical periods.
- Decreased time spent on life functions (e.g., seeking food or mates).
- Temporary masking of auditory signals from other animals of the same species, predators, or prey (e.g., noise could prevent an animal from hearing the approach of a predator).
- Damage to eggs or nestlings if a bird is startled from its nest.
- Temporary exposure of eggs or young in nest to environmental conditions or predation if a parent flees.
- Temporary increased risk of predation if startled animals flee from nests, roosts, or other protective cover.
- Site abandonment.

Studies addressing the effects of overflight noise and sonic booms on wildlife suggest that impacts vary depending on the species as well as a number of other factors such as duration and frequency of flights, type of aircraft, flight speed, proximity, etc. Natural factors which affect reaction include season, group size, age and sex composition, on-going activity, motivational state, reproductive condition, terrain, weather, and temperament (Bowles 1995). Individual animal response to a given noise event or series of events also can vary widely due to a variety of factors, including time of day, physical condition of the animal, physical environment (such as whether the animal is restrained or unrestrained), the experience of the individual animal with noises, and whether or not other physical stressors (e.g., drought) are present (Manci *et al*. 1988). Therefore, it is difficult to generalize effects of noise across species. Studies suggest that overflight noise from military aircraft, including sonic booms, could elicit startle responses from individual animals and may cause physiological and/or behavioral responses possibly affecting an animal's fitness or survivability.

Noises that are close, loud, and sudden and that are combined with a visual stimulus produce the most intense reactions. Rotary-wing aircraft (helicopters) generally induce the startle effect more frequently than fixed-wing aircraft (Gladwin *et al*. 1988; Ward *et al*. 1999). Animals under newly proposed MOAs are expected to be temporarily more sensitive to noise due to lower previous exposure than animals under the existing Powder River MOAs. Some species habituate to repetitive noises, especially noise associated with overflight of fixed-wing aircraft, better than other species (Conomy *et al*. 1998; Krausman *et al*. 1998, Downing 2006).

Studies have primarily focused on avian species and large ungulates such as elk and pronghorn. Findings would also be applicable to domestic animals. Increased heart rate, as well as startle responses (such as moving, running or flushing), have been observed in species such as elk, pronghorn, raptors, and certain species of waterfowl (Downing 2006; Manci *et al*. 1988). Such reactions have been especially noticed with low-level rotary wing aircraft flights. While such responses have been observed, little information is available on indirect or long term effects on the vigor or survivability of free-ranging wildlife populations due to overflight noise compared to other environmental factors. Ellis *et al.* (1991) examined behavioral and reproductive effects of several raptor species to low-level flight. They found no incidents of reproductive failure and that site re-occupancy rates were high the following year. Bald eagle behavioral responses varying from altering posture to taking flight and/or departing the area have been associated with closely-approaching aircraft (Grubb and Bowerman 1999). However, no evidence of reduced reproductive success in bald eagles exposed to overflights or other military noise has been reported (Fraser *et al*. 1985, Grubb and Bowerman 1999). Palmer *et al*. (2003) detected only subtle effects on parental behavior of peregrine falcons from jet aircraft overflights and found no evidence that nest attendance patterns were negatively affected.

Sound exposure levels (SEL) above 90 dB may be detrimental to mammals and are associated with a number of behaviors such as retreat from the sound source, freezing, or a strong startle response (Manci *et al*. 1988). Although not directly applicable to the PRTC, Harrington and Veitch (1992) studied the effects of low-level jet overflight on woodland caribou calf survival and found that mortality rates were significantly higher in groups exposed to the flights. Increased use of low-altitude aircraft in remote areas in Alaska occupied by ungulate populations has focused attention on possible effects of aircraft disturbance on wildlife (Klein 1973 in Manci *et al*. 1988). Such disturbance is most detrimental in treeless terrain where escape cover is lacking.

Studies of large ungulates include observations of flight distances and other behavior of caribou in Alaska. Results were recorded in relation to altitude and angle of fixed-wing aircraft and helicopter approach, intensity and frequency of sound, and external factors such as weather and terrain. Running and panic occurred when the aircraft was at altitudes of 200 feet or less, and such reactions decreased as flight altitudes increased. Above 500 feet, no panic response was observed. The minimum altitude for training in the proposed PRTC is 500 feet, with most (87 percent) of training hours above 2,000 feet AGL. Groups of fewer than 10 animals responded less strongly to the aircraft than larger groups. Groups consisting primarily of cows, calves, and yearlings tended to show a stronger response to the aircraft than groups of bulls. Calef *et al*. (1976 in Manci *et al*. 1988) demonstrated that unfamiliar noise stimuli increased the incidence of miscarriages and lowered the birth rates of caribou and, therefore, recommended that aircraft fly above a minimum altitude of 500 feet during summer and fall migrations, and 1,000 feet at other times.

Studies on pronghorn response to overflight by jet aircraft and helicopters have suggested rapid habituation to overflight after initial responses, which include running for short distances (Workman *et al.* 1992, Bayless *et al.* 2004). In the Bayless *et al.* (2004) study, which included day and night exposures to nearby helicopter activity, movements in response to overflight during nighttime hours were less than movements in response to overflight during daylight, suggesting a visual component to the reaction in addition to noise.

In many studies, animals exhibited continually decreasing responses to increased noise exposure, suggesting habituation. Reactions of captive elk, pronghorn, and bighorn sheep to the impulse noise of sonic booms decreased with exposure (Workman *et al.* 1992). For pronghorn, initial responses were an increased heart rate (that returned to normal within 1½ minutes), running for short distances, and increased alertness. By the third exposure to a sonic boom, the animals' heart rate response had decreased by half and they did not run. Aircraft noise has the potential to be most detrimental during periods of stress, especially during winter, during gestation, and during calving (DeForge 1981). Wildlife management agencies regularly use helicopters and fixed-wing aircraft for radio tracking, monitoring, and surveying wild ungulate populations.

Threatened, Endangered, and Other Special Status Species

The piping plover, least tern, whooping crane, and yellow-billed cuckoo are all rare migrants in the ROI; therefore, minimal to no effects on these species are expected from training flights. For more details on federally listed species refer to Appendix K.

Simulated sonic boom experiments with turkeys did not reveal any reaction other than a few seconds of head alert behavior.

The greater sage-grouse, recently added as a federal candidate species for listing, is of concern in western states that support mature sagebrush habitat. The species also occurs on U.S. Forest Service (USFS) and Bureau of Land Management (BLM) sensitive lists. Likely because the species is showing historic declines and is a popular game bird, much research has been conducted on the potential effects of oil and gas development, which is increasing in the region. Effects of noise, in particular aircraft noise, on greater sage-grouse have been minimally studied. Related research on other upland game birds includes observations on the behavior of four wild turkey (*Meleagris gallapavo*) hens on their nests during real and simulated sonic booms (Lynch and Speake 1978 cited in Manci *et al*. 1988). Simulated sonic booms were produced by firing 5-centimeter mortar shells, 300 to 500 feet from the nest of each hen. Recordings of pressure for both types of booms measured 0.4 to 1.0 psf at the observer's location. Turkey hens exhibited only a few seconds of head alert behavior at the sound of the sonic boom. No hens were flushed off the nests, and productivity estimates revealed no effect from the booms. Twenty brood groups were also subjected to simulated sonic booms. In no instance did the hens desert any poults (young birds), nor did the poults scatter or desert the rest of the brood group. In every observation, the brood group returned to normal activity within 30 seconds after a simulated sonic boom.

Aircraft overflight noise and sonic booms have the potential to affect breeding behavior of sage-grouse; however, no specific research has been completed on these effects. Sage-grouse are known to select their leks (communal breeding display areas) based on good acoustic properties, and depend on auditory communication for mating behavior (Braun 2006). Most sage-grouse leks were established decades ago and are used year after year. Impacts, if any, would depend on the season and altitude of low-level flights, the time of day, and loudness of the sonic booms. Sage-grouse studies on the effects of oil and gas development have shown that light traffic disturbance (1 to 12 vehicles per day) during the breeding season might reduce nest-initiation rates and increase distances hens moved from leks for their nest site selection (Lyon and Anderson 2003). In a heavily-cited dissertation, Holloran (2005) found that declines in the number of displaying male sage-grouse were positively correlated with proximity of leks to gas-field-related sources of disturbance, increased levels of development surrounding leks, increased traffic volumes within 3 kilometers of leks, and increased potential for greater noise intensity at leks. He also found that nesting and brooding females avoided areas with active drilling rigs and producing wells. Holloran suggested that a lag period occurs between when an individual sage-grouse is affected by an anthropogenic disturbance and when survival probabilities are influenced, suggesting negative fitness consequences for females subjected to noise and activity from natural gas development during the breeding or nesting periods. Naugle *et al*. (2006) found that by 2005, active sage-grouse leks, and large and medium-sized leks, were more often found outside or adjacent to coalbed natural gas fields than within coalbed natural gas fields. Potential Proposed Action-related noise such as overflights and sonic booms differ from oil and gas effects as they are more random, not sustained, and not fixed in location. Impacts to sage-grouse from these types of noise disturbances will likely differ and need further study.

Currently, supersonic flights are not permitted within the existing Powder River airspace and rarely will aircraft inadvertently achieve supersonic speeds. As a result, wildlife under the airspace rarely experience sonic booms. Supersonic activity above 20,000 feet MSL for B-1s or above 10,000 feet AGL for other transient fighters could produce sound levels in the 0.5 psf range over broad areas and in the 4 psf range in smaller areas (see Section 4.2.3.5). An estimated average 6 sonic booms per year toward the center of the airspace would produce very infrequent startle effects. Many studies have shown that wildlife have the ability to habituate to noise and become tolerant to overflights (Downing 2006). Operation activities occurring in new areas may affect the behavior of sensitive species that occur within the airspace during the initial exposures. However, any effects would likely be short term and unlikely to significantly adversely affect the populations.

Bird- and Other Wildlife-aircraft Strikes

One potential impact on migratory birds within the training airspace is the possibility of bird-aircraft collisions, or strikes. Discussion of the safety aspects of bird aircraft strike hazards is included in the Section 3.3.3.4, *Safety*. As explained in Section 3.6.3.2, the eastern project area occurs under the convergence of the Central and the Mississippi flyways for migratory birds, which increases the chance for bird-aircraft strikes during the spring and fall seasons in the ROI. Studies have demonstrated that 95 percent of migratory birds fly at altitudes less than 10,000 feet, with the majority of them occurring below 3,000 feet. Most aircraft collisions occur during low level flight, especially around airfields (where low level flight is most frequent) and over water bodies (which attract large numbers of migratory birds). Approximately 87 percent of the time spent in the airspace on sortie-operations under the Proposed Action would take place at altitudes greater than 2,000 feet AGL and water bodies are relatively scarce in the ROI. Although migratory birds such as geese, swans and some raptors have been known to fly at altitudes above 10,000 feet AGL during migration (Lincoln *et al*. 1998), the chance of collision is very low.

Bird-aircraft strike data recorded from 1999 through 2007 indicates that Ellsworth-based aircraft experienced 11 bird strikes in the existing Powder River A and B MOAs during that 9-year period. Of these, 41 percent occurred during July, August and September. PR-3 and PR-4 MOAs overlie the Mississippi and Central Flyways (Figure 3.2-6) and PR-1A and PR-1B MOAs overlie more diverse environment than the PR A and PR B MOAs. There is a greater potential for bird-aircraft strikes in the proposed MOAs than in the existing Powder River A and B MOAs. The migratory birds within the region are protected by the Migratory Bird Treaty Act. If a migratory bird species is involved in a bird-aircraft strike, it would be considered an incidental taking during military training, which is exempt from any permitting requirement by Section 315 of the Fiscal Year (FY) 03 National Defense Authorization Act. These rare bird-aircraft strikes would not be expected to adversely affect any species on the population or regional level.

Fire Potential

Wildfires from any cause can impact wildlife. Fire danger is discussed in Chapter 3.3.3.3. The potential for a defensive training flare-initiated wildfire to affect wildlife habitat is considered minimal for a number of reasons. Once flares are released they burn out within 5 seconds and within approximately 500 feet of the release altitude. Deployment of defensive flares would be limited to above 2,000 feet AGL and would be discontinued under extreme fire conditions below an airspace. Altitude restrictions are expected to result in complete flare combustion more than 1,500 feet above the ground. Any residual materials, such as plastic end caps, would not have the ability to cause a fire. Occasionally flares may not ignite (approximately 0.01 percent of the flares deployed) and the dud flare could fall to the ground. The magnesium within the flare is quite stable and it would take a hot fire to ignite a dud flare, although a dud flare could be ignited by a strike with a power saw or a bullet.

If a wildland fire were to occur as a result of an Air Force activity, a loss of canopy and/or understory vegetation would likely occur depending on the severity of the fire, land condition at the time, and if and how soon fire control can respond. Recovery of the vegetation would depend on the plant species burned, season, and severity. Vegetation types such as grasslands naturally have a fairly frequent fire regime, and therefore are composed of species that can recover quickly from fires. Woodlands and shrubland communities recover over longer time periods depending on severity of the fire and climatic conditions (especially precipitation and temperature regimes) available following fire. Although project-related fires would be expected to be very infrequent, loss of plant cover could increase erosion and sedimentation downslope in some areas. Bare ground as a result of fires can allow the spread of invasive non-native plant species such as annual grasses (e.g., cheatgrass), depending on the nature of the vegetation burned and the presence of invasive species in surrounding areas. Post-fire conditions of erosion, sedimentation, or invasion of non-native species are generally unfavorable for wildlife and reduce productively of habitats to support species.

A wildland fire may result in direct effects on wildlife and livestock, including displacement from important habitat or range. The degree of effect varies by the severity of the fire, the season of the fire, and the type of habitat that was burned. Fires temporarily decrease available cover and foraging habitat, and fires started during breeding season could adversely affect ground nesting birds and interrupt breeding rituals for resident species. As previously stated, the potential for wildland fires as a result of Air Force activity is minimal and not considered a significant risk to wildlife habitat quality or quantity in the ROI.

4.6.3.2 Alternative B

Alternative B would expand existing airspace assets, increase airspace operations, allow supersonic activity, and introduce the use of chaff and flares into the training area similar to the Proposed Action. Potential biological effects would be similar to and comparable to those described for Alternative A, the Proposed Action. Alternative B differs from the Proposed Action by not including PR-1A, PR-1B, or Gap A MOAs. This would result in less local low-level training overflight in the more varied terrain on the western end of the proposed PRTC. As discussed under the Proposed Action, although most animals would be expected to habituate to a level of overflights and sonic booms, the increase in active airspace and frequency of flights could affect the behavior of some wildlife species in the newly proposed MOAs. Overall, Alternative B would be expected to result in slightly fewer adverse effects to wildlife and sensitive species compared to the Proposed Action because the MOA area is smaller and low-altitude overflights would not occur under the PR-1A/1B and associated Gap A ATCAAs. Sonic booms and chaff and flare use would continue from aircraft training in the ATCAA. Overall, Alternative B would not be expected to adversely affect vegetation or wildlife resources.

4.6.3.3 Alternative C

The total MOA airspace included for Alternative C is smaller than that for the Proposed Action. The more varied terrain to the west would be overflown at low levels and consequences would be comparable to those described for Alternative A. Alternative C does not include PR-4 MOA and Gap C MOA. The biological resources present would be generally very similar to those described for the Proposed Action and Alternative B. There would not be low-level overflight in flyways to the east side of the proposed airspace. Potential impacts would be similar to those described for Alternative A except under the PR-4 and Gap C ATCAAs where no low-level training would occur. Any adverse effects to vegetation or wildlife resources from Alternative C would be less than significant.

4.6.3.4 No-Action Alternative

The No-Action Alternative would not create the PRTC or expand training airspace. As a result, conditions would remain the same as those described in Section 3.6, *Existing Conditions* for the biological resources present in the ROI. This would include continued low-level training in the Powder River A and B MOAs which represent most of the proposed PR-2 MOA.

4.7 Cultural and Historic Resources

4.7.1 Methodology

Impact analysis for cultural resources focuses on assessing whether the Proposed Action or alternatives have the potential to affect cultural resources that are eligible for listing in the National Register of Historic Places (NRHP) or have traditional significance for Native American groups. Under Section 106 of the National Historic Preservation Act (NHPA), the proponent of the action is responsible for determining whether any historic properties are located in the area; assessing whether the proposed undertaking would adversely affect the resources, and notifying the State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Officer of any adverse effects.

An adverse effect is any action that may directly or indirectly change the characteristics that make the historic property eligible for listing in the NRHP. If an adverse effect is identified, the federal agency consults with the SHPO/Tribal Historic Preservation Officer and federally recognized Native American tribes to develop measures to avoid, minimize, or resolve the adverse effects of the undertaking.

Direct impacts may occur by physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; introducing visual or audible elements that are out of character with the property or alter its setting; or neglecting the resource to the extent that it deteriorates or is destroyed. Direct impacts can be assessed by identifying the types and locations of proposed activity and determining the exact location of cultural resources that could be affected. Indirect impacts generally result from increased use of an area and are harder to quantify.

Impacts to cultural resources are evaluated for lands beneath the proposed PRTC airspace, and especially the proposed low-level training MOA airspace in portions of several counties in ND, SD, WY, and MT. Because the proposed project is an airspace action only those cultural resources that would reasonably be affected by visual and noise intrusions are considered in this EIS.

Visual and noise intrusions could include low-level overflights, sonic booms, and chaff and flare residual materials. Cultural resources potentially affected include very significant historic sites such as National Historic Landmarks or properties listed on, or eligible for listing on, the NRHP that qualify because of setting or feeling, historic architectural resources or archaeological resources with standing structures (such as historic ranches or forts that could be affected by vibrations), national historic trails, and traditional cultural resources that are associated with places that require isolation or quiet. The Air Force recognizes that hundreds of other cultural resources, some documented and some not yet discovered, exist under the airspace. Aircraft operations have the potential to affect historic structures and districts where setting is an important criterion for significance and where noise vibrations from sonic booms or low-level overflights could adversely impact those types of resources. These resources are typically found on the NRHP or State Register. Conversely, if NRHP-listed properties are not affected by the project elements, then non-listed resources are unlikely to be affected.

Prehistoric and historic archaeological sites lacking standing structures are not included as they are generally surface or even subsurface deposits that would not be directly affected by visual or noise intrusions associated with training aircraft. Some prehistoric archaeological sites could contain natural structures such as rock shelters or caves. These structures often house petroglyphs or pictographs, which are etched or painted onto the rock surfaces. Studies have found that these types of natural formations are affected more by erosion than by sonic booms (Battis 1983).

4.7.2 Issues and Concerns

Concerns mentioned by the general public and Native American tribes during the EIS scoping process include disturbance to traditional or sacred sites, interference with religious ceremonies, and visual effects to sites and sacred areas from overflights and chaff and flares. Correspondence with potentially affected tribes is contained in Appendix M.

Elements under the proposed PRTC include creation of new airspace, flying at low altitudes in the MOAs, use of supersonic speed above specified altitudes in the airspace, and release of defensive chaff and flares. Under the Proposed Action, B-1 supersonic flight would be permitted above 20,000 feet MSL and would be permitted by transient fighters above 10,000 feet AGL. Supersonic flight operations would be permitted during 10 days of LFEs only. The release of defensive flares and chaff would be permitted within all MOA and ATCAA airspaces. Current training operations in the existing Powder River airspace do not permit supersonic flight or the release of chaff and flares.

4.7.2.1 Visual Intrusions

Visual intrusions can include aircraft overflights which intrude into the viewshed of a cultural resource, thus adversely affecting its setting. The aircraft flying overhead has the potential to adversely affect the setting, feeling, and character of cultural resources within sight of the aircraft. For the proposed PRTC MOAs, aircraft would be flying at an altitude as low as 500 feet AGL. At these altitudes aircraft could have visual impacts to resources on the ground.

Questions were raised at scoping about Tribal sovereignty and airspace over Tribal lands. As explained in Section 1.4, Congress has charged the FAA with administering all navigable airspace. FAA is responsible for all airspace associated with the U.S. including airspace over Tribal lands, private property, and public property.

Visual intrusions can include overflight of a Tribal ceremony. During Government-to-Government consultations, Tribal members regularly cited their concerns that low-level overflights would intrude upon their ceremonies and vision quests. Air Force representatives assured the Tribal members that, when told of a specific location to avoid, the Air Force would establish reasonable avoidance areas to protect the privacy of participants.

The release of chaff and flares could have a visual effect from residual materials which remain on the ground or land on structures or at sacred sites. Studies have shown that chaff and its residual materials do not pose a significant threat to the visual integrity of archaeological and architectural resources (GAO 1998). Chaff does not accumulate to any great degree and the fibers, if found, were often mistaken for natural elements such as animal fur or plant material. The fibers generally dissipate within a few days due to mechanical breakdown from wind, sediment erosion, and rain or snow. The residual materials from flares and chaff are described in section 2.4.6.3. Chaff residual plastic materials are typically one inch by one inch. Flare residual plastic materials, usually red or blue in color, can be one inch by two inches or larger. Overall, chaff and flares are unlikely to adversely affect cultural resources. The residual materials from chaff and flares fall to the ground in a dispersed fashion and do not collect in quantities great enough to adversely affect the NRHP status of archaeological or architectural resources. Impacts to traditional cultural resources are more difficult to assess and no studies have been conducted on traditional cultural resources with regard to chaff and flare residual materials. Chaff or flare residual materials have been identified by ranchers on their property. When a plastic chaff or flare piece is found and identified in conjunction with a cultural resource, the individual finding the piece may be annoyed.

4.7.2.2 Noise Intrusions

SUBSONIC

Experimental data and models (Battis 1988, Sutherland 1990, King 1985, King *et al.* 1988) show that damage to architectural resources, including adobe buildings, is unlikely to be caused by subsonic noise and vibrations from aircraft overflights. Subsonic, noise-related vibration damage to structures requires high dB levels generated at close proximity to the structures and in a low frequency range (USFS 1992, cf. Battis 1983, 1988). Aircraft must generate a maximum sound level (L_{max}) of at least 120 dB to potentially result in structural damage (Battis 1988) and, even at 130 dB, structural damage is unlikely (refer to Appendix H). Sutherland (1990) found that the probability of damage to a poorly constructed or poorly maintained wood frame building is less than 0.3 percent even when the building is directly under a large, high-speed aircraft flying only a few hundred feet AGL.

SUPERSONIC

The proposed action would allow for supersonic flights of transient fighter aircraft within the proposed PRTC airspace at altitudes above 10,000 feet AGL with the majority occurring above 18,000 feet MSL or higher (Table 2-8). B-1 bomber supersonic flight would be permitted above 20,000 feet MSL. Supersonic training flights would only be authorized during LFEs and could result in a location toward the center of the airspace experiencing an average of approximately one sonic boom per day during the 1 to 3 days of LFEs per quarter. Sonic booms could be described as ranging from the sound of distant thunder to a sharp double crack.

Sonic booms can be associated with structural damage. Most damage claims are for brittle objects, such as glass and plaster. Table 4.2-6 summarizes damage that could occur at various overpressures. There is a large degree of variability in damage experience, and much damage depends on the pre-existing condition of a structure. Breakage data for glass, for example, spans a range of two to three orders of magnitude at a given overpressure. At 1 pound psf, the probability of a window breaking ranges from one in a billion (Sutherland 1990) to one in a million (Hershey and Higgins 1976). These damage rates are associated with a combination of boom load and glass condition. At 10 psf, the probability of breakage is between one-in-a-hundred and one- in-a-thousand. Laboratory tests of glass (White 1972) have shown that properly installed window glass did not break at overpressures below 10 psf, even when subjected to repeated booms.

Damage to plaster occurs at similar ranges to glass damage. Plaster has a compounding issue in that it will often crack due to shrinkage while curing, or from stresses as a structure settles, even in the absence of outside loads. Sonic boom damage to plaster often occurs when internal stresses are high from these factors. Some degree of damage to glass and plaster should thus be expected whenever there are sonic booms, but usually at the low rates noted above.

The effects of noise on cultural resources may also be related to setting. Noise and startle effect impacts to Native American traditional cultural resources may be related to interference with ceremonies and other traditional activities at sacred sites. Undisturbed habitats, resources, and settings are considered to be critical to religious practices (National Park Service 1994). Potential impacts can be identified only through consultation with the affected groups.

4.7.3 Environmental Consequences

4.7.3.1 Alternative A – Proposed Action

Impacts to cultural resources could occur from an increase in noise, both subsonic and supersonic noise. The low-level overflights would have a startle effect and a noise effect, due to the low altitude and speed of training aircraft. For the proposed action, an average of approximately one sonic boom would be experienced toward the center of the airspace per day during the 1 to 3 day quarterly LFE. The booms could be experienced as a sharp crack-crack or more often, as distant thunder. The potential for damage is presented in Table 4.2-6. The types of structures most susceptible are glass and adobe or similar plaster-type materials. Historic standing structures within the land beneath the affected airspace consist primarily of wood or log buildings with no window glass and some adobe or earth block structures. The infrequency and the random nature of the sonic booms suggest that structural damage to historic structures would not be expected.

Tables 3.7-2 through 3.7-7 provide a summary of all cultural resources that were documented as of Spring 2010 during the background research of areas that underlie the airspace associated with Alternative A. Two hundred and thirty-seven NRHP properties lie in this area; these include historic districts, archaeological sites, ranches, bridges, dams, and a variety of other structures (see Table 4.7-1). Each of these properties currently being overflown by training aircraft is listed as “existing” in Tables 3.7-2 through 3.7-7. None of these properties is currently subject to sonic booms. Neither the noise nor the visual presence of these overflights has affected the NRHP-eligibility status of the resources that are currently being overflown.

Nine other types of cultural resources have been identified beneath the proposed airspace for Alternative A; in some cases these overlap the NRHP properties. There are two National Monuments beneath the affected airspace, Devils Tower is beneath the Gateway ATCAA, and the Little Bighorn Battlefield is beneath the proposed PR-1B MOA. There are also three National Landmarks: Bear Butte, the Frawley Ranch, and the Deadwood Historic District. All but Bear Butte and the Little Bighorn Battlefield are currently overflown by an ATCAA with a floor of 18,000 feet MSL. The Little Big Horn National Monument has a charted 0.75 NM avoidance square around the north and south portions (Custer Battlefield and Reno-Benteen Battlefield). Each is charted with a minimum altitude of 2,000' AGL and this would not change under Alternative A. Currently Bear Butte is on the edge of an ATCAA and the proposed overlying airspace would be an ATCAA. Wind Cave, SD is outside the proposed PRTC. The effects of overflights above 18,000 feet MSL on Bear Butte or Devils Tower would be negligible. Little Bighorn Battlefield would be under a proposed MOA airspace.

Other sites that are eligible for the NRHP but have not yet been listed are also present beneath the affected airspace, these properties include battlefields, prairie churches, and a variety of other sites with standing structures. There are 23 ghost towns beneath the affected airspace, 26 historic ranches, and 1 historic trail. The Tongue River Valley Cultural landscape also underlies the proposed airspace of Alternative A.

Portions of three Native American reservations are underneath the proposed MOA airspace for Alternative A, the Crow, Cheyenne River, and Standing Rock Reservations. The Northern Cheyenne Reservation is completely under the proposed MOA airspace for Alternative A. Beneath Alternative A airspace, eight traditional cultural properties have been directly identified. In addition to these eight, a number of other battlefield sites, archaeological sites, and landscape areas have been identified as being probable sacred areas.

Table 4.7-1. Cultural Resources Under Alternative A Affected Airspace

Resource Type	***Number of Resources***
NRHP Listed Sites	237
National Monuments	2
National Landmarks	3
Ghost Towns	23
Historic Ranches	26
Historic Trails	1
Cultural Landscapes	1
Traditional Cultural Properties	8

Low-level overflights in the newly established PR-1A, PR-1B, PR-3, PR-4, and associated Gap MOAs would impact the setting of cultural properties and cultural resources which have not been used previously for MOA training. SEL_r from B-1 or B-52 aircraft flying level at 500 feet AGL could be in the 108-117 dB range outdoors (Table 3.2-1) and 88-97 dB indoors with windows closed. Should a B-1 perform a maneuver requiring the afterburner to be engaged, SEL_r could increase to 133 dB, but this would be on a very infrequent basis. The numbers of overflights exceeding 65, 75, and 85 dB SEL_r at representative locations under PRTC are shown in Table 4.7-2. A map showing the representative locations listed in Table 4.7-2 as well as other locations can be found at Figure 3.7-1. Overflight noise would be relatively infrequent, with noise levels exceeding 65 dB SEL_r occurring between less than 0.1 times per day and 0.4 times per day. While certain frequencies (such as 30 hertz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (Committee on Hearing, Bioacoustics, and Biomechanics 1977). It is possible, but unlikely, that architectural or archaeological resources would be physically damaged by an average of 6 to 9 low-level overflights per year. Sonic boom effects would be infrequent, approximately one per LFE day (10 LFE days per year), and random and could be felt anywhere under the Alternative A airspace. In the extremely unlikely event that a sonic boom high overpressure damaged a historic structure, a claim to repair the structure would start by contacting Ellsworth AFB Public Affairs.

As described in Section 4.9.3.1.5, an average of 6 to 9 low-altitude overflights per year and an average of approximately one sonic boom per LFE day would be expected in the proposed airspace. The change in setting created by increased noise from these low-altitude overflights and sonic booms would have an adverse impact on traditional cultural properties and cultural landscapes. Establishing altitude restrictions and avoidance areas would be one way to reduce adverse effects on these properties. The Air Force would establish reasonable temporary or seasonal avoidance areas or could adopt other measures identified in consultation with affected tribes to reduce intrusive impacts.

Table 4.7-2. Number of Overflights Exceeding 65, 75, and 85 dB SEL_r at Representative Culturally-Sensitive Locations Under PRTC Under Baseline Conditions and Alternative A

ID#	General Description	Baseline Airspace	Baseline # Events Per Day Exceeding			Proposed Airspace	Proposed # Events Per Day Exceeding		
			65 dB SEL	75 dB SEL	85 dB SEL		65 dB SEL	75 dB SEL	85 dB SEL
1	Inya Kara Mountain	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
2	Devils Tower [2]	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.2	<0.1
3	Little Bighorn Battlefield National Monument [3]	None	n/a	n/a	n/a	PR-1A MOA/ATCAA	0.3	0.2	<0.1
4	Bear Butte	None	n/a	n/a	n/a	Gateway West ATCAA	0.3	0.1	<0.1
13	Crow Native American Reservation (Crow Agency, MT)	none	n/a	n/a	n/a	PR-1B MOA/ATCAA	0.3	0.2	<0.1
14	Northern Cheyenne Native American Reservation (Lame Deer, MT)	none	n/a	n/a	n/a	PR-1B MOA/ATCAA	0.3	0.2	<0.1
15	Standing Rock Native American Reservation	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.3	0.2	<0.1
16	Cheyenne River Native American Reservation	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.4	0.2	<0.1

Notes:
1. Because several of the listed noise-sensitive areas are very large, locations were selected from within the designated areas that are near the center of proposed airspace units.
2. Devils Tower published aircraft avoidance area is 5 NM horizontally and 18,000 feet AGL
3. Little Bighorn Battlefield published aircraft avoidance area is ¾ nautical mile horizontally and 2,000 feet AGL.

Native American Concerns

Portions of three Native American reservations are underneath the proposed MOA airspace for Alternative A, the Crow, Cheyenne River, and Standing Rock Reservations. The Northern Cheyenne Reservation, including its population center Lame Deer, is completely under the proposed MOA airspace for Alternative A. Consultation with local tribal governments is ongoing. Part of the consultation process is working to identify periods of avoidance locations to reduce noise and visual impacts on religious ceremonies for all Tribes affected by the proposed PRTC. In addition to traditional cultural properties, cultural landscapes, archaeological sites, and natural sites (such as rivers) are all locations where religious ceremonies are held. Alternative A, which overflies at low level, parts or all of four reservations, would have greater impacts than either Alternative B or Alternative C.

The change in setting created by increased noise due to low level overflights was identified during Government-to-Government consultations as having a potentially significant impact to Native American Reservations. The Northern Cheyenne, Standing Rock, and Cheyenne River Reservations have expressed concern over noise effects to domestic stock animals during calving season. Financial loss is a concern. The Northern Cheyenne have also expressed concern over the economic welfare of the tribe, which could be adversely impacted by increased noise. Through the consultation process several tribes have requested periods of avoidance for calving season as well as for Tribal and individual ceremonies.

4.7.3.2 Alternative B

Under Alternative B, the PR-1A, PR-1B, and Gap A ATCAAs would be established, but the low-level PR-1A, PR-1B, and Gap A MOAs would not be created. Table 4.7-3 shows the types and numbers of affected properties under the MOAs in Alternative B airspace.

Table 4.7-3. Cultural Resources Under Alternative B Affected Airspace

Resource Type	*Number of Resources*
NRHP Listed Sites	202
National Monuments	1
National Landmarks	3
Ghost Towns	23
Historic Ranches	22
Historic Trails	1
Cultural Landscapes	0
Traditional Cultural Properties	6

The greatest change in effect can be noted for the properties and reservations under the PR-1A, PR-1B, and Gap A ATCAAs. The creation of an ATCAA with training flights above 18,000 feet MSL reduces the possibility of noise when compared to low-level overflights like those associated with Alternative A. Random sonic booms could still occur. An ATCAA, due to its higher altitude is far less likely to have any significant effect on the setting of a cultural property.

Under Alternative B, the effects of noise and change in setting would be minimal for the Crow Reservation, the Northern Cheyenne Reservation, the Little Bighorn Battlefield National Monument, and the Tongue River Cultural Landscape. The change in setting will be minimal for these properties and resources because no low-level overflights, like those associated with Alternative A, would occur under this alternative. Training flights over these properties and resources would be above 18,000 feet MSL significantly reducing the possibility of noise impacts. An average of one sonic boom per day for the 10 LFE days per year would be anticipated. In addition, the effect of an ATCAA on two of the traditional cultural properties, the Battle of Wolf Mountains and the Battle of Rosebud Creek sites, would be negligible. These two properties would only be overflown above 18,000 feet MSL (FL180).

High-altitude noise effects to Devils Tower, Bear Butte, the Frawley Ranch, and the Deadwood Historic District would still occur under Alternative B (though as noted above, all of these would be overflown only above FL180 in an ATCAA. The number of overflights exceeding 65, 75, and 85 dB SEL_r at representative culturally-sensitive locations under PRTC is shown in Table 4.7-4. Overflight noise would be relatively infrequent, with noise levels exceeding 65 dB SEL_r occurring between 0.2 times per day (2 out of 10 days) and 0.4 times per day (4 out of 10 days) on average.

Table 4.7-4. Number of Overflights Exceeding 65, 75, and 85 dB SEL_r at Representative Culturally-Sensitive Locations Under PRTC Under Baseline Conditions and Alternative B

ID#	General Description	Baseline Airspace	Baseline # Events Per Day Exceeding 65 dB SEL	75 dB SEL	85 dB SEL	Proposed Airspace	Proposed # Events Per Day Exceeding 65 dB SEL	75 dB SEL	85 dB SEL
1	Inya Kara Mountain	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
2	Devils Tower [2]	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.2	<0.1
3	Little Bighorn Battlefield National Monument [3]	None	n/a	n/a	n/a	PR-1A ATCAA	0.2	0.1	<0.1
4	Bear Butte	None	n/a	n/a	n/a	Gateway West ATCAA	0.3	0.1	<0.1
13	Crow Native American Reservation (Crow Agency, MT)	none	n/a	n/a	n/a	PR-1B ATCAA	0.2	0.1	<0.1
14	Northern Cheyenne Native American Reservation (Lame Deer, MT)	none	n/a	n/a	n/a	PR-1B ATCAA	0.2	0.1	<0.1
15	Standing Rock Native American Reservation	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.3	0.2	<0.1
16	Cheyenne River Native American Reservation	none	n/a	n/a	n/a	PR-4 MOA/ATCAA	0.4	0.2	<0.1

Note:
1. Because several of the listed noise-sensitive areas are very large, locations were selected from within the designated areas that are near the center of proposed airspace units.
2. Devils Tower published aircraft avoidance area is 5 NM horizontally and 18,000 feet AGL
3. Little Bighorn Battlefield published aircraft avoidance area is ¾ nautical mile horizontally and 2,000 feet AGL.

Native American Concerns

The Standing Rock and a small portion of the Cheyenne River Native American Reservations would be affected by aircraft overflights and their associated changes in noise and setting due to the establishment of the PR-4 MOA. The change in setting created by increased noise from lower altitude overflights, startle effects, and very infrequent sonic boom noise would have an adverse impact on at least four traditional cultural properties, as well as other areas where traditional ceremonies are held. Concerns over impacts to domestic stock animals similar to those discussed under Alternative A would also apply to Alternative B. Establishing altitude restrictions and reasonable avoidance areas would be one way to reduce adverse effects on these properties. The Air Force would establish reasonable temporary or seasonal avoidance areas or could adopt other measures identified in consultation with affected tribes to reduce intrusive impacts.

4.7.3.3 Alternative C

Under Alternative C, there would be no PR-4 or Gap C MOAs. The PR-4 and Gap C ATCAAs would be established for training above 18,000 feet MSL. Table 4.7-5 shows the types and numbers of affected properties under the ATCAAs in Alternative C airspace.

Table 4.7-5. Cultural Resources Under Alternative C Affected Airspace

Resource Type	Number of Resources
NRHP Listed Sites	208
National Monuments	2
National Landmarks	3
Ghost Towns	22
Historic Ranches	23
Historic Trails	1
Cultural Landscapes	1
Traditional Cultural Properties	8

The greatest change in effect can be noted for the properties under the PR-4 and Gap C ATCAAs. The creation of an ATCAA reduces the possibility of noise damage and is far less likely to have any significant effect on the setting of a property. As shown in Table 4.7-6, the number of overflights exceeding 65 dB SEL_r would be 0.3 per day on average at several culturally-sensitive locations selected for analysis.

Table 4.7-6. Number of Overflights Exceeding 65, 75, and 85 dB SEL_r at Representative Culturally-Sensitive Locations Under PRTC Under Baseline Conditions and Alternative C

ID#	General Description	Baseline Airspace	Baseline # Events Per Day Exceeding			Proposed Airspace	Proposed # Events Per Day Exceeding		
			65 dB SEL	75 dB SEL	85 dB SEL		65 dB SEL	75 dB SEL	85 dB SEL
1	Inya Kara Mountain	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.1	<0.1
2	Devils Tower [2]	Gateway ATCAA	0.4	0.1	<0.1	Gateway West ATCAA	0.3	0.2	<0.1
3	Little Bighorn Battlefield National Monument [3]	None	n/a	n/a	n/a	PR-1A MOA/ATCAA	0.3	0.2	<0.1
4	Bear Butte	None	n/a	n/a	n/a	Gateway West ATCAA	0.3	0.1	<0.1
13	Crow Native American Reservation (Crow Agency, MT)	none	n/a	n/a	n/a	PR-1B MOA/ATCAA	0.3	0.2	<0.1
14	Northern Cheyenne Native American Reservation (Lame Deer, MT)	none	n/a	n/a	n/a	PR-1B MOA/ATCAA	0.3	0.2	<0.1
15	Standing Rock Native American Reservation	none	n/a	n/a	n/a	PR-4 ATCAA	0.3	0.2	<0.1
16	Cheyenne River Native American Reservation	none	n/a	n/a	n/a	PR-4 ATCAA	0.3	0.2	<0.1

Under Alternative C, the effects of noise and change in setting would be minimal for the Standing Rock and Cheyenne River Native American Reservations. These reservations would only be subject to high altitude noise effects (above 18,000 feet MSL). High-altitude ATCAA overflight noise effects to Devils Tower, Bear Butte, the Frawley Ranch, and the Deadwood Historic District would occur under Alternative C, but no change in noise levels would be discernable. An estimated average of one sonic boom per LFE day could be experienced anywhere under the airspace during the 10 LFE days per year.

NATIVE AMERICAN CONCERNS

The Crow Native American Reservation and the Northern Cheyenne Native American Reservation would be affected by changes in noise and setting as described for Alternative A. The change in setting created by increased noise from lower altitude overflights, increased sorties, and very infrequent sonic boom noise would have an adverse impact on traditional cultural resources and cultural landscapes. Concerns over impacts to domestic stock animals similar to those discussed under Alternative A would also apply to Alternative C. Establishing altitude restrictions and avoidance areas would be one way to reduce adverse effects on these properties. The Air Force would establish reasonable temporary or seasonal avoidance areas or could adopt other measures identified in consultation with affected tribes to reduce intrusive impacts.

4.7.3.4 No-Action Alternative

Under the No- Action Alternative, there would be no changes in airspace activities within the existing Powder River airspace and the PRTC would not be established. There would be no change in visual or noise intrusions which currently occur to existing properties listed in Table 3.7-2 and summarized in Table 4.7-7. No Native American Reservations are located under the existing Powder River A or B MOAs. Aircraft would continue to fly over these areas and avoidance procedures in effect would continue. The No-Action Alternative would result in no changes to cultural resources.

Table 4.7-7. Cultural Resources Under No-Action Alternative Affected Airspace

Resource Type	*Number of Resources*
NRHP Listed Sites	96
National Monument	1
National Landmarks	2
Ghost Towns	15
Historic Ranches	11
Historic Trails	1
Cultural Landscapes	0
Traditional Cultural Properties	5

4.8 Land Use and Recreation

4.8.1 Methodology

During scoping, participants from many rural areas explained that they consider visual and noise qualities important to that use of the land. Of particular concern to some scoping meeting participants was the original Air Force proposal with the possibility of sudden overflights or sonic booms at any time and the potential effect of such training activities on their use of the land. Land uses include ranching, farming, recreation, and rural communities.

Land use and recreational resources are evaluated to determine if any proposed project activity would preclude or alter the suitability of an area for ongoing or intended land uses. In general, land use impacts would occur if project activities were (1) inconsistent or noncompliant with applicable land use plans and policies, (2) preventing or displacing continued use or occupation of an area or severely diminishing its attributes for ongoing uses, or (3) incompatible with affected areas to the extent that public health or safety is threatened.

Recreation resources would be affected if there were a change in access or availability of recreation sites or activities, or a change in the qualities of an area and thereby reducing the recreational opportunities.

The proposed PRTC would not place restrictions on land use. Any restrictions on towers or tall structures would be established by local agencies and the FAA (see Section 3.3.3.2). Noise from aircraft operations is the primary source of impact on land use and recreation. The following factors are considered in evaluating noise impacts on land use.

4.8.2 Issues and Concerns

General issues for land use and recreation expressed during public scoping include:

- Potential effects from aircraft noise and, during LFEs, sonic booms (particularly on small residential communities and rural quiet of isolated residences, ranching operations, tourism, hunting and fishing, and other livelihoods) and non-commercial recreational pursuits (see also Section 4.2).
- Potential for the proposal to displace existing or planned land uses, or to significantly alter or degrade conditions that are intrinsic to the viability of current and planned uses (see also Section 4.8).
- Changes or disruption to aviation access (see also Sections 4.1 and 4.9).
- Potential effects of noise on wildlife to have indirect effects on hunting (see also Section 4.6).
- Potential effects on ranching and agriculture from flare-caused fires (see also Sections 4.3 and 4.6).
- Potential effects on ranching viability from cattle ingestion of chaff (see also Section 4.6).

Specific issues for land use and recreation identified during scoping:

- Potential incompatibility between current wind farm operations and anticipated development with low-level flights and chaff (Baker MT, Bowman County, Newell to New Underwood, SD, and Mead County SD) (see also Sections 4.1, 4.3, 4.9 and 5.0).
- Effects on hunting, specifically on sage grouse (see also Section 4.6).
- Effects of aircraft noise on quiet rural areas (see also Section 4.2).
- Effect of noise and startle effects on recreational quality and opportunity in Custer National Forest, Little Bighorn Battlefield, or Devils Tower National Monument (see also Section 4.7).
- Effects of noise and startle effects on ranching operations, particularly, seasonal calving, calf weaning, and roundup (see also Sections 4.2 and 4.9).
- Impacts of low level flight and startling noise on persons living under affected airspace (see also Sections 4.2 and 4.7).
- Interference with sleep of night-shift workers who sleep during the day (see also Section 4.2).
- Potential occupational, personal, and recreational safety concerns when animals react to sudden onset noise low-level flight operations and supersonic events (for example, cattle

stampeding or running into fencing;, horses throwing riders or bolting) (see also Sections 4.2, 4.3, and 4.9).

- Effects on private general aviation operations and on the activities and occupations of the residents (see also Sections 4.1 and 4.9).
- Potential incompatibility between low level operations with recreational flying, such as sky divers, gliders, and parasailing (Belle Fourche, SD; Bowman, MT) (see also Section 4.1).

Issues covered elsewhere in this EIS:

- Flight safety for VFR and IFR air operations for private and commercial purposes; affecting weather modification operations (cloud seeding), crop spraying, and fire suppression throughout the region (see Sections 4.1 and 4.3).
- Effects on property values and disclosure requirements for properties underlying affected airspace (see Section 4.9).
- Potential disruption in weather modification programs in western ND (see Section 4.1).
- Potential for widespread fires in oil and gas production areas (see Sections 4.3 and 4.9).
- Potential effects of noise on wildlife populations (see Sections 4.2 and 4.6).
- Potential effects of noise on domestic animal productivity (see Sections 4.2 and 4.6).
- Potential safety risk from dud flares igniting due to ground disturbing activity (e.g., plowing, excavations for construction) (see Section 4.3).
- Potential safety risks from wake turbulence on civilian aircraft (see also Section 4.3).
- Potential safety issues from sonic booms or other impulse noise on sensitive electronic equipment at power plants and coal mines (Colstrip, MT) (see Section 4.3).

As a result of public and agency review comments on the original Air Force proposed action, the Air Force incorporated a series of mitigations into a revised proposal. Mitigation measures, summarized in Section 2.12, are proposed to reduce potential impacts to expressed land use concerns.

4.8.2.1 Noise Effects on Communities and Residential Land Uses

Aircraft low-level overflights, noise, and chaff or flare residual materials could be annoying intrusions, but are not likely to change any land uses under the proposed airspace.

Section 4.2 addresses effects of noise on people, including sleep, interference with speech and communicating, and a variety of factors that affect health, and social and economic functions. These intrusions contribute to annoyance. The Air Force revised proposal has specified morning and afternoon-evening schedules Monday through Thursday and Friday morning. This would provide information to individuals desiring to know when a low-level overflight could occur. As described in Section 4.2, studies have correlated average noise levels with community annoyance as a percentage of the affected population (see 14 CFR part 150, Table 1; FAA Order 1050.1E, App. A, p. A-15). Using this information, several agencies adopted guidelines with 65 DNL as a criterion for compatibility with residential land uses. Some commenters at scoping noted that more sporadic noise exposure may cause greater annoyance due to the unpredictability of the overflights. There has been some investigation to determine if dose/response data on annoyance developed in urban contexts is generally similar in rural environments (Air Force 1992). The majority of these studies have been done in conjunction with sightseeing overflights of National Parks. Typically, rural environments have low ambient noise levels, and an average of 6 to 9 low-level overflights per year or the expected 10 days per year when LFEs with a sonic boom could introduce momentary disruption between the ambient sound and the incidental noise event. A low ambient noise combined with a short, high noise could heighten the reaction of individuals to noise.

The amount of change in noise level is another way to evaluate impact of noise more broadly over a large area. While human perception of, and reaction to, noise can vary, in general, most people can detect a 3 dB change. Even below 65 DNL, a 3 dB change can be perceived as a degradation of the noise environment (Federal Interagency Committee on Noise 1992).

Startle effects are experienced when a loud noise occurs in a context where not expected and when there is no visible or audible warning. Low-flying military aircraft and sonic booms can startle humans and animals. Unpredictability of flight operations in MOAs may "increase people's annoyance because they do not know when the overflights will occur, making affected persons even more prone to 'startle effects'" (Air Force 1992). Startle effects to animals can affect ranching operations; for example, cattle could stampede if startled during specific ranching operations such as calf weaning and branding.

4.8.2.2 Noise Effects on Recreational Land Use

Reactions to noise in recreational settings vary. A study by the USFS found that visitors to wilderness areas did not generally notice high-altitude aircraft noise intrusions, although, startle effects from low-flying high-speed aircraft were noticed and reported as annoying by some visitors (USFS 1992). Visitors varied on whether aircraft overflights were a positive or detrimental factor to their outdoor experience. Recreational opportunity is classified by the BLM as a combination of the type of challenge provided, in part based on the degree of isolation and remoteness. Quiet and naturalness is an intrinsic part of some recreational experiences. Changes to quiet settings could constitute an effect on the range of recreational opportunities in an area or region, but would not be expected to change the land use of the area.

During scoping, several persons expressed concern that noise could interfere with hunting activities and have a secondary affect on motels and restaurants. During the expected 10 annual days of LFEs any area under the airspace could experience approximately one sonic boom per day. During regular training there could be a low-level overflight of a military aircraft at 2,000 feet AGL or below calculated at an average for any location of 6 to 9 times per year. If such an event occurred at exactly the time a hunter was preparing to shoot, it is possible for an animal to be startled. Should such a noise cause the hunter to miss an opportunity, the hunter would likely be annoyed. Some animals or birds (such as pheasants and sage grouse) may be susceptible to noise and scatter when a sudden loud noise occurs. Also, a sudden noise can be undesirable for the quality of the outdoor experience to some hunters. While these isolated events can happen, behavior of game animals and their reproduction and populations are not significantly affected by noise (see Section 4.6). Hunting is a viable local land use under the existing Powder River airspace in SD, MT, and WY and in other parts of the U.S. where low flying military overflights occur. The fact that hunting can and does coexist with infrequent and random low-level overflights does not reduce the perceived significance of the impact to residents or visitors under the proposed PRTC.

Startle effects could affect other recreation. Startle effects could cause a safety risk for rock climbers or other physically challenging tasks requiring a high degree of concentration. The wide distribution of low-level overflight, the fact that such overflight would not normally be scheduled from Friday noon through the weekend, the premier rock climbing locations under the ATCAAs as opposed to under the

MOAs, and the scheduling of day-to-day training and the advance publication of LFE dates when supersonic events could be anticipated all contribute to a low possibility of overflight or sonic boom impacts on recreational land uses.

4.8.2.3 Aircraft Noise and Land Use

The primary impact of sonic booms or low-level overflight on human populations would be annoyance. In response to concerns expressed at scoping, the Air Force revised the aeronautical proposal to schedule supersonic training only during an expected LFE for 10 days per year, typically 1 to 3 days per quarter to reduce the uncertainty of the sonic boom occurrence. A calculated average total of 6 sonic booms could be experienced toward the center of the airspace during the 10 annual days of LFEs. For the purpose of this EIS, this number is rounded up to approximately one sonic boom per LFE training day. Sonic booms may be experienced as a loud crack-crack or be heard as distant, low, rolling thunder.

There are few studies that can help predict annoyance or land use effects from sonic booms. Sonic boom noise may combine with noise exposure from other sources (including subsonic aircraft noise) to cause annoyance. Humans tend to respond to the high frequency sounds in a sonic boom, while structures tend to respond to the low frequencies which cause shaking. Shaking can have a visible and audible component that can be disturbing to persons, and can cause physical damage (such as broken household items) as described in Section 4.2. Most community annoyance is experienced within the primary boom envelope from short duration, high overpressure booms. Guidelines correlate C-weighted measurements of impulsive noise (CDNL) with community annoyance and result in equivalents to A-weighted standards for compatibility. A 65 DNL equates to about 60 CDNL as a guideline for residential compatibility. The projected CDNL in the main areas subject to sonic booms is calculated to be less than 38 dBC. This is below any level of quantified impact (see Section 4.2).

Low-level overflights, like other sudden unexpected sounds, can startle and disturb sleep. Similar effects on recreational experiences could occur as low-level aircraft operations are experienced. There would be an annual average of 6 to 9 low-level overflights of a military aircraft 2,000 feet AGL or below and within one-quarter mile of any location under the airspace. Infrequent low-level overflights or infrequent sonic booms would not be expected to change land use, but they could be annoying to individuals who experienced the startle event.

4.8.3 Environmental Consequences

4.8.3.1 Alternative A

Alternative A includes 1) modification to existing MOA/ATCAA airspace, 2) creation of new airspace consisting of MOA/ATCAA, 3) authorization for supersonic operations during LFEs (expected to be 10 days per year) in the new and existing airspace above 10,000 feet AGL for transient fighters and above 20,000 feet MSL for B-1s, and 4) authorization for defensive chaff and flare use in new and modified airspace.

Land Use Under Existing Airspace

For more than 20 years, land under the existing Powder River airspace has been overflown by a variety military aircraft, mostly operating out of Ellsworth AFB, but also from other regional military installations. Currently, the areas underlying the existing Powder River airspace experience an average of about 1,200 overflight hours per year (Table 2-25). The Powder River airspace overlies mostly private land in MT and mostly federal land in WY, including portions of the Thunder Basin Grassland and Black Hills National Forest. The land under the Powder River airspace is primarily rangeland with a small amount of forest.

The existing Powder River airspace includes active coal, oil, and gas production areas. The operations and maintenance associated with resource extraction fields brings daily noise associated with vehicles, trucks, and other equipment. Oil and gas well sites frequently have continuous noise from pumps and generators. Noise is localized around well and distribution facility sites. In some of the forest areas, timber harvesting equipment generates intermittent noise, also in localized areas in the ROI. Noise from all of these activities is either intermittent and/or localized. The background noise level of the natural surroundings prevails in most locations of the ROI.

The Bighorn Battlefield memorializes the U.S. Army's 7th Cavalry and the Sioux and Cheyenne in one of the Indians last armed efforts to preserve their way of life.

Average noise levels in the existing Powder River MOAs of approximately 49 dB DNL could decrease imperceptibly to 47 dB DNL in the modified PR-2 MOA/ATCAA as training aircraft were distributed throughout the proposed PRTC. Existing land uses have become compatible with the military flight training. DNL would not reach levels which would affect land use compatibility as noted in Appendix H, Table H-4.

The Air Force has established operating procedures to avoid low altitude overflight of specific land use locations considered to be sensitive to aircraft noise or otherwise require avoidance of aircraft overflights. The types of locations addressed by these special operating procedures include residences, ranches, private and commercial airstrips, communication towers, and communities.

Concerns were raised during scoping about specific activities including current and anticipated land uses for wind turbine sites and development, communication towers, and other tall objects. The proposed PRTC would not change the use of public or private land. Any existing or new tall structures, such as wind energy generators or communication towers, would be charted by FAA on sectional aeronautical charts and avoided by aircraft. These guidelines would continue to apply and would not be altered by the proposed PRTC. Larger communities would have a 1,000-foot vertical avoidance above the highest obstruction and a radius of 2,000 feet (14 CFR Part 91.119). The existing 5 NM avoidance of Devils Tower National Monument, which is under an ATCAA, would continue in effect.

Land Use Under Proposed PRTC

The proposed PRTC would enlarge the footprint of land under military training airspace from the existing Powder River airspace of 9,748 square miles to the proposed PRTC of 35,200 square miles. There would be a total of approximately 27,790 square miles with minimum operating altitudes of 500 feet AGL (Section 3.8.3.2). A similar spectrum of land uses occurs on areas underlying the Powder River airspace as under the proposed PRTC described in Section 3.8. The PR-1A, PR-1B, PR-3, PR-4 MOA/ATCAAs, and associated Gap MOA/ATCAAs overlie a combination of tribal, public and private land uses, including large areas of national forest and grasslands. The Little Bighorn Battlefield National Monument is under the PR-1A MOA. Cattle ranching, dispersed recreation and hunting, and other resource productive uses, are the predominant land uses. Residents mostly live in small, widely separated, communities, with scattered individual homes and farms and a few larger communities. Public concerns for land use expressed at scoping

The Grand River National Grasslands are part of the Dakota Prairie Grasslands and are publicly owned lands administered by the USDA USFS.

included the potential impact of noise from low-level overflight and supersonic flight on existing land uses. Noise can cause individual annoyance, and it can cause sleep disturbance and interference in communication. Noise under the MOAs would go from ambient levels of below 45 dB DNL to an aircraft calculated 30 to 47 DNLmr under the PR-1A, PR-1B, PR-3, and PR-4 MOAs. The projected DNL levels are below the 55 dB DNLmr identified by USEPA as being protective of public health and welfare (USEPA 1974). There would not be a noticeable change from existing conditions under ATCAAs not associated with MOAs except for infrequent sonic booms during LFEs. Alternative A would have approximately one sonic boom experienced toward the center of the airspace each day during the 1 to 3 days quarterly of LFEs (for an expected total of 10 days per year). These projected noise levels are compatible with land uses under existing compatibility guidelines used by the FAA or the DoD (see Appendix H). The Proposed Action would not change general land use patterns, ownership, land management or activities in these areas.

Under Alternative A, overflights by individual aircraft operating at low altitude may have single events as loud as 133 dB SEL (for a B-1 using afterburners at 500 feet AGL). Given the size of the proposed airspace, overflight of any particular location would be sporadic and is estimated to be, on average, 6 to 9 times per year, although any location could experience more or less low-level overflights than average. Approximately 2 to 4 percent of the land areas under the activated MOAs would be overflown each training day within one-quarter mile by a military aircraft 2,000 feet AGL or below (see Section 4.9.3.1.5).

Low-level overflights from fast-moving military aircraft can startle persons or animals on the ground and have caused animals, especially penned ranch animals, to stampede or bolt. While proposed military operations represent a change for areas not under the PRTC, existing areas under the Powder River airspace and other areas in the western U.S. have supported and sustained ranching and other livestock land uses with military operations for decades. This indicates that military training and ranching are not intrinsically incompatible. Intermittent noise startle events would not change the basic suitability of the current land uses.

Ellsworth AFB has and would continue to work with noise sensitive land uses such as residences, ranches, farms, and communities to identify avoidance areas and reduce noise levels of single event overflights. Concerns were expressed about the effects of aircraft noise on ranching land uses, particularly when calves are weaned in the spring and being handled in confined areas, such as being corralled in the fall. The Air Force, with information from ranchers, has identified seasonal low-level overflight restrictions at selected locations under the existing Powder River airspace. Comparable restrictions would be briefed to pilots when the Air Force was made aware of the need for land use avoidance areas under the proposed PRTC.

Agriculture and ranching land uses in the region are supported by aviation activities such as crop and herd monitoring and cloud seeding programs. Fire suppression and general aviation operations also regularly occur. To some degree, the economic activity of commercial land uses relies on aviation activities. In scoping, it was noted that aviation is used for routine access by ranchers to aid in efficient operations. Avoidance of specific locations, scheduled MOA activation, and stacking of MOAs so that ATC could support IFR traffic are part of the Air Force's revised proposal to reduce potential impacts of the proposed PRTC on commercial operations that are important to regional land uses.

Operations that are less flexible and more intensive, such as fire fighting, could require real-time deconfliction (including temporary altitude limits or relocation of training military aircraft) to ensure safety. Potential issues of flight safety for these operations are addressed in Sections 4.1, *Airspace/Air Traffic* and 4.3, *Safety*. Low-altitude agricultural applications could be affected by a low-altitude flight of a military training aircraft. Most general aviation could continue using "see-and-avoid" procedures in an active MOA.

A concern noted by scoping participants was the potential incompatibility of low-level flight with land dedicated to wind farms due to the height and electromagnetic emissions of the wind turbines. Like other tall structures, existing and future structures must be officially charted with FAA and avoided by appropriate vertical and lateral distances. As a precaution for proposed night operations and other commercial and private flight, tall structures are required to have lights that warn of their presence. Overflights at altitudes would avoid the physical structure and electromagnetic emissions of wind turbines. The Proposed Action would not inhibit the development of future wind farms or other industrial land uses.

Concern was expressed at scoping that residential land uses could be impacted by late aircraft overflights after 10 p.m. with the potential to disturb sleep, depending on the location and sound exposure level of particular events. Under current (and proposed) operations, night flying in the PRTC would not occur after midnight, since the home airfields are not active after 12:30 AM. Isolated incidents that disturb sleep may occur. The percentage of operations projected for after 10 p.m. and before 7 a.m. (about 17 percent) and the dispersion of these operations over the PRTC, would result in an average of less than one after 10 p.m. low level overflight below 2,000 feet AGL per year throughout the airspace, although specific locations could experience more or fewer overflights. Such disturbance would not be expected to regularly cause disruption to sleep patterns or otherwise impact residential land uses (see Section 4.2).

Persons at scoping expressed concern with potential changes in the peace and quiet that is part of the regional land use. Overall, average noise levels in the PRTC would increase from below 45 dB DNLmr to an aircraft-calculated DNLmr of 47 dB. Average noise would remain below the 55 dB DNL, the threshold established by USEPA below which adverse impacts would not be expected to occur (USEPA 1974). Low-level overflights and infrequent sonic booms during LFEs may result in annoyance and could lessen an experience of recreation. Low-level overflight of any particular location by a training aircraft would average 6 to 9 times a year although specific areas could be overflown more or less frequently. The suddenness and unpredictability of infrequent overflights during scheduled MOA activation and sonic booms during the 10 days of LFEs per year could be seen as an impact to local land uses by some persons.

Recreational activities such as four-wheeling, horseback riding, fishing, hunting, hiking, and climbing typically occur in remote landscapes where the primary noise source is from recreational activities. Sudden and intense noise could result in disruptions to the expected dominant land use. Reactions vary depending upon individual expectations and the context in which aircraft-caused noise occurs. These incidences are not likely to be persistent and would have only temporary impacts on any given experience. These events are not expected to change visitor habits or recreational land uses overall, but such intermittent overflight could be annoying to some residents and visitors.

Public lands and private lands support recreation, camping, off-road vehicle activities, and hunting. Highly valued or frequently visited special recreation areas or developed sites can be identified. Table 3.8-4 identifies some of the larger areas with special status locations under the proposed PRTC. Many people recreate on weekends and military flight training is scheduled in morning and late afternoons on weekdays. Therefore, the potential for significant impacts on recreationists seeking quiet recreation is somewhat reduced.

Hunting is an important land use. Effects on wildlife would be imperceptible and game populations would not be affected. A low overflight could startle an animal or hunter and possibly result in a less successful hunt, but the likelihood is very low. If such an event occurred, the hunter would likely be annoyed. The overall behavior of game animals would not be expected to change from infrequent startle effects that hunting would be impacted. Based on experience under the existing Powder River A and B MOAs, it is unlikely that hunters would modify or cease their hunting activities as a result of the Proposed Action or an alternative.

Other recreational pursuits were identified during scoping with concerns that they may be incompatible with low level military aircraft operations. Recreational aviation, parasailing, and paragliding operate in the lower altitude strata of the proposed low-level MOAs. The Air Force would provide advance schedules of training missions in MOAs and the public would have access to information about low-level MOA activation during scheduled training and/or NOTAMs. Local recreationists would be able to learn about scheduled MOA activation. This would help define the time when recreational operations may either select to not fly or continue using “see-and-avoid” procedures. Military training would normally not be scheduled after noon on Friday to Monday morning. Scheduling would result in an inherent deconfliction with weekend recreation. The proposed PRTC would not be expected to change the use of public or private land.

Land uses on Tribal lands underlying the proposed PR-1A, PR-1B, and PR-4 MOAs are similar to the land uses on surrounding lands. Effects on persons and uses would be similar to those described above. Specific sensitive uses and activities on Tribal lands are addressed in Section 4.7.

Supersonic Operations and Aircraft Noise

Under this alternative the number of supersonic flights in areas underlying the PRTC would go from none to approximately one per LFE day toward the center of the airspace during the 1 to 3 days quarterly when an LFE was scheduled. This means that during an expected 10 days per year, not to exceed 3 days per quarter, individuals under the MOAs and ATCAAs could experience sonic booms. The sound of booms would vary from distant thunder to a loud double crack. The primary effect on humans is annoyance, startle effects, and sleep disturbance, particularly at locations near the center of the boom energy. Although infrequent sonic booms would not cause hearing or health impairment, even infrequent sonic booms can be annoying. The schedule for LFEs would be provided to local news media by Ellsworth Public Affairs so that residents and visitors could be aware of the LFE training activity and the potential for sonic booms.

Even very infrequent sonic booms may cause annoyance for land uses and activities where quiet is desirable, such as dispersed outdoor recreation including hiking and hunting. Because of their infrequency, sonic booms may be startling but should have a minimal effect on the overall quality of recreational opportunities or experiences. LFE training and associated supersonic events would not be expected to occur on weekends when more people are recreating.

Sonic booms produce results similar to those of low-level, high speed subsonic aircraft operations and can startle livestock and cause them to stampede or disperse. This could reduce ranching efficiency and result in accidents. A sonic boom is affected by aircraft speed, aircraft altitude, aircraft attitude, and meteorological conditions. There is no way to specifically avoid a location from experiencing a sonic boom if aircraft are performing supersonic maneuvers in an overlying, or even nearby, MOA or ATCAA. Cattle reproduction, weight gain, or milk production would not experience any appreciable declines from a 3 day per quarter period of LFE training and sonic booms. The effect would not be common, but a ranching activity could not be avoided by a sonic boom if the ranching activity occurred during an LFE. Communication of LFE schedules well in advance could help avoid conflicting land use activities when LFEs could result in sonic booms.

Vibrations from infrequent sonic booms during LFEs can cause indoor items such as bric-a-brac, plates, and dishes to rattle. Items on ledges could fall and break. This may be disconcerting for home dwellers but would not impact land use. In rare instances, sonic booms can cause windows to break or otherwise damage structures (see Section 4.2). The Air Force has a standard process for parties seeking compensation for specific damages caused by training operations. Sonic booms during LFEs, while annoying, would not be expected to change any land use under the proposed airspace.

Chaff, Flares, and Land Use

The proposed use of chaff and flares in PRTC represents a new activity. Modern chaff is not toxic in the environment and would not harm crops or rangeland (Air Force 1997). The effects of chaff on cattle and domestic livestock are addressed in Section 4.6. Domestic animals avoid ingesting chaff or clumps of chaff fibers (Air Force 1997). Chaff fibers are very small, disperse and break down quickly, and do not affect ground activities or land uses.

One scoping concern for range land use is any potential for flare-caused fires. Fire damages crops, rangelands, timber, and/or ranch infrastructure. National grasslands, forests, and agricultural areas under the airspace are vulnerable to fire. The effect of fire in ecological systems is addressed in Section 4.6. Altitude restrictions on flare release above 2,000 feet AGL are designed to have flares burn out a minimum of 1,500 feet above the ground surface. Flare use would be discontinued in a MOA where an extreme fire danger existed. The possibility of a flare-caused fire is remote. There is an extremely remote possibility that a dud flare could fall to the ground under the training airspace. A dud flare would require a heat source to cause it to ignite and would not be expected to ignite if run over by farm equipment. The likelihood of a dud flare located on the ground is extremely remote. An estimated one dud flare in three years would be expected to reach the ground somewhere under the PRTC airspace. As noted in Section 4.3, *Safety*, a dud flare should not be handled and safety personnel should be notified in the extremely unlikely event that a dud flare was found. Safety risks from flares are addressed in Section 4.3. These remote risks would not affect land uses in the region.

During release, defensive chaff and flares deposit residual materials in the ground. Such residual materials consist of wrappers and plastic or felt caps which are small and widely dispersed. At the rate of use described in Section 2.4, an estimated chaff or flare residual plastic, paper, or wrapper piece would be deposited an average of one piece per 115 acres per year. An estimated average of 0.0049 ounce per acre of chaff would be deposited annually. The visibility or effect of this plastic, felt, or wrapping material would be negligible given the patterns of human activity in the underlying areas. Residual materials, if found and identified, could be seen as an annoyance by a rancher, recreationist, or other persons finding the materials.

Overall, chaff and flare use, given altitude restrictions proposed and the distribution of use, would not be expected to impact land use.

4.8.3.2 Alternative B

Alternative B does not include the PR-1A, PR-1B, and associated Gap A MOAs. This results in no low-level overflights over sensitive land uses under PR-1A or PR-1B. The PR-1A and PR-1B ATCAAs would have a minimum operating altitude of 18,000 feet MSL.

Modification to Powder River Airspace

Effects on modifications to existing airspace would be the same as described for Alternative A.

Establishment of the PRTC Airspace

Alternative B would have similar effects as described for Alternative A, except that lands underlying PR-1A and PR-1B MOA would not experience low-altitude overflights. These land uses, which include the Northern Cheyenne Reservation, portions of the Crow Native American Reservation, the Little Bighorn Battlefield National Monument, and other sites, would experience a minimal increase in average noise from training operations operating above 18,000 feet MSL. The predicted average noise level would be similar to current ambient conditions. The projected average number of events exceeding SEL of 65 dB in Alternative B airspace would be as described for Alternative A. The potential for loud startling events would be unlikely under the PR-1A and PR-1B ATCAAs. Recreational activities in portions of Thunder Basin National Grassland and Black Hills and Custer National Forests would not experience low-level overflights under Alternative A. Potential impacts to residential land uses on the Crow and Northern Cheyenne Reservations would be lower under Alternative B than under Alternative A or Alternative C where low-level MOAs overfly residential portions of the reservations (see Section 4.7).

Noise and land use effects in the remainder of the proposed PRTC would be the same as described for Alternative A in Section 4.8.3.1.

Supersonic Operations

Supersonic operations would be essentially the same and have the same effects as described for Alternative A. Supersonic events would be slightly less in areas under PR-1A and PR-1B ATCAAs since LFE supersonic fighter operations would be limited to above FL180.

Chaff and Flare Use

Chaff and flare use for Alternative B would be essentially unchanged from the discussion for Alternative A.

4.8.3.3 Alternative C

Under Alternative C, the PR-4 and the associated Gap C MOAs would not be established. The PR-4 and Gap C ATCAAs would have a minimum operating altitude of 18,000 feet MSL.

Modification to Powder River Airspace

Effects on modifications to existing airspace would be the same as described for Alternative A.

Establishment of the PRTC Airspace

Alternative C effects would be similar to Alternative A. Land use impacts under the proposed PR-1A, PR-1B, PR-2, PR-3, and associated Gap MOAs would be as described for Alternative A.

Areas underlying PR-4 MOA or the Gap C MOA would not experience low-altitude overflight. Land use under PR-4, which includes mostly private land in ND and SD and portions of the Standing Rock and Cheyenne River Native American Reservations, would experience a minimal increase in average noise from training aircraft operating above 18,000 feet. The predicted average noise level would be similar to current ambient conditions. The projected average number of low-level events exceeding a SEL of 65 dB in any given airspace would approximately as described for Alternative A, with the exception that there would be no low level training flights under the PR-4 ATCAA and Gap C ATCAA. Recreational activities in portions of Grand River National Grassland would not experience low-level overflights under Alternative C. Water fowl hunting in Grant and Adam Counties, ND, would not be impacted by Alternative C.

Potential impacts to crop dusting operations would be expected to be less under Alternative C since there would be no low-level overflight below the PR-4 ATCAA where agricultural land uses are prevalent. Agricultural applications and general aviation operations below FL180 would not be affected under the PR-4 ATCAA. Potential impacts to Standing Rock and Cheyenne River Tribal areas are less under Alternative C than under Alternative A or Alternative B. Potential impacts to Crow and Northern Cheyenne tribal areas would be as described for Alternative A (see Section 4.7).

Land use effects in the remainder of the proposed PRTC would be the same as described for Alternative A.

Supersonic Operations

Supersonic operations would be essentially the same and have the same effects as described for Alternative A above. Supersonic events would be slightly less in areas under PR-4 ATCAA since LFE supersonic fighter operations would be limited to the AATCAs.

Chaff and Flare Use

Chaff and flare use would be essentially unchanged from the discussion for Alternative A.

4.8.3.4 No-Action Alternative

Under the No-Action Alternative, conditions would continue as described for the Powder River airspace. Conditions for land use and recreation would not change.

4.9 Socioeconomics

4.9.1 Methodology

The socioeconomic impact analysis examines the potential effects of the proposed airspace modifications, low-altitude overflight, supersonic flight, and chaff and flare use on the social and economic resources of the ROI. These social and economic resources are defined in terms of resident population and economic activity. Under the proposed airspace modifications, Air Force personnel and operations and maintenance procedures would not be expected to change from projected baseline conditions. Potential secondary socioeconomic effects of the action alternatives have been evaluated for airspace use, noise conditions, and fire hazard in the affected area. The potential effects of the airspace modifications, changes in use, and chaff and flare use were evaluated to determine their potential impacts on human and livestock populations, economic pursuits, and land values in the ROI.

4.9.2 Issues and Concerns

Issues and concerns involving socioeconomic resources were identified during the public scoping process. Many of the socioeconomic concerns are listed in Section 4.8.2, *Land Use*. These concerns are related to economic factors including agricultural and mining industry and development, potential property damages, property values, and restrictions on safe flight by general aviation. Public concern was expressed regarding potential detrimental environmental conditions associated with the proposed airspace modifications that could impact the economy or land values in the affected area. There was concern that noise events or fire hazard could negatively impact agriculture or the recreation industry, including hunting and fishing. Concerns were raised regarding potential hazards to activities associated with oil, gas, and coal extraction and wind power generation. Concerns were expressed that military training use would constrain general aviation flight through the airspace and local airports under the airspace.

4.9.3 Environmental Consequences

Based on the issues and concerns noted above, potential socioeconomic impacts were evaluated relative to three elements: (1) modifications in airspace use; (2) noise disturbances from overflights and sonic booms; and (3) flare-caused fire hazard. Other resource analyses in this EIS, specifically airspace management, noise, safety, physical, biological resources, and land use address aspects of these and other issues. This section reviews the potential consequences which may result in social or economic impacts within the region.

4.9.3.1 Alternative A

4.9.3.1.1 AIRSPACE MODIFICATIONS

Alternative A expands the existing Powder River airspace by establishing new MOAs and ATCAAs as described in Tables 2-10 and 2-11. Flight activity, in terms of the number of hours flown, would increase under Alternative A with between four and eight training aircraft flying in the proposed airspace. Normally, the proposed PR-1A, PR-1B, PR-2, PR-3, and PR-4 MOAs would be scheduled from Monday through Thursday from 7:30 a.m. to 12:00 p.m. local time and again from 6:00 p.m. to 11:30 p.m. The same airspace units would be scheduled from 7:30 a.m. to 12:00 p.m. on Fridays. The airspaces could be scheduled all other times by NOTAM. Training time would be distributed in a large volume of airspace. Approximately 17 percent of the average daily flight hours would be 2,000 feet AGL or below.

Supersonic operations would only be scheduled during LFEs which would occur once a quarter for up to 10 days per year. B-1 supersonic operations would be limited to 20,000 feet MSL and above. Fighter supersonic operations would be limited to 10,000 feet AGL and above (Table 2-8). The social or economic impacts of sonic booms and low-level overflight would be directly related to the location and intensity of the boom or overflight and the activity beneath the sonic boom or overflight. Section 4.9.3.1.5 discusses sonic boom effects. The infrequent sonic booms and the daily average low level overflight within one-quarter mile below 2,000 feet AGL of approximately 2 to 4 percent of the airspace each training day would not be expected to affect the regional economy. This analysis is described in more detail in Section 4.9.3.1.5 and in Table 4.9-3.

Defensive countermeasures including chaff and flares would be authorized throughout the airspace. Chaff dispensing would be restricted to 2,000 feet AGL and higher over the existing Belle Fourche ESS. Flares would be restricted to 2,000 feet AGL and above in training areas and discontinued in a MOA during periods of extreme fire danger as rated by the National Fire Danger Rating System. For additional discussion of these issues, also see Section 4.1, *Airspace and Range Management*, and Section 4.3, *Safety*. Socioeconomic effects of chaff and flare use are discussed in Section 4.9.3.1.6.

Property Values

During public scoping, concerns were expressed that property owners underneath the proposed PRTC MOAs would be required by law to disclose that their property is under a MOA during real estate transactions. According to MT, ND, SD, and WY state laws, there is no requirement for property owners to disclose military or commercial airspace over their properties. The state of MT has a law that applies to property in the vicinity of take-off and landing approaches for airports that govern zoning and building restrictions for safety purposes, however, this law applies only to designated 'airport affected areas' that are typically within a few miles of an airport (MT Code 67-7-201). The states of MT and SD have laws that require real estate licensees (such as realtors or real estate brokers) to disclose any knowledge of an 'adverse material fact' to potential buyers. The definition of an adverse material fact for each state typically involves disclosing whether past environmental hazards which are required by law to be disclosed (i.e., lead-based paint, asbestos), or factors that present a health risk, or material defect on the property (MT Statute 37-51-102, SD Real Estate License Law 36-21A-125). The state of WY lists specific factors that must be disclosed by real estate licensees including any significant damage to the property from water, fire, or infestation, defects in the structural or utility systems of the property, and the presence of any hazardous or regulated materials (State of WY Senate File SF0158).

There is little to suggest that airspace modifications under the Alternative A would impact land values in the affected area. Interviews with property appraisers in Carter, Custer, and Powder River counties, MT under the existing Powder River airspace revealed that the existence of the Powder River A or B MOAs is not used in determining the value of a property. The complex nature of property valuation factors makes any estimation of the potential effects of airspace modifications on land values highly speculative. Ranching operations, communities, and private airports all exist and function under the existing Powder River A and B MOAs. Other socioeconomic factors, such as business activity, employment, interest rates, and land scarcity (or availability) are much more likely to affect property values than training airspace. Neither the training flight activity under the existing Powder River airspace nor the training flight activity under the expanded PRTC is expected to affect the value of property under the airspace.

4.9.3.1.2 Civil Aviation in MOAs

The proposed PRTC MOAs would not prohibit civil aviation use because MOAs are joint use airspace. While MOAs are active, civil and military pilots operate under VFR see-and-avoid rules. Aircraft cannot fly IFR in an active MOA. When the MOAs are inactive, civil pilots would be able to fly IFR. During scoping meetings, pilots expressed concern that they did not feel safe within the existing MOAs under see-and-avoid rules and requested improved communications when military training aircraft were in the vicinity. Section 3.1 explains that there is limited communication or radar coverage below FL180 in much of the area. PRTC alternatives do not include any improved communication or tracking systems. The Air Force would notify ATC when entering or leaving an active MOA. Civil pilots would have to communicate with ATC prior to and during a general aviation flight in order to learn whether they could fly IFR through an airspace scheduled for training.

Tables 3.1-3 and 3.1-4 in Section 3.1.3.3.3 list public airports and private airfields under the proposed PRTC airspace. The facilities, as well as the magnitude and nature of their operations are described. Each public airport under the proposed PRTC would have an avoidance area of at least 3 NM in diameter and an altitude of 1,500 feet AGL established in accordance with FAA Order 7400.2G. Areas requiring additional avoidance distance or not covered by standing guidance will be evaluated individually between the 28 BW and that organization needing avoidance. All military aircraft maintain contact with Ellsworth AFB and Ellsworth AFB maintains contact with ATC to allow for deconfliction with civil aviation emergencies.

Airports directly below or in close proximity to the proposed PRTC have the potential to be impacted through the activation and use of MOAs and low-altitude military operations. Military training operations could result in IFR civil aircraft ground holds or re-routing of commercial traffic which would increase costs in terms of fuel consumption and flight delays. The Gap MOAs and ATCAAs are on existing Victor Airways and are designed to serve as transit corridors for commercial and general aviation. The Gap MOAs and ATCAAs would only be scheduled for military operations during LFEs for a total of 10 days per year. Many pilots in the region fly point to point and do not use Victor Airways as demonstrated by Figures 3.1-14, 3.1-15, 3.1-16, 3.1-17, 3.1-20, 3.1-21, 3.1-22, and 3.1-23. Re-routing to the Gap MOAs could increase civil aviation delays and fuel costs. FAA has noted that the airports likely to experience adverse economic impacts from the proposed airspace are small public airports and associated fix-based operators under the airspace that rely heavily on transient traffic for their revenues. The Air Force revised aeronautical proposal includes weekly schedules for MOA activation, MOA stacking to support IFR traffic, and setbacks from airports, such as the Billings International Airport, to avoid adverse impacts to traffic patterns.

The significance of impacts to civil aviation would be dependent on the amount of time that the MOAs are active and the ability for civil aviation to coordinate flight schedules with military flight operations. In response to comments from the public and the FAA, the Air Force revised the proposal presented during the scoping meetings and proposed stacked MOAs and ATCAAs. This stacking allows the Air Force to activate only the airspace that is needed for the specific training missions and allows IFR traffic in an airspace segment after military training is completed. The Air Force would train below 2,000 feet AGL in the Low MOAs for only brief periods of time between 15 and 20 minutes before transiting to higher airspace. When the Low MOA is no longer being used by the Air Force for training it would be inactivated to allow IFR traffic. Likewise, the proposed ATCAAs would be stacked into Low ATCAA (above FL 180 to FL260), Medium ATCAA (above FL260 to FL370) and High ATCAA (above FL370 to FL600). Only the ATCAAs being utilized for training would be scheduled and activated by the FAA for the military. The inactive airspace would then be available for civil aircraft to transit the airspace.

Public airports under the proposed airspace would have designated avoidance areas of 3NM and 1,500 feet AGL. If the Low MOA is active pilots originating in the airspace would fly VFR through the activated MOA until reaching altitude in an inactive MOA or into an ATCAA. Pilots need to maintain contact with ATC in order to know the status of the MOAs and ATCAAs during flight although much of the airspace has limited communication capabilities below FL180. Pilots who are not comfortable transiting an active MOA VFR may choose to hold on the ground until such a time as the MOAs are inactive or weather permits transit VFR. These ground holds could be expected to range from 2 to 4 hours and could result in adverse impacts to the pilots and their business decisions.

Private airfields under Alternative A airspace would be affected in much the same way public airports are affected. It would not be possible to fly IFR in an active MOA and civil aircraft pilots, even ones associated with low-level agricultural applications, would need to decide to fly VFR see-and-avoid in an active MOA where a military aircraft could be randomly flying below 2,000 feet AGL and, as low as 500 feet AGL. This could result in delays estimated to be up to two hours for airfields under an activated airspace or comparable delays to pilots outside the airspace who could not transit the airspace IFR and chose not to transit the airspace VFR. The proposed PR-1A, PR-3, PR-4, and ATCAAs are stacked with low and high MOAs to allow civil aircraft to transit IFR through the airspace in inactive MOAs or ATCAAs even if the military is training in a MOA or ATCAA above or below the inactive airspace. Pilots would need to contact ATC prior to flights for information on the active airspace.

Aerial applications (crop dusting) for agriculture are conducted well below 500 feet and applicators typically fly under 1,000 feet AGL. Frequently, such applications are performed during times of light wind to reduce dispersion of the materials being deposited. Aerial applicators often fly near maximum gross weight. The inability of an aerial applicator to know where or at what altitude a training bomber could overfly the area scheduled for application could affect business decisions. Although some applicators could elect to perform all transit to and from an application at altitudes below 500 feet, most applicators would be expected to fly higher than 500 feet AGL when transiting to or from a field. The uncertainty of low-level bomber overflight could affect the ability of such aerial applicators to safely perform their jobs and could be seen by them as a significant socioeconomic impact.

Adverse impacts to civil aviation are also likely during LFEs when the entire proposed PRTC would be active to accommodate additional training aircraft. Impacts to civil aviation throughout the region are expected to be seen as significant by local airports under, and pilots seeking to transit, the airspace. See Section 4.1.3 for more details. The Air Force would notify the civil aviation community and airports by publishing the scheduled use times through advance NOTAMs, and through access for coordination by the local airports. The scheduled times would ensure the airspace availability for training. As soon as the training mission was completed, the Air Force would notify ATC that the MOA could be used for IFR traffic. This would allow for civilian pilots flying IFR to adjust their flight patterns as required.

Table 4.9-1 summarizes the annual published operations by public airports under each proposed PRTC MOA from Table 3.1-6 (Section 3.1.3.3). The daily timing of published airport operations is not available. Most air taxi operations would be expected to occur during business days whereas local and transient operations could occur on any day during the year. Civil aircraft flight operations are assumed to occur any time during the year. The Air Force revised proposal has specific hours for MOA activation Monday through Friday. This would provide civil aviation pilots unable to fly IFR or unwilling or unable to transit an active MOA VFR with scheduling information.

Table 4.9-1. Alternative A Public Airports Under Proposed PRTC MOAs

		Reported Operations		
		Annual	*Daily*[1]	*Monday to Thursday Flights Affected*[2]
Airports Under PR-1A/1-B (includes Gap A)				
Colstrip	MT	5,750	16	9
Hardin	MT	6,600	18	11
PR-1A/1-B Totals		**12,350**	**34**	**20**
Airports Under PR-2 and Currently Under Powder River MOAs				
Belle Creek	MT	550	1	1
Broadus	MT	5,350	15	9
PR-2 Totals		**5,900**	**16**	**10**
Airports Under PR-3 (includes Gap B)				
Baker	MT	7,000	19	11
Bowman	ND	4,140	11	7
Ekalaka	MT	2,028	6	3
Harding-Buffalo	SD	2,300	6	4
PR-3 Totals		**15,468**	**42**	**25**
Airports Under PR-4 (includes Gap C)				
Bison	SD	5,500	15	9
Elgin	ND	160	1	1
Hettinger	ND	4,450	12	7
Lemmon	SD	12,500	34	20
McIntosh	SD	70	<1	<1
Mott	ND	1,690	5	3
PR-4 Totals		**24,370**	**67**	**40**
PR-1 to PR-4 Totals		**67,048**	**159**	**95**

Notes: 1. Assumes 365 flying days per year
2. Weekday: Monday through Thursday; approximately one-third civilian flights affected Friday morning
Source: From Table 3.1-6

The daily number of civil aircraft at public airports estimated to be potentially affected by a PRTC Alternative A is presented in Table 4.9-2. Private airfields do not provide the FAA with annual operation numbers which are published. Estimates of civil aircraft operations at private airfields under the proposed airspace were made by calculating the public airport published operations per based aircraft. Table 4.9-2 combines Table 4.9-1 with FAA data and the estimated civil operations at private airfields under the proposed airspace to produce a number of daily civil operations estimated under the proposed airspace for each PRTC alternative. Table 4.9.2 data are taken from Table 3.1-10.

Table 4.9-1 presents the civil operations which could be impacted daily by military training. The degree of impact would depend upon pilot choices, the PRTC alternative, and the ability of FAA to provide for IFR traffic. MOAs would be scheduled 10 hours Monday through Thursday and 4.5 hours on Friday mornings. If IFR traffic could not be accommodated and VFR pilots elected to or could not fly see-and-avoid in an active MOA, and assuming a distribution of civilian flights during the day based on FAA data, Table 4.9-2 provides the estimated affected civilian flights from Monday through Thursday. The impact could be a delay of 2 to 4 hours or a diversion for pilots seeking to fly IFR but unable to do so in an active MOA and pilots unwilling or unable to fly VFR using see-and-avoid in an active MOA. During LFEs, the impact could be a 2 to 4 hour delay with no realistic diversion possible. Such delays could be perceived as a significant impact by civil aviation operators under the proposed PRTC.

Table 4.9-2. Estimated Daily MOA Civil Operations Affected by PRTC Alternatives

Estimated Affected Civil Operations in MOAs										
		Alternative A		*Alternative B*		*Alternative C*		*No-Action*		
Proposed MOA	***Daily Civil Operations[1]***	**Day-to-Day[2]**	**LFE[3]**	**Day-to-Day[2]**	**LFE[3]**	**Day-to-Day[2]**	**LFE[3]**	**Day-to-Day[2]**	**LFE[4]**
PR-1A/1B	53	32	16			32	16		
PR-2	25	15	8	15	8	15	8	7	
PR-3	52	32	16	32	16	32	16		
PR-4	83	50	25	50	25				
Gap A	8		3				3		
Gap B	14		5		5		5		
Gap C	7		3		3				
Daily Total	242	129	76	97	57	79	48	7	NA

Notes: 1. From Table 3.1-10
2. Civil operations during scheduled Monday through Thursday day-to-day hours represent approximately 60 percent (Friday mornings would affect approximately 20 percent of daily civil operations)
3. Civil operations during four LFE hours represent approximately 30 percent
4. LFE cannot be accomplished in existing airspace

Scheduling civil aviation flights around military training, communicating with ATC regarding a MOA's status, and flying IFR in an inactivated MOA would reduce potential delays. Ground delays would have the potential to affect economic activity through increased travel time. The extent of travel time increased would be related to when the MOA would be inactivated after military training aircraft left the MOAs. The ground delays would be somewhat alleviated due to the Air Force's ability to specify scheduled times of training which pilots could use to plan their own flights or plan detours around the MOAs. However, unforeseen circumstances such as weather or mechanical difficulties could require military training to be conducted outside of the regularly scheduled times. The Air Force would notify the public 2 hours in advance through NOTAMs of when the airspace would be active. Civilian pilots would need to contact ATC prior to or during transit of the airspace to be aware of the status of the airspace

Uncertainty regarding where a low-level bomber could be within a MOA could affect decisions to traverse an airspace. IFR transit within an active MOA would not be permitted, and much of the area has limited radar or radio frequency coverage to permit adequate in-flight communication. Delays and uncertainty would be expected to produce local impacts to airport access, and pilots would be annoyed by the inability to use IFR or the unwillingness to transit an active MOA using VFR. Impacts could occur to public airports and private airfields under the airspace that are dependent on transient traffic for revenues. Active MOAs could encourage private pilots to re-route around the active airspace and avoid public airports or private airfields under the active airspace. Based on Table 4.9-2, approximately 60 percent of the day-to-day civilian MOA traffic would be affected Monday through Thursday. On Friday mornings, approximately 20 percent of the civilian traffic would be affected. During LFE's, approximately 30 percent would be affected with no work-arounds except delay or fly see-and-avoid in an active MOA.

During scoping meetings, concerns were expressed about whether the proposed airspace could prevent or interfere with emergency flight operations such as firefighting or air ambulances. Under positive ATC, emergency flights, including fire and medical aircraft are given priority over military operations. Under specific situations, the FAA can establish Temporary Flight Restrictions to temporarily restrict access for civil and military aviation in specified areas. These situations include hazardous conditions, such as fires, special events, or general warnings. These procedures are applied to the current Powder River airspace. Pilots are notified of Temporary Flight Restrictions through NOTAMs and pilots are restricted access unless under specified conditions, such as firefighting aircraft. These Temporary Flight Restrictions would allow firefighting aircraft unimpeded access to the airspace above a fire to conduct prolonged firefighting operations. No impacts would be expected other than increased communication.

For non-emergency flights, such as fire reconnaissance, U.S. Fish and Wildlife (USFWS) surveys, Angel flights, and cloud seeding, the pilot could coordinate with Ellsworth AFB to work to deconflict military operations. Weather modification flights need to respond rapidly to cloud formation and other meteorological conditions. Notification to Ellsworth AFB of the seasonable possibility of cloud seeding operations and notification of when and where cloud seeding was occurring would permit the Air Force to deconflict training missions.

Civil aviation and public airports have the potential to be impacted by the proposed expansion of airspace by requiring additional communication from private pilots to determine when the MOAs are active. The extent of potential impacts would be dependent on scheduling, the duration of the ground holds, and the amount of time that the MOAs were active. The airspace use and related activities associated with the PRTC Alternative A could result in delay, uncertainty, or other impacts to an estimated 129 civil operations during Monday through Thursday and approximately one-third that number on Friday morning (see Table 4.9-2). Civil operations would include a takeoff, landing, or transit through a proposed airspace. In addition to the directly affected flights from airports and airfields under the proposed airspace, there are airports and airfields on the periphery of, or near, the airspace which could also be impacted. Tables 3.1-3 and 3.1-4 identify the public airports and private airfields under and near the proposed PRTC, and Table 3.1-6 presents the reported operations from the public airports listed as near the proposed airspace. A review of Figures 3.1-14, 3.1-15, 3.1-20, and 3.1-21 shows a substantial number of civil flight paths with an origin or destination at these airports near the proposed PRTC. Airport operations data do not specify the number of flights from the airports which would potentially be traversing the airspace and would be impacted, to some degree, by activated PRTC MOAs. The estimated 129 daily operations should be seen as a quantifiable and reasonable estimate of the total number of civil aircraft operations impacted. The change in airspace use for military training could be seen by civil airspace users as a significant, adverse impact on the human, social, or economic resources of the region.

4.9.3.1.3 Civil Aviation in ATCAAs

Potential impacts to Victor Airways and to Jet Routes are described in Section 4.1.4.3. In response to FAA-identified potential impacts to commercial aviation, the Air Force has revised the proposal to include Low ATCAAs, from FL180 to FL260, Medium ATCAAs, above FL260 to FL370, and High ATCAAs, above FL370 to FL600. The Air Force would work with FAA to activate only the airspace required to conduct adequate training. The remaining airspace would be available for civil and commercial aviation under ARTCC direction.

PR-3 and PR-4 Medium and High ATCAAs and all other high ATCAAs would be requested for LFEs only (see Table 2.11). This would reduce the potential for impacts to higher altitude commercial flights traversing the airspace. During LFEs, the Air Force would work with FAA to identify time periods when higher altitude airspace could be activated. LFE impacts to higher altitude above FL180 could average from 43 to 244 flights per day (see Section 4.1.3.1.3). LFE impacts could include re-routing around the activated airspace and such re-routing or other schedule effects could be seen as substantial economic impacts to commercial carriers and other high altitude traffic.

4.9.3.1.4 Energy Resource Development

Public scoping comments included the concern that the proposed airspace modifications could interfere with energy resource development, particularly oil and gas exploration, coal mining, or the development of wind farms. Concerns were expressed during scoping that the proposed airspace expansions would interfere with proposals by private and state entities to develop wind farms underneath the proposed airspace. In 2007, the Department of Defense released a letter stating that the DoD would not oppose the development of wind farms or other sources of renewable energy that would not impact military readiness or training. The Air Force would coordinate with FAA and other regulatory agencies to evaluate wind farm proposals under the proposed airspace on a case-by-case basis. If there were a concern about a wind farm proposal, the Air Force would raise those concerns to the appropriate authority. Concerns have been expressed, for example, when wind farms have been proposed in the approach pattern of military airfields. The Air Force would not have the final decision in any wind farm proposals.

Wind farms, towers and other obstructions over 200 feet tall are required to have warning lights installed per FAA regulations. General flight rules state that low-level flight operations would occur at least 200 feet above the highest obstruction within the flight area. With a floor of 500 feet AGL, low-level flights from the B-1s would occur 500 feet above the highest obstruction within the area. For example, if there is a wind farm or other towers underneath the proposed airspace that extend to 400 feet then low-level flight operations at that area would occur not lower than 900 feet AGL.

Altitude overflight restrictions would be established over community airports and over tall structures, such as the power plant stacks at Colstrip. The minimum overflight above a public airport would be 1,500 feet AGL for a 3-NM radius circle centered on the airfield. A comparable avoidance area over Colstrip would place training aircraft a minimum of 500 feet above the structures.

The effects of very infrequent sonic boom overpressure during LFEs or low altitude overflight upon mining operations or major construction projects could impact features of the operations. In most cases, the mining operations would be impacted by overpressures below 5 psf. The overpressure effects would be rapidly dissipated underground. Sonic boom or low-altitude flight overpressure effects upon surface mining would depend upon the focus of the sonic boom or overflight and the distance from the mining operations. Overpressure effects from sonic booms could vary from the sound of distant thunder to a sharp crack-crack with enough overpressure to loosen unstable soils and raise dust. Atmospheric effects, as well as aircraft speed and altitude (turning, descending), all contribute to the intensity of a sonic boom and even determine if it will be felt at ground level. In the unlikely event that a focused boom was directly experienced at a mining operation, the effect could be dust and/or loosening of unstable surface materials. Communication regarding overflights scheduling and mine operations would be required to reduce the potential for surface mining impacts although sonic booms cannot be specifically directed away from a sensitive location.

Electronic capabilities in B-1 and transient fighter aircraft could be at frequencies and levels to cause concern to mining operations. Mining requires frequent blasting with electronically triggered explosives. Mining operations could be significantly impacted if a B-1 or other aircraft were to exercise certain frequencies which interfered with mine blasting. The only way to avoid such a significant risk to safety and mining economics would be for the Air Force and mining operators to ascertain the electronic frequencies involved and abstain from using those frequencies where they could affect mining operations. Such interactions to identify the potential for, and to implement procedures to avoid, such impacts do not exist under the current Powder River A and B MOAs and would require additional communication, procedures, and avoidance areas where existing and potential mining and blasting operations could occur.

Coordination and communication will be required to ensure that mining economics and safety are not impacted by the B-1 or transient fighter electronic capabilities.

4.9.3.1.5 Noise Disturbances

The total number of training sorties is projected to be distributed throughout the proposed PRTC. The relatively low acoustical effects can be attributed to the dispersion of training flights into a large volume of airspace. Average noise levels would be slightly reduced from projected baseline conditions in the PR-2 MOA which is approximately the same as the existing Powder River A and B MOAs. Most receptors in the expanded PRTC would experience higher levels of noise. Animals and humans in these areas are expected to be temporarily more sensitive to noise due to lower previous exposure. Animals and humans under the expanded PRTC would be exposed to higher noise levels than currently experienced under PR-1A, PR-1B, PR-3, and PR-4 MOAs/ATCAAs. For a more detailed discussion, see Sections 4.2, *Noise* and 4.6, *Biological Resources*.

During public scoping meetings, several participants expressed concern that the low-level overflights and supersonic activity would significantly impact their lives. This was especially stated in scoping meetings under and adjacent to the PR-1A, PR-1B, PR-3, and PR-4 MOAs and associated Gap MOAs. The typical human response to noise effects associated with aircraft overflights is annoyance. The USEPA has identified a DNL of 55 dB to be a level protective of the public health and welfare. This represents a threshold below which adverse noise effects are generally not expected. Noise levels for Alternative A are below this level. There are changes in the predicted noise levels in areas under the proposed PRTC. The average annual noise level in those areas could increase to 47 dB DNL and is likely to be noticeable. Although this is below the USEPA-identified level, the sudden and unexpected nature of even infrequent low-level or supersonic events during LFEs could cause surprise and annoyance.

Low-altitude subsonic overflights or infrequent higher-altitude sonic booms could result in short-term negative impacts to wildlife, livestock, or humans (e.g., increased heart rate, flight, potential injury). During scoping meetings, individuals expressed concerns that the startle effect of low-altitude subsonic overflights or sonic booms would adversely affect economic activity, especially ranching during calving or when ranchers are working with concentrations of cattle such as weaning and branding. Impacts could include injury to animals, damage to infrastructure, and time to round up the livestock. As discussed in Section 4.3, *Safety*, the 28 BW currently coordinates with ranchers under the existing

Areas currently under the Gateway ATCAA would experience infrequent sonic booms from supersonic training in the expanded Gateway ATCAA.

Powder River A and B MOAs to identify areas with large concentrations of cattle, particularly during calving, weaning, and branding operations, and to establish temporary avoidance areas for low-level overflights. Such avoidance areas minimize startle effects from overflights. Under the proposed airspace expansion, communication with the 28 BW would be important for ranchers to coordinate temporary avoidance areas. The nature of sonic booms is that the location where a sonic boom could be experienced is dictated by a variety of factors, including meteorology. Anywhere under the airspace could experience average of one sonic boom per LFE day. Public commentors at scoping expressed the opinion that they would consider the sudden onset noise of a low-level overflight or a sonic boom to be a significant impact. During scoping, the estimated number of low-level overflights or sonic booms per year had not yet been calculated. It would not be possible to prevent sonic booms in a sensitive area if an aircraft were performing supersonic maneuvers at altitude during an LFE, although the Air Force would provide advance notice of the one to three days per quarter when LFEs would be conducted. This advance notice would help with knowledge of when a sonic boom could occur.

Concern was expressed at public hearings that noise conditions may negatively affect wildlife and livestock. Animals have demonstrated that they can habituate to loud, regular noises such as sonic booms. The levels of noise anticipated as a result of PRTC could startle penned individual livestock but are not expected to result in biological effects that would impair overall animal populations. Low-level overflights with sudden noise accompanied by a visual stimulus can result in reactions by wild and domestic animals. Should a sonic boom or low-level overflight result in a hunter losing an opportunity, the hunter would be expected to be annoyed. Should a sonic boom or low-level overflight result in a livestock stampede with damage to fences and the livestock, a rancher could suffer economic loss and potentially be placed in harm's way.

Supersonic training in the Gateway East ATCAA or Gateway West ATCAA during LFEs could result in very infrequent sonic booms being experienced in the cities of Sturgis and Deadwood, SD, under the southeast portion of the ATCAA and Belle Fourche and Spearfish, SD, and Sundance, WY, under the ATCAA. Other small communities are also under the ATCAA. B-1 bombers would train at supersonic speeds within the Gateway ATCAA at altitudes above 20,000 feet MSL and fighters could go supersonic above 18,000 feet MSL during LFEs only because the proposed Gateway ATCAAs would begin at 18,000 feet MSL. In the proposed MOA airspace, fighters would be authorized to go supersonic down to 10,000 feet AGL.

The sonic booms during LFEs would be infrequent with approximately one calculated to be experienced each LFE day. These supersonic flights would not be expected to detrimentally impact the region's economy. The infrequent sonic booms could be annoying and, in the case of a focused boom, could result in property damage. The nature of sonic boom creation and the atmospheric effects which determine where or whether a sonic boom reaches the ground make it impossible for an aircraft performing a supersonic maneuver to avoid a sonic boom occurring at any particular location. The sonic boom would typically be experienced as thunder, but approximately 1,300 acres could experience an overpressure of four psf or greater which have the potential for window or other damage. The Air Force has established procedures for damage claims which begin by contacting Ellsworth AFB Public Affairs.

The extent of area affected by a daily average low-level flight below 2,000 feet AGL was estimated using the Chapter 2.0 tables of time by altitude and an assumption of 240 days of flying per year. B-1 and B-52 would be 2,000 feet AGL or below each day as presented in Table 4.9-3. The estimated daily area affected by low-level overflight is presented in Table 4.9-3.

Table 4.9-3 means that, on average, an area within a MOA could be subject to an average of 6 to 9 low-level startle effect overflights per year. The actual number of low-level overflights over a specific area could not be precisely calculated due to the random nature of aircraft training. Any specific area could be overflown at low-level, more or less frequently. Figures 3.1-14 and 3.1-20 demonstrate the random nature of B-1 training in the existing Powder River A and B MOAs from FAA traffic data. The random looping tracks within the PR-A/B MOAs are B-1 training aircraft, and the straight lines represent other transiting aircraft within the airspace. The figures show that low-level overflights are generally not along the edges of the airspace. The existing Powder River A and B MOAs, which constitute nearly all the proposed PR-2 MOA, have an estimated 8 to 9 times per year when, on average, any location would be overflown. Any specific location could be overflown more or less frequently. Pilots performing low-level training are briefed to avoid communities, noise-sensitive areas, and, to the extent possible, farm or ranch buildings (see Sections 2.2.1.3 and 2.2.2.3).

Table 4.9-3. Alternative A Estimated Percent of Area Impacted by Low-Level Overflight Below 2,000 Feet AGL

	PR-1A/1B	*PR-2*	*PR-3*	*PR-4*	*Total*
Area under MOA nm^2 (including Gap MOAs)[2]	5394	6215	4708	4667	20984
Annual B-1 hours 2,000 AGL and below[1]	94.36	155.93	89.30	90.87	430.46
Annual B-52 hours below 2,000 AGL	41.40	41.40	2.30	13.80	98.90
Annual Fighter hours below 2,000 AGL	4.45	4.31	3.42	3.74	15.92
Daily[4] B-1 hours 2,000 AGL and below	0.3932	0.6497	0.3721	0.3786	1.7936
Daily B-52 hours below 2,000 AGL	0.1725	0.1725	0.0096	0.0575	0.4121
Daily Fighter hours below 2,000 AGL	0.0185	0.0180	0.0143	0.0156	0.0664
Daily[3,5] Area estimated impacted by B-1	106.16	175.42	100.46	102.23	484.27
Daily[6] Area estimated impacted by B-52	31.05	31.05	1.73	10.35	74.18
Daily[7] Area estimated impacted by Fighters	5.01	4.85	3.85	4.21	17.91
Total Area Potentially impacted average day	142.21	211.32	106.04	116.79	576.35
Percent Area Affected per Day	2.64	3.40	2.25	2.50	2.75
Average Time any Location Overflown/year	6.33	8.16	5.41	6.01	6.59

Notes:

1. Training hours at altitude from Tables 2-17, 2-23, and 2-29.
2. Airspace MOA areas in square nm.
3. Low-level overflight effect estimated at ¼ nm each side of flight centerline.
4. Assumes 240 flying days per year, including Day-to-day and LFE.
5. B-1 at 2,000 feet AGL or below includes all hours below 2,000 feet AGL plus 75% of flight hours from 2,000 to 4,999 feet AGL at a speed of 540 nm per hour.
6. B-52 includes all hours below 2,000 feet AGL at a speed of 360 nm per hour.
7. Fighters include all hours below 2,000 feet AGL at a speed of 540 nm per hour.

The low population density of 0.2 to 4.0 persons per square mile under the proposed low-level airspace and the infrequent number of annual supersonic events make it highly unlikely that flight activity associated with PRTC would result in significant social or economic impacts to the region. It is likely that there would be specific cases of an individual or animal being startled by an overflight or sonic boom at a specific time and place. Supersonic events would only be scheduled during the 10 days annually when LFEs would be conducted. A low-level overflight would be difficult to predict given the rural nature of the area, the random and dispersed nature of flight operations, and the large airspace area. An individual startled by a low-level overflight or sonic boom could see the overflight as an impact. The duration of supersonic flight would be brief and not be expected to have any effect on other aircraft flying the region. Speculation regarding potential injury to humans as a result of startle reaction to sonic boom has not been supported by any documented incidents or studies.

Outdoor structures such as water towers, wind turbines, and radio towers are routinely subject to wind loads far in excess of sonic boom overpressures and are sufficiently resilient to withstand the anticipated overpressure. Section 4.1.3 provides additional discussion of general aviation and towers within the airspace. No impacts to elevated ground structures, wind farms, oil and gas, or mining are expected. Wake vortex impacts to stock windmills could occur. In the event of property damage due to Air Force activity, individuals would be able to contact Ellsworth AFB Public Affairs for established procedures to file damage claims.

Overflight noise and startle effects, although annoying, are not expected to significantly impact regional economics. This is especially the case if specific economic activities, such as ranch branding operations and mining operations, can be communicated in advance and an avoidance area can be identified and briefed to pilots as part of the training mission described in Section 2.2.1.3.4. Scoping comments suggest that the low overflight and sonic boom impacts to the social and economic features of the community are as likely to be from the uncertainty that such an overflight could occur at any time as from the actual noise from the estimated average of 6 to 9 low-level overflights per year. The fact that such a low-level event could occur at any time and at any location, even infrequently, was identified as a significant potential impact by some commenters during scoping. The Air Force proposal has scheduled weekday hours for MOA activation when low-level events could occur.

The potential for impacts to concentrations of livestock during branding or weaning can be reduced by communicating with Ellsworth AFB to identify a temporary avoidance area over the location.

4.9.3.1.6 Chaff and Flare Use

Under Alternative A, chaff and flare use would be authorized in the PRTC airspace. More discussion of chaff and flares may be found in Sections 4.3, *Safety*, 4.4, *Physical Resources*, 4.5, *Biological Resources*, and Appendices C and D.

Chaff is very fine silica strands coated with aluminum and cut to lengths to reflect radar. Through numerous studies, chaff fibers have never been found to be specifically harmful to wildlife, domestic animals, or humans. Chaff dispenses widely when ejected from aircraft and can travel for long distances before settling to the ground. Once settled to the surface of the earth, chaff breaks down to constituent parts of silica and aluminum, the two most common elements in soil. Chaff is highly unlikely to accumulate in quantities that would result in any negative impact to surface conditions on land or water. It is highly unlikely that chaff residual materials would accumulate in sufficient quantities to affect property values or land uses. On average there would be one plastic, felt, or wrapper piece of chaff or flare residual material deposited on 115 acres per year. It is unlikely that a piece of residual material would be found. As noted in Section 4.8.3.1, some individuals could express annoyance if a chaff or flare end cap or other residual material were found on their property or at a recreation location, but this is not expected to affect land values or regional economics.

Flares are designed to be fully consumed before reaching the ground. Under Alternative A, flare use would occur throughout the proposed PRTC. The risk of fire as a result of flare use is minimal due to the low failure rate of flares and procedures that require flare use above 2,000 feet AGL. During extreme fire conditions, flares would not be authorized in a MOA.

Fire is an ever present concern in the arid west. Altitude restrictions of, normally 2,000 feet AGL, and discontinued during extreme fire conditions, would result in defensive flares burning out over 1,500 feet AGL. Flares are not deployed in a way which could contribute to fire danger.

Fire of any cause is a serious concern in the arid areas under the proposed airspaces. Flare initiated fires would not be expected to occur in the region although the use of flares minimally increases fire risk. Any fires of a natural or non-natural source may adversely affect vegetation, injure wildlife or livestock, and destroy property such as fences or buildings. Any potential loss of forage, livestock, or infrastructure due to fire could result in economic impacts to affected landowners. The Air Force follows established procedures for claims in the unlikely event that an Air Force-caused fire should occur and subsequently damage livestock or infrastructure.

4.9.3.2 Alternative B

Alternative B would establish the PRTC ATCAAs in the same manner as Alternative A. There would not be PR-1A, PR-1B, or a Gap A MOA. Low, Medium, and High PR-1A ATCAAs, PR-1B ATCAAs, and Gap A ATCAAs would begin at 18,000 MSL and extend up to 60,000 MSL. The consequences discussed under Alternative A for property values, supersonic flights, chaff and flares, low-altitude noise disturbances, and high-altitude civil aircraft overflights would all be applicable for PR-2, PR-3, PR-4 and associated Gap MOAs and ATCAAs. Under Alternative B, PR-1A and PR-1B ATCAAs would be included, but there would be no training airspace below FL180.

The estimated civil aircraft annual operations and estimated workday operations by public airports under the Alternative B MOAs are presented in Table 4.9-4. Table 4.9-4 estimates the daily workday operations for public and private airports which could be impacted by military aircraft training. Table 4.9-2 includes FAA data and private airfields to identify a total of 160 average daily flights in MOAs under the Alternative B airspace (see Table 4.9-2: daily operations for PR-2, PR-3, and PR-4). The average daily civilian traffic affected could be 97 flights (see Table 4.9.2). The impact could be a delay of 2 to 4 hours, require a diversion, or require a civilian pilot to fly see-and-avoid in an active MOA. Aircraft operating from public airports could incur a delay of 2 to 4 hours if pilots could not transit the active MOA IFR or were unwilling to transit an active MOA VFR. Alternatively, a pilot could use a Gap MOA corridor or otherwise divert around an active MOA. These impacts could be viewed as significant by pilots operating under the PR-2, PR-3, PR-4, and associated Gap MOAs.

With Alternative B, there would be no low-level overflight under the PR-1A, PR-1B, or Gap A ATCAAs and this area would not be subject to low-level startle impacts. This would apply to ranching and mining operations, such as at Colstrip, under the PR-1A or PR-1B ATCAAs. Mining operations under the PR-1A or PR-1B ATCAAs would not be expected to be impacted by electronic emissions from military training aircraft flying above FL180. Coordination to learn radio frequencies and potential explosive risks would be required to avoid safety risks to mining economics.

The airports under the PR-1A or PR-1B ATCAAs or pilots using the Gap A ATCAAs corridor below FL180 would not be impacted by a MOA or by low-altitude flights in the area beneath the proposed PR-1A or PR-1B ATCAAs. The effect on civil aircraft pilots seeking to fly above FL180 would be a requirement to contact ARTCC and learn the status of the ATCAAs.

Table 4.9-4. Alternative B Impacts to Public Airports Under Proposed PRTC MOAs

		Reported Operations		
		Annual	*Daily*[1]	*Monday to Thursday Flights Affected*[2]
Airports Under PR-1A: No MOA				
Airports Under PR-1B: No MOA				
Airports Under PR-2 and Currently Under Powder River MOAs				
Belle Creek	MT	550	1	1
Broadus	MT	5,350	15	9
PR-2 Totals		**5,900**	**16**	**10**
Airports Under PR-3				
Baker	MT	7,000	19	11
Bowman	ND	4,140	11	7
Ekalaka	MT	2,028	6	3
Harding-Buffalo	SD	2,300	6	4
PR-3 Totals		**15,468**	**42**	**25**
Airports Under PR-4				
Bison	SD	5,500	15	9
Elgin	ND	160	1	1
Hettinger	ND	4,450	12	7
Lemmon	SD	12,500	34	20
McIntosh	SD	70	<1	<1
Mott	ND	1,690	5	3
PR-4 Totals		**24,370**	**67**	**40**
PR-1 to PR-4 Totals		**45,738**	**125**	**75**

Notes: 1. Assumes 365 flying days per year
2. Weekday: Monday through Thursday; approximately one-third civilian flights affected Friday morning
Source: From Table 3.1-6 and Table 3.1-7

Table 4.9-5 estimates the daily area impacted by low-level flights for the Alternative B MOA. Approximately 2.31 percent of the PR-3 MOA and approximately 2.57 percent of the PR-4 MOA would be daily affected by low-level overflight of B-1 or B-52 bombers below 2,000 feet AGL or below and within one-quarter mile of the flight centerline. On average, any location under the airspace would be subject to low-level overflights approximately 6 to 9 times per year. Because the flight training pattern is random, actual low-level overflight could occur more frequently or not at all at any specific location. Most of the proposed PR-2 MOA is within the currently overflown Powder River A and B MOAs.

The remaining components of the PRTC, including the potential for impacts to public airports underneath the proposed PR-2, PR-3, PR-4, and Gap MOAs, would be essentially the same as those airspaces described for Alternative A. The effects of Alternative B would be the same as those discussed under Alternative A with the exception of no low-level effects in PR-1A, PR-1B, and Gap A MOAs in Big Horn County, Rosebud County, Treasure County, Powder River County, and Custer County, MT.

Table 4.9-5. Alternative B Estimated Percent of Area Impacted by Low-Level Overflight Below 2,000 Feet AGL

	PR1A/1B	PR-2	PR-3	PR-4	Total
Area under MOA nm[2] (including Gap MOAs)[2]	5394	6215	4708	4667	20984
Annual B-1 hours 2,000 AGL and below[1]	0	158.73	91.47	93.26	343.46
Annual B-52 hours below 2,000 AGL	0	41.40	2.30	13.80	57.50
Annual Fighter hours below 2,000 AGL	0	4.77	3.86	4.22	12.85
Daily[4] B-1 hours 2,000 AGL and below	0	0.6614	0.3811	0.3886	1.4311
Daily B-52 hours below 2,000 AGL	0	0.1725	0.0096	0.0575	0.2396
Daily Fighter hours below 2,000 AGL	0	0.0199	0.0161	0.0176	0.0536
Daily[3,5] Area estimated impacted by B-1	0	178.57	102.90	104.92	386.39
Daily[6] Area estimated impacted by B-52	0	31.05	1.73	10.35	43.13
Daily[7] Area estimated impacted by Fighters	0	5.37	4.34	4.75	14.46
Total Area Potentially impacted average day	0	214.99	108.97	120.02	443.98
Percent Area Affected per Day	0	3.46	2.31	2.57	2.12
Average Time any Location Overflown/year	0	8.30	5.56	6.17	5.08

Notes:

1. Training hours at altitude from Tables 2-17, 2-23, and 2-29.
2. Airspace MOA areas in square nm.
3. Low-level overflight effect estimated at ¼ nm each side of flight centerline.
4. Assumes 240 flying days per year, including Day-to-day and LFE.
5. B-1 at 2,000 feet AGL or below includes all hours below 2,000 feet AGL plus 75% of flight hours from 2,000 to 4,999 feet AGL at a speed of 540 nm per hour.
6. B-52 includes all hours below 2,000 feet AGL at a speed of 360 nm per hour.
7. Fighters include all hours below 2,000 feet AGL at a speed of 540 nm per hour.

4.9.3.3 Alternative C

Alternative C would expand the existing Powder River airspace over the same surface as Alternative A. Alternative C would not establish the PR-4 MOA or Gap C MOA. PR-4 ATCAA and Gap C ATCAA would begin at 18,000 MSL and extend up to 60,000 MSL stacked into Low, Medium, and High ATCAAs. The remaining components of the PRTC would be the same as described for Alternative A. Alternative C consequences to property values, supersonic flights, chaff and flares, low-altitude noise disturbance, and high-altitude civil aircraft overflights would be essentially the same as discussed for Alternative A. There would not be low-altitude training flights under the PR-4 and the Gap C ATCAAs.

Potential impacts to civil aviation and public airports below the proposed PR-1A, PR-1B, PR-2, PR-3, and associated Gap MOAs would be as described for Alternative A. The number of daily operations potentially impacted if the Alternative C airspace were active for the scheduled time would be 79 civil operations (see Table 4.9-2).

Table 4.9-6 presents the estimated civil aircraft annual operations for public airports under the Alternative C MOAs. The impact would depend on the number of flights seeking to fly IFR in an active MOA or unwilling to fly VFR in an active MOA. There could be a delay of 2 to 4 hours or a required diversion. A pilot could divert using a Gap MOA corridor or otherwise divert around an active MOA during day-to-day operations although the Gap MOAs would be unavailable during LFEs. These delays and diversions are could be viewed as a significant impact by pilots operating in the PR-1A, PR-1B, PR-2, PR-3, and associated Gap MOAs.

Table 4.9-6. Alternative C Impacts to Public Airports Under Proposed PRTC MOAs

		Estimated Operations		
		Annual	*Daily*[1]	*Monday to Thursday Flights Affected*[2]
Airports Under PR-1A/1B (includes Gap A)				
Colstrip	MT	5,750	16	9
Hardin	MT	6,600	18	11
PR-1 Totals		**12,350**	**34**	**20**
Airports Under PR-2 and Currently Under Powder River MOAs				
Belle Creek	MT	550	1	1
Broadus	MT	5,350	15	9
PR-2 Totals		**5,900**	**16**	**10**
Airports Under PR-3 (includes Gap B)				
Baker	MT	7,000	19	11
Bowman	ND	4,140	11	7
Ekalaka	MT	2,028	6	3
Harding-Buffalo	SD	2,300	6	4
PR-3 Totals		**15,468**	**42**	**25**
Airports Under PR-4: No MOA				
PR-1 to PR-4 Totals		**33,718**	**92**	**55**

Notes: 1. Assumes 300 flying days per year; all air taxi during 250 workdays; transient and local proportional to flying days
2. Assumes that in 300 flying days the military is scheduled for 26.7 percent of the time.

Table 4.9-7 estimates Alternative C daily areas impacted by low-level flight by MOA. Approximately 1.45 percent of the PR-1 MOA and approximately 1.59 percent of the PR-3 MOA would be affected daily by low-level overflight of B-1 or B-52 bombers below 2,000 feet AGL. Most of the proposed PR-2 is currently overflown by B-1 aircraft as part of the Powder River A and B MOAs. It is impossible to predict what area would be overflown by random training aircraft. An average location under the Alternative C airspace would be subject to low-level overflights approximately three to five times per year. As explained in Section 4.9.3.1, actual low-level overflight of a specific location could occur more frequently or not at all during any given year. The PR-4 and Gap C ATCAAs would overlie Hettinger County, Grant County, and Adams County, ND and Perkins County, Corson County, and Ziebach County, SD. There would be no low-level MOAs under the PR-4 and Gap C ATCAAs.

Table 4.9-7. Alternative C Estimated Percent of Area Impacted by Low-Level Overflight Below 2,000 Feet AGL

	PR1A/1B	*PR-2*	*PR-3*	*PR-4*	*Total*
Area under MOA nm^2 (including Gap MOAs)[2]	5394	6215	4708	4667	20984
Annual B-1 hours 2,000 AGL and below[1]	96.77	158.25	91.11	0	346.13
Annual B-52 hours below 2,000 AGL	13.80	41.40	2.30	0	57.50
Annual Fighter hours below 2,000 AGL	4.83	4.67	3.79	0	13.29
Daily[4] B-1 hours 2,000 AGL and below	0.4032	0.6594	0.3796	0	1.4422
Daily B-52 hours below 2,000 AGL	0.0575	0.1725	0.0096	0	0.2396
Daily Fighter hours below 2,000 AGL	0.0201	0.0195	0.0158	0	0.0554
Daily[3,5] Area estimated impacted by B-1	108.87	178.03	102.50	0	389.40
Daily[6] Area estimated impacted by B-52	10.35	31.05	1.73	0	43.13
Daily[7] Area estimated impacted by Fighters	5.43	5.25	4.26	0	14.94
Total Area Potentially impacted average day	124.65	214.34	108.49	0	447.48
Percent Area Affected per Day	2.31	3.45	2.30	0	2.13
Average Time any Location Overflown/year	5.55	8.28	5.53	0	5.12

Notes:
1. Training hours at altitude from Tables 2-17, 2-23, and 2-29.
2. Airspace MOA areas in square nm.
3. Low-level overflight effect estimated at ¼ nm each side of flight centerline.
4. Assumes 240 flying days per year, including Day-to-day and LFE.
5. B-1 at 2,000 feet AGL or below includes all hours below 2,000 feet AGL plus 75% of flight hours from 2,000 to 4,999 feet AGL at a speed of 540 nm per hour.
6. B-52 includes all hours below 2,000 feet AGL at a speed of 360 nm per hour.
7. Fighters include all hours below 2,000 feet AGL at a speed of 540 nm per hour.

4.9.3.4 No-Action Alternative

Under the No-Action Alternative, the Air Force would continue to use the current configuration of the existing Powder River airspace. The existing Powder River MOAs and ATCAA overlie portions of Custer County, Powder River County, and Carter County, MT; Butte County and Harding County, SD; and Campbell County, Crook County, and Weston County, WY. Flight activity and noise levels would not change from projected baseline conditions. No-Action low-level overflights would be, on average, approximately 8 to 9 per year. No-Action daily civil operations impacted are projected to be 7 (see Table 4.9-2). There would be no supersonic or chaff and flare training. The socioeconomic effects would essentially continue to be as described for the PR-2 MOA under Alternative A without supersonic flight or chaff and flare training.

4.10 Environmental Justice and Protection of Children

4.10.1 Methodology

The approach applied in the environmental justice analysis is in accordance with the *Interim Guide for Environmental Justice with the Environmental Impact Analysis Process* (Air Force 1997b). The minority and low-income communities and youth population under the proposed airspace were quantified based on census block-group data. These numbers were compared with county and state demographic data to determine whether any disproportionate low-income, minority, or youth population concentrations were located in potentially affected areas.

Environmental justice analysis applies to adverse environmental impacts. Consequently, potential disproportionate impacts to minority or low-income populations are assessed only when adverse environmental consequences to the general human population are anticipated. The same is true for protection of children from health and safety risks, as the potential for such risks would be driven by adverse environmental impacts.

Health and safety factors of the proposed action were analyzed to determine the potential for adverse environmental impacts that could affect the human population and have the possibility of environmental justice concerns. In addition, potential environmental health or safety hazards were examined to assess potential special risks to children. If significant impacts to the human population are expected, these impacts are analyzed further to determine the potential for disproportionate effects to environmental justice populations or special health and safety risks to children.

Affected Areas

Environmental justice data for the ROI by county are presented in Table 4.10-1. The data show that the overall minority population ranges by state aggregated ROI counts from 8.3 to 12.0 percent. Table 4.10-2 presents environmental justice data for areas under the proposed PRTC airspace. Total population for this area is estimated to be 84,420 persons, based on block-group data from Census 2000, the most recent detailed data available. The actual minority population for the affected area is estimated to be 12,661 persons, representing 15.0 percent of the total affected population. Minority persons, comprised almost entirely of Native Americans, are concentrated in areas in which reservation lands are located, primarily Big Horn (64 percent minority) and Rosebud (53 percent) counties in MT. A total of 77 percent of the minority population under the proposed PRTC airspace resides primarily under the proposed PR-1B MOA in these two MT counties.

The population in the affected area is 16.4 percent low-income overall, with poverty rates generally similar to or lower than respective county levels. Areas with a relatively high incidence of poverty include Big Horn (30 percent low-income) and Rosebud (27 percent) in MT, Grant (20 percent) and Sioux (32 percent) in ND, and Harding (21 percent) and Ziebach (40 percent) in SD.

Children under the age of 18 years comprise 27.1 percent of the total potentially affected population. Areas with high percentage youth population include Big Horn (36 percent youth) and Rosebud (38 percent) in MT, Golden Valley (42 percent) and Morton (35 percent) in ND, and Harding (33 percent) in SD.

PRTC Airspace

Environmental justice data for the individual proposed PRTC airspace elements are presented in Table 4.10-3. The majority of the potentially affected minority population resides on lands under the Gateway ATCAA and the PR-1A and PR-1B MOAs and ATCAAs. Environmental justice populations are highest under the PR-1A and PR-1B airspace elements, where minorities account for 57 percent of the total affected population, low-income persons account for 28 percent, and children comprise 36 percent of the population.

Table 4.10-1. Environmental Justice Data for the ROI by County

ROI Counties	**2000 Population**	**Minority Population**		**Low-Income Population**		**Youth Population**	
		Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
MT[5]	**902,195**	**94,372**	**10.5**	**128,355**	**14.6**	**230,062**	**25.5**
Big Horn	12,671	8,214	64.8	3,632	29.2	4,534	35.8
Carter[1]	1,360	21	1.5	242	18.1	361	26.5
Custer[1]	11,696	468	4.0	1,700	15.1	2,939	25.1
Fallon	2,837	47	1.7	349	12.5	724	25.5
Powder River[1]	1,858	55	3.0	235	12.9	494	26.6
Rosebud	9,383	3,424	36.5	2,063	22.4	3,143	33.5
Treasure	861	38	4.4	125	14.7	239	27.8
ND[5]	**642,200**	**53,051**	**8.3**	**73,457**	**11.9**	**160,849**	**25.0**
Adams	2,593	43	1.7	262	10.4	601	23.2
Billings	888	14	1.6	113	12.8	221	24.9
Bowman	3,242	47	1.4	259	8.2	780	24.1
Golden Valley	1,924	54	2.8	276	15.3	545	28.3
Grant	2,841	95	3.3	565	20.3	666	23.4
Hettinger	2,715	34	1.3	393	14.8	624	23.4
Morton	25,303	1,142	4.5	2,386	9.6	6,823	27.0
Sioux	4,044	3,467	85.7	1,564	39.2	1,630	40.3
Slope	767	3	0.4	130	16.9	194	25.3
Stark	22,636	714	3.2	2,691	12.3	5,781	25.5
SD[5]	**754,844**	**90,259**	**12.0**	**95,900**	**13.2**	**202,649**	**26.8**
Butte[1, 2]	9,094	537	5.9	1,147	12.8	2,575	28.3
Corson	4,181	2,630	62.9	1,692	41.0	1,544	36.9
Harding[1, 3]	1,353	46	3.4	277	21.1	440	32.5
Lawrence[1, 4]	21,802	1,171	5.4	3,073	14.8	5,045	23.1
Meade[1, 4]	24,253	2,041	8.4	2,195	9.4	6,877	28.4
Pennington	88,565	12,768	14.4	9,967	11.5	23,565	26.6
Perkins[2]	3,363	118	3.5	561	16.9	811	24.1
Ziebach	2,519	1,855	73.6	1,256	49.9	1,023	40.6
WY[5]	**493,782**	**54,983**	**11.1**	**54,777**	**11.4**	**128,873**	**26.1**
Campbell[1]	33,698	1,997	5.9	2,544	7.6	10,456	31.0
Crook[1, 2]	5,887	158	2.7	529	9.1	1,581	26.9
Sheridan	26,560	1,438	5.4	2,775	10.7	6,412	24.1
Weston[1, 4]	6,644	346	5.2	628	9.9	1,598	24.1

Notes:
1. Portions of county under existing MOAs or ATCAAs.
2. Proposed training airspace 50 to 75 percent ATCAA.
3. Proposed training airspace 10 to 20 percent ATCAA.
4. Proposed training airspace all ATCAA.
5. Total of state population

Source: U.S. Census 2000

Table 4.10-2. Environmental Justice Data for Affected Areas under the Proposed PRTC Airspace (by County)

Counties with Land Area Under the Affected Airspace	2000 Affected Population	Affected Minority Population		Affected Low-Income Population		Affected Youth Population	
		Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
MT[1]	***22,625***	***9,873***	***43.64%***	***5,595***	***24.73%***	***7,610***	***33.64%***
Big Horn	10,187	6,484	63.65%	3,040	29.85%	3,648	35.81%
Carter	1,359	21	1.54%	245	18.03%	361	26.55%
Custer	254	7	2.78%	45	17.86%	57	22.27%
Fallon	2,728	46	1.69%	337	12.36%	696	25.51%
Powder River	1,857	55	2.96%	239	12.90%	494	26.59%
Rosebud	6,169	3,258	52.82%	1,676	27.18%	2,337	37.89%
Treasure	71	1	1.33%	10	14.69%	18	25.19%
ND[1]	***10,731***	***217***	***2.02%***	***1,451***	***13.52%***	***2,518***	***23.46%***
Adams	2,592	43	***1.66%***	269	***10.37%***	601	***23.17%***
Billings	7	0	***0.00%***	1	***12.84%***	0	***0.00%***
Bowman	3,237	47	***1.44%***	264	***8.15%***	779	***24.05%***
Golden Valley	35	0	***0.00%***	4	***10.78%***	15	***42.24%***
Grant	2,698	90	***3.33%***	536	***19.88%***	621	***23.01%***
Hettinger	1,313	8	***0.61%***	212	***16.13%***	284	***21.61%***
Morton	125	1	***0.80%***	19	***15.33%***	43	***34.48%***
Sioux	156	26	***16.49%***	50	***32.15%***	36	***22.93%***
Slope	567	3	***0.53%***	96	***16.95%***	140	***24.71%***
Stark	1	0	***0.00%***	0	***21.40%***	0	***0.00%***
SD[1]	***43,402***	***2,331***	***5.37%***	***6,089***	***14.03%***	***10,767***	***24.81%***
Butte	9,089	537	***5.90%***	1,163	***12.79%***	2,574	***28.32%***
Corson	759	95	***12.46%***	149	***19.64%***	208	***27.42%***
Harding	1,352	46	***3.40%***	285	***21.05%***	440	***32.51%***
Lawrence	20,859	1,055	***5.06%***	3,000	***14.38%***	4,763	***22.83%***
Meade	8,004	485	***6.06%***	922	***11.52%***	1,986	***24.81%***
Pennington	0	0	***0.00%***	0	***0.00%***	0	***0.00%***
Perkins	3,292	114	***3.46%***	551	***16.75%***	783	***23.80%***
Ziebach	48	0	***0.00%***	19	***39.92%***	13	***27.76%***
WY[1]	***7,662***	***240***	***3.13%***	***697***	***9.09%***	***2,012***	***26.25%***
Campbell	403	8	***2.09%***	28	***7.02%***	91	***22.69%***
Crook	5,866	158	***2.69%***	529	***9.01%***	1,575	***26.85%***
Sheridan	240	16	***6.53%***	26	***10.93%***	53	***22.19%***
Weston	1,154	58	***5.06%***	114	***9.85%***	292	***25.30%***

Notes: 1. Total of affected populations within state.
Source: U.S. Census 2000.

Table 4.10-3. Environmental Justice Data by PRTC Airspace

Proposed PRTC Airspace	2000 Affected Population	Affected Minority Population		Affected Low-Income Population		Affected Youth Population	
		Number	***Percent***	***Number***	***Percent***	***Number***	***Percent***
PR-1A MOAs & ATCAAs	7,517	2,218	29.50%	1,260	16.76%	2,371	31.55%
PR-1B ATCAA	9,578	7,564	78.97%	3,535	36.91%	3,784	39.51%
PR-1B MOA	9,229	7,499	81.26%	3,474	37.64%	3,703	40.12%
PR-2 MOAs & ATCAAs	3,261	91	2.79%	519	15.93%	911	27.94%
PR-3 MOAs & ATCAAs	6,964	106	1.53%	793	11.38%	1,766	25.36%
PR-4 MOAs & ATCAAs	9,897	361	3.64%	1,620	16.37%	2,339	23.63%
Gap A MOAs & ATCAAs	335	4	1.06%	31	9.36%	75	22.47%
Gap B MOAs & ATCAAs	1,373	23	1.66%	241	17.58%	364	26.54%
Gap C MOAs & ATCAAs	693	5	0.79%	105	15.14%	146	21.07%
Gateway East ATCAA	1,003	35	3.46%	190	18.89%	281	28.04%
Gateway West ATCAA	43,799	2,255	5.15%	5,537	12.64%	10,868	24.81%

Source: U.S. Census 2000.

4.10.2 Issues and Concerns

Issues and concerns related to Environmental Justice were expressed during the public scoping process, as well as Government-to-Government consultations with each of the Native American tribes with reservations located underneath the proposed airspace. Concerns expressed included disruption of spiritual and cultural ceremonies from the audible and visual effects from overflights such as noise, sonic booms, and contrails; air quality; interference with civil aviation; and effects of chaff and flares on livestock and sacred sites. Concern was also expressed that noise levels and low overflights would interfere with economic development efforts on the reservations, such as building new business ventures including development of a coal power plant and a casino.

4.10.3 Environmental Consequences

4.10.3.1 Alternative A

Section 4.7 *Cultural Resources* identified the potential for adverse impacts to cultural landscapes and traditional cultural properties as a result of the increased noise and sonic booms related to military operations within the proposed airspace. Under the airspace proposed for Alternative A, the affected population is 84,420 persons including affected populations on four Native American reservations: Crow, Northern Cheyenne, Standing Rock, and Cheyenne River. The affected minority population is 12,661 and 13,831 persons live below the poverty line. Beneath the airspace proposed in Alternative A there are eight traditional cultural properties, as well as a number of battlefield sites, archaeological sites, and landscape areas that have identified as probable sacred sites. Of these areas, some are located on the four Native American reservations. Throughout the year, many Native Americans visit these and other sacred sites for spiritual ceremonies and vision quests. The largest of these ceremonies typically occur during the summer months from May through September, depending on the practices of the individual tribes. During these ceremonies, low overflights and sonic booms have the potential to disrupt these sacred sites and tribal members participating in spiritual ceremonies. Because these sites are located on tribal reservations and the ceremonies are conducted by Native Americans, the potential for adverse impacts to these cultural resources would be disproportionate for the four reservations located beneath the proposed airspace.

The Air Force would be able to establish temporary avoidance areas for the largest ceremonies performed at these sacred sites at specific times of year. Flying at higher altitudes during the specified time period could reduce the noise and visual disturbances of their ceremonies by military operations. Advance coordination between the Air Force and the tribes on the scheduling of LFEs could address potential impacts from sonic booms on the largest ceremonies conducted under the airspace. However, there is the potential that small or individual ceremonies would continue to be disturbed and the potential exists for adverse impacts to these Native American cultural resources. Alternative A, which overflies at low level, parts or all of four reservations, would have greater consequences than Alternative C or Alternative B, and Alternative C with its overflight of populated areas on the Crow and Northern Cheyenne Reservations would have greater consequences than Alternative B.

The youth population in the affected counties is similar, in proportion, to the affected state levels. The primary difference is the youth population under the PR-1B MOA which is proportionately higher than under other proposed MOAs. As discussed in Section 4.2.3.7, no long-term impacts are expected to occur as a result of noise levels under the proposed airspace. Additionally, DNLmr would be low enough that schools would be considered a compatible land use. While infrequent low-level overflights may temporarily disrupt learning, these overflights are not expected to have long-term health effects on children. No other health or environmental conditions have been identified which could adversely impact children.

The highest concentration of minorities, low income, and youth populations are located under the proposed PR-1B MOA. These conditions create the potential for disproportionate environmental impacts to populations under PR-1B.

4.10.3.2 Alternative B

Under the PR-2, PR-3, and PR-4 MOAs which would be subject to low level overflights the affected population is 20,122 persons of which 558 are minority and 2,932 persons live below the poverty level including the affected populations within the Standing Rock and Cheyenne River reservations. No overflights below FL180 would occur over the Crow or Northern Cheyenne Reservations. When compared to Alternative A, 16,745 fewer persons would be affected by low level overflights.

Under PR-2, PR-3, and PR-4 low level overflights and sonic booms would have the potential for adverse impacts to sites which are culturally or spiritually significant to Native Americans located on or near reservations and ceremonies being conducted by Native Americans at these sites. The potential for adverse impacts at these culturally significant sites would be disproportionate for the Native Americans associated with the four reservations located beneath the proposed PRTC. The effects to sacred sites and ceremonies in areas below the PR-1A and PR-1B ATCAAs would not be from low-level overflights but could be from infrequent sonic booms. The western one-third of the Standing Rock Reservation would be located beneath the proposed PR-4 MOA and subject to low level overflights. The northwest corner of the Cheyenne River Reservation is under the proposed PR-4 MOA. Areas overflown on these two reservations would experience a change in the noise and visual setting that would have an adverse impact on spiritual ceremonies and sacred sites conducted by Native Americans on the reservations as described in Section 4.7.3.2.

The Air Force is continuing Government-to-Government consultations and has discussed coordinating flight schedules with affected tribes to avoid the largest ceremonies at these sacred sites at specific times of year. Establishing temporary avoidance areas and/or restricting flight to higher altitudes during specified time periods could reduce the disturbance to the sacred sites and ceremonies. Advance coordination between the Air Force and the tribes on the scheduling of LFEs could address potential impacts from sonic booms during the largest ceremonies conducted under the airspace. Specific agreements have not been established. There is also the potential that individual or smaller ceremonies would continue to be disturbed. The potential exists for adverse impacts to Native American ceremonies. The impacts would be less with Alternative B than with Alternative A or Alternative C because low-altitude overflights would not occur over more heavily populated areas of the Crow or all of the Northern Cheyenne Reservations.

The higher concentrations of youth population under the PR-1A and PR-1B MOAs would not be overflown at low altitude. No long-term impacts are expected to occur as a result of noise levels under Alternative B. Schools would be considered a compatible land use and infrequent low-level overflights may temporarily disrupt learning. No other health or environmental conditions have been identified which could adversely impact children.

4.10.3.3 Alternative C

Under Alternative C, there would be the potential for disproportionate adverse impacts to the Crow and the Northern Cheyenne reservations as described for Alternative A. The Standing Rock and Cheyenne River Reservations would be overflown by the PR-4 ATCAA and would not be subject to low level overflights. Alternative B overflies at low attitude 9,897 fewer persons than Alternative A. The population under the PR-1A, PR-1B, PR-2, and PR-3 MOAs which include the Crow and Northern Cheyenne Reservations, is 27,319 persons, of which 9,979 persons would be minority and 6,107 persons live below the poverty level. Section 4.7.3.3 identified the change in cultural landscapes as a result of the noise and visual effects of the low level overflights and sonic booms as an adverse impact. Many of the traditional cultural properties and other cultural sites, such as Little Bighorn Battlefield are located under PR-1A or PR-1B MOAs. The Northern Cheyenne reservation is completely overflown by the PR-1B MOA. Because these sacred sites and spiritual ceremonies are conducted by Native Americans on reservations, there would be the potential for disproportionate adverse impacts.

The impacts of Alternative C would be greater than those for Alternative B because larger reservation areas and a greater proportion of minority and low income persons would be impacted.

4.10.3.4 No-Action Alternative

Under the No Action Alternative, there would be no disproportionate impacts upon environmental justice population. The Air Force would continue to use the existing Powder River airspace, which does not directly affect Native American reservations or other areas where the populations of concern may be disproportionately represented.

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5.0 CUMULATIVE EFFECTS AND OTHER ENVIRONMENTAL CONSIDERATIONS

5.1 Cumulative Effects

Council on Environmental Quality (CEQ) regulations stipulate that the cumulative effects analysis in an Environmental Impact Statement (EIS) should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 Code of Federal Regulations [CFR] 1508.7).

The first step in assessing cumulative effects involves defining the scope of other actions and their interrelationship with the proposed action or alternatives (CEQ 1997). The scope must consider other projects that coincide with the location and timetable of the proposed action and other actions. Cumulative effects analyses evaluate the interactions of multiple actions.

5.1.1 Past, Present, and Reasonably Foreseeable Actions

Table 5-1 summarizes the past, present, and reasonably foreseeable actions within the region which could interact with the proposed Powder River Training Complex (PRTC). In many cases, these actions are outside the area under the PRTC.

Each action in Table 5-1 is explained in the notes, and the status is described where appropriate. A number of the projects are Bureau of Land Management (BLM) management and planning actions. The energy exploration and development has been a stimulus to economic activity within the region.

In addition to these projects, there have been general trends in the area toward larger farming operations, growth in larger established communities, and decline of smaller communities. Recreational uses, which are likely to continue to grow into the foreseeable future, include hunting and fishing, with many hunters and fishermen coming to the region in search of game.

As illustrated in Figure 2.4, the existing Powder River airspace has threat emitters and simulated targets which are typically located on former intercontinental ballistic missile sites. Should funding become available, it is reasonably foreseeable that additional threats which add realism to training could be located under the proposed PRTC airspace.

5.1.2 Cumulative Effects

The cumulative effects of establishing the PRTC airspace have been referred to throughout this Draft EIS. The following analysis examines the incremental impacts of the PRTC action when added to the actions set forth in Table 5-1 and whether the effects of the actions together would result in potentially significant impacts not identified when the Proposed Action or alternatives are considered separately.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions in the ROI (Page 1 of 8)

Report #	*Action*	*Notes*	*Status*
BUREAU OF LAND MANAGEMENT RESOURCE MANAGEMENT PLANS (RMPS)			
1	**Fortification Creek RMP Amendment**	The Bureau of Land Management (BLM) Buffalo Field Office (BFO) is proposing to amend its 1985 Resource Management Plan (RMP) with an associated Environmental Assessment (EA) for the Fortification Creek Area (FCA) (Campbell and Johnson counties, Wyoming). Existing land use decisions need to be evaluated to determine whether they are still relevant given the mixed ownership pattern and other management challenges with the FCA. Land use decisions currently in place need to be evaluated to determine whether those decisions are still relevant. BLM continues to receive requests for oil and gas exploration and development in the 100,000 acres Fortification Creek area, a mix of federal, state and private surface ownership. There has been interest expressed by the public for other uses. The BLM will prepare an EA to evaluate the current conditions and address issues that have presented management challenges.	Potential expanded regional mineral development. Draft Environmental Assessment released in August 2009. Alternative analysis underway. Preliminary issues identified for the Fortification Creek amendment include: • Whether to manage a proposed Area of Critical Environmental Concern (ACEC) area formally as an ACEC. • Whether overhead power should be allowed on Federal surface where it is currently restricted. • Whether to continue the RMP management objectives for any or all of the resource values identified for the FCA (steep slopes, erosive soils, elk habitat, archaeological/paleontological resources, visual resources) and the geographic extent of the identified resource values. Whether to identify tracts for an exchange for the State-owned surface and minerals. BLM BFO, in cooperation with the Wyoming Game and Fish Department (WGFD), University of Wyoming, area land owners, and several coalbed natural gas companies is planning a four-year study of elk in the Fortification Creek area of Campbell County, WY. Increased development in coalbed natural gas (CBNG) near the area is a concern to BLM, WGFD, as well as hunters, outfitters, and land owners in the area. Project objectives for the Fortification Creek Elk Study include monitoring elk movements in relation to CBNG development to analyze the impacts from CBNG, as well as evaluating disturbance potentially caused by traffic levels, noise, and habitat loss. Contact: Tom Bills, Project Manager, Buffalo Field Office, (307-684-1168). Web site: www.blm.gov/wy/st/en/info/NEPA/bfodocs/fortification_creek.html
2	**Miles City Field Office RMP**	Encompassing Eastern Montana (3 million surface acres and 12 million acres of federal minerals within Carter, Custer, Daniels, Dawson, Fallon, Garfield, McCone, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Treasure, Wibaux and portions of Big Horn and Valley counties, Montana), resources are managed under two separate RMPs; the Big Dry Resource Management Plan and the Powder River Resource Management Plan. Due to recent land use changes, changing resource conditions, changes in use of public land, and new environmental concerns the BLM is preparing this updated Resource Management Plan by combining the Big Dry and Powder River Plans into one comprehensive plan. http://www.blm.gov/rmp/mt/milescity/index.htm	Potential expanded regional mineral development. The RMP is being implemented following an EIS ROD on 30 December 2008.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions in the ROI
(Page 2 of 8)

Report #	Action	Notes	Status
BUREAU OF LAND MANAGEMENT RMPs (continued)			
3	**North Dakota RMP**	The North Dakota Resource Management Plan will provide future direction for approximately 58,000 surface acres and over 4.1 million acres of mineral estate (subsurface acres) in the state. As of 2010, an EIS is being prepared as part of the planning process. The purpose of the plan is to establish guidance, objectives, policies, and management actions for BLM-administered public lands for the next 10 to 15 years.	The BLM has received public input about development of federal coal and BLM management of public lands and minerals in North Dakota. http://www.blm.gov/mt/st/en/fo/north_dakota_field/rmp.html
4	**South Dakota RMP**	EIS in process as of 2009. The Resource Management Plan (RMP) and EIS encompass an area including portions of 32 of the 66 counties within South Dakota. The plan will fulfill the needs and obligations set forth by the National Environmental Policy Act, the Federal Land Policy and Management Act, all other acts, laws and regulations associated with land management planning, and BLM management policies.	The BLM has received public input about development of federal coal and BLM management of public lands and minerals in South Dakota. http://www.blm.gov/mt/st/en/fo/south_dakota_field/rmp.html
RMPs FOR OIL AND GAS DEVELOPMENT			
5	**Oil and Gas RMP Supplemental EIS Amendment for Billings, Powder River and South Dakota (1992)**	Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans (Draft Supplemental EIS). The document was prepared by the Bureau of Land Management (BLM) as a result of U.S. District Court issued orders (December 2006). Related documents: (November 2007) Supplemental Air Quality Analysis to the Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans (Supplemental Air Quality Analysis). The document was prepared by the Bureau of Land Management (BLM) to assess the level of coal bed natural gas (CBNG) development that would require mitigation to reduce the potential for impacts to air quality. The comments received on the Supplemental Air Quality Analysis will be considered in the preparation of the Final Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment to the Powder River and Billings RMPs (Final Supplemental EIS).	Proposed expanded regional mineral development. Record of Decision on Supplemental EIS issued December 2008. Topics addressed in the EIS include Phased CBNG development, the inclusion of the proposed Tongue River Railroad in the cumulative impact analysis, and a discussion on how private water well mitigation agreements help alleviate the impacts of methane migration and groundwater drawdown. The Draft Supplemental EIS analyzed three new alternatives (F, G and H) to consider phased CBNG development. Under Alternative F, the BLM would limit the number of Federal applications for permit to drill (APD) approved each year cumulatively and in each fourth-order watershed. The BLM would also limit the percentage of disturbance within identified crucial wildlife habitat. Further, the BLM would place a limit on the volume of untreated water discharged to surface waters from Federal CBNG wells within each fourth-order watershed. Under Alternative G, development of CBNG on Federal leases in the Billings and Powder River RMP areas would be done following the same management actions as described under Alternative F. However, while the BLM would limit the number of Federal APDs approved each year cumulatively, development would be limited to a low range of predicted wells based on the Statewide Document's Reasonably Foreseeable Development scenario.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions in the ROI (Page 3 of 8)

Report #	*Action*	*Notes*	*Status*
RMPs for Oil and Gas Development (continued)			
5 (cont.)	**Final Oil and Gas RMP/EIS Amendment for Billings, Powder River and South Dakota (1992) (continued)**	The Powder River and Billings RMP areas comprise approximately 1.5 million acres of BLM-managed surface and 5 million acres of BLM-managed mineral estate. There are approximately 3.2 million acres of BLM-managed oil and gas. The Powder River RMP area includes Powder River and Treasure Counties, and portions of Big Horn, Carter, Custer, and Rosebud Counties. The Billings RMP area includes Carbon, Golden Valley, Musselshell, Stillwater, Sweet Grass, Wheatland, and Yellowstone Counties and the remaining portion of Big Horn County. The Supplemental EIS supplements the 2003 Montana Statewide Final Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans (Statewide Document).	Alternative H, the BLM's preferred alternative, contained three key components. First, a phased development approach would be implemented where a CBNG proposal would be reviewed against four filters or screens to determine if the proposal needed to be modified. Second, this alternative would include extensive requirements that an operator must meet when submitting a project Plan of Development (POD). Third, mitigation measures, and subsequent modifications to existing operations via adaptive management, would be considered and applied to each POD, as appropriate. The BLM has initiated activities to coordinate and consult with the Montana Governor. Prior to the issuance of the Record of Decision and approval of the proposed land use plan amendment, the Governor will be given the opportunity to identify any inconsistencies between the Proposed SEIS/Amendment and state or local plans and to provide recommendations in writing during the 60-day consistency review period required by the BLM land use planning regulations (43 CFR 1610.3-2).
6	**Buffalo Oil and Gas Leasing EA and possible Buffalo RMP amendment**	In response to rulings made by the IBLA and the U.S. Tenth Circuit Court of Appeals, the BLM proposed to examine land use allocations for oil and gas leasing made and in the context of new information regarding coal bed natural gas (CBNG). www.blm.gov/wy/st/en/info/NEPA/bfodocs/rmp-og.html	Proposed expanded mineral development. EA and FONSI were published 4 March 2008. Leasing will be considered during RMP revision scheduled in FY 2009. Contact: Thomas Bills, Project Manager, (307- 684-1133). Web site: www.blm.gov/wy/st/en/info/NEPA/bfodocs/rmp-og.html
7	**Inventory of Assessed Federal Coal Resources and Restrictions to Their Development**	The report found that the Powder River Basin, which straddles Wyoming and Montana, contains 550 billion short tons of total coal resources, or nearly 58 percent of the 957 billion short tons assessed or analyzed to date on all Federal lands. The Interior Department Bureau of Land Management currently has under lease or lease application about 11.6 billion short tons of coal in the basin, which are not included in the 550 billion tons of Federal coal studied. (The report can be accessed at: http://www.fossil.energy.gov/epact/epact437_final_rpt.pdf)	Report finalized in September. Potential for additional regional mining operations.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions in the ROI (Page 4 of 8)

Report #	*Action*	*Notes*	*Status*
RMPs for Oil and Gas Development (continued)			
8	**Fortification Creek Area (FCA) Plan of Development Proposal (POD)**	The Bureau of Land Management (BLM) Buffalo Field Office is requesting public comments on the Fortification Creek Area (FCA) Plan of Development Proposal (POD). Under the proposal, BLM is preparing environmental assessments (EAs) for seven coalbed natural gas (CBNG) PODs in the FCA of the Powder River Basin (PRB). The 100,000 acre Fortification Creek Area is located approximately 25 miles northwest of Gillette. Special resource values in the area include: an isolated elk herd and its habitat, high visual quality, a 12,000 acre wilderness study area (WSA), steep slopes with erosive soils, and cultural, historic, and or paleontological values. As part of the continuing development of CBNG resources in the PRB, development is now being proposed in the leased areas of the FCA, which include all the federal minerals outside the WSA. Seven PODs, proposed by six different companies, include a total of 158 CBNG wells to be drilled along with installation of associated facilities. The surface disturbance for these PODs is estimated to be approximately 350 acres. Along with the individual PODs, the companies have submitted 4 maps of the FCA showing an estimate of total known development planned for the area. They have worked together to identify common primary access and utility corridors. BLM will use these maps and additional information supplied by the companies to conduct the cumulative effects analysis for the EAs. There is a section of state land in the center of the WSA that also has been leased by the state for oil and gas development. In order for the company to access that lease, they must obtain a Right-of-Way across public land.	Plans underway. Potential for additional regional mining operations.
9	**Dakota Prairie Grasslands, Medora Ranger District; North Dakota; North Billings County Range Allotment Management Plan Revisions**	The Medora Ranger District, Dakota Prairie Grasslands, proposes to continue grazing on 48 allotments in a manner consistent with direction set forth in the Dakota Prairie Grasslands Land and Resource Management Plan (Grasslands Plan) and applicable laws. The ETS lays the groundwork for revising the Allotment Management Plans (AMPs) for the 48 allotments. Site-specific resource objectives, allowable grazing strategies, and adaptive management tools set forth in the Environmental Impact Assessment under completion following receipt of public comments 10 October 2009. The purpose of this action is to develop AMPs for permitted domestic livestock grazing using management that is consistent with the Grasslands Plan direction and to maintain, meet, or move towards desired resource conditions within a 10-20 year timeframe following the decision. There is an overall need for greater management flexibility to meet Grasslands Plan resource goals and objectives and to cope with fluctuations in environmental and social conditions including, but not limited to, annual changes in weather; to be responsive to permittee requests for reasonable operational adjustments; and to respond to unforeseen issues.	Continuing activity

Table 5-1. Past, Present, and Reasonably Foreseeable Actions in the ROI (Page 5 of 8)

Report #	*Action*	*Notes*	*Status*
RMPs for Oil and Gas Development (continued)			
10	**Federal Department of Transportation Tongue River Railroad**	The Tongue River Railroad was first proposed in 1983 between Miles City and Decker for a distance of 130 miles. The railroad would cross the coal-rich Powder River Basin along the Montana-Wyoming border. In October 2009, federal officials announced federal approval of the final 17-mile stretch of the line near Decker that had not been included in prior approvals. Other sections had been approved in 1986 and 1996. Permits from state and federal agencies are still needed, including rights of way through private and public property. The new rail line could boost Montana coal production by about 12 million tons annually. The railroad also projects hauling 12 to 16 million tons of Wyoming coal annually, as the Tongue River Railroad would reduce transportation distance by an estimated 320 miles from current rail transport of Wyoming coal. The coal would be destined primarily for Midwestern power plants.	The Tongue River Railroad is moving closer to development with the obtaining of permits. Although the railroad is controversial, the project is undergoing planning and permitting and qualifies as reasonably foreseeable for cumulative analysis.
11	**Otter Creek Coal Reserves**	The Otter Creek coal reserves proposed for strip mining are located southeast of Ashland in south central Montana. Coal reserves are estimated at approximately 1.3 billion tons. In Spring 2010, the State of Montana contracted with Arch Coal Inc. to develop the coal reserves. In April 2009 the Northern Cheyenne Tribe entered into a settlement agreement which removed some litigation to development of the coal deposits. Otter Creek could eventually be an operation nearly the size of Colstrip. Potential environmental effects are expected to include soils, water, and air quality impacts as well as socioeconomic growth in the region. Public concern has been expressed that the agricultural way of life and some cultural resources could be irreversibly altered by coal development and transport. The agreement with the Tribes states that any company that mines the state tracts must give hiring preference to Tribal members. As part of the settlement, Montana's Congressional delegation promised the Tribe $10 million per year for seven years to offset mining impacts.	Preliminary development plans have been prepared. Lease agreements have been signed. Additional lawsuits have been filed in Spring 2010 to challenge the project. For the purpose of this EIS, a strip mine to excavate Otter Creek coal reserves would be a reasonably foreseeable project within the ROI.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions in the ROI (Page 6 of 8)

Report #	*Action*	*Notes*	*Status*
Military			
12	**BRAC beddown and flight operations of Remotely Piloted Aircraft (RPA) at Grand Forks AFB, ND**	In accordance with 2005 Base Realignment and Closure Commission (BRAC) and the Total Force Integration Plan, Phase II, the ANG would plan for and establish an operational Predator squadron at Hector Int'l Airport ND with 8 Primary Mission Aircraft Inventory MQ-1s. Furthermore, ACC would support the 119 FW's Remotely Piloted Aircraft (RPA) mission by activating an active duty associate unit at Grand Forks AFB. This unit (to stand up in FY 09/2) will provide maintenance support for the 8 MQ-1 aircraft and Predator Launch and Recovery operations at Grand Forks. ACC would establish Grand Forks AFB as the second Global Hawk Main Operating Base (MOB) in FY11 (as reflected in the Total Force Integration Plan, Phase II) by activating an active duty unit with end-state manpower estimated at 393 personnel (81 officers, 304 enlisted, and 8 contractors). Approximately eight RQ-4 aircraft are currently slated for Grand Forks.	Proposed airspace designation northeast of PRTC to create training area for Grand Forks AFB-based RPAs. Final EIS to be released to the public in August 2010 to convert portions of the Devils Lake MOA to Restricted Areas or other airspace designation to support RPA training.
13	**Proposed White Elk Military Operations Area**	The Air Force proposes to establish the White Elk MOA on the western edge of the Utah Test and Training Range (UTTR) beneath the existing Currie/Tippet ATCAA. The proposed MOA would extend from 14,000 feet MSL up to but not including 18,000 feet MSL while the existing ATCAA extends from 18,000 feet MSL to 58,000 feet MSL. The proposal includes additional training operations in proposed MOA and existing ATCAA, authorization of chaff and flares in the MOA and ATCAA, and authorization of supersonic operations in the existing ATCAA.	Proposed airspace designation southwest of PRTC to create additional training capabilities for military aircraft based at Hill AFB. A Draft EIS was completed in August 2008.
14	**Beddown of a Second B-52 Flying Squadron at Minot AFB**	The Air Force evaluated the stand up of a new operational B-52 squadron and beddown at Minot AFB to support conventional and strategic missions Adding an additional squadron to Minot AFB significantly increases the base's ability to support both missions while maintaining constant levels of operational readiness.	Beddown has been completed at Minot AFB. New squadron of B-52 aircraft is included in baseline and alternative analysis for PRTC.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions in the ROI (Page 7 of 8)

Report #	*Action*	*Notes*	*Status*
Military (continued)			
15	**Siting of Threat Emitter Sites to Enhance Training in PRTC**	Although threat emitters are not proposed as part of PRTC, it is reasonably foreseeable that, if funds become available, the Air Force would propose to lease 15-acre parcels under the airspace on which to locate features to enhance training realism. Threat emitters and simulated targets could be developed under the proposed PRTC airspace comparable to those in Figure 2-4. These sites are designed to realistically simulate a battlefield environment and successfully accomplish mission training. Locations for these sites would be approximately 15 to 20 miles apart, where possible, and either under or near the MOAs/ATCAAs. Emitter or simulated target sites would consist of a 15-acre barbed wire fenced area with a 1- to 2-acre fenced smaller area to secure electronic equipment. The degree of construction or development would depend on the type of site, utility requirements, safety and security parameters, and existing conditions. Siting near existing roads and power lines would reduce costs and disturbance to environmental resources. An existing cleared area on a rise, such as a former ballistic missile site, would improve the range of any emitters while reducing the extent of clearing or other disruption to the existing environment. A site on a rise typically avoids biologically sensitive lowlands or wetlands and provides the transmitter with a full line of sight into the training airspace, thereby improving its effectiveness as a training aid.	At this time, the Air Force cannot identify the number, nature, or location of any candidate sites. Doing so would be premature since the final PRTC airspace structure would dictate the appropriate locations for these training assets. Should a decision be made to implement the PRTC and pursue additional emitter and/or simulated target sites, the Air Force would undertake NEPA analysis tiered to this EIS. The Air Force would also conduct the required real estate and NHPA process for all sites. Ellsworth AFB formerly performed a Minuteman Intercontinental Ballistic Missiles mission that included a number of 15-acre remote sites dispersed under the area of the proposed PRTC airspace. Such sites would be expected to receive initial consideration as possible threat emitter and/or simulated target locations.
Public Airports			
16	**Hardin Airport Relocation, Hardin, MT**	Proposal to develop a new public airport in Hardin, Big Horn County, MT approximately 2.5 miles west of Hardin and south of Interstate 90. Project would include a new 4,490 foot runway, aircraft taxiway, parking apron, airport beacon, Precision Approach Path Indicator, hangar access, taxi lane, and an entrance road. This public airport would replace the existing Hardin airport which is inadequate for current and projected air traffic and does not comply with current FAA standards. The relocated airport is expected to meet FAA standards and be eligible for additional state and federal funding.	Environmental Assessment was completed and approved by the FAA in August 2007. Improvements to airport would facilitate additional aircraft traffic.
Federal Energy Regulatory Commission (FERC)			
17	**Grasslands Expansion, Williston Basin Interstate Pipeline Co. PF03-3**	Construct three new compressors stations and add compression at the Manning compressor station in Dunn County, North Dakota, and construct a supply lateral in southeastern Montana.	Under review; representative of ongoing upgrades to regional mineral development.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions in the ROI (Page 8 of 8)

Report #	*Action*	*Notes*	*Status*
FERC (continued)			
18	**Baker Storage Field Well Abandonment, Williston Basin Interstate Pipeline Company, CP05-391**	Abandonment of three existing natural gas storage injection/withdrawal wells in the Baker Storage Field, Fallon County, Montana.	In process; representative of ongoing changes to regional mineral development.
19	**Spearfish Hydroelectric Project City of Spearfish, South Dakota P-12775**	On Spearfish Creek, in Lawrence county, South Dakota. The project occupies United States lands within the Black Hills National Forest administered by the U.S. Forest Service.	In process; representative of ongoing community improvements within region.
Other			
20	**MDU Wind farm in Baker, MT January 2008**	The wind farm is located southeast of Baker, MT. The 121 feet long blades will begin to turn with wind of 6 mph or 7 mph. As soon as they are turning at a consistent rate, they start producing energy, which goes into the power grid. The blades reach capacity at wind speeds of about 25 mph.	Wind farms are mapped on FAA-prepared sectional aeronautical charts and are avoided by aircraft.
21	**Great Lakes Airlines**	Received Department of Transportation approval and is taking over the Essential Air Service carrier flights in Montana. These would all be existing flights to Glasgow, Glendive, Havre, Lewistown, Miles City, Sidney and Wolf Point.	Existing flights included in data used for airspace analysis in PRTC EIS.
22	**Ekalaka Water and Sewer System improvements**	Improved water and sewer systems for Ekalaka	Constructed facilities improve prospects for community growth.
Outside of ROI, But Raised at Scoping			
23	**Avalanche Hazard Reduction**	Avalanche Hazard Reduction by Burlington Northern Santa Fe Railroad in Glacier National Park and Flathead National Forest Montana	Final EIS issued 24 July 2008
24	**South Dakota bombing range cleanup**	Officials from the Oglala Sioux Tribe and Ellsworth Air Force Base have signed a plan to finish cleanup of 2,486 acres of the 15-mile-wide, 40-mile-long Badlands Bombing Range that lies about 55 miles southeast of Ellsworth AFB. The cleanup of the ranges has been an ongoing process spanning several decades. A completion date has not yet been finalized.	Continuing action; no bombing range associated with proposed PRTC.
25	**Ellsworth AFB Remotely Piloted Aircraft Ground Station**	The Air Force announced on June 21, 2010 that Whiteman AFB, MO, and Ellsworth AFB, SD, will host ground control stations for MQ-1 Predator and MQ-9 Reaper remotely piloted aircraft, respectively. Each base will add a total of 280 personnel, both civilian and military. Ellsworth operations are expected to be in place by May 2012.	Construction of new facility to be analyzed under a separate action. No aircraft are proposed to be beddown at Ellsworth AFB. No new or changes to airspace are proposed.

AIRSPACE/AIR TRAFFIC

The Proposed Action would not prohibit general aviation use or development under the proposed airspace. The cumulative actions listed in Table 5-1 represent activities which currently take place in the ROI, including energy resource development and airport development. The proposed airport relocation in Hardin, MT represents a replacement for an existing airport. The relocated airport would have a designated avoidance area of 3NM and 1,500 feet AGL. The additional B-52 squadron has been included throughout the EIS as a baseline condition. Cumulative potential effects upon other airspace users or potential users have been included throughout this EIS and include impacts to airspace access and impacts to time-sensitive deliveries as a result of the inability to fly IFR through an active MOA. Approximately 2 or more hour delays or re-routing could impact time-sensitive deliveries to existing or proposed mining, transportation projects, industrial development, or agricultural operations. All other impacts to civil aviation and air traffic would be the same as those described in Section 4.1.

NOISE

Infrequent sonic booms during 10 days of LFEs per year would not be expected to interfere or cumulatively affect other ongoing or proposed projects. Aircraft training overflight noise is expected to be random and would not cumulatively interact with construction sites. Noise levels under the proposed airspace would not impact energy resource development efforts. The Burlington Northern Santa Fe Railroad study involving avalanche hazard reduction was raised as a concern during scoping, however, the project area is outside of the proposed PRTC and would not be impacted by PRTC flight operations or noise. All other potential noise impacts would be as described in Section 4.2. No cumulative impacts are anticipated.

SAFETY

Limited communication and radar coverage would continue below 12,000 feet MSL in much of the proposed airspace which impact safe civil aircraft operations and airports. The B-1 or B-52 would randomly overfly at levels of 2,000 feet AGL or below approximately 2 to 4 percent of the MOAs during scheduled training days. This level of overflight and potential startle effect is not expected to significantly alter or cumulatively affect safety of any development plan of resources within the region. The Air Force would coordinate with future mining, rail line construction, or other blasting operations as described in Section 4.3 to avoid potentially significant impacts from electromagnetic interference. Temporary avoidance areas would be established over construction sites where tall cranes or helicopters would be used during construction. Permanent avoidance areas would be mapped for tall structures such as wind generation equipment or tall smokestacks. All other potential safety impacts would be as described in Section 4.3. No cumulative impacts are anticipated.

AIR QUALITY

Mineral excavation and transportation projects, both construction and operation, could result in air quality impacts. The proposed PRTC would result in small increases in air emissions from aircraft training operations. Air quality impacts associated with proposed PRTC would primarily occur from combustive emissions from aircraft training operations. Regarding criteria pollutant emissions from project alternatives, proposed project operations would emit these pollutants across an approximately 35,200 square mile area. Due to this large area of operation, the flight altitude, and the intermittent nature of the emissions, any aircraft emissions would be well diluted when they approach ground level. Minor construction activities would be expected for the development of threat emitter sites. The emissions associated with constructing emitters are considered negligible. Siting criteria would include being near power for electricity to run the threat emitters, so no air quality effects from generators would be anticipated. Emissions of criteria pollutants from other existing and future sources and projects would occur in the region. The combination of reasonably foreseeable projects in the ROI could contribute to the exceedance of air quality standards. The proposed PRTC would not substantially contribute to or produce cumulative impacts on regional air quality that would result in violations of any National Ambient Air Quality Standard (NAAQS), including in the Lame Deer, MT and Sheridan, WY, non-attainment areas. PRTC training would not produce emission quantities which could contribute to any cumulative effects on visibility within the Federal and State Prevention of Significant Deterioration (PSD) Class I areas.

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Coal excavation and combustion has been identified as a potential cumulative impact from projects within the ROI. GHG emissions associated with the PRTC operations activities would be from combustive emissions during aircraft training operations. As described in Section 4.4.3, the proposed training activities would be conducted somewhere else within the U.S if PRTC were not available. The proposed PRTC would not contribute to potential cumulative GHG emissions in conjunction with any past, present, and reasonably foreseeable actions in the ROI.

Physical Resources

Mineral excavation and transportation line construction could impact large amounts of soil and water resources. Separate environmental analyses, prepared for the projects, will document impacts and mitigations. No surface disturbance is proposed as part of PRTC. Chaff and flare plastic and wrapper residual materials are typically inert and not expected to impact soils or water bodies. PRTC is not expected to impact ongoing or future energy resource development and resource management under the airspace. The locations of the reasonably foreseeable threat emitters would be determined by the final configuration of the airspace to improve training. Existing Minutemen missile sites and previously cleared areas will be considered, which would reduce new construction impacts and soil disturbance. Additional land clearing necessary on these sites will depend on the type of site, utility requirements, and safety and security parameters required (e.g., access road, additional fencing, parking). Emitter sites consist of a 15-acre barbed wire fenced area, with a smaller 1 to 2 acre chain link fenced area inside to secure electronic equipment. Wetlands, wildlife refuges, and other special natural areas will be avoided during site selection of new emitter sites. Potential construction of emitter sites would not be expected to have an impact on soils or water resources. Any applicable permits would be obtained if land near or upstream of wetlands needed to be disturbed. Construction would follow USACE regulations if in the vicinity of wetlands to reduce likelihood of disturbances. New construction would occur in accordance with established Best Management Practices to avoid, reduce, or minimize adverse effects to soil and water resources. Therefore, no cumulative impacts from PRTC or from reasonably foreseeable site emitters would be anticipated.

Biological Resources

Mineral excavation and transportation line construction could impact biological resources. Separate environmental documentation would address potential direct and indirect impacts of these large-scale energy projects. Potential construction of emitter sites would not be expected to have a cumulative impact in conjunction with large scale mining projects based on the relatively small size of the emitter sites and the need for sites to be on an open rise where they could project out as far as possible. Emitters would be located to avoid environmentally sensitive areas and would not be expected to cumulatively contribute to disturbance of biological resources.

As discussed in Section 4.6, chaff and flares are not anticipated to adversely impact wildlife, domestic animals, or vegetation. No other surface disturbing activity is anticipated under the proposal. Low-level flights and infrequent supersonic events create noise and startle effect to species on the ground. Infrequent low-level overflight and sonic booms may affect the behavior of sensitive species that occur within the airspace during the initial exposures. However, any effects would likely be short term and unlikely to significantly adversely affect the populations. Impacts to ranching operations including grazing from past, present, and reasonably foreseeable actions would be the same as those described under Section 4.6. The PRTC is not expected to contribute to any cumulative biological impacts within the ROI.

CULTURAL RESOURCES

Mineral excavation and transportation line construction could impact cultural resources. Construction and other ground-disturbing projects could impact Tribal lands and cultural resources. Separate environmental documentation would assess direct and indirect impacts of these projects. Cultural resources on Tribal lands experiencing construction or other ground-disturbing effects could be impacted directly as a result of other projects in the ROI. Some cumulative effects could occur from infrequent low-level overflights in conjunction with extensive planned mineral operations on or near Northern Cheyenne and Crow Reservations under PRTC Alternatives A and C. PRTC does not include any ground disturbing activity which could adversely impact historical structures or archaeological sites (see Table 4.7-1). Structural damage is not expected from infrequent sonic booms although there is no ability to direct sonic booms away from a specific location on the ground. Four Native American reservations would be potentially impacted by PRTC Alternative A, and two reservations would be potentially impacted by Alternatives B or C. The Crow and Northern Cheyenne Reservations have the greatest degree of impact with either PRTC Alternatives A or C. Cheyenne River and Standing Rock Reservations are impacted under PRTC Alternatives A or B. Low-level overflights, sonic booms, and visual intrusions may interfere with cultural or spiritual practices or ceremonies and may be perceived as an adverse impact which could cumulatively contribute to adverse impacts from past, present, and reasonably foreseeable mining actions. Any federal project that includes ground-disturbing activities has the potential to adversely affect cultural resources. These projects are also subject to NEPA compliance and Section 106 consultation prior to project start. Such projects include construction of wind farms, pipelines, oil, gas, or coal development, threat emitter sites, or any other ground-disturbing undertaking that affects public land.

LAND USE

Large-scale mineral excavation and transportation line construction would change some land uses from agricultural to industrial. This will affect both land use and land ownership, especially in portions of the Powder River Basin. The creation and modification of the Powder River airspace is not expected to have any adverse impacts on land use or ownership nor would PRTC contribute to any cumulative impacts of mineral development. The Air Force has established operating procedures to avoid low altitude overflight of specific land use locations considered to be sensitive to aircraft noise or otherwise require avoidance of aircraft overflights. The types of locations addressed by these special operating procedures include residences, ranches, private and commercial airstrips, communication towers, and communities. The PRTC would not change the use of public or private land. Any existing or new tall structures, such as wind energy generators, communication towers, or smokestacks would be charted by FAA on sectional aeronautical charts and avoided by aircraft. The locations of threat emitters included as a reasonably foreseeable action in Table 5-1 would be dependent on the final configuration of the PRTC. The incremental effects of PRTC would not be expected to create any significant or adverse cumulative effect to land use in the ROI. Low-level overflight and associated startle effects could diminish the quality of the recreational experience. The fact that recreational hunting continues throughout the area overlain by the existing Powder River airspace A and B MOAs suggests that the actual cumulative impact from low-level military aircraft overflight is less than the perceived uncertainty of impacts. Recreational land use, ranching operations, wind energy operations, oil, gas, and coal exploration are not expected to experience any limitations or negatives under implementation of the Proposed Action or alternatives.

SOCIOECONOMICS

Substantial construction projects in the ROI would alter employment patterns in areas of mineral development or transportation projects. Construction projects and additional large-scale mining would contribute to regional employment while changing the nature of the economy. Implementation of the Proposed Action or alternatives is not expected to adversely impact energy resource development projects including oil, gas, coal, or wind energy developments, airport development, or ranching operations. Temporary avoidance areas would be established over construction sites where tall cranes or helicopters would be used in the construction. Permanent avoidance areas would be mapped for tall structures such as smokestacks or wind generation machines. The Air Force would coordinate with any energy resource development projects as described in Section 4.3 to avoid the risk of significant impacts from electromagnetic emissions. Future airport development would be possible under the proposed airspace and the new airports would be afforded the same avoidance areas and procedures as the existing airports as described in Section 4.9. Civilian aircraft operations could be affected as described for airspace, with some potential for civilian flight delay to transit active MOAs IFR and 2- to 4-hour IFR delays at public airports and private airfields under active MOAs. Pilots could fly see-and-avoid in an active MOA. Ranchers, lessees of grazing allotments, and construction managers would have the opportunity to coordinate with the Air Force for temporary avoidance areas during sensitive times such as calving and weaning or construction as described in Section 4.9. The low population density of 0.2 to 4.0 persons per square mile under the proposed low-level airspace and the relatively small number of annual supersonic events make it highly unlikely that flight activity associated with PRTC would contribute to any significant social or economic changes or impacts to the region. Hunting and other recreation activities would continue throughout the proposed PRTC area. Potential socioeconomic and airspace impacts from the beddown of the RPA mission at Grand Forks would occur outside of the PRTC region of interest. No contribution from PRTC to regional cumulative impacts is anticipated.

ENVIRONMENTAL JUSTICE

Large-scale construction projects could change the economy of the area, particularly under the proposed PR-1B MOA. Agreements regarding mining construction and operation jobs for Tribal members could improve economic opportunities for minority and low income populations. Low-level overflights may have a disproportionate impact on the Native American reservations located beneath the proposed airspace. The cumulative effect of past, present and reasonably foreseeable construction projects could incrementally change employment opportunities and reduce the number of minority persons who also represent low income populations. Cumulative health or safety impacts to children are not anticipated beyond the infrequent disruption of sonic booms or low-level overflights.

5.2 Other Environmental Considerations

5.2.1 Relationship between Short-Term Uses and Long-Term Productivity

CEQ regulations (Section 1502.16) specify that environmental analysis must address "…the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity." Special attention should be given to impacts that narrow the range of beneficial uses of the environment in the long-term or pose a long-term risk to human health or safety. This section evaluates the short-term benefits of the proposed alternatives compared to the long-term productivity derived from not pursuing the proposed alternatives.

A short-term use of the environment is generally defined as a direct consequence of a project in its immediate vicinity. Short-term effects could include localized disruptions and higher noise levels in some areas. Under PRTC, short-term uses of the environment would result in airspace impacts and very short-term startle effects. No substantial construction project is proposed. Depending on their location, humans and animals cumulatively experience somewhat increased levels of noise in some areas. Humans and animals would be exposed to low-level overflights over approximately 2 to 4 percent of the area during each training day and an estimated one sonic boom per day during LFE days. Aircraft average noise levels would be below the USEPA-identified level of 55 dB. The relatively low acoustical effect can be attributed to the dispersion of training flights into a large volume of airspace. The military training that occurs in the PRTC airspace results in noise effects that are transitory in nature. Noise effects would be short-term and would not be expected to result in permanent damage or long-term changes in wildlife and livestock productivity or habitat use.

The PRTC proposal largely involves changes in airspace and would not impact the long-term productivity of the land. Cumulative use of chaff and flares would not negatively affect the long-term quality of the land, air, or water. Airspace changes are procedural and do not affect long-term productive use of natural resources.

5.2.2 Irreversible and Irretrievable Commitment of Resources

NEPA CEQ regulations require environmental analyses to identify "...any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented" (40 CFR Section 1502.16). Primary irreversible effects result from permanent use of a nonrenewable resource (e.g., minerals or energy). Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., disturbance of a cultural site) or consumption of renewable resources that are not permanently lost (e.g., old growth forests). Secondary impacts could result from environmental accidents, such as accidents or fires. Natural resources include minerals, energy, land, water, forestry and biota. Nonrenewable resources are those resources that cannot be replenished by natural means, including oil, natural gas and iron ore. Renewable natural resources are those resources that can be replenished by natural means, including water, lumber and soil.

For PRTC, most impacts are short-term, temporary, and not irreversible. Short-term reactions of wildlife or livestock could include temporary shifts in habitat use or activity, but long-term habituation is expected. Military training necessarily involves consumption of nonrenewable resources, such as jet fuel for aircraft. With PRTC training operations would use comparable fuel volumes to produce improved local training as compared with the No-Action Alternative. Military energy consumption under No-Action would be expected to be comparable to any of the action alternatives as training aircraft commuted to remote ranges for less productive training.

There could be the potential to increase the consumption of jet fuel by commercial carriers if ARTCC authorized use of the ATCAAs up to FL600 and thereby interfered with commercial traffic. Should commercial aircraft be diverted on an average day, it could result in increased distance traveled and fuel consumed. During an average LFE day, between 43 and 244 civilian flights could be diverted, assuming LFE training occurred during a continuous 4-hour time period. No irreversible or irretrievable effects are expected for cultural resources or other natural resources, including land and water.

Secondary impacts to natural resources could occur in the unlikely event of an accident and/or fire. However, while any fire can have short-term impacts to agricultural resources, wildlife, and habitat, the fire's effects are not irreversible in a natural environment. Any increased risk of fire hazard due to PRTC operations would be very low.

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6.0 REFERENCES

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8.0 GLOSSARY

Above Ground Level (AGL): Altitude expressed in feet measured above the ground surface.

Aerial Refueling Tracks: Refueling operations are performed in designated aerial refueling tracks, anchors, or FAA approved airspace.

Aerospace Expeditionary Forces (AEF): Deployed US Air Force wings, groups, and squadrons committed to a joint military operation

Air Force Instruction (AFI): Air Force Instructions implementing United States laws and regulations, and providing policy for Air Force personnel and activities.

Air Combat Command (ACC): The Air Force Command that operates combat aircraft assigned to bases within the contiguous 48 states, except those assigned to Air National Guard and the Air Force Reserve Command.

Air Force Global Strike Command (AFGSC): The Air Force Command that operates the nuclear capable aircraft and intercontinental ballistic missiles within the contiguous 48 states.

Air-to-Air Training: Air-to-air training prepares aircrews to achieve and maintain air superiority over the battlefield and defeat enemy aircraft. Air-to-air training often includes some aircraft playing the role of adversaries, or enemy forces. Air-to-air training activities include advanced handling characteristics, air combat training, low-altitude air-to-air training, and air intercept training. This training also requires the use of defensive countermeasures.

Air-to-Ground Training: Air-to-ground training employs all the techniques and maneuvers associated with weapons use and includes low-and high-altitude tactics, navigation, formation flying, target acquisition, and defensive reaction. Training activities include surface attack tactics, different modes of weapons delivery, electronic combat training, and the use of defensive countermeasures.

Air Traffic: Aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.

Air Traffic Control (ATC): A service operated by appropriate authority to promote the safe, orderly, and expeditious flow of air traffic.

Air Traffic Control Assigned Airspace (***ATCAA):*** Procedural airspace established by letter of agreement between the user and ATC, within positive control (Class A) airspace, of defined vertical and lateral limits, for the purpose of providing air traffic segregation between the specified activities conducted within the assigned airspace and other IFR traffic. ATCAAs are not charted.

Clean Air Act (***CAA):*** This Act empowered the United States Environmental Protection Agency to establish standards for common pollutants that represent the maximum levels of background pollution that are considered safe, with an adequate margin of safety to protect public health and safety.

Candidate Species: A species for which the United States Fish and Wildlife Service has sufficient information regarding the biological vulnerability of and threat(s) to that species to warrant a proposal to reclassify it as threatened or endangered (Formerly Category 1 Candidate species).

C-Weighted Day-Night Sound Level (CDNL): C-Weighted Day-Night Sound Level is day-night sound levels computed for areas subjected to sonic booms. These areas are also subjected to subsonic noise assessed according to the Onset-Rate Adjusted Monthly Day-Night Average Sound Level (DNL_{mr}).

Chaff: Chaff is the term for small fibers of aluminum-coated mica packed into approximately 150 gram bundles and ejected by aircraft as a self-defense measure to reflect hostile radar signals.

Council on Environmental Quality (CEQ): The Council is within the Executive Office of the President and is composed of three members appointed by the President, subject to approval by the Senate. Members are to be conscious of and responsive to the scientific, economic, social, esthetic, and cultural needs of the nation; and to formulate and recommend national policies to promote the improvement of quality of the environment.

Day-Night Average Sound Level (DNL): Day-Night Average Sound Level is a noise metric combining the levels and durations of noise events and the number of events over an extended time period. It is a cumulative average computed over a 24-hour period to represent total noise exposure. DNL also accounts for more intrusive nighttime noise, adding a 10 dB penalty for sounds after 10:00 P.M. and before 7:00 A.M. DNL is the FAA's primary noise metric. FAA Order 1050.1E defines DNL as the yearly day/night average sound level.

Decibel (dB): A sound measurement unit.

Defensive Countermeasures: Coordination of maneuvers and use of aircraft defensive systems designed to negate enemy threats. Those maneuvers (which include climbing, descending, and turning) requiring sufficient airspace to avoid being targeted by threat systems. Aircraft use sophisticated electronic equipment to jam air and ground radar-tracking systems and dispense chaff and flares to confuse hostile radar and infrared sensors.

Distance Measuring Equipment (DME): A transponder-based radio navigation technology that measures distance by timing the propagation delay of Very High Frequency or Ultra High Frequency radio signals.

Endangered Species: The Endangered Species Act of 1973 defined the term "endangered species" to mean any species (including any subspecies of fish or wildlife or plants, and any distinct population segment of any species or vertebrate fish or wildlife which interbreeds when mature) that is in danger of extinction throughout all or a significant portion of its range.

Environmental Justice: Pursuant to Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, review must be made as to whether a federal program, policy, or action presents a disproportionately high and adverse human health or environmental effect on minority and/or low-income populations.

Environmental Night: The period between 10 p.m. and 7 a.m. when 10 dB is added to aircraft noise levels due to increased sensitivity to noise at night.

Fiscal Year: U.S. Government accounting year beginning 1 October through 30 September.

Flight Level: The Flight Level refers to the altitude above MSL. FL230, for example, is approximately 23,000 feet MSL.

Instrument Flight Rules (IFR): A standard set of rules that all pilots, civilian and military, must follow when operating under flight conditions that are more stringent than visual flight rules. These conditions include operating an aircraft in clouds, operating above certain altitudes prescribed by Federal Aviation Administration regulations, and operating in some locations like major civilian airports. Air traffic control agencies ensure separation of all aircraft operating under IFR.

Instrument Route (IR): Routes used by the Department of Defense and associated Reserve and Air Guard units for the purpose of conducting low-altitude navigation and tactical training in both IFR and VFR weather conditions below 10,000 feet MSL at airspeeds in excess of 250 knots indicated airspeed.

Jet Route: A route designed to serve aircraft operations from 18,000 feet mean sea level (MSL) up to and including flight level 450. The routes are referred to as "J" routes with numbering to identify the designated route; e.g., J-151.

Large Force Exercise (LFE): An LFE is a highly sophisticated training exercise that simulates full-scale battlefield scenarios, and requires enough airspace to provide assembly, transition, ingress, egress, and maneuver areas. Such training exercises employ a full range of combat tactics, equipment, and personnel.

Maximum Sound Level (L_{max}): L_{max} is the highest sound level that occurs during a single aircraft overflight. For an observer, the noise level starts at the ambient noise level, rises up to the maximum level as the aircraft flies closest to the observer, and returns to the ambient level as the aircraft recedes into the distance. FAA Order 1050.1E defines L_{max} as a single event metric that is the highest A-weighted sound level measured during an event.

Mean Sea Level (MSL): Altitude expressed in feet measured above average sea level.

Military Operations Area (MOA): Airspace below 18,000 feet MSL established to separate military activities from instrument flight rule traffic and to identify where these activities are conducted for the benefit of pilots using visual flight rules.

Military Training Airspace: Special Use Airspace and Airspace for Special Use used by military aircrews to practice flight activities necessary to maintain combat readiness. Military training airspace associated with PRTC includes the Powder River MOAs, ATCAAs, Gateway ATCAA, and surrounding MTRs and Aerial Refueling Areas.

Military Training Route (MTR): A Military Training Route is a corridor of airspace with defined vertical and lateral dimensions established for conducting military flight training at airspeeds in excess of 250 nautical miles per hour.

Mitigation: CEQ Sec. 1508.20 defines “Mitigation” to include:

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

Nautical Mile (NM): Equal to 1.15 statute miles.

National Environmental Policy Act (***NEPA):*** The National Environmental Policy Act of 1969 directs federal agencies to take environmental factors into consideration in their decisions.

National Historic Landmark: NHLs are places that “possess exceptional value or quality in illustrating and interpreting the heritage of the United States” and include battlefields, architectural or engineering masterpieces, ruins, and historic towns and communities.

National Historic Preservation Act (***NHPA):*** The NHPA of 1966, as amended, established a program for the preservation of historic properties throughout the United States.

Notice to Airmen (NOTAM): A notice containing information (not known sufficiently in advance to publicize by other means) concerning the establishment, condition, or change in any component (facility, service, or procedure of, or hazard in the National Airspace System) the timely knowledge of which is essential to personnel concerned with flight operations.

Onset-Rate Adjusted Monthly Day-Night Average Sound Level (DNL_{mr}): Onset Rate-Adjusted Monthly Day-Night Average Sound Level is the measure used for subsonic aircraft noise in military airspace (MOAs or Warnings Areas). This metric accounts for the fact that when military aircraft fly low and fast, the sound can rise from ambient to its maximum very quickly. Known as an onset-rate, this effect can make noise seem louder due to the added "surprise" effect. Penalties of up to 11 dB are added to account for this onset-rate. Noise levels are interpreted the same way for L_{dnmr} as they are for DNL. (See DNL above).

Ordnance: Any item carried by an aircraft for dropping or firing, including but not limited to, live or inert bombs, ammunition, air-to-air missiles, chaff, and flares.

Performance Data Analysis and Reporting (PDARS): A collaboration between FAA Office of System Capacity and NASA Aviation Safety Program, and is networking and analysis tools for Air Traffic Control (ATC) radar data.

Restricted Areas: A restricted area is designated airspace that supports ground or flight activities that could be hazardous to non-participating aircraft.

See-and-avoid: When weather conditions permit, pilots operating IFR or VFR are required to observe and maneuver to avoid other aircraft. Right-of-way rules are contained in FAR Part 91.

Sonic Boom: A sonic boom is the impulsive noise created when a vehicle flies at speeds faster than sound.

Sortie: A sortie is a single flight, by one aircraft, from takeoff to landing.

Sortie-Operation: The use of one airspace unit (e.g., Military Operations Area or Air Traffic Control Assigned Airspace) by one aircraft. The number of sortie-operations is used to quantify the number of uses by aircraft and to accurately measure potential impacts; e.g. noise, air quality, and safety impacts. A sortie-operation is not a measure of how long an aircraft uses an airspace unit, nor does it indicate the number of aircraft in an airspace unit during a given period; it is a measurement for the number of times a single aircraft uses a particular airspace unit.

Sound Exposure Level (SEL): Sound Exposure Level (SEL) accounts for both the maximum sound level and the length of time a sound lasts. It provides a measure of the total sound exposure for an entire event. FAA Order 1050.1E defines SEL as a single event metric that takes into account both the noise level and duration of the event and referenced to a standard duration of one second.

Special Activity Airspace (SAA): Any airspace with defined dimensions within the National Airspace System wherein limitations may be imposed upon aircraft operations. This airspace may be restricted areas, prohibited areas, military operations areas, air traffic control assigned airspace, and any other designated airspace areas.

State Historic Preservation Office (SHPO): State department responsible for assigning protected status for cultural and historic resources.

Statistical Exceedance Level: The sound level exceeded x percent of the time. L_{10} is the level exceeded 10 percent of the time, L_{90} is the level exceeded 90 percent of the time, etc.

Temporary Flight Restrictions (TFR): A TFR is a geographically-limited, short-term, airspace restriction. Temporary flight restrictions often encompass major sporting events, natural disaster areas, air shows, space launches, and Presidential movements.

Threatened Species: A species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Traditional/Cultural Resource: Cultural and traditional resources are any prehistoric or historic district, site or building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes.

Transient Aircraft: Aircraft not permanently assigned to 28 BW or 5 BW, including F-16s, F-15s, F-22s, and RC-135s, that sometimes use the existing Powder River airspace and are expected to use the proposed PRTC.

Victor Airway: A Victor Airway is a special kind of Class E airspace. The routes connect radio navigation beacons called very high frequency omni-directional range (VOR) stations that radiate a signal in all directions. These stations are usually located at or near airfields. North-south Victor Airways have odd numbers while east-west airways have even numbers. These federal or Victor Airways are used by both Instrument Flight Rules and Visual Flight Rules aircraft. The airspace extends from 1,200 feet AGL to 18,000 feet MSL. The width of the Victor corridor depends on the distance from the navigational aids (such as VOR’s). When VOR’s are less than 102 NM from each other, the Victor airway extends 4 NM on either side of the centerline (8 NM total width). When VOR's are more than 102NM from each other, the width of the airway in the middle increases. The width of the airway beyond 51NM from a navaid is 4.5 degrees on either side of the center line between the two navaids (at 51NM from a navaid, 4.5 degrees from the centerline of a radial is equivalent to 4NM). The maximum width of the airway is at the middle point between the two navaids. This is when 4.5 degrees from the center radial results in a maximum distance for both navaids.

Visual Flight Rules (VFR): A standard set of rules that all pilots, both civilian and military, must follow when not operating under instrument flight rules. These rules require that pilots remain clear of clouds and avoid other aircraft. See instrument flight rules.

Visual Routes (VR): Routes used by military aircraft for conducting low-altitude, high-speed navigation, and tactical training. These routes are flown under Visual Flight Rules.

VHF Omnidirectional Radio Range (VOR): **A** type of radio navigation system for aircraft. These are ground-based radio navigational aids scattered around the country A VOR station transmits a signal that the receiver can use to calculate its position relative to or from the station (see Victor Airway).

Wetland, Jurisdictional: A jurisdictional wetland is a wetland that meets all three United States Army Corps of Engineers’ criterion for jurisdictional status: appropriate hydrologic regime, hydric soils, and facultative to obligate wetland plant communities under normal growing conditions.

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Acronyms and Abbreviations

°F	degree Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
28 BW	28th Bomb Wing
5 BW	5th Bomb Wing
A.D.	Anno Domini
ACC	Air Combat Command
AEF	Aerospace Expeditionary Forces
AFB	Air Force Base
AFI	Air Force Instruction
AGL	above ground level
Air Force	United States Air Force
ANG	Air National Guard
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
B.C.	Before Christ
BASH	Bird/Wildlife Aircraft Strike Hazard
BLM	Bureau of Land Management
CAA	Clean Air Act
CAN	Canadian
CDNL	C-weighted Day-Night Average Sound Level
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	equivalent carbon dioxide
CRL	Conventional Rotary Launcher
CWA	Clean Water Act
dB	decibel
dBC	C-weighted decibel
DCI	Digital Communications Improvement
DME	Distance Measuring Equipment
DNL	Day-Night Average Sound Level
DNL_{mr}	Onset Rate-Adjusted Day-Night Average Sound Level
DoD	Department of Defense
DOT	Department of Transportation
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
ESS	Electronic Scoring Site
FAA	Federal Aviation Administration
FL	Flight Level
FY	Fiscal Year
GHG	greenhouse gas
GPS	Global Positioning System
Hz	Hertz
IFR	Instrument Flight Rule
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
INRMP	Integrated Natural Resource Management Plan
IR	Instrument Route
L	Local
LFE	Large Force Exercise
L_{dnmr}	Onset Rate-Adjusted Day-Night Average Sound Level
L_{max}	Maximum Sound Level
L_{pk}	Peak Noise Level
MHRC	Mountain Home Range Complex
MOA	Military Operations Area
MSL	mean sea level
MT	Montana
MTR	Military Training Route
N_2O	nitrous oxide
navaid	Navigational Aid
NAAQS	National Ambient Air Quality Standards
ND	North Dakota
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NM	nautical mile
NO_2	nitrogen dioxide
NOTAM	Notice to Airmen
NO_x	nitrogen oxides
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTTR	Nevada Test and Training Range
NVG	Night Vision Goggle
O_3	ozone
Pb	Lead
PDARS	Performance Data Analysis and Reporting
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
ppm	parts per million
PR-1A	Powder River 1A
PR-1B	Powder River 1B
PR-2	Powder River 2
PR-3	Powder River 3
PR-4	Powder River 4
PRC	Powder River Complex
PRTC	Powder River Training Complex
PSD	Prevention of Significant Deterioration
psf	pounds per square foot
QOL	Quality of Life
ROD	Record of Decision
ROI	Region of Influence
RPA	Remotely Piloted Aircraft
SAA	Special Activity Airspace
SD	South Dakota
SEL	Sound Exposure Level
SEL_r	Onset-Rate-Adjusted Sound Exposure Level
SHPO	State Historic Preservation Office(r)
SIP	State Implementation Plan
SO_2	sulfur dioxide
SUA	Special Use Airspace
TFR	Temporary Flight Restrictions
TCP	traditional cultural property
U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTTR	Utah Test and Training Range
VFR	Visual Flight Rule
VOC	volatile organic compound
VOR	VHF Omni-directional Radio Range
VR	Visual Route
WY	Wyoming